LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

MASTER
ECONOMICS

MASTER´S FINAL WORK
DISSERTATION

DOES THE SIZE OF PUBLIC EXPENSES INFLUENCE LONG-TERM ECONOMIC GROWTH? THE EXAMPLE OF EUROPEAN COUNTRIES

JOÃO CARLOS BATISTA VAZ FERREIRA DA GRAÇA

LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

NOVEMBER - 2023

MASTER

ECONOMICS

MASTER´S FINAL WORK

DISSERTATION

DOES THE SIZE OF PUBLIC EXPENSES INFLUENCE LONG-TERM ECONOMIC GROWTH? THE EXAMPLE OF EUROPEAN COUNTRIES

JOÃO CARLOS BATISTA VAZ FERREIRA DA GRAÇA

SUPERVISION:

PROFESSOR ANTÓNIO AFONSO

LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

NOVEMBER - 2023

Contents

LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

Table of Charts

Glossary

GDP – Gross Domestic Product
EU – European Union

Abstract

The aim of this Thesis is to evaluate the influence of the size of public expenditures in the medium and long-term economic growth on 31 countries in Europe (EU 27 and United Kingdom, Switzerland, Iceland and Norway) over the period of 1995-2019. Since there are countries with different per capita incomes, the sample was segmented among the countries with higher and lower per capita incomes. Based on several econometric techniques, it is concluded that the size of public expenditures has a negative effect on growth in the medium and long term, especially in countries with lower per capita income, which is explained by the countries under analysis being on the descending side of Armey Curve.

Keywords

KEYWORDS: State; Government; Growth; Public Expenditures; Investment; Education; Liberty; Armey Curve; Correlations; Panel Data.

1 - Introduction

1.1 - The Role of Government

The importance of the government is unquestionable in most countries, either in low, middle or high-income countries. Among many definitions of State and government, I emphasize that advocated by Locke (1690), which justifies its existence as a contract where the citizens transfer their individual powers to a political power that would ensure social coexistence, the protection and guarantee of life, the freedom and the property of every citizen.

A century later, Smith (1776), the father of economic liberalism, in The Wealth of Nations, defined the importance of the State more extensively. He argued that the production and supply of public works, such as roads, bridges and navigable canals, the facilitation of commerce, the education of the youth and the instruction of people of all ages are the responsibility of the State

Meanwhile the Industrial Revolution occurred, which completely transformed the most developed societies. There was an exponential increase in production accompanied by a demographic explosion, the first with greater magnitude that led to a sharp growth in per capita incomes. With the transformation of society, there was a demand for a more interventional State in regards to the regulation of the economy, the defense of property rights, the construction of infrastructures, the growing need for security, in consequence of the phenomenon of urbanization, and in a whole myriad of other functions associated with the complexity of society. Therefore, economic liberalism, which gained a significant boost with the industrial revolution, called for more State. On the other hand, the improvement of life of the populations in general led to a much greater demand for education services, where the State was once again called to intervene. Additionally, the fact that the industrial revolution was accompanied by an extreme level of inequality, along with socialist ideas that have become increasingly important

in intellectual and proletarian environments, led to a call for the State to have increased functions regards to social assistance and some redistribution of wealth. It is in this economic and social context that the so-called Wagner's Law (Wagner, 1912) emerges, developed by the German economist Adolph Wagner who argued that the growth of a country's GDP leads to an increasing value of public expenditures. Thus, it is a unidirectional cause/effect relation. The aforementioned reasons are aligned with the development of industrial society and are summarized as follows:

- With the industrial development there is a growing need for administrative and protective functions of the State, such as trade regulation, respect for contracts, the defense of private property, security in increasingly populated cities, etc.;
- There is a need for increased provision of social and cultural goods and services, education being the best example;
- Government intervention is required to manage and finance natural monopolies and to ensure the smooth operation of market forces.

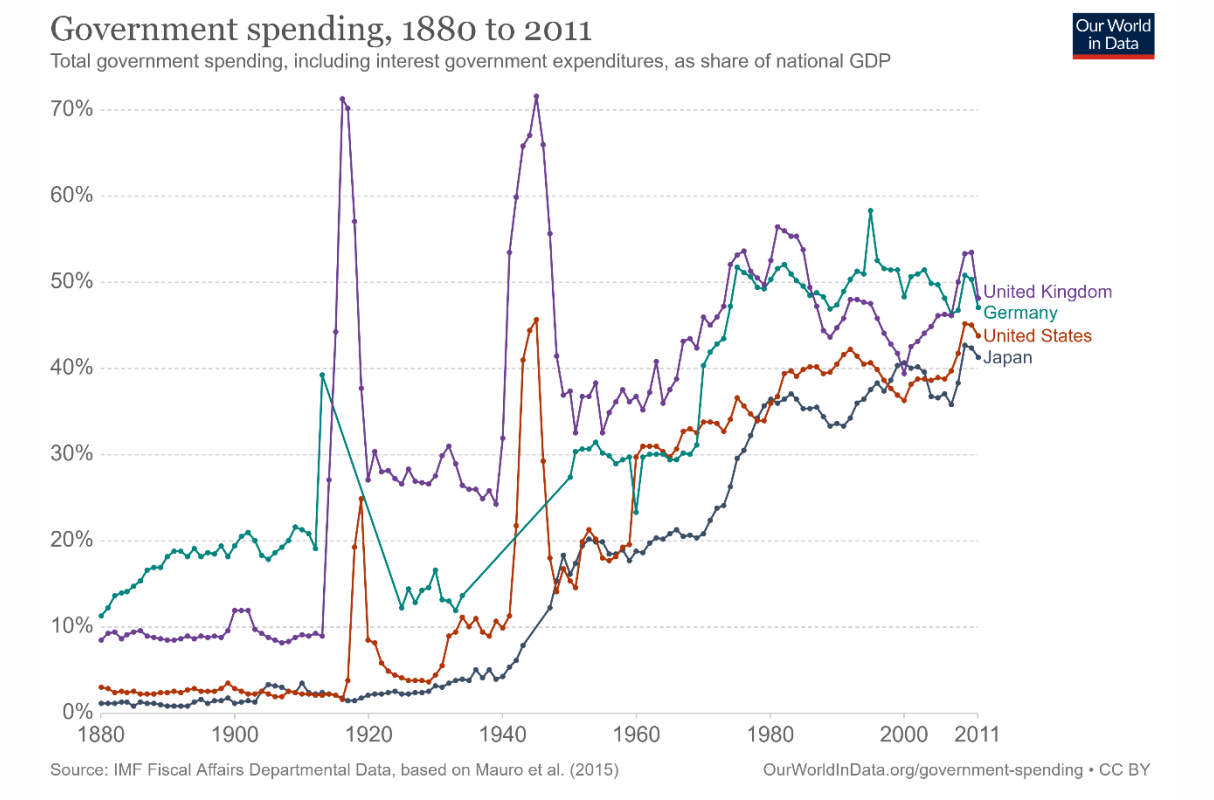
At the beginning of the 20th century the discussion intensified, namely questioning whether the government expenditures could also be a cause of GDP growth. This discussion was based both on political and economic ideas, where the purpose was to reconcile the role of a powerful State with a capitalist economy, and mainly on the emergence of Keynes' economic ideas (Keynes, 1936) that postulated the use of government expenditures as a tool of economic policy in a context of economic depression. Essentially, the rationale was that in a context of economic depression demand would fall short of the theoretical supply provided by installed capacity, which could be for a prolonged amount of time, with an impact on the level of employment. Contrary to what the classical school had postulated, the economy would not automatically balance and a government stimulus was needed to drive internal demand. This stimulus would be an increase in government expenditures that would increase domestic demand, which in turn would have the effect of increasing supply, given the installed capacity. With this increase in supply, the product would increase and through multiplier effects the economy would return to normality with product levels close to his potential. In other words, Keynes argued that

government expenditures would have a positive effect on GDP growth, especially in periods of recession and in a short-term context.

1.2 - The Relationship between Long-term Economic Growth and Public Expenditures

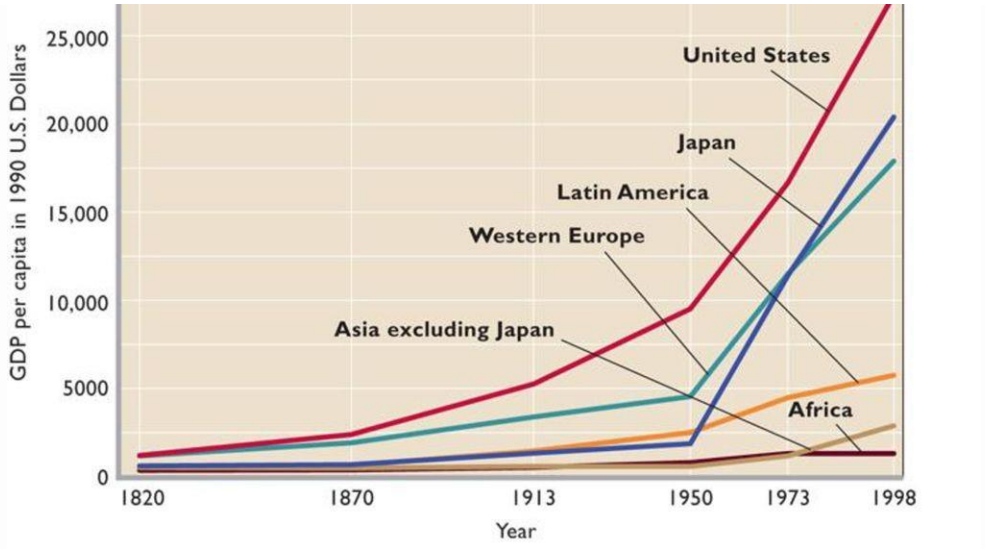
Chart 1 below illustrates a significant increase in the size of government expenditures for four major global countries during the period between 1880 and 2011. Similar graphs could be presented for most countries in the world, which reflects an indisputable steady increase (at least until the end of the last century) of government expenditures as a percentage of each country's GDP.

Chart 1 - Government Spending as Share of National GDP



On the other hand, Chart 2 demonstrates how the last two centuries have been characterized by steady GDP increases, in virtually all parts of the world.

