



Economics of Nations during Austerity; Does Government Size Matter?

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Abstract

This study examined the impact of austerity and government size on the economic performance of developed countries. The study was unique in the sense that it incorporates both the austerity and government size on the economic performance of developed countries, and according to Erixon, these two variables need to be taken in the same study to get a better depiction of the economic performance. For this purpose, the study used 20 developed countries. To estimate the data, the fixed effect model is used and the study concluded that both the austerity and government size have a negative association with economic performance. The negative effect of austerity was much more than government size. According to the results, the study suggested that the government might need to stay away from applying austerity measures due to its devastating impact on the economy.

Keywords: Austerity, Develop Nations, Economic Performance Index, Fixed Effect Model, Government Size.

JEL Classification: C59, E52, E69.

1. Introduction

The effect of austerity on the economic performance of the nations was mostly devastating (Dolls et al., 2018; dos Reis M. Laureno Oliveira et al., 2020; Semmler, 2013). The austerity was divided into two parts. Austerity by increase of taxes direct or indirect and austerity with the reduction of government spending. The taxation measure of austerity may have a positive impact, but the spending cut always results in a reduction of the debt-to-GDP ratio (Ponticelli and Voth, 2020).

The difference between these two austerity measures depends on two things. Firstly, their effect on the denominator of debt to GDP ratio is different. In addition, the spending cuts have a more permanent effect on automatic entitlement

programs than tax hikes. The increase in taxation results in the decline of GDP (Alesina and Perotti, 1995). Hence, the debt-to-GDP ratio declined.

There are two main reasons for the different effects of austerity measures. One theory is that it is simply due to the heterogeneity in accompanying policies. Exchange rate devaluation, supply-side reforms, and others all help the expenditure-based approach rather than the taxation one (Dolls et al., 2018). The second approach deals with expectation and confidence. Imagine an unstable economy with the ever-rising level of debt. It creates confusion among investors (Alesina and Perotti, 1997), and so the stabilization policy is going to be implemented (Oscar and Alan, 2015). The longer the time the government took to implement the policy, the harsher the result would be (Ponticelli and Voth, 2020).

Austerity is usually the correction of past policy mistakes. Starting in the mid-1970s and continuing into the 1980s, many countries accumulated large public debts for no apparent good reason. Some countries tried to stabilize their runaway public debts in the late 1980s and 1990s. The rules required to join the euro forced several other countries to reduce their deficits. Another round of austerity occurred after the Great Recession, in countries facing debt crises. These recent episodes have generated passionate discussions about the costs and benefits of austerity. When a legislature decides to launch a fiscal consolidation program, normally the first decision is by how much the deficit should be reduced; then, and often after much discussion, which taxes to increase or which expenditure items to cut. Thus, if the goal is to reduce the deficit by a certain amount, spending cuts and tax increases are not independent of each other because they must add up to a defined sum.

Generally, the government should implement austerity when the potential cost of this austerity move is low. One may think that austerity should be applied when the economy is in boom, not in recession (Isabel and Cummins, 2013). This argument is valid. However, generally, austerity is applied in recession than in the boom period (Challan and Tim, 2011). Therefore, if the economy applied austerity in the period of boom, then the associated cost with austerity would be lower. In addition, the cost associated with spending cuts would be even lower. In addition, we may find expansionary austerity.

Tax-based austerity generates the large recessions feared by the critics of austerity. Conversely, austerity based on reductions in government expenditures does not. Spending-based austerity plans are remarkably less costly than tax-based plans. The former has on average a close to zero effect on output and leads to a reduction of the debt over GDP ratio. Tax-based plans have the opposite effect and cause large and long-lasting recessions.

The question of whether the large government size is good or bad for economic growth and development is the most important in economics. From

1980, it was perceived that large government size results in slow-paced economic growth. This consensus of economists is challenged by the recent financial crisis of 2008, which happened around the globe (Popov, 2012). The crisis urged the government to act not only as a last lending resort but also as demand-driven, which was the key to recovering from the recession. However, still it is too early to claim that the idea of 'large government size is bad for the economy' has lost its value (Semmler, 2013). The coming of the financial crisis also indicates that the government now must take austerity measures to meet their ever-increasing budget deficit gap and provides room for private investors to carry on.

