

GOVERNMENT SIZE AND ECONOMIC GROWTH IN EU-31

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ABSTRACT

The relationship between government and economic growth has been an important topic in public economics. This paper discusses the theoretical foundations for the existence of an optimal size of government as depicted by an inverted U curve (Army curve) based on a panel data of 31 European countries. Data properties were analyzed to determine their stationarity using the LLC, IPS, ADF and PP unit root tests which indicated that the series are I(1). We find a cointegration relationship between economic growth and government expenditure by applying Kao panel cointegration test. The evidence indicates that the optimum size of total tax rate in the economy measured as the share of government spending as a percentage of GDP (Tax) that maximizes economic growth, is no greater than 27% of GDP (at a 95% confidence level) based on data for the period of 1995 to 2010. In addition, the evidence indicates that the optimum level of government consumption on final goods and services as a share of GDP is 26%. However, due to model and data limitations, it is probable that the results are biased upwards, and the “true” optimum government level is even smaller than the existing empirical study indicates. Optimal government size is also, of course, influenced by the quality of a government. Because the measures of “government quality” are inherently subjective, no attempt was made to incorporate them in this study. **JEL classifications:** H20, H20, C01

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1- Introduction

There are two basic types of growth model: the neoclassical growth model, also known as the exogenous growth model developed primarily by Solow (1956), and the new growth theory, also known as the endogenous growth model, pioneered by Romer (1986), Lucas (1988), Barro (1990) and Rebelo (1991). However for a long time studies on growth haven been based on SOLOW's (1956), which focuses on the importance of two factors related to long-term growth, i.e. exogenous technological changes and convergence of per capita income. If one assumes that all the determinants of growth are exogenous, it is clear how economic policies are not susceptible of influencing the growth process – unless temporarily during the transitional phase of an economy towards its stationary state. As a consequence, the role of Government in the growth process in this approach has been neglected. On the other hand, the new growth theory postulates that transition and steady state growth rates are endogenous, implying that long-run economic growth rates are also endogenous. The introduction of the new growth theory, which also permits a nonlinear relationship between government expenditure and economic growth, sees the role of government in the growth process in a new light. It maintains, contrary to the neoclassical growth theory, that endogenous factors including government can influence economic growth. As a result, government policy plays a role in navigating economic growth. And in the endogenous approach to growth the positive and negative influence of Government on the growth process, cannot be overlooked. In this perspective long-term growth rates can differ among the various countries, and the convergence of per capita incomes is not necessary. Obviously Governments, at the various level, provide both intermediate public goods that can be considered as factors of production and as factors for the private consumption, and goods for final consumption or/and redistribution purposes. While public expenditure, in a general meaning, is necessary to have a functioning market economy and to promote GDP growth, its expansion cannot necessarily be consistent with the maximization of the long-term rate of GDP growth. Indeed, if size of the Government grows then free market economy goes down. An equilibrium among them has to be found. This does not mean that this equilibrium should be that where the GDP growth rate is maximized. An high growth with an unbalanced society may not be consistent with the welfare maximization in any of the various meaning of this complex concept. Nevertheless to know whether there is a point beyond which the increase size of the public expenditure as it exists, and financed in given countries reduces the growth rate is

extremely important. A recent approach to the effects of Government size on economic growth is centered on the “ARMEY curve”, which relates the rate of economic activity to public expenditure, considered as a peculiar proxy of Government size (ARMEY (1995); RAHN and FOX(1996); CHAO and GRUBEL (1998); VEDDER and GALLAWAY (1998); TANZI and SCHUKNECHT (1998a; 1998b; 2007); SCULLY (1998; 2000; 2002; 2004); PEVCIN (2003; 2004; 2008)). The optimal size of the government is a problem that has attracted the attention of researchers for decades. Professor Arthur Laffer illustrated that there is tax revenue maximizing tax rate, and in a similar way other authors try to identify the government share of GDP which maximizes the GDP growth. In this study an attempt is made to determine the optimum average tax rate and Government expenditure that maximizes economic growth in 31 countries of the European by using a balanced budget approach. Government expenditure comprises of public goods such as education, social services, security and health and in a balanced budget context sufficient funding is required to provide these services to the public. The secret is obviously to find the optimum level of taxes in order to optimize economic growth, without distorting the moral of the general public, (Rosen, 2005).

At this optimum tax level economic growth is maximized. However, a tax rate beyond this optimum level has a negative effect on economic growth and impacts negatively on economic behavior of the tax paying public. For example, too high tax rates result in lower productivity and savings, (Black, 2006). Such a change in behavior is often caused by a double tax effect since firstly, tax payers have to pay their taxes, but secondly they also experience a decrease in their standard of living because of the lower growth rates (Scully, 1994). Since then, This paper analysis the relation between government expenditures, tax revenue and economics and question must be answered "where and how does government intervene in the economy?" or "What is the optimal size of the government (existence of the ArmeY curve)?" Obviously, the optimal size of each country is different because different countries have different institutions.

2- Literature on the relationship between government size and economic growth:

The literature regarding government expenditure (or government size) and economic growth is comprised of studies that assume a linear as well as a non-linear relationship between government expenditure and economic growth.

2.1- Government expenditure and economic growth based on linear models:

Based on linear models, Extensive studies have been conducted on the effects of government size on economic growth that the first study is Myrdal research in 1960. He believed that government intervention can exacerbate economic growth because government intervention can reduce Social inequality. Kaldor (1966) also showed that government intervention has positive impact on the growth and long-run productivity and Emphasized that increased government expenditure has a positive effect on economic growth. There is another study that approves of expanding government size which will promote economic growth. For instance, Rubinson (1977), Ram (1986), Kormendi & Meguire (1986), Grossman (1988), Diamond (1989), and Carr (1989) establish arguments of a positive relationship between the two variables. The studies by Devarajan, Swaroop & Zou (1993), Sheehey (1993), Hsieh & Kon (1994), Hsieh & Lai (1994), Lin (1994), Cashin (1995), and Kneller, Bleaney & Gemmell (1998) put forward mixed results, while Kormendi & Meguire (1985) showed whether there is a positive and significant relationship between government expenditure and economic growth. They write that expanding government size provides an insurance function to private property, and public expenditure can encourage private investment which will cause economic growth. Government expenditure provides the investment of public goods that will improve the investment environment. The traditional Keynesian model indicates that the expansion of government size may resist a recession.