Chart 2 - GDP per Capita over the Period 1820-1998



Source: Maddison Project

What is extracted from the comparison of the two phenomena expressed in the graphs? Does Wagner's law remain applicable? Is it true that with the increases of the GDP people require more government expenditures? But for how long? Is there no limit? Does the role of government explain economic growth? Does this include all government expenditures or only the productive government expenditures? According to many of the economic models of modern growth theory the principal drivers of growth are capital accumulation and productivity factors. The productivity factors could be a myriad of things, namely the accumulation of human capital, education, technological transformation, entrepreneurship, international trade or institutions. For many of these elements a powerful government is not necessary. But for many others, it is. Thus, what is the effect of a government's action on medium and long-term economic growth, particularly in terms of the size and the structures of its expenditures?

This Thesis aims to contribute to the answers to the abovementioned questions. In this sense, an empirical study relating the GDP annual growth rate in 31 countries in Europe (European Union countries as well as the United Kingdom, Switzerland, Iceland and Norway) with the percentage of public expenditure in GDP will be conducted. In other words, in addition to

indicators usually associated with long-term economic growth, such as physical and human capital, I will introduce the size of the State in the economy as an explanatory variable of growth in the medium and long term.

The remainder of the Thesis is organized as follows: Section 2 comprises the literature review; Section 3 the data and methods used; Section 4 provides analysis; and Section 5 offers the conclusion.

2 - Literature Review

1.2 - The Modern Economic Growth Theory

The ingredients of the modern economic growth theory can be found in the classical economists, such as Smith (1776), Ricardo (1817) and Malthus (1798), and, later, in Ransey (1928) and Schumpeter (1934). However, it is with Solow (1956) and later with Cass (1965) and Koopmans (1965), who develop Ramsey´s works, that the designated modern economic growth theory began. Essentially, these authors use the neoclassical framework and advocate that the long-term (per capita) economic growth is a consequence of capital and technological change, the latter being an exogenous productive factor.

The inclusion of technological change in the classical framework was not easy, as perfect competition is not compatible with some characteristics of technological change, since the creation of new ideas could be partially nonrival and therefore has aspects of public goods. Later, in his seminal paper “Endogenous Technological Change”, Romer (1990) answers this question. The argument of the paper has three premises. The first is that technological change is the principal driver of economic growth (as in the Solow model) because, in combination with the capital accumulation, it is the fundamental explanation of the increase in productivity for each worked hour. The second premise or assumption is that technological change is a consequence of people´s actions in response to market incentives, namely the goal of companies to attain profits. The third premise relates to the specific nature of the technology. In fact, the

costs of producing a new technology are fixed costs: as incurred, they can be used repeatedly. Romer argues that that consequence of these three premises is it is an impossible scenario of Walsarian markets. In concrete, the companies looking for technology changes support fixed costs with new design, new research and new development and, therefore, they need to sell their products at a price above their marginal costs, which implies the existence of a monopolistic competition. Thus, we can argue that there are no conditions to have a socially optimal welfare, as defined in the first theorem of the economy, because we have imperfect markets. This occurs because there is a nonrival and a nonexcludable component of the creation of new "knowledge". In this context, the existence of patents regulated by the government is very important; and government incentives for investment in research and development to achieve the socially optimum could be necessary.

Another complementary theory of economic growth is advocated by the so-called modern institutionalists, a reference being the paper of Acemoglu & Robinson (2019). According to these authors, it is the incentives and opportunities provided by "inclusive economic institutions" that explain economic development and not the racial, cultural, geographical or climatic differences that justify the differences in economic development between countries. By "inclusive economic institutions" the authors highlight the property rights and the competitive markets that lead to a correct allocation of resources (in the spirit of First Welfare Theorem). There are political institutions associated with economic institutions, which can also be classified as inclusive or extractive. Inclusive political institutions tend to generate inclusive economic institutions; contrary to extractive political institutions that tend to generate extractive economic institutions. As inclusive political institutions the authors refer a political system where the State has a strong power in the implementation of rules (justice, property rights, competition, patents, etc...) but associated with a distribution of power (democracy, scrutiny, transparency, etc.). According to the authors, only this type of (inclusive) political institution will promote inclusive economic institutions, a necessary condition for faster economic development. In conclusion, once again, economic growth is very dependent om political and economic institutions, which are closely related to the functions of a government.

2.2 - The Relationship between Size of Public Expenditures and Economic Growth

In economic growth literature, the generality of economic models does not incorporate the variable of the government, despite it being indirectly present due to its influence on physical capital, human capital and different productivity factors, with a special focus on technological development. In them, economic growth is understood as a process that results from market mechanisms and there is no consensus regarding the role of the government and its influence on long-term growth. However, it is clear that the government has an unquestionably positive influence when it secures property rights and an adequate environment for private economic activity, which contributes to an increase in investment and production. In addition, the government is called to play an increasing role in the construction of infrastructure, on public health and education and as a complement to private activity (Hajamini and Falahi, 2018), with theoretically positive effects.

On the other hand, in order to play its role, the government has to collect taxes or get into debt to finance budget deficits. In the case of taxes, a possible effect is a lower efficiency in the allocation of resources; with public indebtedness there will be increased costs of investment (due to the interest), displacement of private investment and an increase in taxes in the future. In addition, the possible inefficiencies created by the centralization and bureaucratization of public expenditures could have an impact on the overall productivity of the economy.

Thus, government activities can have a positive or negative impact on long-term growth. The overall effect depends on a multitude of factors, as we will see below.

The introduction of the public sector in an endogenous growth model is due to Barro (1990). According to its theoretical model, government size has both positive and negative effects on the growth rate. Therefore, the growth rate first increases in consequence of the ratio of productive government expenditure to GDP, eventually reaches a peak and subsequently declines. Thus, there is a non-linear relationship known as the “Barro Curve” (Mehdi, 2018). Subsequently, other authors developed the Barro model (1990), namely Mourmouras & Lee

(1999), concluding also by the existence of a Barro Curve but only for public expenditures on providing services to producers such as roads, airports, railways, harbors, R&D and forces enhancement services. In the case of public expenditures on providing free services to consumers such as parks, museums, art galleries and health, which directly enter in the consumer´s utility function, there are always negative effects on economic growth.

The ambivalent effect that public expenditures have on economic growth begs the question of its efficiency. Here Barra et al (2020) highlight the effect on the productivity of public expenditures in consequence of a poor governance, if facing a government that is not accountable. Barra et al (2020) also emphasize how different components of public expenditures affect economic growth in a differentiated way.

Government accountability is closely associated with how State is understood and how the different functions of the government are performed. It is here that the discussion around the theories of Public Finance (Musgrave, 1939) and Public Choice (Buchaman, 1978) arise. Both authors start from a similar vision of the justification for State action. In fact, “both began with the idea that the State is an organization through which people can achieve collectively those ends that they would not be able to achieve through individual action or through the market” (Caplan, 1999), although Buchman emphasizes the contractual relationship between citizens and the State, which is in line with Locke's thinking, while Musgrave points out the merits of government action to enhance the well-being of citizens. However, they differ substantially in their views regarding the role that the State should play in economic affairs and in a significant extent in the trust in the State and in politicians. Buchman thought that government had grown too big at the end of 20th century; Musgrave though the opposite. The main difference, which is based on the public choice theory, is that Buchman considers that government officials do not necessarily act in accordance with the well-being of citizens, but according to their own interests, and it is here that there may be a very plausible explanation for the existence of more or less efficient public expenditures and with differentiated effects on medium and long-term economic growth.

The role of government is closely linked to the type of political and economic institutions that a country chooses and has (Acemouglu, 2009; Barro & Sala-i-Martin, 2004). If a country has

inclusive political and economic institutions, it is more easily faced with government actions that seek the well-being of citizens, which are more conducive to being a factor of economic growth in the medium and long term. However, when institutions are more aligned with some interests of society rather than the "general interest", or is captured by the interests of its agents, there is a much greater probability of having an inefficient allocation of public expenditures, with an obvious reflection on economic growth in the medium and long term.

There is a myriad of empirical studies that relate the government size to the GDP growth rate. According to Nyasha & Odhhiambo (2019) there are currently four different views: (i) the first is "government sized-led economic growth view" in line with the Keynesian ideas; (ii) on the extreme continuum of this view is the "growth-led government size" that follows the premises contained in Wagner's Law (Wagner, 1912); (iii) there is a third view, known as the "bidirectional causality view", which argues there is a cause-effect relationship in both directions. More economic growth induces greater public expenditures, but on the other hand these also contribute to greater economic growth; (iv) and there is a fourth strand, known as the "neutrality view" which argues that the government size and the economic growth are independent. Within these four visions, the one that has the greatest acceptance in the academic world is the one that highlights that government size is a consequence of the economic growth.

Hajamini & Falahi (2018) also refers to a variety of empirical studies with different results which is explained by the different level of development of countries, the starting base of the government size and the type of public expenditures. In their opinion, this supports the Barro Curve, which is a non-linear relationship with the form of inverted U curve. Until a certain level, an optimal level of public expenditures, there is a positive effect on economic growth, which is reversed when it exceeds that level. Among the papers analyzed by Hajamini & Falahi (2018), those studying the most developed countries (OECD and EU) point to a relationship of negative causality between the government size and the GDP growth rate, which means that these countries are already on the descending side of Barro Curve.

Lamartina & Zaghini (2010) emphasize that there is a great debate about the size of the government and that the economic literature has been providing several possible determinants

for the different sizes across countries, namely the trade openness, country magnitude, degree of economic development, political organization and business cycle volatility. Among these factors, they consider the degree of economic development the factor that has received relatively larger attention, supporting Wagner's law.

Afonso & Jalles (2015) point out that "throughout history high levels of economic development have been attained with government intervention". However, they consider that government intervention is a necessary but not sufficient condition for economic development. They refer to Keynesian positive effect from a short-term perspective, but the existence of a negative trade-off on the revenue side; with more public expenditures there will be more taxes in the present and future which will have a negative impact on economic growth. It is referred to the "Armey Curve" (Armey & Armey, 1995), as well as an inverted U curve as the Barro Curve, which leads to an optimal point for government size.

