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Does the level of public spending influence the success of fiscal consolidations?

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Abstract

Fiscal consolidations are a popular theme, especially after the last financial and economic crisis. Scholars and policymakers have been studying what tends to influence the decision to perform a fiscal consolidation, but also which factors influence its duration, intensity and success. This dissertation aims to close a gap in the literature regarding what is the role of the level of public spending in the success of fiscal consolidations through reviewing the existing literature but also through an empirical research to support and complement this analysis, in order to contribute to the theoretical framework regarding fiscal consolidations and allow for future research on related and consequent questions. Existing literature on the composition of fiscal consolidations, the optimum government size and fiscal rules suggest that the level of public spending might have an impact on the success of fiscal consolidations. To complement this analysis, a *probit* model is applied to a data panel set on the 1995-2017 period of the 28 member states of the European Union at the time of investigation. The main conclusions suggest that the level of public spending before a fiscal consolidation has a positive impact on the chances of success of that fiscal consolidation, i.e. the higher the level of public spending in the year before a fiscal consolidation, the higher the probability of the fiscal consolidation being successful, everything else remaining the same, which may be in accordance with the literature finding that expenditure based fiscal consolidations are more likely to achieve success.

Keywords: fiscal consolidations, public spending, fiscal discipline, panel data, European Union

JEL Codes: C25, E62, H60

Resumo

As consolidações orçamentais são um tema relevante, especialmente após a última crise económica e financeira. Investigadores e decisores políticos têm vindo a estudar que fatores influenciam o início de um episódio de consolidação orçamental, mas também que fatores influenciam a sua duração, intensidade e sucesso. Esta dissertação tem como objetivo preencher a lacuna na literatura relativamente à importância do nível de despesa pública no sucesso das consolidações orçamentais através da revisão de literatura existente, mas também através de uma investigação empírica para complementar a análise, de modo a contribuir para a literatura existente no que toca a consolidações orçamentais e permitir o estudo de questões consequentes no futuro. A literatura existente relativamente à composição de consolidações orçamentais, da dimensão ótima do Estado e das regras orçamentais sugere que o nível de despesa pública possa ter um impacto no sucesso de consolidações orçamentais. Para complementar a investigação, foi estimado um modelo *probit* e aplicado a uma base de dados em painel para o período 1995-2017 nos 28 Estados membros da União Europeia à data da investigação. As principais conclusões da investigação sugerem que o nível de despesa pública anterior ao episódio de consolidação orçamental tem um impacto positivo na probabilidade de esta ser considerada um sucesso, isto é, quanto maior o nível de despesa pública no ano anterior ao episódio de consolidação orçamental, maior a probabilidade da consolidação orçamental ser bem-sucedida, *ceteris paribus*, o que poderá estar de acordo com a literatura que defende que consolidações orçamentais pelo lado da despesa pública têm uma maior probabilidade de serem bem sucedidas.

Palavras-chave: consolidações orçamentais, despesa pública, disciplina orçamental, dados em painel, União Europeia

Códigos JEL: C25, E62, H60

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Introduction

Fiscal consolidations are a popular theme amongst scholars and policymakers, having been an object of study in many perspectives and still today theory around this subject is being developed and tested, getting confronted with the latest data coming from the recent global economic and financial crisis.

Despite the importance given to the study of fiscal consolidations, to the best of my knowledge there is still a gap in the literature regarding the role of the level of public spending on the success of fiscal consolidations. Thus, the purpose of this dissertation is to review the relevant literature related to fiscal consolidations and try to get some empirical evidence regarding the importance of the level of public spending on the success of fiscal consolidations.

This dissertation's motivation comes from the lack of information regarding the role of the level of public spending on fiscal consolidations, being its main objective to get empirical evidence to close this gap, but also to review some relevant literature that builds the theoretical framework in which this research question fits into. Finding some empirical evidence regarding the importance of the level of public spending on the success of fiscal consolidations might enable this dissertation to contribute to the theoretical framework regarding fiscal consolidations and allow for future research on related and consequent questions as well as to help designing the appropriate public policies.

There are two important concepts that it is useful to clarify right from the beginning. First, it should be clarified that the level of public spending corresponds to the total government spending, which means that both interests and public investment are included. Finally, it is important to note that the success of fiscal consolidations is considered in terms of the sustainability of fiscal discipline. As such, a fiscal consolidation is considered to be successful, depending on the criterion that each author applies.

The dissertation is structured as follows: chapter 1 includes the literature review, with section 1.1. defining fiscal consolidations and the criteria to classify if it is considered successful or not; section 1.2. presents the current state of the literature regarding the importance of the composition of fiscal consolidations; section 1.3. comprises a brief description of the research on non-Keynesian effects of fiscal policy, section 1.4. summarizes the research around the influence of the government size on economic

growth; and finally, section 1.5. approaches the literature around the importance of fiscal rules, giving special attention to those that limit public spending. chapter 2 focuses on the empirical strategy, presenting an empirical application aiming to find evidence of whether the public expenditure level has an impact on the success of fiscal consolidations. Finally, the main conclusions and proposed further developments are presented in the Conclusion.

1. The literature on fiscal consolidations

Considering the research question of this dissertation, the literature review starts by identifying and defining the key concepts of the dissertation: fiscal consolidation and successful fiscal consolidation. Defining these concepts empirically is essential to later develop an empirical application that will aim at answering the research question. The empirical concepts will be crucial in spotting when did fiscal consolidation episodes occur and which of them were successful. The next sections focus on the current state of the literature regarding fiscal consolidations, exploring topics from the literature that should be taken into account in the study of the role of the public spending level on the success of fiscal consolidations.

The first of the topics explored to define the conceptual framework around the research question is the influence of the composition of fiscal adjustments on the success of fiscal consolidation, i.e. whether a fiscal consolidation has a higher chance of being successful if it is executed via expenditure cuts or tax rises. Next, the topic explored is the study of non-Keynesian effects, i.e. whether there are scenarios in which fiscal consolidations can originate economic expansions. Thirdly, the researched topic is the optimum government size measured by the expenditure level as a percentage of GDP, i.e. the study of the existence of an optimum government size, at least in theoretical terms, and how does the increase in the government size influence the economic performance. Finally, the last topic approached in this framework is the importance of fiscal rules, giving special attention to the fiscal rules that limit expenditure increasing.

It is useful to bear in mind that to the best of my knowledge there is no specific literature on this research question. The strategy aims at searching and exploring the relevant literature that contributes to define an adequate conceptual framework around the influence of the level of public spending on the success of fiscal consolidations.

1.1. (Successful) Fiscal consolidations

Fiscal consolidations can occur for several reasons: theoretically, responsible governments turn a favourable global economic setting into a chance to embark on a consolidation route supported by these conditions. Governments may have no choice but to wait for such favourable economic setting as a result of, for instance, credibility effects or their commitment to careful fiscal conduct, but sometimes governments find themselves

in an excessive public debt situation which would comply them into performing a fiscal consolidation. Molnar (2012) found that an important element to the start of a consolidation is a country's need for consolidate, but this start can also be triggered by monetary conditions or influenced by political economy factors. All these different possible causes may trigger a government to implement a fiscal consolidation, which can vary in size and duration.

Therefore, to research the influence of the public spending level on the success of fiscal consolidations, there is a need to define what a fiscal consolidation is. Fiscal consolidations can be defined in different ways, but they are usually conceptualized in empirical terms; for example, according to Alesina, Perotti, and Tavares (1998), a year of tight fiscal policy (fiscal consolidation) is a year in which the primary public deficit to GDP ratio decreases by at least 1.5 percentage points, i.e. a fiscal consolidation is seen as a policy that impacts the primary public balance to GDP ratio in a way that that ratio improves by at least 1.5 percentage points, in a certain year. Giavazzi and Pagano (1995) define it as a period in which the structural component of the primary fiscal balance changes in the same direction without interruptions. The authors used the cumulative changes in the primary cyclically-adjusted budget balance to potential GDP ratio that are at least 3 percent of potential GDP for 4 or 3 consecutive years, 2 percent of potential GDP for 2 consecutive years or if the change exceeds 3 percent of potential GDP in one single year. Alesina and Perotti (1995, 1997a) and Alesina and Ardagna (1998) use the Blanchard index (introduced by Blanchard (1990)), also considered by Alesina et al. (1998) in some of their tests to define a fiscal consolidation episode, which calculates a cyclically-adjusted budget balance assuming an unchanged unemployment rate with respect to the previous year. However, the criteria based on the cyclically-adjusted primary balance have an important disadvantage.

Molnar (2012) summarizes the explanations around the shortcomings of using a cyclically-adjusted primary balance: the major one is that, instead of only showing fiscal consolidations, it can also reflect accounting distortions and one-offs (Koen & van den Noord, 2005), but it will also account for revenue fluctuations due to growth surprises (Larch & Salto, 2005) and asset prices (Girouard & Price, 2004). To overcome this problem, authors can define a fiscal consolidation only as a large change in the cyclically-adjusted primary balance but there is a trade-off when using this practice: adjustments that

are more moderate (but that are extended for a longer period of time) end up being excluded from the analysis.