However, there is an ongoing debate on the effects of government size on economic growth. Landau (1983, 1986), Grier & Tullock (1987), Barro (1989, 1990, 1991), Alexander (1990), Engen & Skinner (1992), Hansson & Henrekson (1994), Devarajan, Swaroop & Zou (1996), Gwartney, Holcombe & Lawson (1998), Folster & Henrekson (1999), Folster & Henrekson (2001), Dar & Amirkhalkhali (2002), and Chen & Lee (2005) support a negative relationship between government expenditure and economic growth. They believe that expanding government size has the effect of a decreasing return of government expenditure and over-expanding government size will cause a crowded effect to private investment. In addition, government expenditure often turns into inefficient expenditure which will cause a distorted allocation to the resource. When expanding government expenditure, a government needs more taxes to support the expenditure, but expanding taxes will damage the economy.

FOLSTER and HENREKSON (2001) examined the effects of expenditure and fiscal withdrawal measures on growth rate in rich countries between 1970 and 1995, finding a strong negative relation between public expenditure and economic growth. In a separate study by Higgins, Young & Levy (2006), the relationship between US economic growth and the size of government is explored at three levels: federal, state and local. They conclude that all federal, state and local governments are either negatively correlated with economic growth or are uncorrelated with economic growth.

The results of the investigations on the effect of government spending on economic growth have been diverse and extensive. Although There are studies that test whether the evidence is consistent with the predictions of the endogenous growth model that the structure of taxation and public expenditure can affect the steady-state growth rate. For instance, Kneller, Bleaney & Gemmell (1999) use data for 22 OECD countries to demonstrate that productive government expenditure enhances growth, whilst non-productive expenditure does not. The study by Miller & Russek (1997) examines the effects of fiscal structure on economic growth. They found evidence to support the view that debt-financed increases in government expenditure retard growth and tax-financed increases stimulate growth for developing countries. They also found evidence, on the other hand, that debt-financed increases in government expenditure do not affect growth and tax-financed increases reduce growth for developed countries.

In other study, Marta Pascual Sáez and Santiago Álvarez García(2006)¹ found that the relationship between government spending and economic growth can be positive or negative depending on the countries included in the sample, the period of estimation and the variables which reflect the size of the public sector. The results obtained, based on regressions and panel techniques, suggest that government spending is positively related with economic growth in the European Union countries.

2.2- non-linear relationship between government expenditure and economic growth:

The existence of a non-linear relationship between government expenditure and economic growth, has been first verified in endogenous growth models. Barro(1990)², argues that different

¹- Sáez, M. P. and García, S. A. (2006). "Government Spending and Economic Growth in the European Union Countries: An Empirical Approach", *University of Cantabria, Department of Economics; University of Oviedo, Department of Economics*

² - Barro, R.J. 1990. Government Spending in a simple model of endogenous Growth. *Journal of Political Economy*, Vol 98, No.5, Part 2: The Problem of Development: A Conference of the *Institute for the Study of Free Enterprise Systems*.S103-s125. Online available: <http://links.jstor.org/sici?sici=00223808%28199010%2998%3A5%3CS103%3AGSIASM%3E2.0.C.O%3B2-T> [Downloaded 21/11/2007]

sizes of government can create two different effects on economic growth. In particular, an increase in taxes reduces growth rate through disincentive effects, but an increase in government spending raises marginal productivity of capital, which raises growth rate. He indicates that the second force is stronger when the government is small, and the first force becomes stronger when the government is large. Barro, claims that the size of government consumption relative to national output is optimal when its marginal product equals one (so called Barro rule). Furthermore, based on empirical findings Barro discussed about an inverse U-shape curve showing the relationship between growth rate and government expenditure ratio. Some researchers use the theoretical framework of Barro (1989) based on endogenous growth model in order to estimate the optimal size of government that maximizes economic growth.

Karras (1997)¹ develops an empirical methodology to investigate the role of government services in the process of economic growth. He examines the Barro Rule for 20 European countries and finds out that the optimal government size is 16 per cent (+/-3 percent) for the average European country. Following the theoretical framework of Barro and the methodology of Karras, Burak Gunalp and Oguzhan C. Dincer² estimate the productivity of government services and the optimal government size for 20 transition countries based on annual data for the period 1990-2001. The optimal government size is estimated to be 17.3 percent (+/-3 percent) for the average transition country. Null hypothesis that government consumption is not productive is rejected in favor of the alternative that government services are conducive to production in transition countries.

Scully (1994) also elaborates on the relationship between the level of government expenditure /taxes and economic growth. He states that government expenditure until a certain optimum point, after which productivity and economic growth are reduced. He finds that tax rates affect not only government revenue, but also economic efficiency. High tax rates divert resources from the private sector, encourage tax avoidance and evasion and channel resources into a less productive “shadow” (or informal) economy in order to escape the high taxes. According to Scully countries that increase government revenue at the expense of economic growth, expose their taxpayers to a form of double taxation. The first tax would be taxes paid according to the tax jurisdiction and the second tax the lowering in their standard of living,

¹ - Karras, G. (1997). “On the Optimal Government Size in Europe: Theory and Empirical Evidence,” *The Manchester School of Economic & Social Studies, Blackwell Publishing, vol. 65(3), pages 280-94, June*

² - Gunalp, B. and Dincer, O. (2005). “The Optimal Government Size in Transition Countries,” *Department of Economics, Hacettepe University Beytepe, Ankara and Department of Commerce, Massey University, Auckland*

caused by the lower economic growth. The study concludes that after a 40 year period of optimum levels of taxation, a country would enjoy more than three times as much economic growth.