Lamartina & Zaghini (2010) studied the relationship between Government expenditures and economic growth in 23 development countries (OECD countries) from 1970-2006, concluding with a positive correlation between public spending and per-capita GDP, which is consistent with the Wagner's law, in consequence of a long-run elasticity larger than 1 in government expenditures with respect to economic activity. Additionally, they detected that this correlation was higher in countries with lower per capita GDP, since the phase of higher growth of the countries is characterized by a stronger development of government activities. In addition to the usual causes associated with Wagner's law, Lamartina & Zaghini (2010) add two more, one on the demand side and one on the supply side. On the demand side, there are increased social security expenditures in consequence of the increasing share of the population over 65. In the supply-side there is the "technology of taxation", which is no more than the greatest sophistication and the greatest opportunity to extend the amount of taxes charged, thus facilitating the increased public expenditures. Lamartina & Zaghini (2010) also report that the growth of public expenditures can happen without any benefit to taxpayers, as a result of inefficiency of certain public expenditures, corruption, moral hazard and political principal-agent problems.

Barra et al (2020) led to a study based on an international database over the 1996-2012 period, controlling for the quality of the institutions (corruption control, government effectiveness, political stability, rule of law, regulatory quality an accountability). They conclude that the empirical evidence supports the existence of the Wagner´s law. In the short-run, public expenditures react to a positive shock in national income, with a lower magnitude for democratic countries. In the long-run there is also a positive correlation between public expenditures and national income, but less quickly for non-democratic, low-income and non-OECD countries. Institutional quality may help to reduce the value of per-capita public expenditures and making it more productive. One of the reasons for the increase in public expenditures is public services for the elderly.

Irandoust (2019) evaluated the validity of Wagner´s law using a sample of twelve OECD countries over the period of 1995-2015. The results demonstrate a causal relationship in favor of Wagner´s law in five countries and a bidirectional effect in another two. Neutrality hypothesis is found in four countries and only Norway is an exception of the validity of Wagners´s law. There are no clear evidence of government expenditures causing national income. Methodologically, I highlight the author´s choice to exclude some dates related to the financial crisis of 1997-1998 and 2007-2008 and the economic downturn of 2001.

Tesarova (2020) analyses the relationship between gross domestic product and public expenditures over the period 1999-2019 for Czech Republic, Slovakia, Poland and Hungary. The results support the validity of the Wagner´s law in all countries except Slovakia, a country where she found a long-run bidirectional relationship. In the opinion of the author the optimal trade-off between the public and private supply of services and goods depends on the level of institutional quality and mentality of citizens.

Lupu & Asandului (2017) study the relationship between governmental expenditure and economic growth for 8 Eastern-European countries with data for 1995-2014, with the principal goal to test the presence of a non-linear – Armey Curve – relationship between the government size and economic growth; and to find an optimal level of public expenditures which maximizes economic growth. Their results reveal the occurrence of a significant cointegration of public

expenditures and GDP. For three countries they conclude that the current share of public expenditures within the GDP exceeds the optimal level.

Hajamini & Falahi (2018) study the non-linear relationship among 14 developed European countries over the period 1995-2014 between government size and economic growth. As measure of government size, they use final consumption expenditure (FCE), current expenditure other than final consumption expenditure (OCE) and government gross fixed capital formation (GFCF). The results indicate the existence of the Barro Curve on FCE and GFCF and a negative effect of OCE. Based on the results, the sum of the optimum of FCE and GFCF is approximately 19%, which is less than the results of other studies.

Rajput & Tarik (2019) led a study applied to 89 countries from 1990 and 2018. The results show substantial evidence for the Armey Curve across non-OECD. However, the results relating to OECD countries do not support the presence of the Armey Curve.

Afonso & Jalles (2015) led an empirical study linking government size, institutions and economic activity across 140 countries over 40 years (1970-2010 in 5-year non-overlapping averages). Countries are grouped into advanced (OECD), emerging market economies (EME) and lower income countries (LIC). The results show mostly a negative effect of government size and a generally positive effect of institutional quality. Additionally, the negative effect of government size is stronger the lower institutional quality and the positive effect of institutional quality on economic activity increases with smaller government sizes. Afonso & Jalles (2015) suggest that a possible interpretation of the results is the fact that most countries may already be on the descending side of the Armey Curve, where public expenditures are not productive enough and/or government financing is too distortionary. Despite this paper does not differentiate distinct public spending items, they refer, based in other studies, that each item can have different impacts on growth.

3 - Data and Methods

The aim of this Thesis is to verify the unidirectional relation cause / effect between the size of public expenditures and the long-term economic growth on 31 countries of Europe – EU 27 and United Kingdom, Switzerland, Iceland and Norway – over the period of 1995-2019 (25 years) using as dependent variable the percentual annual growth rate of GDP (constant terms). All these countries are relatively similar. They are high-income countries per capita: according to IMF (GDP per capita, current prices, purchasing power parity; international dollars per capita), in 2019, Bulgaria, the poorest country of this sample, is the sixty-third and Luxemburg the second. All these countries belong or belonged to the EU, or have strong connections to it. All are democratic countries with more or less similar institutions. Given that all belong to the same economic zone without economic barriers, technological innovation is supposed to be available to all. Also, since all these countries have the same degree of openness abroad, this factor should not be explanatory to different rates of long-term economic growth.

Thus, how can we justify that there are different growth rates, in addition to the size of public expenditures, that we intend to study?

First, and as it is widely studied, the least developed countries tend to grow more than the more developed countries according to Solow (1956), Barro & Sala-i-Martin (2004), Acemouglu (2009), Aghion & Howitt (2009) and Vollrath (2020), regardless of other causes, as a result of a process of convergence to a steady state. On the other hand, Wagner's law states that more developed countries will tend to have a greater size of public expenditure and, according to recent literature, when excessive this size compromises growth (Armey Curve). Thus, and for example, does Germany grow less than Estonia because it is already more developed or because it has a higher size of public expenditures, which in turn is explained by being more developed? In order to overcome this issue, which is to have a sample of countries with different per capita incomes and in different development states, the analysis will subdivide countries into lower-income and higher-income per capita.

To explain different annual growth rates, in addition to the size of public expenditures, investment (as proxy of physical capital), the high education (proxy of human capital) and the index of economic liberty (institutions) will be considered.

As dependent variable I will use the real annual growth GDP of World Bank World Development Indicators over de period 1995-2019. For the investment, the gross capital formation as percentage of the GDP will be used using the World Bank World Development Indicators. To measure the size of public expenditures, the total of general government expenditures as percentage of GDP using the Eurostat database will be used. As indicator of the quality of education, an indicator of tertiary school enrollment of World Bank World Development Indicators will be used. As mentioned above, there are not substantial differences in the institutions of the countries included in the sample compared to other countries of the world. However, there are some slight differences that could explain diverse growth rates. Therefore, the general index of economic freedom of Heritage Foundation will be used.

In this analysis some problems are anticipated. Firstly, two of the indicators used (investment and size of government expenditures) have the GDP in their denominator, the variable whose growth is intended to be studied, which points to potential problems of endogeneity. In addition, investment and the size of government expenditures themselves may be correlated due the possible trade-off between both (collinearity). Taking into account the econometric technique used - Panel Data - these possible effects will be minimized. On the other hand, the withdrawal of the atypical year of 2009 from the time-series will be tested.

As the goal is to study the cause-effect relationship between the size of the public expenditures and the long-term economic growth, a rolling average to overcome short-run business cycle fluctuations will be used.

In the analysis it will be checked if there is an effect related to Scandinavian countries (Finland, Norway, Sweden and Denmark) in the conclusions obtained. In fact, these countries are characterized by simultaneously having big governments sectors and market-friendly policies (Afonso & Jalles, 2015).

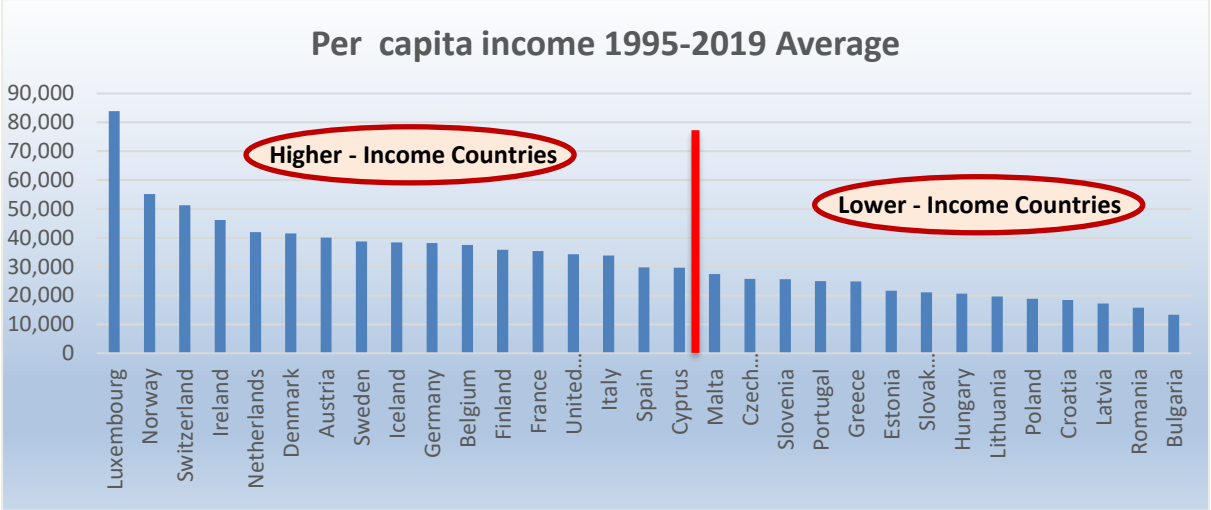
Regarding methodology, a set of analytical analyses of the evolution and correlation of the different variables will be used. These will be complemented by the use of panel data techniques, which allow for both cross-section and time-series variation in all variables and manage well the heterogeneity between countries whilst controlling for collinearity problems between variables (Baltagi, 2021).