Having defined fiscal consolidations, one needs to define the criteria by which fiscal consolidations will be considered to be successful and, in a similar way to the definition of fiscal consolidation, successful fiscal consolidation is also defined in empirical terms; for example, Alesina et al. (1998) measure the success of fiscal consolidations by its persistency, i.e. a fiscal adjustment is successful if after a year of tight fiscal policy one of two conditions applies: in the three years afterwards, either the primary public deficit to GDP ratio is on average at least 2 percentage points below its level in the tight year, or the debt to GDP ratio is at least 5 percentage points below its level in the adjustment year. But the success of fiscal consolidations can be defined in different ways; for example, Molnar (2012) defines it as debt stabilization in the three years following the end of a consolidation episode, but even this author emphasizes the idea that there is a big variety in the definition of success regarding fiscal consolidations: the European Commission (2007) defines the success of a fiscal adjustment by using a cyclically-adjusted primary balance-based criterion, but Guichard, Kennedy, Wurzel, and André (2007) consider a fiscal consolidation to be successful if it stabilized the debt to GDP ratio and Barrios, Langedijk, and Pench (2010) use the public debt level to measure success, which is similar to the approach used by Molnar (2012), as explained above.

Once again, it is important to keep in mind that the success of fiscal consolidations is considered here in terms of the sustainability of fiscal discipline, as it is perceived by the different definitions provided above for successful fiscal consolidations.

1.2. Does the composition of fiscal consolidations matter?

As it was already explained in the introduction of this dissertation, there is a gap in the literature in what regards the role of the public spending level on the success fiscal consolidations. One of the major points of interest of the studies regarding fiscal consolidations is the composition of the fiscal adjustments and their influence on the success of fiscal consolidations, i.e. the central point of research is usually to determine if a fiscal consolidation has a higher probability of being successful if executed with expenditure-based adjustments or tax-based adjustments.

Most of the authors seem to agree that the composition of fiscal consolidations is a relevant question: Alesina et al. (1998) emphasize that the composition of adjustments matters, and even in more recent years Molnar (2012) states that the composition of consolidation measures seems to be related to its success in terms of the sustainability of fiscal discipline.

Alesina et al. (1998) found, using a data set of nineteen OECD countries for the 1960-1995 period, that two thirds of the deficit reduction in successful adjustments come from spending cuts, and in unsuccessful adjustments just one quarter of the adjustment is based on the spending side.

From that moment onwards, many other authors researched about what would be the path that would bring a higher chance of achieving a successful fiscal consolidation and there seems to be a consensus arguing that expenditure cuts are more likely to achieve success. Alesina and Ardagna (1998), von Hagen, Hallett, and Strauch (2002), Guichard et al. (2007), and Barrios et al. (2010) are some of the authors that reach the conclusion that fiscal consolidations based on expenditure cuts are indeed the ones that are more likely to be successful, and the European Commission (2007) even argues that a possible explanation for the higher effectiveness of expenditure-based fiscal consolidations, comparing to tax-based ones, is that spending cuts consolidations are usually accompanied by reforms that enhance the effectiveness of budgetary procedures. One other possible explanation is that, as Batini, Eyraud, Forni, and Weber (2014) argue, spending multipliers are usually larger than revenue multipliers, i.e. spending cuts are more potent than tax increases in affecting the economy.

In more recent years, Molnar (2012) studied the determinants of the success of a fiscal consolidation and found that adjustments based on expenditure cuts are more likely to stabilize debt (as mentioned in section 1.1., this author analyses debt stabilization to define if a fiscal consolidation is successful or not), but in some results the stabilization is only temporary and the author actually concludes that, regarding very large consolidations, debt stabilizes temporarily if those consolidations are expenditure-based because in those results the debt is stabilized a year after the episode finishes but escalates again in the following years. In the same study, the author also found that there are other factors that might help stabilizing debt: economic growth, an easing in monetary conditions (when captured by the long-term interest rate), the closer the government is to the centre (the

further it is from the centre, the smaller the probability of it stabilizing debt), and fiscal rules, which seem to be associated with successful consolidations, whether they are expenditure rules, budget balance rules or a combination of both; the author also found that the stronger the rules, the more effective they seem to be.

However, revenue-based adjustments can also achieve success and be effective. Tsibouris, Horton, Flanagan, and Maliszewski (2006) argue that if there is room to increase the revenue to GDP ratio, especially if the revenue types that are less damaging for growth are under-exploited, such as environmental taxes, user fees, value-added taxes and property taxes, revenue-based fiscal consolidations are more likely to achieve success. However, Alesina and Perotti (1997a) actually found that the successful adjustments that are tax-based, which represent a small share of the total successful adjustments, come almost exclusively from corporate income taxes and not indirect taxes.

Taking into account that most authors seem to agree that if a consolidation is based on expenditure cuts rather than based on tax increases it has a bigger chance of being considered successful, one consequent point of interest for the literature is to determine which expenditures should be reduced in order to increase the chances of a successful fiscal consolidation: Guichard et al. (2007) found that the areas where expenditure cuts should be focused in order to achieve success are social expenditures and transfers. Interestingly, the European Commission (2007) analysed the consolidations that occurred in the European Union and found that the expenditures on social protection, education and health increased during consolidation periods, whilst the cuts focused on economic affairs (such as capital transfers, subsidies, intermediate consumption and fixed capital formation) and housing and community amenities. Also, Alesina and Ardagna (2010) argue that past empirical studies found that decreasing the current government spending is more likely to lead to successful consolidations due to the less productive character of current public spending when compared to capital expenditure.

There are some reasons behind the inclusion of the literature review about the composition of fiscal adjustments in this dissertation. First of all, and as explained above, there is a clear gap in the literature regarding the role of the public spending level on the success of fiscal consolidations, but the central point of fiscal consolidation studies is usually the composition of fiscal adjustments, thus it is useful to summarize the state of the literature regarding that topic since it is one of the most researched regarding fiscal

consolidations. Then, the fact that the literature concludes that expenditure-based adjustments are more likely to produce a successful fiscal consolidation is also important because expenditure-based adjustments are changes in the public spending level. Intuitively this relationship might help to investigate whether the public spending level impacts the chance of success of fiscal consolidations: if expenditure-based adjustments are more likely to be successful and if there are fiscal consolidations that follow that strategy and are not successful, that might be because of the public spending level. In other words, the fact that the empirical evidence on the success of fiscal consolidations is explained by its composition is somewhat mixed may be due to other missing explanatory variables. Our point is that the level of public spending may play an important role in this adjustment process.

1.3. Not all fiscal consolidations are contractionary

To study the role of the level of public spending on fiscal consolidations, one should first understand that there are authors who argue that not all of them are contractionary: "some are, and some are not" (Alesina et al., 1998, p. 198). Thus, according to Alesina et al. (1998), it is usual to distinguish fiscal consolidations from economic contractions and to give credence to the idea that reductions in budget deficits can be expansionary, under certain conditions.

Some of the first authors to start working on the possibility of an expansionary fiscal consolidation were Giavazzi and Pagano (1990): the authors analysed the 1987-1989 Irish and the 1983-1986 Danish consolidations and found that those adjustments had expansionary effects on the economy instead of contractionary. They argue that fiscal consolidations may lead to recessions (through the usual Keynesian mechanism), but in some cases a fiscal consolidation is accompanied by an economic expansion: this was achieved, for example, in the 1983-1986 Danish consolidation, in which the government cut public investment (stabilizing government consumption) and raised net taxes and in the 1987-1989 Irish consolidation by cutting in government consumption and public investment. In both cases, private consumption and private investment grew at a very good rate, which more than compensated for the public cuts. In Giavazzi and Pagano (1995), the same authors expanded their 1990 work and started studying which circumstances may have given birth to those, at the time, unusual results. In fact, the possibility that fiscal consolidations may lead to expansionary results in the short run, i.e. the occurrence of non-

Keynesian effects, has stimulated the interest among academic economists and policymakers since the first empirical results in the early 1990s showed that prospect (Bhattacharya & Mukherjee, 2013).

There are two primarily mutually nonexclusive views to justify how fiscal adjustments can generate expansionary results. As summarized by Bhattacharya and Mukherjee (2013), the first view lays emphasis on the wealth effect on consumption and on expectations on future tax liabilities, having private demand reacting to the perceived credibility of a fiscal adjustment, that is, when public spending cuts are perceived by the population as permanent, consumers will anticipate a reduction in the tax burden and then a permanent increase in their lifetime available income. So, in contrast with the usual Keynesian mechanism, the wealth effect foresees that private consumption increases when government cuts expenditure. Similarly, a tax increase would usually result in a reduction in private demand (being contractionary), but it can be expansionary if a tax increase makes consumers disregard beliefs that larger tax increases would be necessary in the future. This first view suggests that there may also be another mechanism at work: the credibility effect on interest rates. High or rapidly increasing public debt levels may face a high interest rate premium due to inflation or default risks and, if a fiscal consolidation is perceived as permanent and successful, it may lead to a reduction of real interest rates which in turn can lead to an increase in private investment and consumption. This view – based on both the wealth and credibility effects – focuses on the demand side and was proposed by the already mentioned authors Giavazzi and Pagano (1990), but also explored by Bertola and Drazen (1993) and Sutherland (1997).