Also, Gerald Scully¹ concludes that in order to maximize economic growth in the USA, the average rate of federal, state and local taxes combined should be between 21.5 and 22.9% of GNP. A more recent paper by Scully² published in September 2008 shows that the growth-maximizing tax rate for the United States over the 1960– 1990 period was an estimated 19.3 percent of GDP, so this is the optimal government size. During that time, however, federal, state and local governments consumed a much higher percentage of GDP, and the economy grew more slowly than it would have at the growth-maximizing level. The Scully model also shows that while the growth of real government consumption and investment expenditures contributed positively to American economic growth (unlike transfers and subsidies), these expenditures were about one-fifth as productive as real private capital (physical and human) accumulation (0.22 compared with 1.11 and 0.96, respectively). Thus, at the margin, a dollar of public expenditure ought to have five times the rate of return of a dollar of private investment to justify the marginal dollar's worth of taxation to pay for it. Using Scully's method to estimate the optimal size of government in Canada, Johnny Chao and Herbert Grubel³ find that the optimal rate of taxation and government spending in Canada is about 34 percent. The econometric results show that every one percent change in the ratio of spending to national income results in a 0.74 percent increase in the rate of economic growth. The reduction in the spending ratio of 29 percent due to the movement to the optimal level results, therefore, in an increase in economic growth of 22 percent.

Vedder and Gallaway (1998)⁴ indicate that the existent inconsistency about the relationship between government size and economic growth is because of the nonlinear relationship between government size and economic growth. They in study on the American economy for the period 1947-1997, show that "the Curve peaks where federal government spending equals 17.45 percent of GDP." The size of state and local government that maximizes the growth rate in GDP is 11.42 percent, which means that the overall optimal government size is 28.87 percent of GDP.

¹ - Scully, G. (1994). "What is the optimal size of government in the USA?," *National Center for Policy Analysis, Policy Report No. 188*

² - Scully, G. (2008). "Optimal Taxation, Economic Growth and Income Inequality in the United States," *National Center for Policy Analysis, Policy Report No. 316*

³ - Chao, J. And Grubel, H. (1998). "Optimal Levels of Spending and Taxation in Canada," *The Fraser Institute, Vancouver*

⁴ - Vedder, R. and Gallaway, L. (1998). "Government Size and Economic Growth," *Joint Economic Committee, Washington D.C., p. 5*

Sheehey (1993)¹ uses data of cross countries and finds that while government size (government consumption expenditure/GDP) is smaller than 15%, government size and economic growth have a positive relationship, but when government size is larger than 15%, the relationship is negative.

Stefan Fölster & Magnus Henrekson (2000)² estimate that an increase of the government expenditure ratio by 10 percentage points is associated with a decrease in the growth rate on the order of 0.7–0.8 percentage points.

Empirical evidence by Andrea Bassanini and Stefano Scarpetta (2001) from a pooled cross-country time-series analysis of the OECD countries supports the notion that the overall size of government in the economy may reach levels that hinder growth. The results suggest that for a given level of taxation, higher direct taxes lead to lower output per capita, while, on the expenditure side, government consumption and government investment tend to have non-negative effects on output per capita. Government investment may also influence growth by improving the framework conditions (e.g. better infrastructure) in which private agents operate.

Heitger (2001)³ views increases in government size arising from increased government consumption spending (which includes consumption of fixed assets, compensation of employees, net purchase of non-fixed goods and services, net payment of interests and royalties, etc.) as constraints on growth, while increases in size that arise from government investment spending (for example, schooling, infrastructure and R&D, capital formation) should be positive in their effect on growth. His central hypothesis is that government expenditures on core public goods (such as on the rule of law, internal and external security, etc.) have a positive impact on economic growth, but this positive impact of government tends to decline or even reverse if government further increases expenditures in a way that it also provides private goods. He indicates that there are two important reasons for a negative impact of excessive government spending on economic growth are the fact that the necessary taxes reduce the incentives to work, to invest and to innovate, and the fact that government crowds out more efficient private suppliers.

¹- Sheehey, A. J. (1993), 'The effect of government size on economic growth', *Eastern Economic Journal* 19(3): 321-328.

² - Fölster, S. and Henrekson, M. (2000). "Growth Effects of Government Expenditure and Taxation in Rich Countries", *Working Paper Series in Economics and Finance 391, Stockholm School of Economics*

³ - Heitger, B. (2001), *The Scope of Government and Its Impact on Economic Growth in OECD Countries, Kiel Working Paper No. 1034. Kiel: Institute of World Economics.*

ILLARIONOV and PIVAROVA (2002)¹ studied the optimal size of Government in OECD countries in the period 1960-2000, coming to the conclusion that the rise of one percentage point in the share of public expenditure on GDP has come with a 0.1% reduction of the average growth rates of economic activity.

Martinez-Mongay, Sekkat and van den Noord (2003)² who find that the maximum stabilizing size of government is lower for small open economies. Their model suggests a threshold of about 35% of GDP for small open economies and somewhat higher, or about 40% of GDP, for large open economies. According to the authors, a larger government sector helps stabilize output in case of demand shocks but would destabilize output in case of supply shocks, if the government size exceeds a certain threshold. They suggest that reducing the government size with the aim to eliminate distortions and encourage long-run growth is not necessarily detrimental for the functioning of automatic stabilizers.

In a recent study, Antony Davies³ expands on the previous literature by (1) shifting the criterion for optimal government size from productivity to social welfare by employing the United Nations' Development Programme's Human Development Index (HDI) as the outcome variable, and (2) generalizing from single country studies by employing panel data techniques to a data set of 154 countries over the period 1975 through 2002. The results indicate that, over all countries, the estimated levels of government consumption and investment expenditures that are associated with maximal growth in per-capita RGDP are 8.5% and 6.2%, respectively. This implies an optimal level of government expenditures of 14.7%.