4 - Analysis

4.1 - Analytical Review

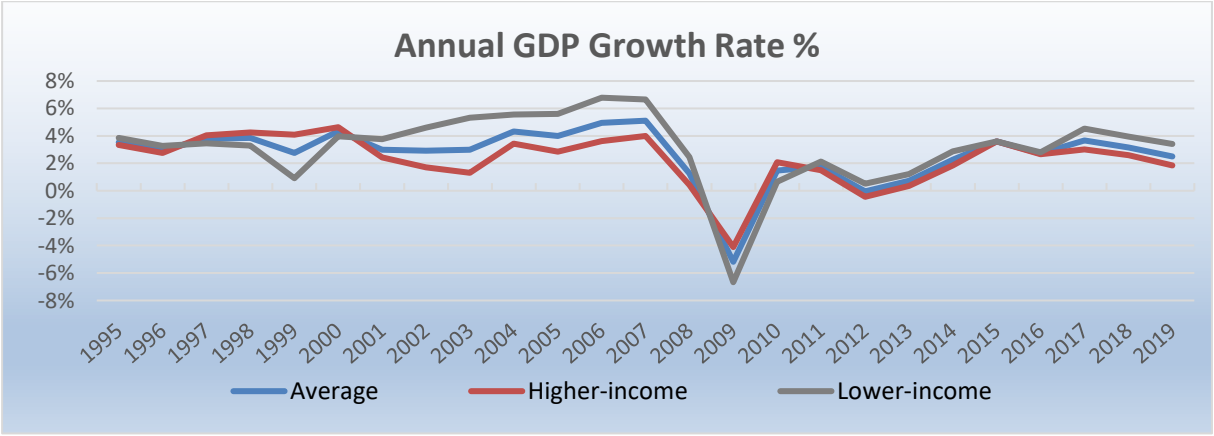
Despite all 31 countries of the sample being amongst the most developed in the world (Bulgaria with the lowest development is still the sixty-third in the world), there is a significant gap between them. For example, the first of our sample, Luxemburg, in 2019, has a per capita PPP of 120,490 USD and Bulgaria has 24,247 USD, five times less. Even Denmark, the fifth most developed country in our sample, with its 59,719 USD has almost twice as much as Latvia, the fifth least developed country in the sample, with its 32,014 USD. If we go back in time, we find differences of even greater magnitude. Thus, it is in this context, and as previously state, the sample should be divided into lower-income and higher-income countries. As the intention is to study the economic growth dynamics over the period of 1995-2019, the average per capita income was used, obtaining the results illustrated by the following graph:

Chart 3 - Per Capita Income



The graph below depicts the evolution of annual GDP growth for the period 1995-2019, using the arithmetic average of the 31 countries in the sample and the same average for the 17 countries with the highest per capita income and for the 14 countries with the lowest per capita income.

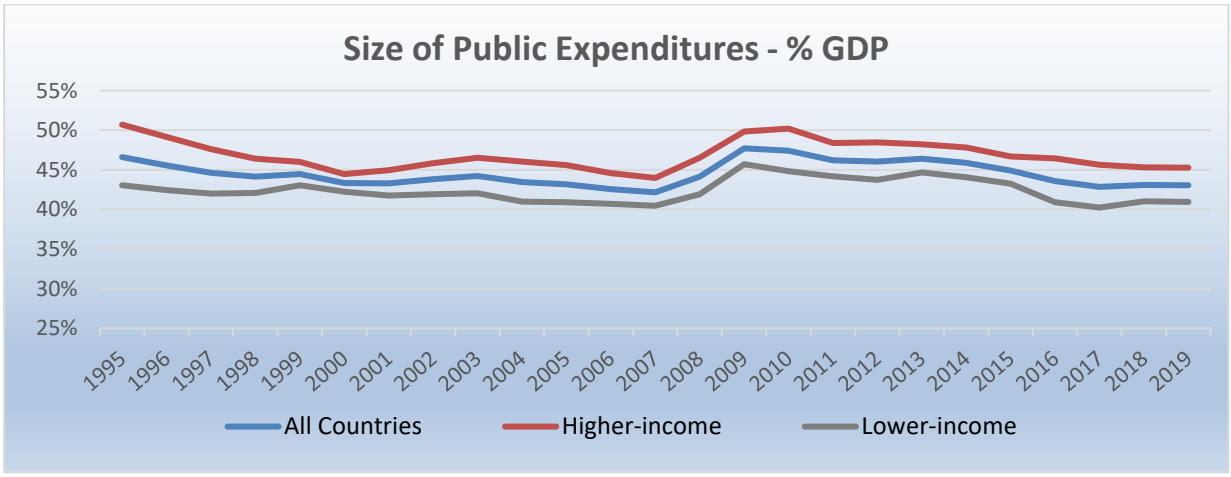
Chart 4 - Annual GDP Growth Rate



Several conclusions can be drawn from the analysis of the chart above. The first is that, in general, the least developed countries have a higher rate than the more developed countries. In fact, for the period between 1995 and 2019 the countries with the lowest per capita income grew

at an average rate (arithmetic) of 3.1% while the higher-income countries grew at a rate of 2.3%, resulting in an average rate of 2.7%. The second conclusion is that the least developed countries suffered more in downturns, as is visible in 1999 and 2009. The third conclusion that arises is that there is a significant recession in 2009, prolonged by anemic growth in the following years, which is due to the international financial crisis unrelated to the explanatory variables used. On the other hand, as in investment and in the size of the public expenditures are used indicators that have in the denominator the GDP, there is here a significant effect derived only from exogenous factors. This means that the cause-and-effect analyses must be complemented by removing the effect of 2009.

Chart 5 - Size of Public Expenditures

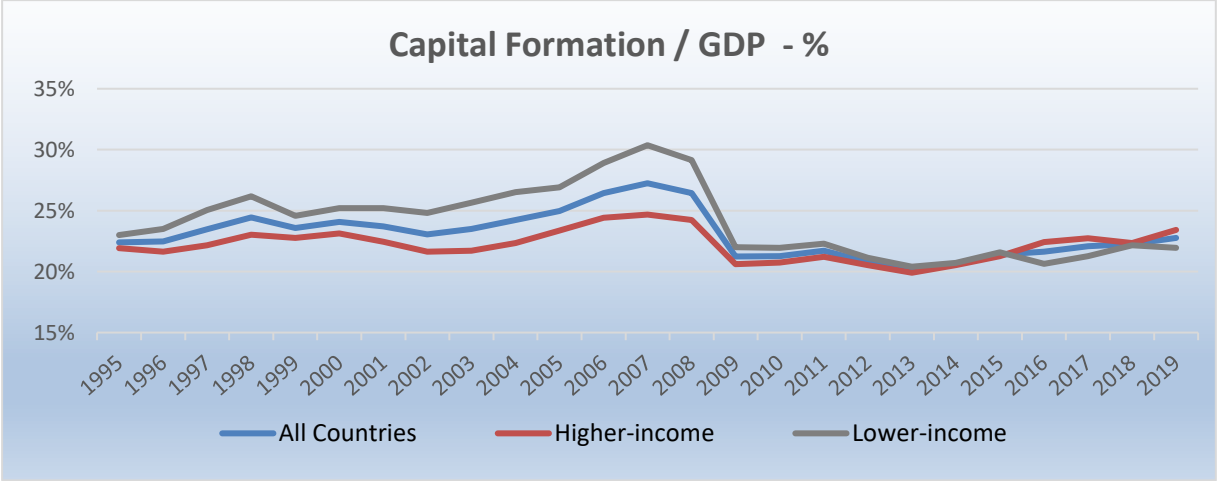


The chart above represents the size of the State in the economy, measured by the percentage of public expenditures in the GDP. Over the period of 1995-2019, it can be verified that public expenditures were always above 40% and, in the case of higher-income countries, in some years exceeded 50%. Given the generality of the existing bibliography, it can be concluded that the European countries under analysis are, as a whole, on the descending side of the Armey Curve. Therefore, it can be said that increases in public expenditures tend to have a negative impact on growth in the medium and long term. On the other hand, and as expected based on Wagner's law, the higher-income countries have a larger government size than the lower-income countries. Analyzing the evolution along the period under analysis, it is evident that in 2019 the size of the State is lower than in 1995, highlighting, however, the sharp increase that occurred

in 2009 and 2010. This increase is explained by the significant reduction in the GDP in 2009, but possibly also (especially in the following years) by expansionary fiscal policies followed by many countries.

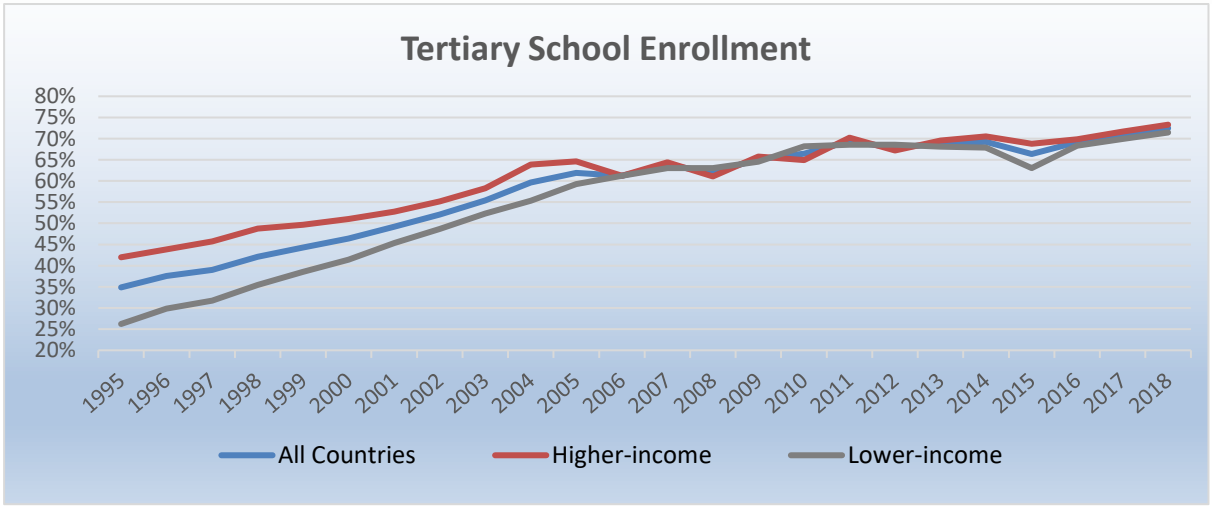
The graph below illustrates the evolution of the investment capital formation as percentage of GDP) over 1995-2019