The continuous appeal that large government size is detrimental to growth is due to uncertainty in economic theory (Tanzi, 2011). Theoretically, big government size can have both a negative and positive effect on economic growth. The large government size, on the one hand, limits private investment hence crowding-out effects of private investment (Eric M. Engen, 1992; Landau, 1983) and on the other hand, big government size means high taxation which comes with distortionary impacts on growth too (De Gregorio, 1992). Furthermore, a large government size may also decrease economic growth due to corruption and rent-seeking behavior (Hamilton, 2013).

A bunch of studies show a negative relation between government size with economic growth (Barro, 1991; Grier and Tullock, 1989; Lee, 1995), and a sizeable number of studies show a positive association (Aschauer, 1989; Munnell, 1990).

Such varied findings were not appalling because of the inconclusiveness of how the government size was measured. Generally, different nations are at different stages of development and they have different optimal government sizes. Furthermore, analysis techniques and model specification also differ between studies. Given these scenarios, it is needed to restructure the current literature on the link between government size and economic performance. This research will address whether the government's size is growth-enhancing or growth retarding. However, according to Lennart (2015), there is no study, that examines the effect of both austerity and government size on economic performance. Therefore, this study filled this gap by adding these variables to a single model.

2. Literature Review

This section critically analyzes the previous studies conducted on austerity, government size, and economic performance. Different research revealed several different findings.

The effects of austerity on economic performance have been a debatable issue and different studies have found different results. The next sections of

chapters describe previous studies conducted on austerity, government size, and economic performance.

2.1 Austerity

This section critically reviewed the prior studies on the effect of austerity on economic performance economic.

Haque et al. (2000) explored the effect of fiscal austerity measures on service quality of labor and found that the government in developing countries maximizes their utility at the expense of reduced private-sector output. They also showed that the fiscal constraints positively affect the output of developing countries

Challan and Tim (2011) explained the distributional effects of austerity measures on household income in six European countries from the 2007-08 financial crises and studied the austerity measures taken during that time. All of these three countries increased their tax rate and implemented cuttings in their public spending. The article uses the EU microsimulation model EUROMOD and the Irish national model, SWITCH. Moreover, the author proved that pay cuts are progressive in four countries and the elite class suffers more from it. However, in Ireland and Portugal, low-income people suffer more due to an increase in the taxation rate. In addition, in all countries except Greece, the old people were protected with a pension. In addition, the family with children suffers more than those without children. Therefore, the risk of being dragged into poverty is high for families with children.

Popov (2012) during the examination of Russian austerity and fiscal deficit reduction by using variables such as government expenditure as a share of GDP, index of the political right, war dummy, and inflation, and by applying multiple regression found that the size of the government in the soviet economy instantly decreases which result in the collapse of institutions, as a result, the entire country collapse.

Isabel and Cummins (2013) utilized data from 128 developing countries to examine the impact of austerity measures on the economy. The study used the IMF reports to conclude that developing countries increased their public spending around the first phase of the crisis. However, the spending drastically decreased in 91 developing economies at the later stage. Furthermore, one-quarter of countries decrease their expenditure below the pre-crisis period showing an excessive fiscal concentration. The governments decrease their spending on wage bills, subsidies, social safety nets, and old-age pensions. Which proves to have a negative impact on children and women.

Semmler (2013) studied the effect of austerity measures in Europe by using variable deficit in terms of GDP (output gap) and debt in terms of GDP

(unemployment), and by applying the regression technique they concluded that the effect of austerity was much higher during the recession period, furthermore, the effect of government spending cut multiplier is higher than the increase in taxation multiplier. The overall effect of austerity depends on the condition of the economy. According to this study, fiscal multiplier helps in long-run economic growth depending on the public investment productivity.