GWARTNEY, LAWSON, and HOLCOMBE (1998)⁴ considering a sample of 23 OECD member countries, from 1960 to 1996, argued that the expansion of Government beyond its core functions has a negative influence on economic growth for three reasons: a) the discouraging effects of high taxation and the crowding effect of public investments if compared to private ones; b) the diminution in profits coming from governmental intrusion in activities not appropriate to the public sector; c) the interference in the wealth generating process. They shows that 10 percentage point increase in government expenditures as a share of GDP is associated

1 - ILLARIONOV A., PIVAROVA N. (2003). *Size of Government and Economic Growth*, in "Voprosy Ekonomiki".

2 - Buti, M., C. Martinez-Mongay, C., K. Sekkat and P. van den Noord (2003), "Macroeconomic policy and structural reform: A conflict between stabilisation and flexibility?," in: M. Buti (ed.) *Monetary and Fiscal Policies in EMU* (Cambridge University Press), pp. 187-210.

3 - Davies, A. (2008). "Human Development and the Optimal Size of Government," *Journal of Socioeconomics*, forthcoming

4 - Gwartney, J., Lawson, R. and Holcombe, R. (1998). "The size and functions of government and economic growth," *Joint Economic Committee, Washington, D.C., April*

with approximately a one percentage point decline in the growth rate of real GDP. An analysis of a larger data set of 60 countries reinforces the conclusions reached by analyzing the OECD countries. Grimes (2003) reassessed the work of Gwartney, Holcombe & Lawson (1998) with respect to 22 OECD countries and found that the size of government has only a minor effect on long-term growth outcomes. The study completed by Bagdigen & Hakan (2008), which examines the validity of Wagner's Law using data for Turkey, concluded that public expenditure has no effect on economic growth.

KUSTEPELI (2005)¹ analyzed the size of Government in the twelve new countries that adhered to the EU and the two candidate ones, referring to the period 1994-2001. The sample was initially subdivided into three groups, according to the average expenditure share on the GDP: low (26- 33%): Lithuania, Latvia, Estonia, Czech Republic, Turkey and Romania; medium (34-40%): Slovakia, Cyprus, Poland, Bulgaria and Slovenia; high (41-47%): Malta, Hungary and Croatia. The results of the panel-type econometric analysis show that a smaller size of Government positively influences the economy's growth rates. On the contrary, in relation to average

ratios of this indicator, there is a diminution in the economic growth. In a recent essay, HILL (2008)² criticized the model used by SCULLY (1996; 2003), through which the scholar determined the optimal taxation level for the United States of America in the thirty-year period 1960-1990 equal to 19.3%. HILL's critiques mainly concerned the peculiar form of the production function – to which SIEPER (1997) and KENNEDY (2000) had already objected – which includes the scarcely plausible assumption that all capital goods are completely consumed every year. Correcting this mistake, HILL found out that the size of Government able to maximize economic growth oscillates between 16% and 28%.

Some researchers examine the impact of not only the size, but also the quality of government on economic growth. For example, a 2008 study by Arusha Cooray³ investigates the role of the government in economic growth by extending the neo classical production function to incorporate two dimensions of the government – a size dimension and a quality dimension. The study comprises 51 developing countries on the period 1996-2003. The empirical results indicate

¹ - KUSTEPELI Y. (2005), The Relationship Between Government Size and Economic Growth: Evidence From a Panel Data Analysis, in "Dokuz Eylül University-Faculty of Business- Department of Economics Discussion Paper Series", No. 05/06, November- December.

² - Hill R. (2008). "Optimal taxation and economic growth: a comment," *Public Choice*, 134: 419-427

³ - Cooray, A. (2008). "Economic Growth and The Size And Quality Of The Government", *University of Tasmania*

that the size of the government has a positive but insignificant impact on growth, while the quality of the government has a significant and positive impact on economic growth. Hence, investing in the capacity for enhanced governance is a priority for the improved growth performance of the countries examined. A 10% rise in the public capital stock will lead to 1.7% increase in output per head over 7 years, and a one unit rise in the composite governance index increases output per head by 8.8% over 7 years. The results suggest that for developing economies that already allocate a considerable share of public resources to social services, further spending may not improve growth outcomes. Increases in the size of the government can impede growth due to the disincentive effects of taxes, increased rent seeking and the crowding out effect on private investment. The results indicate that good governance can improve growth outcomes.

Most recent studies of the impact of government size on growth in the OECD/EU countries find the following conclusions. In a paper³⁸ published in January 2008, António Afonso and Davide Furceri¹ analyze the effects in terms of size and volatility of government revenue and spending on growth in the OECD and EU countries. Using a panel regression for the OECD and EU countries over the period 1970-2004, they find that indirect taxes (size and volatility), social contributions (size and volatility), government consumption (size and volatility), subsidies (size) and government investment (volatility) have a sizeable, negative and statistically significant effect on growth. In particular, a percentage point increase in the share of total revenue in GDP would decrease output growth by 0.12 percentage points both for the OECD and the EU countries. For the OECD (EU) countries, an increase of one percentage point in the share of total expenditure to GDP would decrease growth by 0.13 (0.09) percentage points.

CHOBANOV and MLADENOVA (2009)² examined the optimal size of Government (defined as the share of the total public expenditure on GDP) able to maximize economic growth for a set of 28 countries adhering to the OECD in the period 1970-2007. The empirical results showed that the ratio between public expenditure and optimal GDP equals to 25%. Moreover, all the countries in the sample were situated in the right descending part of the curve.

¹- Fölster, S. and Henrekson, M. (2000). "Growth Effects of Government Expenditure and Taxation in Rich Countries", *Working Paper Series in Economics and Finance 391*, Stockholm School of Economics.

² - CHOBANOV D., MLADENOVA A. (2009), What Is the Optimum Size of Government, Institute for Market Economics, August.