Chart 6 - Investment



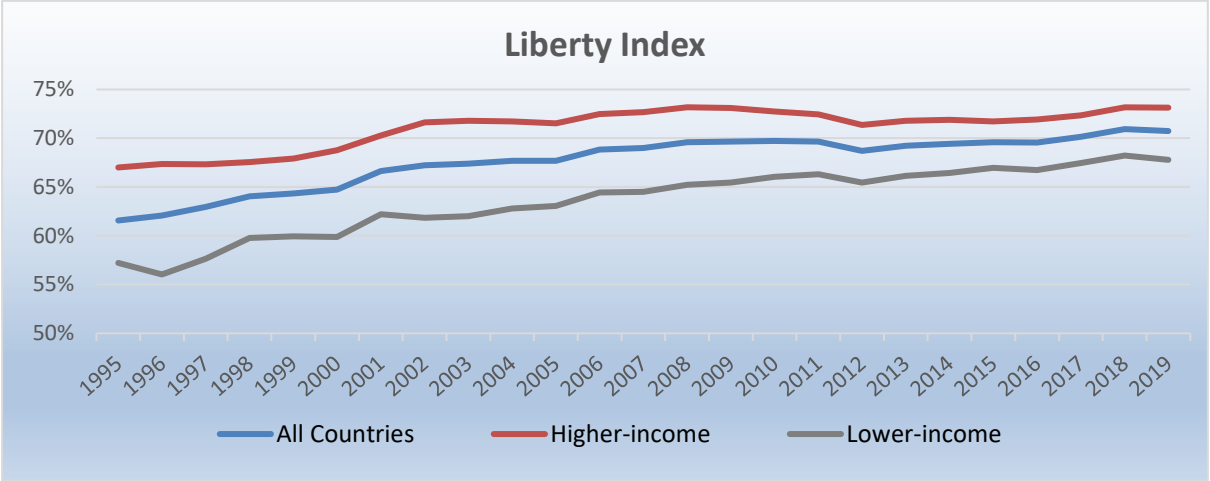
There are clearly two distinct periods. Until 2008 there was an increasing weight of investment in GDP, with invariably higher values for the lower-income countries. With the 2009 crisis, there was a clear reduction in the two groups of countries that have never recovered to the 2008 figures, with the particularity of not presenting relevant differences between the higher and lower-income countries.

Chart 7 - Education



As proxy of human capital, the percentage of tertiary school enrollment, which is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown is used. It is one of many other ratios that could be used as a cause for the long-term economic growth and none are a perfect ratio. There was a sharp growth until 2005, the year in which growth became much more tenuous. Until 2005 there is a convergence of lower-income countries, which from that year are on par with the higher-income countries. As there are some missing dates on the panel data, there some abnormal effects, as is example the year of 2015, with no economic significance.

Chart 8 - Economic Liberty



The graph above shows some stability but invariably with some increase in the general index of economic freedom. As it would be expected, the countries with the highest per capita income tend to have a higher rate, but a convergence between the lower and higher-income countries is clear.

4.2 - Correlations

The graphs below illustrate the average data for all countries according each variable over the period 1995-2019. For the time being, this analysis does not consider the time effects and the combined relationship between variables, which will carried out in due course.

Chart 9 - Correlation Growth vs Government Expenditures

All Countries

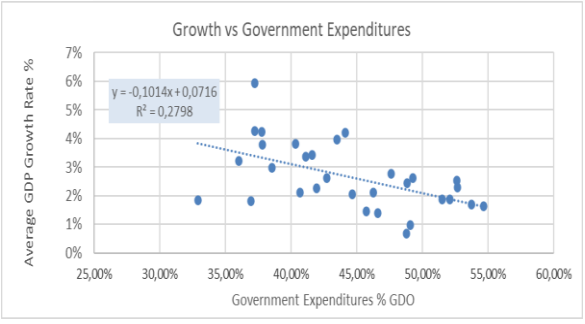


Chart 10 - Correlation Growth vs Government Expenditures

Higher-Income Countries

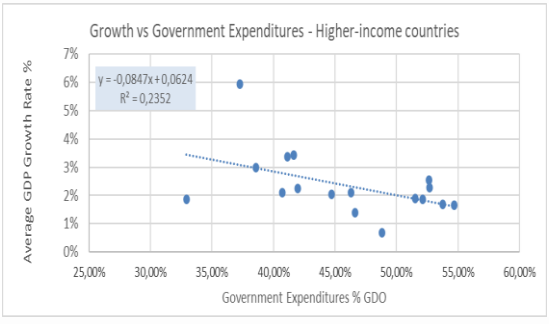


Chart 11- Correlation Growth vs Government Expenditures

Lower-Income Countries

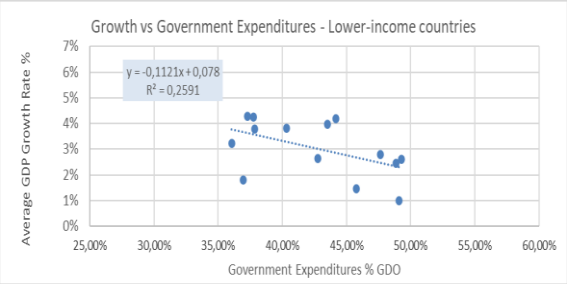


Chart 12 - Correlation Growth vs Liberty

All Countries

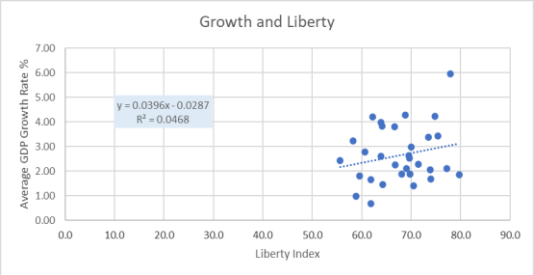


Chart 13 - Correlation Growth vs Liberty

Higher-Income Countries

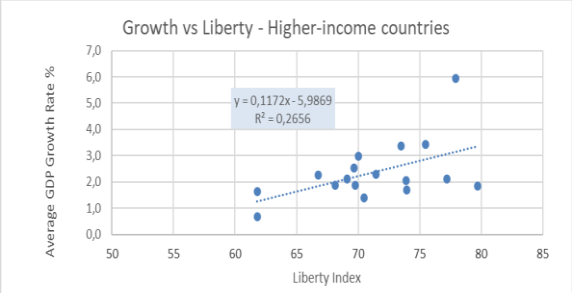


Chart 14 - Correlation Growth vs Liberty

Lower-Income Countries

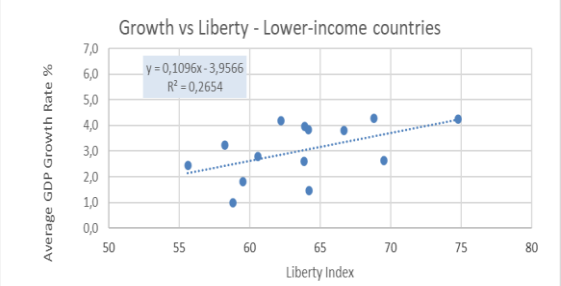


Chart 15 - Correlation Growth vs Education

All Countries

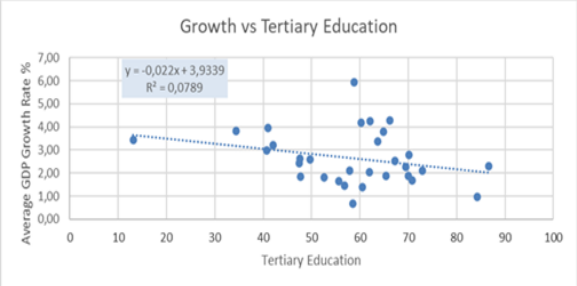


Chart 16 - Correlation Growth vs Education

Higher-Income Countries

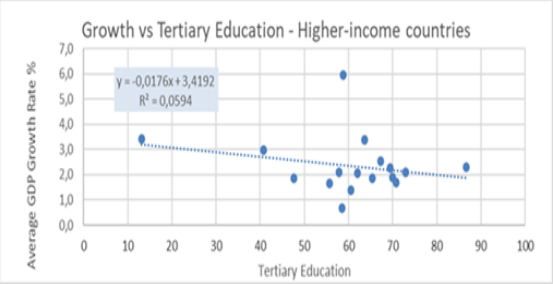


Chart 17 - Correlation Growth vs Education

Lower-Income Countries

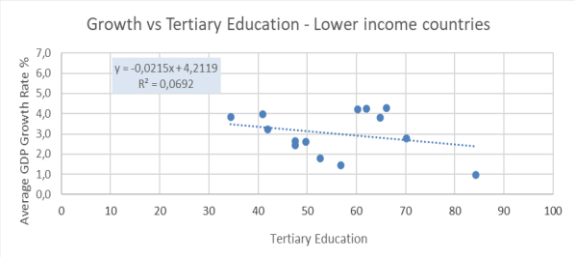


Chart 18 - Correlation Growth vs Investment

All Countries

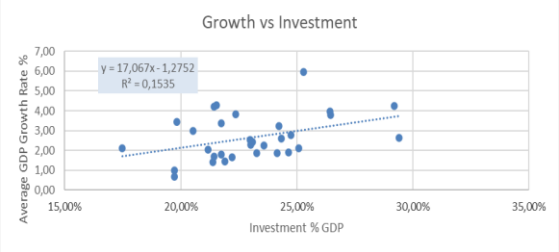


Chart 19 - Correlation Growth vs Investment Higher-Income Countries

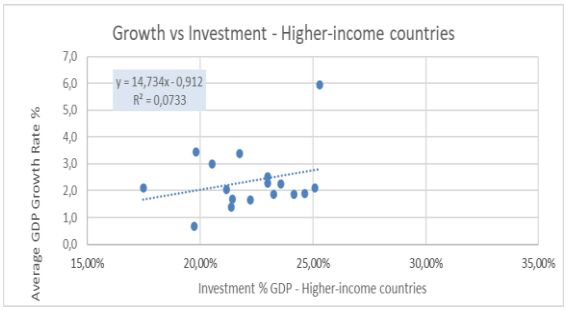
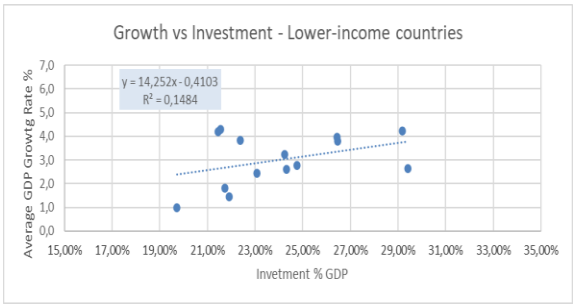