There are many empirical studies available on fiscal multipliers and they show some limitations. The lesson, which can be derived from this literature, is the effect of austerity measures depends on the number of historical and economic factors of the country. Besides, the current literature shows the positive effect of austerity is unlikely, more prominently during the recession (Mauro and Zilinsky, 2015; Auerobach and Gorodnichenko, 2012; 2013; House et al., 2017; Fatas and Summers, 2018; Boitani and Perdichizzi, 2018). The prominent argument of “it’s not austerity” is that austerity alone is not the only reason for the poor performance of the countries. The real world is so complex to be subjected to monocausal explanations. Furthermore, the data also the divergence of situations among different countries.

2.2 Government Size

In the mid of the twentieth century, and especially after the event of the Second World War, the size of the public sector increased dramatically both in developed and developing countries. According to Tanzi and Schuknecht (1997a), the large increase in public spending from 1870 to the 1990s, was the result of the justification of more spending. For instance, in the incident of the great depression of 1929-30, John Maynard Keynes (1936) suggested the role of government as a stabilization entity by increasing the general government spending. Furthermore, the Beveridge Report in the United Kingdom also made forward the way for a welfare state which could be achieved by high spending by the government on welfare programs.

The role of government completely took a new turn in the twentieth century, and the government took several responsibilities on its shoulders such as pension, education, health, unemployment and grants, different youth development programs, and different subsidies for increasing the competitiveness of the infant industries. The government also started to play an active role in income distribution and social-economic life (Tanzi, 2011). The suffering of economies during the start of the twentieth century in the form of history's worst depression and two world wars put forward a way for government sector expansion: the population was given more voice, and the government used that voice to provide the public with grants, subsidies, and programs that increase the general welfare of the people. In the middle of the 1990s, social transfers as a share of GDP ranged

from 12% in Japan to 32% in Finland in OECD countries (Livio, 2020). However, the increased role of government in every sector of the economy made the reforms difficult, because, every individual depends on government incentive programs for his livelihood (Tanzi, 2005).

The average level of spending in 13 industrialized countries around the world increased from 12.3 percent in 1913 to 27.9 percent in 1960, which further increased to 43% in 1990 (Tanzi and Schuknecht, 1997a; 1997b). According to Tanzi and Schuknecht (1997a), the level of public spending in some developed and developing countries started to surpass the threshold level, they argued that the high size of government in form of high government spending does not necessarily mean high efficiency and social indicators. Florio and Colautti (2005) found out that the ratio of government spending to national income in the middle of the nineteenth century was around 5 to 10 percent, while at the end of the twentieth century, this ranged from around 35 to 55 percent.

There is one explanation for why the public sector size increased dramatically in one century. The view is called Wagner's Law of Expanding State Activity (Peacock and Scott, 2000; Wagner, 1883: 1892-94). Wagner's law states that government expenditures tend to increase faster than output in the industrializing country, because, the general government expenditure, expenditure on welfare, expenditure on education, expenditure on health, and expenditure for development programs were more income elastic. It means the reaction of government expenditure to a change in national income is greater than one (Aulad and Miller, 1982). The empirical evidence supports this hypothesis; however, it only explains the demand side and fails to explain why the government revenue would be ever increasing to facilitate the rise in demand.

This section of the chapter deals with studies related to government size and its impact on the economic performance of different nations around the world.

Gali (1993) explored the concept of government size and economic stability. The author calculated government size by adding GDP share of tax and government expenditure less interest payment as a percentage of GDP and for output volatility, the author used the sum of the growth rate of per capita GDP and standard deviation of cyclical fluctuation of per capita GDP and the author used variable trade openness, the average share of the primary sector, etc. The study used a panel regression model. The result dictated that there is an inverse relationship between government size and output volatility and it turns to a positive association in the next periods. However, the author urges those factors other than government size are far more important.

After analyzing the literature it was concluded that government size has a negative while trade openness has a positive impact on economic performance (Abrams, 2016; Dar and Amir Khalkhali, 2002; Gali, 1993; Carmignani et al.,

2009; Galí, 1994). The effect of austerity can be minimized and even turn into a positive one by providing access to free credit (Demopoulos and Yannacopoulos, 2013). Furthermore, the effect of austerity can only be positive when the economy is free from stress which is generated in times of fiscal constraints (Born et al., 2020).