MAGAZZINO (2009; 2010a; 2010b)¹ pointed out how, in the framework of 13 OECD countries examined, a country with a ratio between public expenditure and GDP higher than 10% registers, on average, a reduction of its own GDP growth equal to 0.74%. Moreover, an increase in the variation of public expenditure equal to one percentage point corresponds approximately to a reduction in the acceleration rate of economic activity equal to 0.31%. These results are particularly relevant in countries with a strong presence of the State in their economy, such as, in Europe, Belgium, Denmark, Finland, France, Greece, Hungary, Italy, the Netherlands, Portugal, Sweden and the United Kingdom, taking into account that the average share of public expenditure on GDP in 2008 was equal to 46.8% both for EU-16 and EU-27, and that the main international institutes – given the current severe economic and financial crisis and the consequent interventions launched by the various governments to support real economy – expect that in 2009 both groups of countries will exceed 50%. Others researchers focused on fiscal policies and the relationship between public revenue and expenditure.

3-Arme y curve

The recognition that in the history of mankind there has never been any society who experienced widespread wealth without providing a public apparatus: otherwise, economic activity and welfare would be penalized by complete anarchy. For this reason, the first functions bestowed to the state entity – guaranteeing order and the rule of law, and defending the property right –, in line with classical economic thought, have a strong impact on economic development. The presence of the State thus becomes a necessary but insufficient condition for prosperity. On the other side, collectivistic societies with planned economy failed because of the centralization and monopolization of the allocation of resources and decisions in the economic field. As a result, the expansion of the public sphere beyond a certain limit is subjected to the “law of diminishing marginal productivity”, which would grant positive profits because of the checks to public expenditure in the economies with a wide public intervention. If governments could interfere in the economic growth process by becoming actively involved in the economy as some of the literature suggests, how much government involvement is needed? One can use the notion of optimal size of government to answer this question. The idea of optimal size of government was

¹ - MAGAZZINO C. (2010a), “Wagner” s Law” in Italy: Empirical Evidence from 1960 to 2008, in “Global & Local Economic Review”, vol. 14, n. 1, January-June, pp. 91-116.

refined and popularised by Armeý (1995)¹ through his so-called ‘Armeý Curve’, which explains the optimal government size that ensures positive incremental economic growth for a particular country. Armeý (1995) implements the Laffer curve” – representing the relationship between tax flows and the average tax rate through an “upside-down U”-shaped graph – to present the relationship between government size and economic growth. Armeý argues that without government, a state of anarchy and low levels of output per capita will exist, because there is no rule of law, and no protection of property rights. Therefore, there is little incentive to save and invest, because the threat of expropriation exists. On the other hand, where all input and output decisions are made by government, output per capita is also low. However, where there is a mix of private and government decisions on the allocation of resources, output should be larger (point B in Figure 1).. Accordingly, the output-enhancing features of government should be stronger when government is very small, and expansions in governmental size should be associated with expansions in output. Nevertheless, at some point growth-enhancing features of government should diminish and further expansion of government should no longer lead to output expansion. Armeý infers that government size and economic growth have an inverse U shape as Fig. 1 show

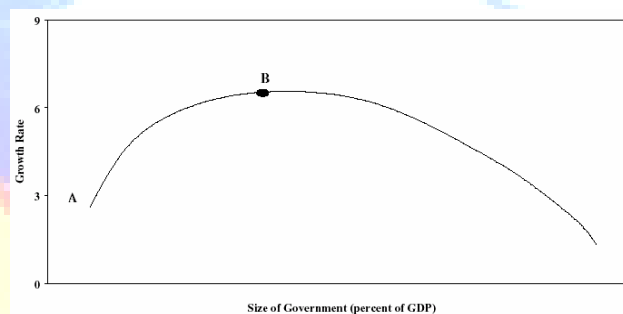


Figure. no. 1 – Public expenditure and the economy (Armeý curve)

Chao and Grubel (1998)², indicates several reasons for the existence of the mentioned inverted U shape curve. First the law of diminishing returns to additional government expenditure exists and the additional withdrawal of resources from the private sector more and more occurs at the cost of projects with ever-higher returns. Second, in order to finance the government expenditure, taxes should be increased, which reduce the private sector’s incentives to work, save, invest, and

¹ - Armeý, R. (1995) The freedom revolution. Washington, DC: Rognery Publishing Co.

² - Chao, Johnny C. P. and Herbert Grubel (1998), ”Optimal Levels of Spending and Taxation in Canada”, In Herbert Grubel, eds. How to use the fiscal surplus Vancouver: The Fraser Institute, 53-68.

take risks. Third, some of the spending programmes can also make disincentive effects if they lower the risk of economic life. These effects change economic behavior of individuals, which decrease the effective supply of labor and entrepreneurship. As Chao and Grubel argue, all these forces reduce economic growth. The research studies using various empirical techniques and different sets of countries for estimate the optimal government size (total government spending as a share of GDP) for example; SCULLY (1994; 1998; 2000; 2002; 2003)¹ Analyzing the relation among tax rates, public revenue and economic growth in 103 countries, found out that economic growth rates are maximized when public expenditure is approximately equal to the fifth part of the aggregate income, as excessive increases in the expenditure have a substantially depressive effect on economic growth. AFONSO, SCHUKNECHT, and TANZI (2003)², on the basis of ARMEY's contribution, suggested that the general Government expenditure exceeding the ratio of 30% of the national income reduces economic growth and does not trigger, in practice, any improvement in social welfare. PEVCIN³ (2008) analyzed the presence of a "Army curve" in twelve European countries (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Sweden and United Kingdom) with regard to the period 1950-1996, using – like VEDDER and GALLAWAY – the relationship between total public expenditure and domestic product as a proxy of the Government size. The results show the: "the panel data estimates of the ArmeY Curve suggest that optimal size of government in the sample of 12 European countries is approximately between 36 and 42 percent of GDP, indicating that potential scope for reduction of government spending ratio is from approximately 19 to approximately 30 percent. However, given the fact that large differences in the size of government across countries included in the sample exist, some theoretical as well as methodological considerations about panel data estimation occurred. Consequently, separate time series data estimations are implemented, implying, on average, approximately 19 percent reduction in government spending ratio." Pevcin concludes that countries with a higher level of government expenditure, experiences lower rates of economic growth.