The second perspective is also synthesized by Bhattacharya and Mukherjee (2013). It focuses on the supply side effects of fiscal adjustments operating through the labour market and was proposed by Alesina and Perotti (1997a, 1997b) and Alesina and Ardagna (1998). If leisure and consumption are normal goods, an increase in income taxes will reduce the disposable income and also the demand for both leisure and consumption and will increase labour supply – this is the income effect; but at the same time, there is the substitution effect, that implies that higher income taxes should reduce labour supply, due to the decrease of the opportunity cost of not working. Thus, the income effect and the substitution effect work in opposite ways regarding the effect of an increase in income taxes on labour supply, so that the outcome is uncertain, i.e. a tax cut can lead either to an

increase or a decrease in the supply of labour.

It is important to notice that a fiscal consolidation policy operates through both the demand side (with both its mechanisms) and the supply side and the results are highly influenced by certain conditions. Sutherland (1997) and Perotti (1999) demonstrate that when fiscal consolidations happen in situations characterized by high or rapidly increasing public debt to GDP ratio, the positive wealth-expectation effects should be stronger (since this scenario makes it more credible for a government to cut permanently in expenses, making the population anticipate a reduction in the tax burden, and so anticipate an increase in their lifetime available income), which is also the condition that allows the work of the credibility effects on the interest rates mechanism. Alesina et al. (1992) show that, regarding the credibility effects on the interest rates mechanism, the risk premium probably is only significant when the public debt to GDP ratio reaches a relatively high enough threshold. All these conditions point to a "fiscal stress" situation, which is a specific scenario that allows governments to implement deficit reduction interventions that will seem credible to the population, thus changing their expectations. Those are the conditions that allow a government to put in practice a fiscal consolidation that results in expansionary economic effects; if there were no such conditions, the fiscal consolidation would not result in expansionary economic effects. Thus, a scenario with high public debt to GDP ratio makes it more plausible to justify the existence of non-Keynesian effects, because it increases the importance of both the wealth and the credibility effects, leaving the usual Keynesian correlations to work regularly in "normal situations" (Alesina et al., 1998).

Alesina et al. (1998) also found evidence that the rate of economic growth of the G7 countries increases during a successful fiscal adjustment, giving the authors foundation to state a key regularity in their estimations: "the macroeconomic environment does not deteriorate during successful adjustments" (Alesina et al., 1998, p. 206).

It is important to take note that in more recent years, after the fiscal consolidations that resulted from the recent financial and economic crisis, there has been some debate on whether the existence of non-Keynesian effects are as frequent and strong as previous studies stated. The most recent discussions, like the ones present in Blanchard and Leigh (2013) and Alesina, Barbiero, Favero, Giavazzi, and Paradisi (2015), are actually focused on the size of fiscal multipliers before, during and after the most recent financial and economic crisis. The first authors conclude that the predictions for the fiscal multipliers in

2011 (based on previous fiscal consolidations) were smaller than the actual fiscal multipliers, suggesting that fiscal multipliers are larger after the recent crisis. In their study, Alesina et al. (2015) actually conclude that for the 1986-2007 period, expenditure-based consolidations are correlated with an output increase whilst tax-based adjustments have a negative effect on output and on the 2009-2013 period expenditure-based adjustments were much less costly to GDP than tax-based adjustments; these conclusions go in conformity with what the literature states, which is explained in section 1.2. Additionally, the authors have different results from the ones of Blanchard and Leigh (2013): they conclude that probably no changes or only negligible changes in the fiscal multiplier have occurred after the most recent crisis; this difference may be due to the fact that Alesina et al. (2015) applied the model to fiscal consolidations episodes, whilst Blanchard and Leigh (2013) apply their model unconditionally.

Non-Keynesian effects are important to consider for the analysis of the role of the public spending level on the success fiscal consolidations because it can change the categorization of a fiscal consolidation: it being successful or not, or even it being considered a fiscal consolidation in the first place. This depends on the definition adopted for the concept of fiscal consolidation and for the concept of successful fiscal consolidations that, as it was already explained, varies from author to author. For example, the successful fiscal consolidation definition used by Alesina et al. (1998) and Guichard et al. (2007) are ratios in which the denominator is the GDP, i.e. the impact of a fiscal consolidation on the economic performance impacts the chances of success of a fiscal consolidation in two ways. To exemplify these two impacts, consider that the criteria adopted to define a fiscal consolidation is the measure of the primary public balance to GDP ratio, similar to the one considered by Alesina et al. (1998). From the authors' perspective, a fiscal consolidation occurs when the primary public balance (primary public deficit) to GDP ratio increases (decreases) by at least 1.5 percentage points. Considering a fiscal consolidation with contractionary economic effects, a possible scenario might be the increase of the primary public balance but also the degradation of the economic performance, resulting in a decrease of the GDP. This would be a possible scenario that would increase the primary public balance to GDP ratio, since the numerator increases and the denominator decreases. However, if in the implementation of a fiscal consolidation the conditions are such that non-Keynesian effects occur, the denominator will be positively impacted (GDP will increase); but the numerator will also be positively impacted: the

public balance will increase either by the cut on public expenditure or by the increase in revenue, and since the primary public balance also depends on the GDP (due to the functioning of the automatic stabilizers), the increase of the latter (due to non-Keynesian effects) helps the first increasing as well. This scenario is possible (under certain conditions) and the final effect on the primary public balance to GDP ratio would not be determined since both the numerator and the denominator would increase. Thus, there is the possibility of such policy strategy not being considered a situation of fiscal consolidation (if the ratio does not improve by at least 1.5 percentage points).

As perceived by the example given, the existence of non-Keynesian effects would be able to make a certain episode of discretionary fiscal contraction not being considered a fiscal consolidation, under certain conditions.

1.4. Optimum government size

For years economists have asked which would be the ideal mechanism for resource allocation in the society and the reality is that much of it is affected by governments. Thus, the emergent question is: what is the appropriate amount of government involvement in the economy?

To answer this question, it is first required to find a way of measuring the government impact on the economy, but as Di Matteo (2013) explains, there is no single quantitative measure that summarizes the entire impact of government on the economy. In fact, economic measures of the size of the government attempt to relate the influence of government to its control over economic resources. Therefore, one of the most common measures is government spending as a share of the gross domestic output (GDP). Even though it is a relatively simple view of the effect of governments on the economy, the data is more readily available and more easily quantifiable and thus enables more adequately time and space comparisons than measures that take into account the effects of government's regulation, for example.

Given the standard measure for the government size, one must define what will be the economic performance variable that will measure its impact. The rate of economic growth is a key economic performance variable, so it can be considered as the measure of economic performance. Whether a larger public sector has a negative or positive impact on

economic growth is, fundamentally, an empirical question and there is an abundant number of studies that have examined the relationship.

Landau (1983) is one of the first studies around the correlation between the size of the government and the economic performance. The author found that the correlation was negative by examining the relationship between the share of government consumption expenditure in GDP and the rate of growth of real per capita GDP for less developed countries in the period of 1960 to 1980. The conclusion supports the Wagner's Law that states that, as Auld and Miller (1982) explain, government spending is expected to grow faster than the economy in industrialized countries and there has been a number of studies around this relationship since then, and most of them conclude that there is a negative correlation between the government size and the economic performance. However, there are some studies that conclude the opposite.

Ram (1986) found, using the same data as Landau (1983), that the empirical relationship between the public sector and GDP growth is positive. Colombier (2009) also found a positive correlation between government size and economic growth, using OECD data.

Interestingly, Barro (1990) argues that government spending is beneficial for the economy when directed to institutional infrastructure like property rights, but as expenditure levels rise, economic growth eventually decline as spending gets directed to less productive activities, i.e. the author states that the government size is positively correlated with the economic performance when the first grows by directing its expenditure to institutional infrastructure (considered to be of a more productive character); however, as the government size increases, the correlation turns into a negative one, since the spending starts to get directed to less productive activities. This can be seen as an argument that matches what was later presented by Armey (1995) and known as the Armey Curve. As Di Matteo (2013) explains, there is no theory that specifically relates the size of the public sector and economic growth but there is a relationship that is known as the Armey Curve, presented in 1995. It is a hump-shaped relationship between the government size and economic growth. For a small size, when there is an expansion of the public sector, it has a positive impact on economic growth, as the development takes place and the provision of infrastructure complements the private sector growth. There is, however, a certain point at which the growth of the public sector results in diverting resources into less productive

activities such as rent-seeking, as well as in higher taxes financing the expansion of the public sector, which reduces the economic growth.