3. The Simple Keynesian Model

John Maynard Keynes when writing about the ways to get out of the great depression of 1930, he suggested a way by increasing government spending. This proved to be very helpful during that time. However, at that time the government spending to GDP ratio was quite low such as in France, it was 27%, and in the US, it was 12% of GDP. However, currently, it is much higher in France it is around 60%, in Europe close to 50%, and in the USA close to 40% (Alesina et al., 2019). Therefore, today the increase in spending will have a much deeper result.

The basic Keynesian model deals with the demand side only and it is static. So, it does not include future consequences and results of current policies. In the closed economy, the income is equal to the production, which is the sum of private, and government investment. Moreover, in the open economy exports and imports were added. In this scenario, the effect of austerity is clear. The decline in government spending because of austerity will reduce the aggregate demand, which in turn reduces the output, which further results in the decrease of income for the government and private sector, creating some sort of multiplier effect. This is because a decrease in government spending is directly related to a decrease in private consumption. The effect of the multiplier would be even larger. The decrease in spending also hits the profit of firms by reducing sales.

The literature for theoretical modeling of the impact of austerity on macroeconomic performance could be divided into four groups. The first group examines the impact of large fiscal consolidation or stimuli on macroeconomic variables' performances Alesina and Ardagna (2010) and Alesina et al. (2017). The second group checks the effects of discretionary components of so-called taxes and government expenditures on economic growth and output by applying the VAR approach (Banchard and Perotti, 1999). The third group investigates the impact of debt level or fiscal deficit on the interest rate and macroeconomic variables in the long run by using cross-country analysis (Reinhart and Rogoff, 2010). The final group examines the cyclical components of fiscal deficit rather than discretionary components to check the other possible causality direction, how efficient, is fiscal policy response is toward the state economy, and does it help in stabilizing the economy in a counter-cyclical fashion.

The second group lacks the essence of true austerity measures. The measures used in the second category studies are government expenditure or taxes.

These measures are generally not suitable for representing austerity, because they fail to differentiate whether the changes in government expenditure or taxes are made by following austerity or some other policies. The third category uses variables such as fiscal deficit or debt level. These variables show the need for austerity. However, they failed to explain whether the economy undergoes through austerity measures or not. These variables show the current debt burden. Nevertheless, for austerity, they are not suitable. The fourth category of study is qualitative in nature. In addition, the studies in this category mostly used graphs to explain the effect of before and after austerity.

The work of Giavazzi and Pagano (1990) is included in first category. However, the most prominent work in this group is carried out by Alesina and Ardagna (2010). The author assumes that fiscal consolidation is necessary after the crisis period of 2008, the author used the same technique previously used in Alesina and Perotti (1995), and tries to check the impact of different fiscal consolidation measures on macroeconomic performance. The study concluded that the fiscal adjustment made by adjusting government spending is more effective than the adjustment made through taxation.

Alesina and Perotti (1995) used cyclically adjusted primary balance as a share of potential GDP as a measure of austerity measures. By using this variable, they checked the impact of large fiscal consolidation episodes on the performance of macroeconomic variables. This study will follow in their footsteps and will use cyclically adjusted primary balance as a share of potential GDP to measure the impact of austerity.

4. Theories on Government Size

To understand the relationship between government size and economic performance, the starting point should be (Henrekson, 1994), they provide a general overview of the theories of government size and how these theories posit the effect on economic performance. They divided the theories into endogenous, neoclassical, and institutional. Neoclassical narrates per capita output to per capita stock (Solow, 1956; Swan, 1956), by explaining that the government policies affected capital accumulation, saving, and labor supply, which in turn caused the economic growth to change. An endogenous growth theory which was presented by (Barro, 1990; Romer, 1986) relates economic growth and performance with shocks in technological change, innovation, and investment in human capital. Government policies of tax and expenditures, which result in a decrease in innovation, are growth-reducing, while policies such as investment in education and training that increase competitiveness and innovation are growth-enhancing policies. The third approach institutional, which was presented by historian Douglass North (1987: 190) focused on the competitiveness and efficiency of

government institutions such as the rule of law, and property rights institutions (Rodrik, 2007; Rodrik et al., 2004). Trust in government, economic liberty, minimal corruption, and well-functioning technocrats and bureaucrats are the causes of high economic growth and performance.