4-Methodology

4-1- The Scully Model

1 - SCULLY G.W. (2003), Optimal taxation, economic growth and income inequality, in "Public Choice", 115, pp. 299–312.

2 - Afonso, A., L. Schuknecht and V. Tanzi (2003), Public Sector Efficiency: An International Comparison, Working Paper No. 242. Frankfurt: European Central Bank.

3 - PEVCIN P. (2008), The Issue Of The Economically Preferred Size Of Government, E.A.B.R. & T.L.C. Conference Proceedings, Salzburg.

Scully (1998¹, 2003²) developed a model that estimates the share of government spending (or general tax rate) that maximizes real economic growth. Following the exposition of the model, the production function is specified in Cobb-Douglas form:

$$Y_t = a(G_{t-1})^b[(1 - \tau_{t-1})Y_{t-1}]^c \quad (1)$$

where Y is real GDP, G is total government spending (in constant prices), τ is total tax rate in the economy measured as the share of government spending as a percentage of GDP.

A balanced-budget assumption is made that $G = \tau Y$ each year. By substituting this assumption in equation (1), we obtain:

$$Y_t = a(\tau_{t-1}Y_{t-1})^b[(1 - \tau_{t-1})Y_{t-1}]^c \quad (2)$$

By finding the first and second differential of Y with respect to τ , Scully shows that the maximum real output is derived when government spending as a share of GDP equals the following:

$$\tau^* = \frac{b}{b + c}$$

Thus, we use the following equation to estimate the optimum level of government spending:

$$\ln(y_{it}) = \ln(a) + b \ln(\tau_{i,t-1}Y_{i,t-1}) + c \ln[(1 - \tau_{i,t-1})Y_{i,t-1}] \quad (3)$$

where the index i indicates the country ($i = 1, \dots, 31$), the index t indicates the period ($t = 1995-2010$); $y_{i,t}$ is real GDP per capita for i country in year t . The panel is unbalanced due to non-availability of data.

4-2- Quadratic equation

In order to test the relationship between general government consumption expenditures and economic growth that is theoretically characterized by the inverted U curve, we use a simple quadratic equation following Vedder and Gallaway³, Pevcin¹ and Davies².

¹ - Scully, G. (1998). "Measuring the Burden of High Taxes," *National Center for Policy Analysis Policy Report No. 215*

² - Scully, G. (2003). "Optimal taxation, economic growth and income inequality," *Public Choice 115: 299-312*

³ - Vedder, R. and Gallaway, L. (1998). "Government Size and Economic Growth," *Joint Economic Committee*

$$1 + g_{i,t} = a + b(GC)_{i,t} + c(GC)_{i,t}^2 \quad (4)$$

The government consumption as a share of GDP that maximum economic growth from the quadratic function above is found to be the following after differentiating the g with respect to GC :

$$GC^* = -\frac{b}{2c}$$

We estimate the following equation:

$$1 + d(\ln(GDP_{i,t})) = a + b(GC)_{i,t} + c(GC)_{i,t}^2 \quad (5)$$

where the index i indicates the country ($i = 1, \dots, 31$), the index t indicates the period ($t = 1995-2010$) $d(\ln(GDP_{i,t}))$ represents real growth of GDP, GC is general government consumption expenditures as a share of GDP.

5- Data

To investigate the relationship between government size and growth economics (existence of Arme Curve), Usually In the empirical analysis, two measures are used as proxies of the government size. The first measure is total general government expenditures (GC) as a percentage of GDP. The sample of Data on government expenditures as a share of GDP and data on real gross domestic product(GDP) in constant 1995 prices is obtained from the World Development Indicators of the World Bank. The total tax rate in the economy measured as the share of government spending as a percentage of GDP (Tax) are used as another measure of government size, Data is taken from World Development Indicators of the World Bank. The panel is balanced and consists of 465 observations. The sample consists of 31 countries of the European³ and The time span is from 1995 to 2010 period.

¹ - Pevcin, P. (2004). "Does Optimal Size of Government Spending Exist?," *University of Ljubljana*

² - Davies, A. (2008). "Human Development and the Optimal Size of Government," *Journal of Socioeconomics*

³ - Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovak, Slovenia, Spain, Sweden, Switzerland, UK.

Baltagi¹ lists several benefits from using panel data. These include the following:

1) Controlling for individual heterogeneity, panel data suggests that countries are heterogeneous. Time-series and cross-section studies which do not control this heterogeneity run the risk of obtaining biased results. Panel data are able to control for these state- and time-invariant variables whereas a time-series study or a cross-section study cannot.

2) Panel data give more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency. While time-series studies are plagued with multicollinearity, this is less likely with a panel across the OECD countries or a world set of countries since the cross-section dimension adds a lot of variability, adding more informative data on independent variables.

3) Panel data are better able to study the dynamics of adjustment.

4) Panel data are better able to identify and measure effects that are simply not detectable in pure cross-section or pure time-series data.