In Barro (1991), the author actually found that economic growth is inversely related to the share of government consumption in GDP and insignificantly related to the share of public investment, by examining the growth rate of real per capita GDP for the period of 1960 to 1985 in 98 countries.

Other particular interesting research is Scully (1991) in which the author analysed the relationship between government size (measured by the ratio of taxation to GDP) and economic growth between 1960 and 1980 for 113 countries and found that rates of economic growth are maximized when the size of the government is 19% of GDP, approximately. This investigation incited a Scully Curve identical to the Armey Curve in shape, but taking into consideration the taxation to GDP ratio, instead of the public expenditure to GDP ratio used in the Armey Curve.

In a more recent empirical study, Asimakopoulos and Karavias (2016) also examined the relationship between the government size and economic growth and identified the optimal government size to be 18.04%, measured by the public expenditure to GPD ratio, which is a similar result to the one found by Scully (1991).

Even more recently, Afonso and Schuknecht (2019) studied a number of advanced countries in order to assess how big should a government reasonably be. The average public spending in this sample was 45% of GDP, but the authors found that, to obtain the same levels of performance, the countries were spending 27% above the necessary, i.e. the average public spending level on those countries should be around 35% of GDP and this value would allow them to maintain their performance levels. This study obviously differs from the ones by Scully (1991) and Asimakopoulos and Karavias (2016) as it does not research the (theoretical) optimum level of government, but instead the authors study the actual size of the government in different countries, figuring if those governments are overspending or not, given a certain government performance level. Despite the clear differences of the purposes of this article when compared to the researches from Scully (1991) or Asimakopoulos and Karavias (2016), it is important to realize the difference between the theoretical optimum government size that those authors found and the actual government size values on advanced countries studied by Afonso and Schuknecht (2019).

Baumol (1993) defends a cost-disease view, which argues that the production of

government output is labour intensive and exhibits low productivity, while the demand for government output is income elastic. This means that as income increases, government production grows more than proportionally and employs an increasing share of GDP. Also, Buchanan (1980) explains that rent-seeking and the resources dedicated to this practice are positively correlated to the size of the government. Both these theories provide explanations that support a relationship between the government size and the economic growth like the one stated in the Armey Curve or the Sully Curve, since the theories provide a justification to a decline in economic performance after a certain government level.

Regarding the different conclusions respecting the correlation between the government size and the economic performance, Bergh and Henrekson (2011) argue that research on the government size and economic growth sometimes produce conflicting conclusions due to the different definitions used for government size and also due to the countries in which the research is focused.

By having a relationship with the economic performance, the government size will also impact the success of fiscal consolidations. With some similarities to what was explained in section 1.3. regarding the impact of non-Keynesian effects on the success of fiscal consolidations, the government size will also impact the success of fiscal consolidations via its relationship with the economic performance. Taking into consideration the same example as the one given on section 1.3., the definition is the one used by Alesina et al. (1998), i.e. a fiscal consolidation occurs when the primary public balance (primary public deficit) to GDP ratio increases (decreases) by at least 1.5 percentage points. This means that by affecting GDP growth, the government size will have an impact on the chances of success of fiscal consolidations not only through the denominator but also through the numerator (both directly via the public expenditure and taxation and indirectly via the effects of the GDP) of the definition presented above. Additionally, it is also important to take into account the fact that fiscal consolidations consist of changes on the government size i.e., if a fiscal consolidation is tax-based it will result in the increase of the government size (if we consider the government size to be defined by the share of taxes on GDP), and if a fiscal consolidation is expenditure-based it will result in the reduction of the government size (if we consider the government size to be defined by the share of public expenditure on GDP); this relationship is the same as the

one mentioned at the end of section 1.2., since the government size can be measured by the level of public spending.

Considering section 1.2. and the composition of fiscal consolidations, one possible role that the level of public spending might play on the success of fiscal consolidations is that if that level is too high and above the optimum government size, performing an expenditure-based fiscal consolidation might be more likely to be successful because it reduces the level of public spending to a level closer to the optimum government size.

Finally, the existence of an optimum government size measured by the level of public spending is also, intuitively, seen as a predictable restriction to the influence of the public spending level on fiscal consolidations, i.e., intuitively, if the public spending level has an impact on the chances of a fiscal consolidation being successful, that impact could change depending whether the public spending level of a certain country is under or above the theoretically optimum government level, which according to Scully (1991) is about 19% of GDP (measured by the revenue to GDP ratio) and according to Asimakopoulos and Karavias (2016) is about 18% (measured by the public expenditure to GDP ratio).

1.5. Fiscal discipline and fiscal rules

The recent financial and economic crisis was accompanied by a sovereign debt crisis, at least for European countries, that served as a reminder that countries must not forget the importance of fiscal discipline, not even take it lightly.

As it was stated in previous sections, the classification and criteria used to define a fiscal consolidation as successful in this dissertation is with respect to fiscal discipline: as Wyplosz (2013) explains, this is not a year-by-year concept but a medium- to long-term attribute; it may even be defined as when, over a long period of time, the debt to GDP ratio is stationary or decreasing, which actually is similar to the concepts used by Guichard et al. (2007), Barrios et al. (2010) and Molnar (2012) to define the success of a fiscal consolidation.

As stated in section 1.1., theoretically, fiscal consolidations would only be applied by governments as a countercyclical fiscal policy. However, if this was the case, budgets would alternatively show a deficit or a surplus, depending on the economic conditions, with these variations being primarily driven by business cycles and countercyclical fiscal policy. There is yet a number of reasons that add to these fluctuations, as summarized by Wyplosz

(2013): fluctuations on the budget balance may be higher due to governments borrowing money to invest during a recovery stage, or because of war purposes, or else in the outcome of a financial crisis that drove the government to bail out some banks. This demonstrates that fiscal discipline can be vulnerable to a number of circumstances that may, apparently, have little to do with the regular budget. Also, when unexpected spending needs arise, fiscal discipline becomes harder to ensure.

However, these are not the only explanations about what makes governments be fiscal undisciplined. The deficit bias problem occurs for a number of reasons, but there are two that are considered to be the most important ones, as explained by Wren-Lewis (2011): the first one is the governments' tendency to push the discipline burden out to future governments or future generations. Governments tend to be fiscal undisciplined because they want to delay the policies and consequences associated to fiscal discipline in such a way that they tend to strategically use fiscal policy to pursue electoral motivations. The second reason is associated with the democratic processes and politics around groups of interests: politicians tend to increase their election (or re-election) chances by trying to catch the votes of interest groups, providing public endowments at the loss of future taxpayers.

Wyplosz (2013) explains that shifting the debt weight to future governments and spending above taxing level are demonstrations of the common pool problem. This problem emerges when the beneficiaries of public expenditure (or tax benefits) ignore the externalities that they impose on the other taxpayers. The author defines two sets of externalities: intra temporal externalities that consist on the pressure groups grabbing benefits and intertemporal externalities that occur when governments shove out taxes on future generations. The author also explains that the common pool problem is in the essence of democratic systems; such would not be the case only if voters were completely homogeneous and cared about the future generations as much as they care about themselves. Since this is not the case it is not surprising that governments tend to run deficits frequently, which contributes to the deficit bias problem being perceived as universal.

Additionally, when fiscal discipline is forgotten it ends up having considerable economic consequences like what happened in the recent financial and economic crisis. Thus, some mechanisms are necessary to keep governments' fiscal discipline under control,

such as fiscal rules.

Kopits (2001) and Wyplosz (2013) use a restrictive definition for fiscal rules, as both authors consider fiscal rules only to be numerical rules in order to exclude institutions (a different fiscal discipline control mechanism) from the definition. However, both fiscal rules and procedures and institutions are important to keep fiscal discipline since both can constrain the policymakers' ability to strategically use fiscal policy to push the fiscal burden to future generations or future governments.

Fiscal rules can have a variety of forms, setting upper limits on public spending, budget balance or debt or they can stipulate lower limits for government revenue. Fiscal rules are also different in their application period, some are year-by-year, but others are for a number of years. In theory, well-designed and implemented fiscal rules can reduce or even eliminate the deficit bias problem. However they have limitations: Kydland and Prescott (1977) describe that fiscal rules are essentially arbitrary and non-contingent, and therefore they are in some cases suboptimal, which creates a time-consistency problem.

Besides those limitations, Wyplosz (2013) argues that fiscal rules are self-imposed by the elected officials that they are designed to bind, i.e. the decision makers whose behaviour is being constrained by fiscal rules are the ones designing those same fiscal rules. This way, fiscal rules work as laws that restrict freedom for common good but that present a big challenge: keeping those rules in place when they are required. The author explains that even though fiscal rules are self-imposed, elected officials do not want to be limited, and there have been occasions where potentially useful rules were rescinded right when they became needed the most, such as the case of Europe's Stability and Growth Pact. However, the author also argues that fiscal numerical rules have often been successful in keeping fiscal discipline in governments. On this topic, Debrun and Kumar (2007) studied the impact of fiscal rules on the primary balance and found that fiscal rules can indeed be effective.