All of these theories provide general insight into the role of government in enhancing economic performance, however, no one explains about the size of the government sector. The relationship also known as Army Curve (Armey and Armey, 1995) develops a hum-shaped association between both these variables. At the initial level when government size starts to increase, it has a positive impact on the economic performance, because state institutions are developing and provide the necessary facilities for the private sector to grow. However, at a later stage, the public sector starts to utilize sources for unproductive work such as rent-seeking, which ultimately decreases economic performance. Buchanan (1980) believed that resources diverged to rent-seeking and other non-productive purposes due to the size of the government sector. The cost disease view presented by Baumol explained that the large government size is detrimental to growth.

5. Economic Performance Index

The policymakers who are responsible for the nation's economic policy generally have four objectives in mind; a low rate of unemployment, a low rate of inflation, a high real GDP growth rate, and a sustainable trade balance. The first three objectives are present in the United States Full Employment Act of 1946, and these objectives help the policy makers in other advanced and developing nations as well. There are other objectives as well such as income inequality. However, these are the primary ones. Recently, another objective got attention in both developed and developing countries after the recent financial crisis of 2008-09. This objective is maintaining the low debt to GDP level.

There are several indexes available to measure the economic performance of the nation such as Okun's Misery index, Calmfors index, and Magic Diamond index. The Okun's Misery is defined as the collection and sum of the unemployment rate and inflation rate. This index provides a gloomy measure for investigating the economic performance of the nation. The Calmfors index is defined as the difference between the unemployment rate and the normalized trade balance as a share of GDP. The Magic Diamond index consists of four variables rate of unemployment, normalized trade balance as a share of GDP, the rate of inflation, and the growth rate of GDP. The Okun's Misery index and Calmfors index both are two-dimensional indexes and both attach equal weights to each component. On the other hand, the Magic Diamond index has four dimensions; however, this index also gives equal weights to each variable. The primary shortfall in these models is their random weightage scheme. There are unnecessary

restrictions on equality in weightage and undesirable restrictions on equality across different nations. These restrictions penalize the country's objective at the expense of conflicting objectives. What is required is a weighting scheme that gives the weight according to what should be.

The current study used an index called the Economic Performance Index developed by the IMF. This index has multiple advantages. Firstly, this index provides the same result whether we choose to apply different weight or equal weight schemes. Secondly, this index used variables that are easily available for every economy. The Economic Performance Index examines the overall performance of the economy and also tells us about the deviation of the economy from the desired stage (Khramov and Ridings Lee, 2013). Like the construction of GDP which measures the overall product of an economy. The Economic Performance Index measures the three main sectors of the economy: firms, households, and government. The Economic Performance Index can be calculated annually, bi-annually, quarterly, or monthly by taking a total score value of 100 and then abstracting the inflation rate, unemployment rate, budget deficit, and then finally adding the growth rate of real GDP. The weightage of these variables is calculated by deviation from their desired values. This methodology is effective in measuring performance at national and international levels.

The economic performance index is calculated as follows:

1. It falls when the inflation rate increases above 0.0% (Khramov and Ridings Lee, 2013).
2. It falls when the unemployment rate rises above 4.75% (Khramov and Ridings Lee, 2013).
3. It falls when the government deficit as a share of GDP increases above 0.0% (Khramov and Ridings Lee, 2013).
4. It rises when the real GDP growth rate is positive (Khramov and Ridings Lee, 2013).