Chart 20 - Correlation Growth vs Investment Lower-Income Countries



From the graphs above, it is possible to concluded that there is a negative correlation between the annual rate of economic growth and the size of public expenditures in the GDP. The higher the size of the State, the lower the GDP growth rate, being a ratio of about 10 to 1; that is, a 10% increase in public expenditures corresponds to a 1% reduction in GDP. It should be noted that R^2 of about 0.24 – 0.28, despite being relatively low, has some statistical significance. It could be interpreted as a cause-and-effect relationship or not. Thus, up to this point, it is not possible to conclude that the increase in public expenditures is the cause of lower economic growth, as there may be other explanatory causes. On the other hand, countries with higher per capita incomes tend to grow less (Solow 1956, Barro & Sala-i-Martin 2004, Acemouglu 2009, Aghion & Howitt 2009 and Vollrath 2020). Additionally, according to Wagner's law higher-income countries tend to have a higher State size, which is the reason why it is not possible to infer whether that there is a cause-effect relationship. However, when the sample is segregated, between higher-income and lower-income countries, the same correlation is verified, which indicates the cause-effect relationship may exist.

Analyzing the correlation between the GDP growth rate with the liberty index, contradictory results can be found. If we take the complete sample, it seems that there is not a significant correlation (R^2 = 0,0468). However, with a segmentation of the sample, there is some correlation (R^2 = 0,26), which indicates a relationship of 10 to 1; with an increase of 10 points in the liberty index there will be an increase of 1% in the annual GDP growth rate.

The graphs also show a negative correlation between tertiary education and growth, which seems to be nonsensical. However, there are some reasons for this. Firstly, the R^2 is very low, thus having no statistical relevance. Secondly, it is possible to have a bad indicator for human

capital, since education has various aspects with tertiary education being only one of them. Furthermore, abnormal dates in this indicator can be found (for example, with an average of 58,1, Greece has 84,3 and Luxembourg 13,1). Thirdly, a higher level of education could be a cause for growth in previous decades; and a higher-income country with low GDP growth rate maintains its high level of education. Finally, all countries are developed countries with high levels of education. As education levels increase, the "productivity" of more education tends to reduce when faced with "fully grown" countries (Vollrath 2020). In conclusion, it is not expected that tertiary education could be a relevant explanation for differences in the GDP growth rates for the countries included in the sample.

Finally, there is the analysis between growth and investment, as a percentage of the GDP and as proxy of physical capital. A relationship of 6-7 to 1 can be found, which means that an increase in the investment ratio of 6-7% can lead to an additional increase in 1% in the GDP growth. However, there is not a significant R^2, particularly in the higher-income countries

In conclusion, based on correlation analysis and until now without time dynamics effects, it is possible to affirm that investment could be determinant for the growth, but with a low statistical significance. The size of governmental expenditures is also relevant for the growth with greater statistical significance. Economic freedom can also be seen to have a causal relationship but only has statistical significance if the sample is segmented.

Below there are the correlations between all independent and the dependent variable, using all dates of the time-series over the period 1995-2019, with three different results: general, and for the segments of higher and lower-income countries. The conclusions are not significantly different from those previously explained, when the averages were used for the period 1995-2019. There is a clear positive correlation between investment and growth, mainly in lower-income countries, as well as a negative correlation between the size of public expenditures and growth. As expected, based on the abovementioned analysis, there are no relevant correlations between the independent variables education and the freedom index and the dependent variable growth. Another analysis that results from the tables below is the correlations between the independent variables that can indicate some collinearity. When analyzing the correlations without the segmentation of the sample, the correlation between education and public

expenditures is relevant, which is not surprising because it is known that the more developed countries tend to have a higher volume of public expenditures and, simultaneously, a higher level of education. A negative correlation between investment and public expenditures was also found, which can be justified by the trade-off between these dependent variables: more public expenditures take away investment in the economy. When the sample is segmented, economic freedom is revealed to be a very relevant explanation for a lower degree of public expenditures, especially in the higher-income countries.

Chart 21 - Correlations 1995-2019
All Countries

	All Countries				
	Growth	P. Expenses	Investment	Education	Liberty
Growth	1.0000				
P. Expenses	-0.3355	1.0000			
Investment	0,4061	-0.2202	1.0000		
Education	-0.1654	0.2727	-0.1148	1.0000	
Liberty	0.0174	-0.1986	0.0475	0.2262	1.0000

Chart 22 - Correlations 1995-2019
Higher-Income Countries

	Higher-Income Countries				
	Growth	P. Expenses	Investment	Education	Liberty
Growth	1.0000				
P. Expenses	-0.3560	1.0000			
Investment	0.2795	-0.1523	1.0000		
Education	-0.1649	0.3640	0.1207	1.0000	
Liberty	0.0574	-0.4819	0.0789	-0.0168	1.0000

Chart 23 – Correlations 1995-2019
Lower-Income Countries

	Lower- Income Countries				
	Growth	P. Expenses	Investment	Education	Liberty
Growth	1.0000				
P. Expenses	-0.3201	1.0000			
Investment	0.4565	-0.2178	1.0000		
Education	-0.1479	0.1136	-0.2161	1.0000	
Liberty	0.0929	-0.3067	0.2640	0.3404	1.0000

As mentioned above, we can have substantial variations of the GDP growth rate caused by exogenous factors, the best example being the downturn of 2009. Thus, the analysis is repeated, now excluding the year 2009 from the time-series, with the correspondent results in the subsequent tables.

Chart 24 - Correlations 1995-2019 without 2009
All Countries

	All Countries				
	Growth	P. Expenses	Investment	Education	Liberty
Growth	1.0000				
P. Expenses	-0.3439	1.0000			
Investment	0,4319	-0.2099	1.0000		
Education	-0.1430	0,2659	-0.1072	1.0000	
Liberty	0.0596	-0.2126	0.0631	0.2267	1.0000

Chart 25 - Correlations 1995-2019 without 200
Higher-Income Countries

	Higher-Income Countries				
	Growth	P. Expenses	Investment	Education	Liberty
Growth	1.0000				
P. Expenses	-0.3502	1.0000			
Investment	0.2703	-0.1364	1.0000		
Education	-0.1514	0.3585	0.1312	1.0000	
Liberty	0.1114	-0.4995	0.0955	-0.0200	1.0000

Chart 26 - Correlations 1995-2019 without 2009

Lower-Income Countries

	Lower- Income Countries				
	Growth	P. Expenses	Investment	Education	Liberty
Growth	1.0000				
P. Expenses	-0.3231	1.0000			
Investment	0.4961	-0.2102	1.0000		
Education	0.1093	0.1032	-0.2083	1.0000	
Liberty	0.1750	-0.3199	0.2845	0.3400	1.0000

The conclusions are very similar, although it is worth noting a small increase in correlations between growth and the variables investment and public expenditures. On the other hand, economic freedom becomes of some relevance when segmenting the sample.

In order to exclude short-term effects on growth, an additional analysis was carried out which consisted of determining the correlations based on a 5-year rolling average (the first year becomes 1999). This analysis is considered to be the most appropriate. The following table depicts the results obtained.

Chart 27 - Correlations Moving Average 1999-2019

All Countries

	All Countries				
	Growth	P. Expenses	Investment	Education	Liberty
Growth	1.0000				
P. Expenses	-0.4500	1.0000			
Investment	0.4312	-0.2402	1.0000		
Education	-0.2863	0.3361	-0.1210	1.0000	
Liberty	0.0576	-0.2354	0.0157	0.1180	1.0000

Chart 28 - Correlations Moving Average 1999 -2019

Higher-Income Countries

	Higher-Income Countries				
	Growth	P. Expenses	Investment	Education	Liberty
Growth	1.0000				
P. Expenses	-0.4412	1.0000			
Investment	0.3202	-0.1037	1.0000		
Education	-0.2952	0.4321	0.1524	1.0000	
Liberty	0.1410	-0.5165	0.0416	-0.0857	1.0000

Chart 29 - Correlations Moving Average 1999-2019

Lower-Income Countries

	Lower- Income Countries				
	Growth	P. Expenses	Investment	Education	Liberty
Growth	1.0000				
P. Expenses	-0.4625	1.0000			
Investment	0.4668	-0.2905	1.0000		
Education	-0.2695	0.1920	-0.2845	1.0000	
Liberty	0.1694	-0.3833	0.3038	0.2565	1.0000

The aforementioned findings reinforce the conclusions made thus far. We have a strong positive correlation between investment and growth (0.4312), particularly more evident in the lower-income countries (0.4668), which can be explained by these being in an earlier stage of

economic development and as such more dependent on investment. There is also a strong negative correlation between growth and public expenditures (-0.4500), in this case evident both in the higher-income countries (-0.4412) and in the lower-income countries (-0.4625). The apparently erratic behavior of education is maintained, due to the aforementioned causes. Economic freedom seems to have some effect but only when the sample is segmented.