If fiscal rules can be effective in keeping governments' fiscal discipline, this means that the presence of fiscal rules is related to the success of fiscal consolidations, since the latter is measured in terms of the sustainability of fiscal discipline. However, this conclusion cannot be taken without first analysing if fiscal rules have any impact on economic growth.

Regarding the impact of fiscal rules on economic growth, Wyplosz (2006) argues

that EU fiscal rules may have a negative influence on economic growth, undermining it in Europe. There are some empirical studies that support that argument: Hein and Truger (2005) analysed the effects of EMU fiscal and monetary policies on growth and on convergence. The authors found that the Stability and Growth Pact (and the European Central Bank policy stance) had restrictive effects on economic growth. Similarly, Soukiazis and Castro (2005) make a direct analysis between the growth in the period before the Maastricht treaty and the one after the treaty and found that the greater fiscal discipline resulting from the fiscal rules was harmful to economic growth.

Taking into consideration the results from the authors above and the primary public balance to GDP ratio as the criteria for assessing the success of fiscal consolidations, one cannot determine the exact effect of the existence of fiscal rules on the success of fiscal consolidations, since fiscal rules seem to have a positive impact on fiscal discipline but a negative impact on economic growth (which indirectly impacts the public balance negatively).

A more recent study did, however, come up with a different result: Castro (2011) tried to find an empirical answer to the question of whether the Stability and Growth Pact fiscal rules had a negative effect on EU growth by making an analysis similar to the one of Soukiazis and Castro (2005). The author concluded that growth was not negatively affected for the period after the Maastricht treaty, sustaining the view that the rules in the Stability and Growth Pact are important to promote fiscal consolidation and economic stability, which in turn are fundamental to guarantee sustainable economic growth.

Given this more recent result, if we consider that fiscal rules have no negative impact on economic growth, one can now assume that fiscal rules have a positive impact on the success of fiscal consolidations, due to the positive impact on fiscal discipline.

For the purpose of this dissertation, it is particularly important to take into consideration fiscal rules that limit public expenditure: as explained by Dudine, Eyraud, Lledó, and Peralta (2018), expenditure rules are the ones that set limits on the current, primary or total spending (nominal or real) which are usually set in absolute terms or growth rates and in some cases in percentage of GDP. One example of such rules is the expenditure benchmark introduced in 2011 into the Stability and Growth Pact, establishing that the net growth rate of government expenditure should be at or below a country's medium-term potential economic growth and even though it is not a strict rule but a

benchmark, it is an useful example for demonstration purposes: rules such as these are a clear constrain on the level of public expenditure (via its growth), which is the same as saying that expenditure rules can limit the government size.

According to Haavelmo (1945), under certain circumstances, an increase in public spending that is completely covered by taxes will result in an increase of GDP (equivalent to the increase in public expenditure, i.e. the fiscal multiplier is 1). Considering what was explained in section 1.4., the increase in GDP is possible initially while the country is developing its infrastructures, but it will reach one point, after which the increase in government size will have a negative effect in GDP. This interaction between the theories demonstrates why public expenditure fiscal rules are important to complement budget balance fiscal rules: under budget balance fiscal rules, governments might increase the government size by funding public expenditure with taxes which initially might have a positive impact in GDP depending on the economic conditions and the size of the government but that will inevitably end up having a negative impact in GDP if the government size continues to increase; public expenditure fiscal rules will limit this increase in government size and avoid reaching the point from which the increase in government size will have a negative impact in GDP.

Additionally, on a favourable economic setting that is propitious to GDP growth, governments might feel tempted to take advantage of such scenario and increase public expenditure for electoral reasons and, as explained in section 1.4., at an initial stage under certain circumstances, such policies would result in an increase of output, which the government would take advantage of and again, increase public expenditure for electoral motivations. When taking this cycle into consideration as well as a certain rigidity of public expenditure (due to legal or electoral reasons, governments might be resistant to cut on public expenditure), one can understand that there is a clear importance of imposing limits to public expenditure or public expenditure growth in the form of fiscal rules, which would avoid or at least limit such behaviour.

Taking into consideration what was explained in section 1.4., these fiscal rules might have a positive impact on the success of fiscal consolidations because these might limit how much public expenditure can grow above the optimum government level which could be, around the 19% or 18%, according to Scully (1991) and to Asimakopoulos and Karavias (2016) respectively and, i.e. if the level of public expenditure is above the

optimum level and gets reduced to around that same optimum level with a fiscal consolidation, the fiscal rule might impact the success of that fiscal consolidation positively, since it will not allow the public expenditure to grow to an undesirable level, maintaining fiscal discipline. However, if an expenditure-based fiscal consolidation is executed when a country is already bellow the optimum government level and fiscal rules do not allow public expenditure to grow, these rules might have a negative impact on the success of the fiscal consolidation since they are not allowing the economy to reach its full potential (by limiting public spending). This may be important to determine the success of a fiscal consolidation if we take into consideration the success concept used by Alesina et al. (1998) - the primary public balance to GDP ratio; even though the primary public balance will be fiscally disciplined, the GDP will also be taken into account when determining the success of the fiscal consolidation, which means that the impact of the fiscal rule on the public spending level will impact the success of the fiscal consolidation via its effects on GDP.

Overall, according to Molnar (2012), independently of whether they are expenditure rules, budget balance rules or a combination of both, fiscal rules seem to be associated with successful consolidations; the author also found that the stronger the rules, the more effective they seem to be.

2. Approach on the importance of the public spending level

The main purpose of this dissertation is to find empirical evidence of the influence of the level of public spending on the success of fiscal consolidations.

The empirical approach to the research question starts by defining the time and space dimensions that will be part of such an investigation: the period of analysis will range from 1995 until 2017, targeting the study of the European Union (EU) countries.

The following step is to define the key concepts identified in section 1.1., i.e. both the concepts of fiscal consolidation and of successful fiscal consolidation need to be empirical defined in order for the fiscal consolidation episodes to be identified and categorized as successful or unsuccessful. The chosen definition of these concepts is of the upmost importance since, as already stated in section 1.1., there are some shortcomings associated with some of the definitions, for example, as explained by Molnar (2012), using the definition that involves the cyclically-adjusted primary balance may lead to identifying as fiscal consolidations some episodes that are no more than one-off measures; this shortcoming can be overcome by defining the fiscal consolidation as a larger variance in the cyclically-adjusted primary balance, but this comes with a different disadvantage: moderate episodes of fiscal consolidations might not be defined as fiscal consolidations.

Thus, section 2.1. will explain the empirical strategy defined to approach the research question; section 2.2. will develop around the definition of fiscal consolidation episodes and their categorization as successful or unsuccessful; section 2.3. describes the base model specification and variations estimations. Finally, the results will be analysed and discussed in section 2.4. and the empirical limitations will be described in section 2.5..

2.1. Empirical strategy

Given the research question "Does the level of public spending influence the success of fiscal consolidations?", the empirical study requires the analysis of multiple variables for 28 countries (EU member states at the time of this investigation[1]) across 23 years (1995-2017).

[1] These are the countries in the EU at the time of investigation: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

The spatial dimension under analysis comprises the 28 EU countries as those share a common budget framework which presumably places these countries in a more similar scenario regarding fiscal rules, which is one of the aspects that influences the success of fiscal consolidations.

The selected time series goes from 1995 until 2017 which coincides with the implementation of the 1995 version of the European system of national and regional accounts (ESA) that allows for a more uniform design for the national accounting of European countries. The last year of the analysis period is 2017 as it is the most recent year with close to final data.

After empirically defining the key concepts, identifying the fiscal consolidation episodes and categorizing them as successful or not, an econometric model will be built in order to analyse those episodes. Since the purpose is to find empirical evidence of the influence of the level of public spending on the success of fiscal consolidations, the explanatory variable of interest is the public spending to GDP ratio.

The nature of this strategy requires the use of a panel data as it allows the analysis of data containing time series observations of the countries which, as Hsiao (2007) explains, has its advantages: it allows for a more accurate inference of model parameters as the panel data regularly contains more degrees of freedom and it also allows for a better capacity for capturing the intricacy of economic agents behaviour.

2.2. Episodes of (successful) fiscal consolidations

Following the discussion on section 1.1. around the definition of the key concepts and, the concept chosen to empirically define a fiscal consolidation is the one used by Alesina et al. (1998) for its simplicity and for the availability of the required data. This means that every year in the database in which the primary public balance to GDP ratio improves by at least 1.5 percentage points (in comparison to the year before) is a fiscal consolidation episode.

The application of the concept determines that there is a total of 113 episodes of fiscal consolidation out of 645 observations distributed across the 28 EU countries, with the distribution displayed in Table 1.