6- Panel unit root tests

6-1- Panel unit root tests

A first specification assumes that all units are stationary with the same autoregressive coefficient across units (the *homogeneous* alternative hypothesis). average at the same speed. The statistics developed by Levin, Lin and Chu (2002) –LLC hereafter – and Breitung (2000), both test the null of unit root against this homogeneous alternative of stationarity. These tests allow for heterogeneous serially correlated errors, country-specific fixed effects and country-specific deterministic trends, and are based on an Augmented Dickey-Fuller (ADF) regression of the following type:

1 Baltagi, B. (2005). "Econometric Analysis of Panel Data," Third Edition, John Wiley & Sons Ltd., pp.4-7

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + \sum_{j=1}^{p_i} \rho_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \quad , \quad i = 1, \dots, N \quad ,$$

$$t = 1, \dots, T \quad (1)$$

Where Δ is the first difference operator, y_{it} is the series for country i in the panel over period t , p_i is the number of lags selected for the ADF regression and ε_{it} are independently and normally distributed random

variables for all i and t with zero means and finite heterogeneous variances, σ_i^2 . IPS tests the null hypothesis of the unit root for each individual (country) in the panel, that is, $H_0: \beta_i = 0 \forall_i$ against the alternative $H_1: \beta_i < 0, i = 1, \dots, N_1; \beta_i = 0, i = N_1 + 1, \dots, N$ which allows for some of the individual series to be integrated. The proposed $Z_{tbar}(p, \rho)$ statistic converges in distribution to a standard normal variate sequentially, as $T \rightarrow \infty$ followed by N . The LLC unit root test is also based on model (1) but it considers the coefficients of the autoregressive term as homogeneous across all individuals, that is $H_0: \beta_i = \beta \forall_i$. LLC tests the null hypothesis that each individual in the panel has integrated time series, that is, $H_0: \beta_i = \beta \forall_i$ against the alternative $H_1: \beta_i < \beta \forall_i$. Therefore, under the alternative, all single series are stationary. The resulting statistic, t^* , asymptotically follows a standard normal distribution.

6-2- Panel cointegration approach

If two time series are respectively nonstationary, but some linear combination of them is a stationary process then the two time series are said to be cointegrated. A time series is said to be covariance stationary if its mean, variance, and covariances are all invariant with respect to time, in which case it is integrated of order zero, or $I(0)$. In this section we apply panel cointegration test, the DF and ADF-type tests proposed by Kao (1999) for the null hypothesis of no cointegration in homogeneous and heterogeneous panels. Given that each variable is integrated of order one, we test for panel cointegration using Kao's (1999) tests. Consider the following system of cointegrated regressions:

$$y_{it} = a_i + x_{it}\beta + u_{it} \quad (2)$$

Where $i=1, \dots, N, t=1, \dots, T$

Where α_i are individual constant terms, β is the slope parameter, u_{it} are stationary disturbance terms, and

finally, by construction, it y_{it} and it x_{it} are integrated processes of order one for all i . Kao (1999) derives

two types of panel cointegration tests. The first is a Dickey-Fuller (DF) type test and the second is an

Augmented Dickey-Fuller (ADF) type test. Both tests can be calculated from:

$$\hat{u}_{it} = \rho \hat{u}_{it-1} + v_{it} \quad (3)$$

And

$$\hat{u}_{it} = \rho \hat{u}_{it-1} + \sum_{j=1}^p \Delta \hat{u}_{it-j} + v_{it} \quad (4)$$

Where the residuals \hat{u}_{it} are obtained from Equation (2). The following specification of null and alternative

hypotheses is used:

$$H_0: \rho = 1, H_A: \rho < 1$$

Kao (1999) proposes four DF-type statistics. The first two DF statistics are based on assuming strict

exogeneity of the regressors with respect to the errors in the equation, while the remaining two allow for

endogeneity of the regressors. In addition, Kao (1999) proposes an ADF test statistic. Finally the DF statistics, which allow for endogeneity, and the ADF statistic involve deriving some nuisance parameters from the longrun conditional variances \square . The asymptotic distributions of all tests converge to a standard normal distribution $N(0, 1)$ as $T \square \square$ and $N \square \square$.

7-Unit root test results

We begin our empirical analysis by testing for unit roots in the Tax revenue(TAX) , government Expenditure(GC) and GDP. To establish the integrational properties of series, we apply the LLC Breitung , IPS , ADF , PP test. The results of the LLC , Breitung , IPS , ADF , PP panel unit root tests are presented in Table 1. The LLC, Breitung , IPS , ADF , PP statistics for the levels

of Tax revenue(TAX) , government Expenditure(GC) , and GDP do not reject the null hypothesis of a unit root. However, we take the first difference of each of the variables. Therefore, we conclude that GC, TAX and GDP are each integrated of order one or I(1) and the variables are no stationary in the level for 31countries in Euro. In the next stage, we will test whether there is a long-run equilibrium relationship among these three variables.

Table 1- Results - Panel Unit Root Test (p-values), EU-30, 1995-2010

Variable	Method	GC		TAX		GDP	
		Without Trend	With Trend	Without Trend	With Trend	Without Trend	With Trend
Trend							
H0: Unit root (common unit root process)							
LLC t	Without Trend	-0.5572	-7.953*	-19.379*	-1.526	-5.587*	
	With Trend						
		0.356					
Level		(0.2887)	(0.000)	(0.000)	(0.000)	(0.063)	
		(0.000)	(0.639)				
First difference		-7.996*	-6.346*	-1.362	0.3355	-	
8.434*		-8.074*					
		(0.000)	(0.000)	(0.086)	(0.6314)	(0.000)	
		(0.000)					
Breitung t-test		-----	0.926	-----	4.120	2.393	
Level				(0.82)	(1.000)	(0.991)	
First difference		-----	1.618	-----		1.9448	
		0.9344					
				(0.947)		(0.9741)	
			(0.8250)				
H0: Unit root (individual unit root process)							
IPS t-stat		2.84692		-2.908*	-5.496*	-.245	
		0.689	-2.319				

Level		(0.9978)	(0.001)	(0.000)	(0.403)	
		(0.754)	(0.010)			
First difference	-6.520*	-2.856*	-2.8600*	-0.0986	-6.989*	-4.2285*
	(0.000)	(0.002)	(0.002)	(0.460)	(0.000)	(0.000)
ADF-MW χ^2		25.9218	88.89	97.566*	60.57	47.047
		93.43*				

Level		(1.000)	(0.014)	(0.002)	(0.314)	(0.920)
		(0.006)				
First difference	147.30*	94.72*	89.32*	57.40	165.10 *	
126.679*						
(0.0)	(0.004)	(0.003)	(0.422)	(0.000)	(0.000)	