To overcome the persistency problem during the period of high spikes in the economy. Moreover, to make the economic performance index to be comparable across different nations. We normalize the index by adding different weight schemes to each component. The weight of each component is calculated by multiplying the inverse standard deviation of each component with the average standard deviation of all variables. Therefore, the overall average weight should be equal to 1. This method helps in smoothing data, which is disturbed by short-lived volatility (Khramov and Ridings Lee, 2013).

$$\begin{aligned} \text{Weighted EPI} = & 100\% - W_{inf} \cdot [\text{inf}(\%) - I^*] - W_{unem} \cdot [\text{Unem}(\%) - U^*] \\ & - W_{Def} \cdot \left(\frac{Def}{GDP(\%)} - \frac{Def^*}{GDP} \right) + W_{GDP} \cdot (\Delta GDP(\%) - \Delta GDP^*) \end{aligned}$$

In addition, weight is calculated as follows:

$$W_i = \frac{1}{StD_i} * StDev_{AV}$$

The StD_i is the standard deviation of each component of the economic performance index such as unemployment, inflation, government deficit as a share of GDP, and real GDP growth rate, where the $StDev_{av}$ is the average standard deviation and it is calculated by:

$$StDev_{AV} = \frac{1}{4} \sum_{i=1}^4 StD_i$$

The average weight is equal to one. This technique allows the use of the same measurement and percentage across all four components. The weightage economic performance index assigns a large value to a low volatile variable and a low value to a volatile variable. This approach is similar to what is used by the Chicago Fed National Activity Index. They also normalize the weightage by using a standard deviation scheme. The basic difference between the Chicago Fed National Activity Index and the Economic Performance Index is, that the former takes the business cycle into account and uses variables such as production and income, sales and inventories while the latter considers the four big macroeconomic indicators such as real GDP growth rate, inflation, and unemployment and government deficit. Based on the above discussion on different theories about government size, the government size usually possesses a positive impact on economic performance until the threshold level. After the level, its impact was devastating. In addition, expansionary austerity may only exist in the presence of a good private sector, which works from toe to toe with the public sector.

6. Data and Methodology

The model includes both the government size and austerity measure into a single equation, which is not the case in earlier studies. This augmented model is an attempt to fill the literature gap by adding value to the existing literature identified by Erixon (2015)¹. According to Erixon (2015), this model is more beneficial than the previous counterpart because every country has different government characteristics and these characteristics affect how the economy behaves when subjected to austerity. Therefore, by introducing the government size, we could see a brighter picture of the effect of austerity on the presence of different government sizes.

¹. The Erixon mainly found out that the hypothesis of expansionary austerity was never true for Europe. Moreover, the boom in the Swedish economy in the late 20th century was due to the boom of telecommunication sector, not due to austerity.

6.1 Model

Our main functional form of model for this study is:

$f(EPI) = f(CAPB, GOV)$	Functional Form
$EPI_{it} = CAPB_{it} + GOV_{it}$	Mathematical Form
$EPI_{it} = \beta_1 + \beta_2 CAPB_{it} + \beta_2 GOV_{it} + \mu_{it}$	Econometric Form

whereas

EPI = Economic Performance Index as dependent variables (Khramov and Ridings Lee, 2013).

CAPB = Cyclically Adjusted Primary Balance as a share of Potential GDP as an independent variable (Guajardo et al., 2014).

GOV = Government consumption as a share of Total GDP as an independent variable (Madhusudan Mohanty, 2009).

All the variables are in percentage format to restrict them to 100 percent and reduce normality in data.

6.2 Data

According to the United Nations Report 2020 on World Economic Situation (World Economic Situation and Prospects United, 2020), there are 43 developed countries divided into four regions, and 126 developing countries divided into three regions. The study used 20 developed.

Table 1. List of Developed

Developed Countries	
Canada	Germany
United States	Greece
Australia	Ireland
Japan	Italy
New Zealand	Netherlands
Austria	Portugal
Belgium	Spain
Denmark	Sweden
Finland	United Kingdom
France	Croatia

Source: World Population Review.

This study looked deep into these countries and figured out the impact of austerity measures applied and government size in these countries on the economic performance of the nations.

Table 2. List of Variables Used with Sources

Variable	Source
CAPB	IMF Database
GE	IMF Database
(Def/GDP) %	IMF Database
UNEM	World Development Indicator
INF	World Development Indicator
GDP%	World Development Indicator

Source: IMF, World Bank.