Table 1. Number of fiscal consolidation episodes per EU country between 1995 and 2017

Country	Number of fiscal consolidation episodes		
	1995-2007	2008-2017	Total
Austria	4	2	6
Belgium	1	0	1
Bulgaria	3	3	6
Croatia	0	3	3
Cyprus	5	1	6
Czech Republic	3	1	4
Denmark	2	2	4
Estonia	3	1	4
Finland	4	1	5
France	0	1	1
Germany	4	1	5
Greece	1	4	5
Hungary	4	1	5
Ireland	0	4	4
Italy	2	0	2
Latvia	1	2	3
Lithuania	1	3	4
Luxembourg	3	0	3
Malta	3	2	5
Netherlands	1	1	2
Poland	1	1	2
Portugal	2	4	6
Romania	1	4	5
Slovakia	4	2	6
Slovenia	1	3	4
Spain	1	2	3
Sweden	4	0	4
United Kingdom	2	3	5
Total	61	52	113
Average	2.2	1.9	4

Source: Own calculations based on data from AMECO.

By examining Table 1, it is noticeable that between 1995 and 2017, Austria, Bulgaria, Cyprus, Portugal and Slovakia are the countries that experienced the largest number of fiscal consolidation episodes with 6 episodes each, 2 more fiscal consolidation

episodes than the average number of fiscal consolidation episodes per country in the period under analysis. Both Belgium and France show the lowest number of fiscal consolidations episodes between 1995 and 2017 with only 1 episode. One other interesting point is that, from the countries targeted for financial help in the recent crisis, Greece, Ireland and Portugal had a significant amount of fiscal consolidation episodes (4 episodes), Spain had 2 episodes, but Cyprus performed only 1 fiscal consolidation episode in the 2008-2017 period. Finally, it is curious to note that Belgium, Italy, Luxembourg and Sweden performed no fiscal consolidation episodes between 2008 and 2017, using Alesina et al. (1998) criterion.

Regarding the success of fiscal consolidations, the definition adopted is one of debt stabilization similar to the ones from Guichard et al. (2007), Barrios et al. (2010) and Molnar (2012) as it allows to define the success of fiscal consolidations in terms of the sustainability of fiscal discipline. Therefore, a fiscal consolidation episode is considered to be successful if, on average, the public debt to GDP ratio in the year of the fiscal consolidation and the year after did not increase, i.e. if the change of the public debt to GDP ratio is, in average, null or negative on the year of the fiscal consolidation episode and the year after. The authors mentioned above tend to use a longer-term definition for the sustainability of fiscal discipline by taking into consideration more than two years when measuring the success of fiscal consolidations, but for the purposes of having the ability to evaluate the success of more recent fiscal consolidations, our definition focus on a shorter-term fiscal discipline.

The application of this definition determines that there are 63 successful fiscal consolidation episodes out of the 113 total fiscal consolidation episodes previously determined across all 28 EU countries, which means that approximately 56% of the fiscal consolidation episodes in the database are successful, with the distribution presented in Table 2.

By analysing Table 2, one can notice that there is some disparity in the success rate of the different countries regarding the sustainability of fiscal discipline after a fiscal consolidation episode. On one hand, Austria, Cyprus, Denmark, Estonia, Finland, Germany and Sweden have the highest number of successful fiscal consolidation episodes with 4 each; however, from this group of countries, only Denmark, Estonia and Sweden have a 100% success rate on fiscal consolidation episodes, alongside Belgium, Italy, Latvia

and the Netherlands. On the other hand, France, Lithuania, Romania and Spain had no success on their fiscal consolidation episodes, in terms of the sustainability of fiscal discipline with Romania having the most critical situation with 5 fiscal consolidation episodes without any success between 1995 and 2017.

Table 2. Number of fiscal consolidation episodes and success rate per EU country between 1995 and 2017

Country	Fiscal consolidation episodes	Successful fiscal consolidation episodes	Percentage of success
Austria	6	4	67%
Belgium	1	1	100%
Bulgaria	6	3	50%
Croatia	3	2	67%
Cyprus	6	4	67%
Czech Republic	4	3	75%
Denmark	4	4	100%
Estonia	4	4	100%
Finland	5	4	80%
France	1	0	0%
Germany	5	4	80%
Greece	5	1	20%
Hungary	5	3	60%
Ireland	4	2	50%
Italy	2	2	100%
Latvia	3	3	100%
Lithuania	4	0	0%
Luxembourg	3	1	33%
Malta	5	3	60%
Netherlands	2	2	100%
Poland	2	1	50%
Portugal	6	2	33%
Romania	5	0	0%
Slovakia	6	3	50%
Slovenia	4	1	25%
Spain	3	0	0%
Sweden	4	4	100%
United Kingdom	5	2	40%
Total	113	63	55%

Source: Own calculations based on data from AMECO.

Having empirically defined fiscal consolidation episodes and how to measure if they are successful or not, the next step is to explain the variables and the model specification that will be used to assess whether the level of public spending influences the success of fiscal consolidations.

2.3. A model on fiscal consolidation episodes

As stated in section 2.1., the empirical approach suggests the use of a panel data model, as it allows the analysis of data containing time series observations of the countries. The model will take advantage of pooled data as an unstructured data panel model since the database is built of only fiscal consolidation episodes so it does not include every year between 1995 and 2017 and, additionally, countries performed fiscal consolidation in different years and in different numbers, as described in section 2.2.. The purpose of the estimations is to understand if the public spending level has an influence on the probability of a fiscal consolidation episode being successful and to fulfil such purpose the baseline specification consists on a *probit* model (Model 1):

$$SFISCEP^{*}_{i,t}=\beta_1+\beta_2\cdot EXP_{i,t-1}+\beta_3\cdot DEBT_{i,t-1}+\beta_4\cdot PBAL_{i,t}+\beta_5\cdot EA_{i,t}+\beta_6\cdot GDPGR_{i,t}$$

$$+\beta_7\cdot GDPPC_{i,t-1}+\beta_8\cdot FRIND_{i,t}+u_{i,t}$$

The specified model is applied to 112 of the 113 fiscal consolidation episodes previously identified (due to lack of data for one of the entries) and it measures how the estimated probability of a fiscal consolidation being successful (SFISCEP*, which differs from SFISCEP as the former is an observable self-built dummy based on data from the AMECO database that indicates whether the fiscal consolidation episode is successful or not, based on our definition) is influenced by the total public expenditure to GDP ratio at the year before the fiscal consolidation episode (EXP), the public debt to GDP ratio in the year before the fiscal consolidation episode (DEBT), the primary public balance to GDP ratio (PBAL), the GDP real growth rate (GDPGR), the GDP per capita in the year before the fiscal consolidation episode (GDPPC) and a fiscal rules index provided by the European Commission (FRIND); it also measures the influence of a dummy that indicates if the country belongs to the Euro Area or not (EA).

The total public expenditure to GDP ratio at the year before the fiscal consolidation episode (obtained from the AMECO database) is the independent variable

of interest in this model, and there are two possible expected effects of this variable: the first is that it is associated with a negative coefficient since one would think that the bigger the government size involvement in the economy, the more difficult it would be to perform expenditure-based fiscal consolidations, which are defended by the literature as the ones with the higher chance of being successful, due to the complex bureaucratic processes associated with such a government, as well as the legal setting that may difficult staff dismissal, wage decreases as well as social benefits cuts; the second is that it would be associated with a positive coefficient since the bigger the government size, the more it would be above the theoretical optimum government level and therefore, by performing expenditure-based fiscal consolidations, the cut in public expenditure would result in an improvement in economic performance, which provides a better setting for fiscal discipline.

The debt to GDP ratio in the year before the fiscal consolidation episode (obtained from the AMECO database) represents the fiscal setting into which the country was before performing the fiscal consolidation. Intuitively, this variable would be associated with a negative coefficient as countries with higher public debts are generically associated with higher interest rates which hamper the fiscal consolidation process as the fiscal consolidation categorisation as successful correlates directly from the public debt change.

The primary public balance to GDP ratio (obtained from the AMECO database) represents a fiscal performance indicator and it is expected that it has a positive effect on the success of fiscal consolidations, i.e. the higher the primary public balance to GDP ratio, the higher one would expect to be the probability of the fiscal consolidation being considered successful as it directly influences the debt to GDP ratio, which is the criterion used to classify successful fiscal consolidations.

The real GDP growth rate (obtained from the AMECO database) represents the economic conjuncture and it is expected that it has a positive effect on the success of fiscal consolidations. Fiscal consolidations would theoretically be countercyclical policies to be performed under economic expansions, and these conditions would allow for a better public balance, which would directly positive influence the public debt which, as explained above, is the criterion used to define success on fiscal consolidations. Even if fiscal consolidations are being performed due to excessive deficit procedures instead of as a countercyclical initiative, a good economic environment will always have a positive effect

on the success of fiscal consolidations. A similar explanation is applied to the GDP per capita in the year before the fiscal consolidation episode (obtained from the World Bank database) which represents the country development level, i.e. it is expected that, the higher the GDP per capita in the year before the fiscal consolidation episode, the higher the chances of the fiscal consolidation episode being considered successful.