PP - MW χ^2		7.74	122.26*	70.25	32.08
		83.72	19.60		

Level		(1.000)	(0.000)	(0.2206)	(0.995)	
		(0.034)	(1.000)			
First difference	115.310*	40.260	167.72*	162.28*	130.94*	98.9801*
	(0.000)	(0.98)		(0.000)	(0.000)	(0.000)
		(0.002)				

* Null hypothesis rejected at 1% significant level

8-Panel Cointegration Approach results

Taking into account these results, we conclude that the series are integrated of order one and proceed to test for cointegration. Thus the second stage involves testing for the existence of a long-run equilibrium relationship among Tax revenue(TAX) , government Expenditure(GC) and GDP within a trivariate framework. Based on Kao's (1999) ADF test statistics reported in Table 2, According Table 2, we find that Tax revenue(TAX) , government Expenditure(GC, and GDP are cointegrated within the panel of these 31 Euro countries.

Table 2- Results of Kao's Residual Cointegration Test

	t-Statistic	Prob.
ADF	-6.1323	0.0000

Next given that the Kao test indicates cointegration, we can now estimate the long-run coefficients of the panel model. A central assumption in random effects estimation is the assumption that the random effects are uncorrelated with the explanatory variables. One common method for testing this assumption is to employ a Hausman (1978) test to compare the fixed and random effects estimates of coefficients. The Hausman test is frequently used in order to choose between the fixed effects and the random effects specification. The results of Hausman test are presented in Table 3. Based on the Hausman test, the null hypothesis is rejected at the 1% significance. However this outcome suggests that fixed effect models are more appropriate, for all the following extensions, we present fixed effect regressions.

Table 3- Description of the Hausman test

Hausman Test	χ^2 . Statistic	P-values
Cross-section random	44.3290	0.0000

The results on the long-run coefficients are reported in Table 4. The empirical results reveal that in the longrun that all of the coefficients are significant affect at %1.

9-Results

This paper uses Scully (1998, 2003)and Gallaway, Pevcin and Davies threshold regression model to study whether a non-linear Arme y curve exists in members of the European Union (EU-31). In equation (7) we report the estimated coefficients of the Scully model using Pooled Least Squares method with period fixed effects. The pool consists of 416 observations with 31 countries over the period 1995-2010.

$$\ln(y_{it}) = 1.088 + 0.2465\ln(\tau_{i,t-1}Y_{i,t-1}) + 0.6589\ln[(1 - \tau_{i,t-1})Y_{i,t-1}] \quad (7)$$

(10.05) (14.70) (35.57)

In parenthesis are presented the *t*-statistics. They show that all coefficients are statistically significant at 1 percent. Thus, empirical results show that the optimal or growth maximizing rate of government expenditures (total tax rate in the economy measured as the share of government spending as a percentage of GDP) as a share of GDP amounts to 27%. The result shows that almost all countries from the sample are on the positive side of the inverted U curve. The Cyprus with a general government spending of 47% of GDP, Denmark with a general government spending of 32% of GDP and Norway with a general government spending of 32% of GDP in period 1995-2010, are above of optimal point and UK with 27.3% is closest to the optimal government size as estimated by the Scully model. (see table 1 in Appendix 1).

In equation (8), we report the estimated coefficients of the quadratic form of the relationship of the economic growth with respect to government consumption using panel least squares method with period and cross-section fixed effects. The panel consists of 2650 observations with 81 countries over the period 1961-2005.

$$1 + d(\ln(GDP_{i,t})) = 1.008 + 0.231(GC)_{i,t} - 0.443(GC)_{i,t}^2 \quad (8)$$

(104.38) (2.89) (-5.05)

In parenthesis are presented the *t*-statistics. They show that all coefficients are statistically significant at 5 percent. Results are consistent with the suggested hypothesis – government consumption expenditures are detrimental to economic growth after a certain point and that is why the coefficient of the square term of government consumption is negative. Thus, empirical results show that the optimal or growth-maximizing rate of government consumption as a share of GDP amounts to 26%. In some of the countries sample, government consumption as a share of GDP exceeds this threshold by several percentage points. For example, in 1995-2010 period government consumption as a share of GDP is 27% in France and Netherlands, 44% in Latvia

and 32% in United another countries of sample are the positive side . (See table 2 in the appendix).

10- Concluding remarks and policy implications

In the second half of the 20th century there has been a general growth in the size of Government, due to the institution of modern Welfare State systems and to the intervention of the public economy in the economic process. The rates of economic growth in the EU countries have undergone a systematic reduction trough time. However, those welfare states have faced with several problems, especially in the form of efficiency losses from redistribution and disincentives of high taxation, which have obviously caused the decline of long-term GDP growth. Although negative and statistically significant relationship between government size and GDP growth has been established in this and several other studies, mainstream theory predicts that the negative effect should be expected in countries where the size of government sector exceeds a certain threshold. Consequently, optimal size of government sector from GDP growth perspective should exist. This study attempts to answer two research questions related to government expenditure and economic growth in the context of European countries: (a) can government expenditure increase or decrease economic growth? (b) is it possible to empirically verify the existence of the Arme y curve in the case of European countries?

In answering the first question as to whether government expenditure can increase or decrease economic growth, the findings of the investigation validate the non-linear relationship between government expenditure and economic growth. The results are generally consistent with the previous findings: government expenditure and economic growth are positively correlated; excessive government expenditure is negatively correlated with economic growth In answering the second question The overall results suggest that the optimal or growth maximizing rate of government expenditures(total tax rate in the economy measured as the share of government spending as a percentage of GDP) as a share of GDP amounts is 27%.according to the Scully model. Furthermore, examining the relationship between general government consumption on final goods and services for a set of 31 countries, we estimate that the optimal size of government consumption is 26% of GDP. The Arme y curve provides the possibility of calculating optimal government expenditure percentages, and, therefore, may be used as a policy tool in determining the efficient levels of government expenditure.

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