4.3 Estimation Technique

For estimating panel data, the Hausman test has been used. Moreover, the results confirmed that the fixed effect model is best suited for our analysis. In addition, the study skips the GMM model, because for the GMM model the optimal condition is:

$$N > T$$

where,

N = Number of panels

T = Time period

However, in our data set $N < T$, so we applied the Fixed effect model.

4.4 Fixed Effect Model

The study applied the fixed effect model when they needed to scrutinize the impact of independent variables that change over time. Hence, the fixed effect model creates a link between dependent and independent variables. In this fixed effect model, every single unit has its uniqueness that may or may not affect the repressors' variables. If the error term of the given equation relates to the residuals of other entities' error terms, in that case, the random effect model should be opted. However, in this study, the Hausman test results dictate that the fixed effect model has been suitable. The result of the Hausman and fixed effect model was presented in the next chapter.

5. Results and Discussions

In this section, we explained the results generated by using a fixed effect model based on the Hausman test. The data is taken from 20 developed countries. This chapter further included other tests such as the test for heteroscedasticity detection namely the Breusech Pagan test and White test, the test for normality, and Testparm for deciding whether to stick with pooled OLS or go for the Hausman test and then further go for fixed and random effect model.

5.1 Developed Countries

Firstly, the simply pooled OLS regression was run to get a glance of what was the impact of these two independent variables on the economic performance of the economies.

5.1.1 Pooled OLS

Table 3. Result of pooled OLS for Developed Countries

Source	SS	Df	MS	No of obs	1,520
Model	1054.731	2	527.3655	F (2, 1517)	573.79
Residual	1394.2554	1,517	.9190	Prob > F	0.000
Total	2448.98656	1,519	1.6122	R ²	0.4307
				Adj R ²	0.4299
				Root MSE	.9586
EPI	Coef.	Std. Err.	T	p>[t]	[95% Conf. Interval]
CAPB	-.2624	.0084	-30.97	0.000	-.2791 - .2458
GOVT	-.0416	.0035	-11.79	0.000	-.0486 - .0347
_Cons	100.550	.1599	628.57	0.000	100.2363 100.8639

Source: Research Finding.

The above table portrays the impact of austerity measures and government size on the economic performance of developed countries. The interesting thing to note was that the R squared value was 0.43 (43 percent). This implies that nearly half of the economic performance in developed countries could be managed and explained by these two regressors. Moreover, austerity is normally not always present in the economies as well because, of its devastating impact. The impact of both of the regressors on regressed was negative and statistically significant with a high t-value (greater than 2) and low p-value (less than 0.05). Again, in this case, the impact of austerity was much more than government size.

5.1.2 Multicollinearity

Table 4. Multicollinearity Test Result for Developed Countries

Variable	VIF	1/VIF
CAPB	1.02	0.977611
GOVT	1.02	0.977611
Mean VIF	1.02	

Source: Research Finding.

The above table shows the mean value and per-variable value for the VIF test. The value was 1.02, which was quite low from 10. Which was the base value for the severe multicollinearity problem. Therefore, we were safe to conclude that the data was free from any severe multicollinearity problem.

5.1.3 Breusech Pagan Test

Breusch-Pagan/ Cook-Weisberg test for heteroscedasticity

Ho: Constant variance

Variables: fitted values of EPI

$\chi^2(1) = 2.46$

Prob > $\chi^2 = 0.1167$

The above test showed that probability value was greater than 0.05. The null hypothesis was that the data was free from heteroscedasticity. Due to the high value of probability, greater than 0.05. The null hypothesis did not reject. Therefore, we concluded that the data was free from the heteroscedasticity problem. For further clarification, the white test was also conducted.

5.1.4 White Test

White's test for Ho: homoscedasticity

against Ha: unrestricted heteroscedasticity

$\chi^2(5) = 311.79$

Prob > $\chi^2 = 0.0000$

Table 5. White Test Result for Developed Countries

Cameron & Trivedi's decomposition of IM-test			
Source	Chi ²	Df	P
Heteroskedasticity	311.79	5	0.000
Skewness	34.29	2	0.000
Kurtosis	7.92	1	0.0049
Total	354.00	8	0.000

Source: Research finding.