Finally, considering the specificity of the Scandinavian countries (Sweden, Norway, Finland and Denmark), which combine high levels of economic freedom with a very relevant State, the same analysis was carried out but without the data of these countries. The results obtained are as follow

Chart 30 - Correlations without Scandinavian Countries
All Countries

	All Countries				
	Growth	P. Expenses	Investment	Education	Liberty
Growth	1.0000				
P. Expenses	-0.4719	1.0000			
Investment	0.4490	-0.2433	1.0000		
Education	-0.2689	0.2512	-0.1351	1.0000	
Liberty	0.1054	-0.3685	0.0213	0.0457	1.0000

Chart 31 - Correlations without Scandinavian Countries
Higher-Income Countries

	Higher-Income Countries				
	Growth	P. Expenses	Investment	Education	Liberty
Growth	1.0000				
P. Expenses	-0.4946	1.0000			
Investment	0.3831	-0.1520	1.0000		
Education	-0.2888	0.3346	0.0758	1.0000	
Liberty	0.2332	-0.6468	0.0647	-0.1440	1.0000

Chart 32 - Correlations without Scandinavian Countries
Lower- Income Countries

	Lower- Income Countries				
	Growth	P. Expenses	Investment	Education	Liberty
Growth	1.0000				
P. Expenses	-0.4625	1.0000			
Investment	0.4668	-0.2905	1.0000		
Education	-0.2695	0.1920	-0.2845	1.0000	
Liberty	0.1694	-0.3833	0.3038	0.2565	1.0000

These results greatly reinforce the conclusions suggested so far, especially with regard to the relationship between growth, on the one hand, and public expenditures and economic freedom, on the other. There is a negative correlation between growth and public expenditures of -0.4719, with relevance in any of the segments studied, and there is economic freedom with some relevance when the sample is segmented (0.2332 for the higher-income countries and 0.1694 for the lower-income countries).

4.3 - Panel Data Analysis

As mentioned above, the aim of this thesis is the verification of whether the size of public expenses influences growth in the medium and long term, using for this purpose a well-defined sample from 31 European countries. Thus, as a method, we studied a set of independent variables that can be tested as causal factors for different growth rates. Independent variables that could explain medium and long-term growth but are common to most countries in the sample, such as technological innovation and the opening of economies to the outside world, have nor studied. On the other hand, it is admitted that there is a component on the error of linear regression that results from the specificity of each country, which may also be related to some independent variables used, which means that we can have situations of endogeneity.

Thus, to deal with this situation of possible endogeneity will be used the Panel Data One-Way Fixed Effects analysis based on Stata.

Above, four different forms of analysis were considered: with all the data for the years 1995-2019; excluding 2009; with rolling averages of five years, the first data referring to 1999; and the same analysis, excluding the Scandinavian countries. Among these analyses, it is considered that the use of averages is the most appropriate for the smoothing of short-term effects. In contrast, disregarding the Scandinavian countries does not present any different results. So, the analysis that will be demonstrated below will be based on the rolling average of five years (without exceptions for Scandinavian countries), although the other alternative analyses have been tested without substantially different results.

Chart 33 - Fixed-effects (within) regression - All Countries

Growth	Coef.	Std. Err.	T	P>|t|	[95% Conf. Interval]	
P. Expenses	-.0987959	.0112779	-8.76	0.000	-.1209441	-.0766477
Investment	.1721373	.017791	9.68	0.000	.1371984	.2070761
Education	-.0000509	.0000402	-1.27	0.206	-.0001298	.000028
Liberty	.0002221	.000096	2.31	0.021	.0000336	.0004106
Constant	.0178426	.0102138	1.75	0.081	-.0022157	.037901

Number of obs = 636 Group variable: Year Number of groups = 21
R-sq: Obs per group:
within = 0.3086 min = 29
between = 0.4625 avg = 30.3
overall = 0.3131 max= 31
F (4,611) = 68.18 Corr (u_i, Xb) = 0.1637 Prob > F = 0.0000
Sigma_u = .01132649 Sigma_e = .0155609 rho .34632471 (fraction of variance due to u_i)
F test that all u_i=0: F (20, 611) = 14.47 Prob > F = 0.0000

Chart 34 - Fixed-effects (within) regression – Higher-Income Countries

Growth	Coef.	Std. Err.	T	P>|t|	[95% Conf. Interval]	
P. Expenses	-.0653069	.0141461	-4.62	0.000	-.0931389	-.0374749
Investment	.1615096	.0269217	6.00	0.000	.1085417	.2144774
Education	-.0000871	.0000489	-1.78	0.076	-.0001833	9.09e-06
Liberty	.0004502	.000163	2.76	0.006	.0001295	.0007709
Constant	-.0097116	.0168602	-0.58	0.565	.0428838	.0234605

Number of obs = 342 Group variable: Year Number of groups = 21
R-sq: Obs per group:
within = 0.2943 min = 15
between = 0.2951 avg = 16.3
overall = 0.2562 max = 17
F (4,317) = 33.05 Corr (u_i, Xb) = 0.1106 Prob > F = 0.0000
Sigma_u = .01096833 Sigma_e = .01298846 rho .41627158 (fraction of variance due to u_i)
F test that all u_i=0: F (20, 317) = 9.69 Prob > F = 0.0000

Chart 35 - Fixed-effects (within) Regression – Lower - Income Countries

Growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
P. Expenses	-.1313939	.0224197	-5.86	0.000	-.1755342	-.0872535
Invest	.1380594	.0323168	4.27	0.000	.0744334	.2016855
Education	-.0000677	.0000684	-0.99	0.324	-.0002024	.0000671
Liberty	.0003419	.0002316	1.48	0.141	-.0001141	.0007978
Constant	.0339274	.0186126	1.82	0.069	-.0027175	.0705723

Number of obs = 294 Group variable: Year Number of groups = 21
R-sq: Obs per group:
within = 0.3234 min = 14
between = 0.5316 avg = 14.0
overall = 0.3230 max = 14
F (4,269) = 32.14 Corr (u_i, Xb) = 0.1913 Prob > F = 0.0000
Sigma_u = .01398693 Sigma_e = .01715637 rho.39927382 (fraction of variance due to u_i)
F test that all u_i=0: F (20, 269) = 8.16 Prob > F = 0.0000

With a global R^2 of 0.3131 there is not a strong robustness of the model, but a moderate and significant robustness, which is higher among countries (0.4625). When the sample is segregated, the model is more robust in low-income countries with a global R^2 of 0.323, with 0.5316 among countries. There is a constant of 0,01784 which is compared to an average GDP growth rate of 0,02556. This means that most part of the growth rate could be exogenous to the independent variables that are studied. One possible explanation is that this study does not aim to determine all the variables causing economic growth, but only, within a well-defined sample, to determine the influence, if any, of the size of public expenditures, along with other variables that hypothetically could also be a cause of differentiated growth levels. Hence no indicator for technological innovation was included, for example.

Analyzing each of the independent variables, based on what has been discussed thus far and as was expected, the independent variable education has no statistical significance, either in the higher or in the lower-income countries.

On the contrary, the results point to economic freedom having some relevance (t between 1.48 and 2.76,) as an explanatory variable of the GDP growth rate. With an index with an average of 67.90 and a coefficient amounting to 0.00045 and 0.00034, for the higher and lower-income countries respectively, this means that an index improvement of 10%, for example to 74.69, would have an effect on the average GDP rate of 0.3% and 0.2% in higher and lower-income countries respectively. As was also expected, the independent investment variable has an important relevance (t above 4.27) in the growth rate. In the global sample considered, the investment represents an average of 23.12% of the GDP. Additionally, the coefficient obtained for the sample as a whole, for the higher-income countries and for the lower-income countries are 0.172, 0.161 and 0.138 respectively. Therefore, with these data, a 10% change in the ratio of investment in the GDP would mean an increase in the average GDP rate of around 0.3 or 0.4%.

Finally, there is the size of public expenditures as a hypothetical cause for GDP growth, which has statistical significance (t above 4.62). The average size is 44.53% and the coefficient for the general sample, higher-income countries and lower income countries are -0.09879, -0.06531 and -0.13139 respectively. This means that a hypothetical decrease of the ratio to around 40% (less 10%) could increase the GDP growth rate on 0.4%, 0.3% and 0.6% respectively. If the limits for a confidence interval of 95% are considered, we have 0.3 - 0.5%, 0.2 - 0.4% and 0.4 – 0.8% respectively.

These results are consistent with previous studies, namely Afonso and Jalles (2015), which report that an increase in the size of the government by 10% points is associated with a 1.1-0.8% lower annual growth rate, and are consistent with the previous conclusion when I used the correlation between the average of public expenditures with the average of GDP growth rate.

A complementary method testing the endogeneity of the explanatory variables Investment and Education (that could be related to technology change) can also be used, using as variables instrumental the lags (n-1) of these variables. The results are below.

Chart 36 - Fixed-effects (within) IV Regression– All Countries

Growth	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
Investment	.168486	.0178949	9.42	0.000	.1334126	.2035594
Education	-.0000571	.0000405	-1.41	0.159	-.0001364	.0000223
P. Expenses	-.0938308	.0114462	-8.20	0.000	-.1162649	-.0713967
Liberty	.0002238	.0000966	2.32	0.021	.0000344	.0004132
Constant	.0167075	.0102786	1.63	0.104	-.0034383	.0368532

Number of obs = 622 Group variable: Year Number of groups = 21
R-sq: Obs per group:
within = 0.2944 min = 28
between = 0.4670 avg = 29.6
overall = 0.3071 max = 31
Wald chi2(4) = 1966.10 Corr (u_i, Xb) = 0.1732 Prob > chi2 = 0.0000
Sigma_u = .0113767 Sigma_e = .01556694 Rho .34815359 (fraction of variance due to u_i)
F test that all u_i=0: F (20,597) = 14.10 Prob > F = 0.0000

Chart 37 - Fixed-effects (within) IV regression – Higher – Income Countries

Growth	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
Investment	.1499342	.0267479	5.61	0.000	.0975092	.2023592
Education	-.0001024	.0000487	-2.10	0.035	-.0001977	-6.99e-06
P. Expenses	-.0553897	.0142729	-3.88	0.000	-.083364	-.0274154
Liberty	.0004682	.0001651	2.84	0.005	.0001447	.0007918
Constant	-.0121512	.0169678	-0.72	0.474	-.0454075	.0211051