The Euro Area dummy was self-built using data from the European Commission and it represents the monetary union centrally regulated by the European Central Bank (ECB). The expected effect is unpredictable because even though it might provide for stable monetary conditions, countries in the EA are not able to use monetary and exchange rate policies to boost economic performance.

Finally, the fiscal rules index (obtained from European Commission fiscal rules database) is placed in the baseline model to represent the impact of fiscal rules on fiscal consolidations. It is expected that the fiscal rules index is associated with a positive coefficient as stronger fiscal rules comply with fiscal discipline after a fiscal consolidation, which is the criterion used to define success on fiscal consolidations.

Some descriptive statistics on the used variables for the fiscal consolidation database are displayed in Table 3.

Table 3 Descriptive statistics of Model 1 variables

Variables	Average	Maximum	Minimum	Standard Deviation
EXP	47.00	65.08	31.95	7.29
DEBT	60.83	177.41	4.55	33.97
PBAL	0.47	9.57	-9.45	3.21
EA	0.37	1	0	0.48
GDPGR	2.96	11.80	-9.13	3.25
GDPPC	27 756	104 943	3 782	18 561
FRIND	0.15	3.40	-0.95	1.01

Additionally, before estimating the model, it is a useful and interesting exercise to analyse how the different variables averages behave within the database, specially comparing them between successful fiscal consolidation episodes and unsuccessful ones, adopting the definition explained in section 2.2..

Table 4. Variables average for fiscal consolidations, successful fiscal consolidations and unsuccessful fiscal consolidations

Variables	Fiscal consolidations	Successful fiscal consolidations	Unsuccessful fiscal consolidations
EXP	47.00	47.67	46.16
DEBT	60.83	62.16	59.11
PBAL	0.47	2.04	-1.50
GDPGR	2.96	3.90	1.76
GDPPC	27 756	29 292	25 414
FRIND	0.15	0.34	-0.09

There are a few interesting points that one can observe by analysing Table 4. First, it is curious to notice that successful fiscal consolidation episodes seem to be associated with a higher level of total public expenditure to GDP ratio in the year before the fiscal consolidation episode than unsuccessful fiscal consolidations and the same is observable for the debt to GDP ratio.

One can also see that, in general, successful fiscal consolidation episodes seem to be associated with what one would consider to be better economic indicators, such as a bigger primary public balance to GDP ratio, GDP real growth rate, GDP per capita and stronger fiscal rules.

Additionally, it is important to note the importance of the Euro Area dummy and through own calculations based on data from Eurostat it is noticeable that only 38% of fiscal consolidations happened in countries belonging to the Euro Area and only 32% of successful fiscal consolidations were performed on Euro Area countries; however, of even more importance is the fact that, according to the key concept definitions presented in section 2.2., from the fiscal consolidation episodes that occurred in Euro Area countries, only 47% of those are considered to be successful.

This model estimation correctly classified 82.14% of the fiscal consolidation episodes, correctly classifying 85.71% of successful fiscal consolidations and correctly classifying 77.55% of unsuccessful fiscal consolidations. The results from estimating the *probit* model specified above are described in the Table 5.

Table 5. Model 1 estimation on fiscal consolidation episodes

SFISCEP	Coefficient	Standard Error	p-value
Constant	-3.292	1.340	0.014
EXP	0.058	0.027	0.032
DEBT	0.010	0.006	0.101
PBAL	0.418	0.090	0.000
EA	-0.956	0.508	0.060
GDPGR	0.199	0.076	0.009
GDPPC	-0.025	0.000	0.349
FRIND	0.267	0.166	0.108
Number of observations		112	
Pseudo R2		0.4496	

Model estimated through Stata.

A variation of the model (Model 2) was also estimated to compare results:

$$SFISCEP^{*}_{i,t}=\alpha_1+\alpha_2\cdot EXP_{i,t-1}+\alpha_3\cdot DEBT_{i,t-1}+\alpha_4\cdot EA_{i,t}+\alpha_5\cdot GDPGR_{i,t}+\alpha_6\cdot GDPPC_{i,t-1}$$

$$+\alpha_7\cdot EXPB_{i,t}+\alpha_8\cdot FRIND_{i,t}+v_{i,t}$$

In Model 2 EXPB is a self-built dummy variable that states if the fiscal consolidation is expenditure-based or not; a fiscal consolidation is considered to be expenditure-based if the primary public expenditure (obtained from the AMECO database) change corresponds to at least 50% of the primary public balance change in the fiscal consolidation episode year. After applying this definition, the calculations show that about 67% of fiscal consolidation episodes and around 70% of successful fiscal consolidations are expenditure-based. Additionally, 57% of expenditure-based fiscal consolidation episodes are considered to be successful which suggests that expenditure-based adjustments are more likely to be successful, as discussed in section 1.2..

Furthermore, Model 2 does not take into account the effects of the primary public balance to GDP ratio as one can argue that it already has an direct role in setting up the database through the fiscal consolidation definition and because it is certainly tied with the change in the debt to GDP ratio which is the indicator used to classify a fiscal consolidation as successful or not.

Model 2 correctly classified 70.54% of the fiscal consolidation episodes, correctly

classifying 79.37% of successful fiscal consolidations and correctly classifying 59.18% of unsuccessful fiscal consolidations. After estimating the specified models and assessing its quality, the analysis of the empirical results obtained is discussed in section 2.4.. The estimation results of this model are displayed in Table 6.

Table 6. Model 2 estimation on fiscal consolidation episodes

SFISCEP	Coefficient	Standard Error	p-value
Constant	-2.807	1.049	0.007
EXP	0.0392	0.023	0.087
DEBT	0.010	0.006	0.064
EA	-0.800	0.373	0.032
GDPGR	0.235	0.065	0.000
GDPPC	0.014	0.020	0.497
EXPB	-0.143	0.304	0.638
FRIND	0..332	0.141	0.019
Number of observations		112	
Pseudo R2		0.1984	

Model estimated through Stata.

2.4. Results analysis

By observing the results presented in Table 5, the first point to notice is that the primary public expenditure variable appears to have a positive impact on the probability of success of fiscal consolidations i.e., everything remaining constant, the higher the total public expenditure to GDP ratio in the year before the fiscal consolidation episode, the higher the probability of the fiscal consolidation episode being considered successful, a statistically significant result to confidence levels of 95%. This means that independently of the composition of the fiscal consolidation, the bigger the public expenditure to GDP ratio before the fiscal consolidation episode, the higher the chance of it being successful (with the other variables remaining constant).

This result matches the result visible in Table 4 and discussed in section 2.3. and can be interpreted according to what is explained in section 1.4. regarding the optimum government size, i.e. if the fiscal consolidation episode was expenditure-based, the higher the public expenditure to GDP ratio before the fiscal consolidation episode the higher the probability of the episode being considered successful because the government size was too high which means that the cut in public expenditure resulted in a better economic

performance which provides for a better setting for fiscal discipline that is the criteria used in this dissertation to define successful fiscal consolidations.

Other variables also have an interesting behaviour. The debt to GDP ratio in the year before the fiscal consolidation episode has a positive impact on the probability of fiscal consolidations being successful, everything else remaining constant. This result is surprising because, as explained above, it was expected that the debt to GDP ratio before the fiscal consolidation would have a negative impact on the chances of success of fiscal consolidations due to the increased debt costs, such as interests, usually associated with countries with high debt to GDP ratio.

Additionally, the estimation of the model states that, *ceteris paribus*, the higher the primary public balance to GDP ratio or the real GDP growth rate, the higher is the probability of fiscal consolidation episodes being considered successful. First of all, the primary public balance to GDP ratio having a positive impact on the chances of success of a fiscal consolidation is not surprising due to the fact that a fiscal consolidation is defined as successful if the change of the public debt to GDP ratio is, in average, null or negative on the year of the fiscal consolidation episode and the year after (as defined in section 2.2.), and the primary public balance is directly tied to this indicator, i.e. remaining everything the same, the bigger the primary public balance, the bigger is the negative variation of the public debt to GDP ratio, which has a direct impact on the definition used for successful fiscal consolidations.

Secondly, the real GDP growth rate (everything else remaining the same) having a positive impact on the probability of a fiscal consolidation episode being successful does not seem to be very surprising since the sustainability of fiscal discipline is inevitably tied to the economic performance, i.e. a better economic setting is more prosperous for a bigger primary public balance to GDP ratio which, as explained above, has a direct impact on diminishing the debt to GDP ratio. This result also shows that it is wise to perform fiscal consolidations in periods of economic expansion because a higher real GDP growth rate increases the probability of a fiscal consolidation being considered successful, but it might also link to the discussion around non-Keynesian effects in section 1.3. because successful fiscal consolidations are associated with a higher real GDP growth rate (as observed in Table 4), i.e. fiscal consolidation episodes that occur under certain conditions may cause non-Keynesian effects and generate a higher real GDP growth rate.