The white test for heteroscedasticity showed that the data contains a problem of heteroscedasticity. Because the null hypothesis was homoscedasticity, it was rejected due to the probability value less than 0.05. Therefore, one test shows the problem of heterogeneity while the other one shows homoscedasticity.

5.1.5 Test Parm

Now to decide whether to stick with pooled OLS regression or go for a random or fixed effect model Test Parm was conducted. The result of this test helps us to decide which model best suits our case.

$F(19, 1498) = 54.90$, Prob > F = 0.0000

The statistically significant value of the Test Parm indicates that the best way for our analysis is to go for the Hausman test.

5.1.6 Hausman Test

Table 6. Hausman Test Result for Developed Countries

Coefficients	(b)	(B)	(b-B)	Sqrt (diag (V b-V_B))
	Fixed	Random	Difference	S.E.
CAPB	-.2648551	-.264447	-.0004081	.0015141
GOVT	-.0485975	-.0480627	-.0005348	.0015252
				Prob>chi2 = 0.031

Source: Research finding.

After conducting, the Test Parm, which led us to go for the Hausman test, the result of the probability value for the Hausman test, was 0.031. The test showed the coefficient and differences of both fixed and random effect models. In addition, the coefficients were not so different from each other. The null hypothesis was that the random effect model was suited for analysis. Which was rejected due to the low p-value. Therefore, the fixed effect model was the way to go.

5.1.7 Fixed Effect Model

Table 7. Fixed Effect Model Result for Developed Countries

Fixed-effect (within) regression						
Number of obs	1,520		Number of groups	20		
R-sq			Obs per group			
Within	0.3806		Min	76		
Between	0.4886		Avg	76		
Overall	0.4297		Max	76		
			F (2,1498)	460.17		
			Prob>F	0.0000		
EPI	Coeff	Std. Err.	T	P> t	[95% Conf. Interval]	
CAPB	-.248551	.0088466	-29.94	0.000	-.2822082	-.247502
GOVT	-.0485975	.005947	-8.17	0.000	-.0602627	-
_cons	100.8597	.26631664	378.72	0.000	100.3373	.0369322
Sigma u	6.3157931		101.3821			
Sigma e	7.4073531					
Rho	.42095856 (fraction of variance due to u i)					

Source: Research finding.

The results of the Hausman test are portrayed in the above table. By looking at the variables and statistics, we concluded that both of these variables possess a significant negative relationship with the economic performance index (Dar and AmirKhalkhali, 2002; Gali, 1993). The relationship was significant because of the

high t (greater than 2) and low p (less than 2) values. The F statistic for the above model was way over its threshold level (4). Which portrayed that the model was fitted for analysis. The R squared value of the model was not too high (48 percent). However, the value was greater than that of developing countries, which means that developed countries need to pay a lot more attention to these two variables than developing countries. The impact of austerity was negative and quite high as well (26 percent), showing that the private and public sectors in the developed countries also lack coherence and proper attraction with each other. The results were quite similar between developed and developing countries. However, in the case of government size, the impact was negative but not high, and even less than in developed countries. This implies that the organizations and institutions worked better than developing countries and they were able to minimize the impact of large government size.

8. Conclusion

This study investigated the effect of austerity and government size on economic performance by incorporating 20 developed countries for analysis. Different data reliability test was conducted such as the multicollinearity test, heteroscedasticity test, and normality test. The study concluded that the fixed effect model suited our analysis by applying the Hausman fixed random effect model. The CAPB decreased the economic performance in the case of developed countries. This result is consistent with previous studies conducted by (Dolls et al., 2016; Ponticelli and Voth, 2020). While increase in government spending results in a decrease in the economic performance of developed countries. Both the results of austerity and government size are consistent with the studies concluded by (Dar and AmirKhalkhali, 2002; Dolls et al., 2018; Erixon, 2015; Gali, 1993; Ponticelli and Voth, 2020). All the results are statistically significant with a t -value above two and p value less than 0.05. The effect of austerity measures was huge and negative, while the effect of government size was not. It shows that with better governance and good management policies, little negative effect may turn into be positive one. However, to counter the effect of negative austerity measures various efforts may needed on multiple fronts.

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