Number of obs = 328 Group variable: Year Number of groups = 21
R-sq: Obs per group:
within = 0.2723 min = 14
between = 0.2697 avg = 15.6
overall = 0.2385 max = 17
Wald chi2(4) =1172.84 Corr (u_i, Xb) = 0.1121 Prob > chi2 = 0.0000
Sigma_u = .01104233 Sigma_e = .01275671rho .4283361 (fraction of variance due to u_i)
F test that all u_i=0: F (20,303) = 9.58 Prob > F = 0.0000

Chart 38 - Fixed-effects (within) IV regression – Lower – Income Countries

Growth	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
Investment	.1380594	.0323168	4.27	0.000	.0747197	.2013992
Education	-.0000677	.0000684	-0.99	0.323	-.0002018	.0000665
P. Expenses	-.1313939	.0224197	-5.86	0.000	-.1753356	-.0874521
Liberty	.0003419	.0002316	1.48	0.140	-.000112	.0007958
Constant	.0339274	.0186126	1.82	0.068	-.0025526	.0704074

Number of obs = 294 Group variable: Year Number of groups = 21
R-sq: Obs per group:
within = 0.3234 min = 14
between = 0.5316 avg = 14.0
overall = 0.3230 max = 14
Wald chi2(4) = 976.76 Corr (u_i, Xb) = 0.1913 Prob > chi2 = 0.0000
Sigma_u = .01398693 Sigma_e = .01715637 rho .39927382 (fraction of variance due to u_i)
F test that all u_i=0: F (20,269) = 8.16 Prob > F = 0.0000

The above results do not differ from those previously presented, with the sole exception of the effect of Public Expenses in the Higher-Income Countries, where in the Fixed-Effects IV method there is a lower effect (-0.0653060 vs -0.0553897). In everything else the conclusions are similar, as shown in the comparative chart below:

Chart 39 - Comparison Fixed-Effects and Fixed-Effects IV

					Impact variation 10%	
	Fixed-Effects	Fixed-Effects IV	Difference %	Average	Fixed-Effects	Fixed-Effects IV
Public Expenses:						
All Countries	-0.0987959	-0.0938308	-5.0%	44.5%	-0.44%	-0.42%
High - Income Countries	-0.0653069	-0.0553897	-15.2%	46.0%	-0.30%	-0.25%
Lower - Income Countries	-0.1313939	-0.1313939	0.0%	42.8%	-0.56%	-0.56%
Investment:						
All Countries	0.172373	0.168486	-2.3%	23.1%	0.40%	0.39%
High - Income Countries	0.1615096	0.1499342	-7.2%	22.2%	0.36%	0.33%
Lower - Income Countries	0.1380594	0.1380594	0.0%	24.3%	0.34%	0.34%
Liberty:						
All Countries	0.0002221	0.0002238	0.8%	67.90	0.15%	0.15%
High - Income Countries	0.0004502	0.0004682	4.0%	71.28	0.32%	0.33%
Lower - Income Countries	0.0003419	0.0003419	0.0%	63.79	0.22%	0.22%
GDP Growth						
All Countries				2.56%		
High - Income Countries				2.26%		
Lower - Income Countries				2.91%		

5 – Conclusion

The aim of this thesis is to assess whether the size of public expenditures influences long-term economic growth. For this purpose, a sample of 31 European countries (those in the EU and United Kingdom, Norway, Iceland and Switzerland) was selected, which would theoretically already be on the descending side of the Armey Curve, thus in a situation where more public expenditures would mean less economic growth. Although the 31 countries in the sample are all part of the developed world, they have very different per capita levels. In addition, we know that more developed countries tend to grow less and, by Wagner's law, tend to have larger States. To avoid these effects, a segmentation of the sample was performed between higher and lower per capita incomes. Therefore, all analyses were carried out on the basis of three samples: (i) the sample from the 31 countries, (ii) the sample of the highest 17 per capita income countries and (iii) the lowest 14 per capita income countries. In addition to the size of public expenditures there are other causes for different levels of economic growth, which is why other independent variables have also been selected: investment as proxy of physical capital, education (tertiary enrollment) as proxy of human capital and an index of liberty as an indicator of the quality of institutions.

Different analyses were developed. The first consisted of an analysis of the evolution over the period of 1995-2019 for each variable for the three samples of countries. Secondly the correlation between each variable without considering the time effect, using the average for the period of 1995-2019. Thirdly, correlations were produced considering all the data over the period under analysis. Finally, panel data techniques were carried out to determine the relevance of each explanatory variable in the GDP growth.

Based on the work performed, it is concluded that investment and the size of public expenditures are determinant in explaining the different GDP growth rates. There is some influence, albeit with weak statistical robustness, of economic freedom in GDP growth. Furthermore, education does not seem to be an explanatory variable at all, based on the data used.

For each percentage points increase of the size of government we have a reduction of about 0.1% in annual GDP growth, which is more notable in the lower-income countries (-0.13%) than in the higher-income countries (-0.6%). In other words, a high level of public expenditures is more detrimental to lower-income countries, countries that naturally tend to grow more and converge. These results are consistent with previous studies, namely Afonso and Jalles (2015), which report that an increase in the size of the government by 10% points is associated with a 1.1-0.8% lower annual growth rate

It is beyond the scope of this thesis to study the causes for a higher level of public expenditure to lead to a negative effect on growth. Such an investigation would lead us to the analysis of the composition of public expenditures, in particular for their classification between productive and non-productive expenditures. However, several hypotheses can be raised. Theoretically if the State performs an activity that can be carried out by the private sector with the same level of efficiency, there should be no effect. Moreover, the countries on the ascending side of the Armey Curve, which are usually the least developed, benefit from more State because it is more efficient in the supply of public goods, such as infrastructure. In more developed countries, where the presence of the State is already significant in the supply of public goods, more State can mean either inefficiencies in the provision of more service or even public expenses that by its nature are not productive, examples being the costs of bureaucracy or interest related to public debt.

6 – References

1. Acemouglu Daron (2009) Introduction to Modern Economic Growth, Princeton University Press
2. Afonso, António and Jalles, João Tovar (2015) Economic Performance, Government Size, and Institutional Quality, Empirica (2016) 43:83-109
3. Aghion, Philippe and Howitt, Peter (2009) The Economics of Growth, The MIT Press, Cambridge, Massachutsetts and London, England
4. Baltagi, Badi H. (2021) Econometric Analysis of Panel Data, Sixty Edition, Springer
5. Barra, Cristian, Ruggiero, Nazarenno and Zotti, Roberto (2020) Short - and Long - Term Relation between Economic Development and Government Spending: the Role of Quality of Institutions, Applied Economics, 52:9, 987-1009
6. Barro, Robert J. and Sala-i-Martin, Xavier (2004), Economic Growth, Second Edition, The MIT Press, Cambridge, Massachutsetts
7. Buchanam, M. James (1978) The economics of politics, Cambridgeshire College of Arts and Technology
8. Caplan, Bryan (1999) James M. Buchanam and Richard A. Musgrave, Public Finance and Public Choice: Two Contrasting Visions of the State, Department of Economics and Center for Study of Public Choice, George Mason University
9. Cass, David (1965) Optimum Growth in an Aggregate Model of Capital Accumulation, Review of Economic Studies 32: 233-240
10. Hagamini, Mehdi and Falahi, Mohammad Ali (2018) Economic Growth and Government Size in Developed European Countries, Economic Analysis and Policy 58 (2018) 1-13
11. Iransdoust, Manuchehr (2018) Wagner on Government Spending and National Income: a New Look at an Old Relationship, Journal of Policy Modeling 41 (2019) 636-646
12. Keynes, J. M. (1936) The General Theory of Employment, Interest and Money, London: Palgrave Macmillon

13. Koopmans, Tjalling C. (1965) On the Concept of Optimal Economic Growth, In the Econometric Approach to Development Planning, Amsterdam: North-Holland, pp, 225-295
14. Lamartina, Serena and Zaghini, Andrea (2010) Increasing Public Expenditure: Wagner´s Law in OECD Countries, German Economic Review 12(2): 149-164
15. Locke, John (1690) O Segundo Tratado do Governo, Fundação Calouste Gulbenkian
16. Lupu, Dan and Assandului, Mircea (2017) The Nexus Between Economic Growth and Public Spending in Eastern European Countries. Izinerine Ekonomika – Engineering Economics, 2017, 28(2), 155-161
17. Malthus, Thomas R. (1798) An Essay on the Principles of Population, London: W. Pickering
18. Musgrave, Abel Richard (1939) The Voluntary Exchange Theory of Public Economy, The Quarterly Journal of Economics, Feb., 1939, Vol 53, Nº 2 (Feb., 1939), pp. 213-237
19. Nyasha, Sheilla and Odhiambo, Nicholas M. (2019) Government Size and Economic Growth: a Review of International Literature, Sage Open July - September 2019: 1-12
20. Rajput, Sheraz and Tariq, Aziz (2019) Government Size and Economic Growth: a Panel Data Study comparing OECD and non-OECD Countries, Applied Economics Journal Vol. 26 No 2 (December 2019): 22-37
21. Ramsey, Frank (1928) A Mathematical Theory of Saving, Economic Journal 38: 543-559
22. Ricardo, D. (1817) Princípios de Economia Política e de Tributação, Fundação Caloute Gulbenkian, 5ª Edição
23. Schumpeter, Joseph A. (1934) The theory of economic development, Cambridge, Mass.: Harvard University Press
24. Smith, Adam (1976) The Wealth of Nations, Bantam Classic
25. Solow, Robert M. (1956) A Contribution to the Theory of Economic Growth, Quarterly Journal of Economics 70: 65-94
26. Tesarová, Zaneta (2020) The Wagner´s Law Testing in the Visegrád Four Countries, Review of Economic Perspectives Vol 20, Issue 4, 2020, pp. 409-430

27. Voltrath, Dietrich (2020) Fully Grown – Why a Stagnant Economy is a Sign of Success, University of Chicago
28. Wagner, A. H. (1904) Les Fondements de l`Économie Politique, Paris : Giard & Brière

7 – Appendix

7.1 – Database

https://d.docs.live.net/dcbb1623f3d8cd01/Economics/Thesis/Data/Final/Excel/Database