It is also curious to note that the dummy variable that states whether the fiscal consolidation episode occurred in a Euro Area country or not is associated with a negative coefficient, i.e. if a fiscal consolidation occurs in a Euro Area country it has a lesser probability of being considered successful, *ceteris paribus*, which is understandable due to the loss of the ability to perform monetary and exchange rate policies to boost economic performance whilst performing a fiscal consolidation. Furthermore, the estimation suggests that, everything else remaining the same, the higher the fiscal rules index the bigger the chance of the fiscal consolidation episode being considered successful, which coincides with what theory suggests and was discussed in section 1.5.; however, this result is not significant to confidence levels above 90%. Finally, the GDP per capita in the year before the fiscal consolidation episode does not seem to have statistical significance, i.e. the country's development level does not influence the success of fiscal consolidations.

By analysing Table 6 one can notice that it general it reinforces the results obtained in Table 5: the total public spending to GDP ratio in the year before the fiscal consolidation episode, the public debt to GDP ratio in the year before the fiscal consolidation episode, the real GDP growth rate and the fiscal rules index are associated with positive effects, i.e. the higher one of these variables is, with all other variables remaining constant, the higher the probability of the fiscal consolidation being successful. In addition, fiscal consolidations performed in countries that belong to the Euro Area at the time of the fiscal consolidation episode are less likely to be successful, which is also consistent to what is obtained in the estimation of Model 1 in Table 5.

Finally, it is curious to notice that, according to Table 6, a fiscal consolidation episode being expenditure-based or not is not statistically significant which opposes what is discussed in section 1.2. in which the literature agrees that the composition of fiscal consolidations has a role in the success of fiscal consolidation episodes.

2.5. Empirical limitations

There are a few limitations regarding the empirical strategy. Firstly, the model specifications do not consider any possible variables related to politics such as government ideology, cabinet composition or it being an election year or not that might also have an effect on the probability of a fiscal consolidation episode being considered successful by influencing the level of public spending but also the detailed composition of fiscal adjustments. The model also does not take into consideration any variables regarding the

detailed composition of fiscal adjustments, i.e. if the adjustment was based on cuts on public wages, social transfers or the increase of indirect taxes, for example.

Additionally, as already stated in section 2.2., the definition used to define a successful fiscal consolidation episode takes into consideration the public debt in the year of the fiscal consolidation episode and the year after. Even though this definition is as such to take advantage of the most recent episodes in the database, the period that this definition considers is relatively short termed to evaluate the sustainability of fiscal discipline, which is the success criterion for fiscal consolidation episodes in this dissertation.

Furthermore, one other point that might be considered a limitation is linked to the definition of fiscal consolidation episodes; as explained by Molnar (2012) and stated in section 1.1., the definition used fails to identify fiscal consolidation episodes that are more moderate but extended through different years, i.e. do not provoke a change in the primary public balance of at least 1.5 percentage points in a single year.

Finally, as explained in section 2.3., there were justifications for both a positive and a negative influence of the public spending to GDP ratio on the success of fiscal consolidations: a positive effect related to the optimum government size associated with expenditure-base adjustments which seems to be supported by these results; but one can also expect a negative effect of the public spending level on the chances of success of fiscal consolidations related to the difficulties of performing expenditure-based fiscal consolidations on countries with a high public spending to GDP ratio due to the complexity of bureaucratic processes as well as the legal setting limiting , for example, staff dismissal and wage decreases, that are usually associated with such countries. The negative effect was not supported by the results obtained and that could be due to the not inclusion of any variables that measure the employee protection legal system or the size of the social security system.

Conclusion

The purpose of this dissertation was to find if the success of fiscal consolidations is influenced by the level of public spending. Despite the lack of literature on this subject, the literature reviewed suggests that the level of public spending might have a role in the success of fiscal consolidation episodes.

Most authors seem to agree that expenditure-based fiscal consolidations have more probability to be successful (when compared to tax-based adjustments), and these mean changes in the level of public spending. However, there are expenditure-based fiscal consolidations that are not successful, and this might be due to the level of public expenditure.

Merging this point with the literature on the optimum government size, expenditure-based fiscal consolidation episodes when a country has a public expenditure level above the theoretical optimum government size will, intuitively, have a higher chance of being successful because the expenditure cuts will improve economic performance and possibly generate non-Keynesian effects which will boost the economic performance even more. As it is less costly to keep fiscal discipline under a good economic performance, all these factors should positively affect the chance of a fiscal consolidation being considered successful.

Additionally, fiscal rules aim to assure fiscal discipline which suggests that fiscal rules have a positive impact in the chances of success of fiscal consolidations as fiscal discipline is the criterion adopted to define a successful fiscal consolidation

The empirical research complements the theoretical analysis: by examining the impact of the total public spending to GDP ratio in the year before the performance of the fiscal consolidation episode, results suggest that this ratio has a positive impact in the success of fiscal consolidations, i.e. the higher the level of public spending to GDP ratio before the fiscal consolidation, the higher the chance of it being successful, *ceteris paribus*. Additionally, the empirical analysis also suggests that the public debt to GDP ratio in the year before the fiscal consolidation episode, the real GDP growth rate, fiscal rules index and primary public balance to GDP ratio have a positive impact in the probability of a fiscal consolidation being considered successful, i.e. the higher the values one of those variables has (with every other variable remaining the same), the higher the probability of

the fiscal consolidation episode being considered successful. Furthermore, the results suggest that a variable that states if a fiscal consolidation is expenditure-based or not has no statistical relevance in the chances of success of fiscal consolidations, which goes against what is examined in the literature.

This dissertation opens ground on the research of the role of public spending on the success fiscal consolidations and there is room for future developments in this subject. It would be interesting to expand this analysis to a bigger database both in spatial and temporal dimensions, which intuitively would provide for more variety for variables such as the fiscal rules index and levels of public spending. Additionally, future research should also take into consideration the possible existence of non-Keynesian effects which, as explained in section 1.3., could make fiscal consolidation episodes not be considered as such, depending on the chosen definition. Furthermore, research can be done using more rigorous definitions for concepts such as fiscal consolidation episode and successful fiscal consolidation episode as well as considering political variables that this dissertation did not and which could influence the public spending level. Moreover, it would be very interesting to research scenarios where the composition of public spending is so rigid that it cannot be used as an instrument to perform fiscal consolidations or scenarios that would help to understand how the level of public spending before the fiscal consolidation can be observed and used by policymakers to better align their strategy before performing fiscal consolidation episodes.

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Appendix – Stata estimations output

Model 1

```
Iteration 0:   log likelihood = -76.755191
Iteration 1:   log likelihood = -42.735102
Iteration 2:   log likelihood = -42.249588
Iteration 3:   log likelihood = -42.248157
Iteration 4:   log likelihood = -42.248157

Probit regression                               Number of obs   =        112
                                                LR chi2(7)      =      69.01
                                                Prob > chi2     =     0.0000
Log likelihood = -42.248157                     Pseudo R2       =     0.4496

------------------------------------------------------------------------------
      sfiscep |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         exp |   .0582915   .0272077     2.14   0.032     .0049654    .1116176
        debt |   .0101731   .0062102     1.64   0.101    -.0019986    .0223449
        pbal |   .4183305   .0902253     4.64   0.000     .2414922    .5951688
          ea |  -.9560235   .5075118    -1.88   0.060    -1.950728    .0386813
       gdpgr |   .1994124   .0759881     2.62   0.009     .0504785    .3483463
       gdppc |  -9.92e-06   .0000106    -0.94   0.349    -.0000307    .0000108
       frind |   .2671582   .1660539     1.61   0.108    -.0583015    .5926179
       _cons |  -3.292104   1.340195    -2.46   0.014    -5.918837   -.6653706
------------------------------------------------------------------------------
```

Model 2

Iteration 0: log likelihood = -76.755191
Iteration 1: log likelihood = -61.599078
Iteration 2: log likelihood = -61.523918
Iteration 3: log likelihood = -61.523903
Iteration 4: log likelihood = -61.523903

Probit regression	Number of obs = 112
	LR chi2(7) = 30.46
	Prob > chi2 = 0.0001
Log likelihood = -61.523903	Pseudo R2 = 0.1984

sfiscep	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
exp	.0391899	.022906	1.71	0.087	-.005705	.0840848
debt	.0102347	.0055325	1.85	0.064	-.0006087	.0210782
ea	-.7996424	.3731806	-2.14	0.032	-1.531063	-.0682218
gdpgr	.2349689	.0645241	3.64	0.000	.108504	.3614339
gdppc	5.56e-06	8.18e-06	0.68	0.497	-.0000105	.0000216
expb	-.1431758	.3042565	-0.47	0.638	-.7395075	.4531559
frind	.3318729	.1412958	2.35	0.019	.0549383	.6088075
_cons	-2.807191	1.049029	-2.68	0.007	-4.86325	-.7511309