LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

MASTER IN

MONETARY AND FINANCIAL ECONOMICS

MASTERS FINAL WORK

DISSERTATION

THE MACROECONOMIC IMPACT OF A FISCAL STIMULUS IN PORTUGAL (2016-2018)

JOSÉ FRANCISCO GASPAR RODRIGUES DA SILVA

OCTOBER – 2017

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PROFESSOR MIGUEL ST. AUBYN

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Abstract

The aim of the present work is to study the macroeconomic impact of a fiscal stimulus in Portugal in 2016-2018.

Considering the fiscal policy restrictions in the context of the corrective arm of the Stability and Growth Pact, and the benchmarks commonly accepted within the literature for the fiscal multiplier and the budget balance semi-elasticity, the document attempts to measure the macroeconomic impact of a temporary increase in government spending.

After accounting for the feedback effect of the fiscal stimulus, as well as the implications in the nominal GDP growth, the work finds evidence supporting the existence of positive effects in the macroeconomic conditions, namely debt-to-GDP ratio path, GDP growth and employment.

JEL: E61; E62; E65; H62; H63; H68

Keywords: Fiscal policy; Budget Balance; Debt-to-GDP ratio; Portugal

Resumo

O objetivo do presente trabalho é o estudo do impacto macroeconómico da introdução de um estímulo fiscal em Portugal no período 2016-2018.

Tendo em consideração as restrições à política orçamental previstas no contexto do braço corretivo do Pacto de Estabilidade e Crescimento, bem como os referenciais aceites na literatura para os multiplicadores fiscais e para as semi-elasticidades do saldo orçamental, o documento pretende medir o impacto macroeconómico de um aumento temporário da despesa pública.

Após considerar o efeito *feedback* do estímulo fiscal, bem como as implicações no crescimento do PIB nominal, o trabalho realizado sugere a existência de efeitos positivos nas condições macroeconómicas, nomeadamente no rácio dívida/PIB, crescimento do PIB e emprego.

JEL: E61; E62; E65; H62; H63; H68

Palavras-chave: Política orçamental; Saldo orçamental; Rácio dívida/PIB; Portugal

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1. Introduction

Portugal's debt-to-GDP ratio has been steadily rising since the early of the century (50.32 % in 2000 up to 130.35 % in 2016). Whilst real GDP growth was fairly positive in the early of the century, the crisis brought a severe downturn, with the real economy growing to a minimum of -4.03 % in 2012. Moreover, unemployment rates can be found to have the same path, with reasonable figures in the early century (5.1 % in 2000) and increasingly degrading from then on, having its highest peak also in the peak of the downturn (16.4 % in 2013)[1].

Nevertheless, the country has benefited from a recent economic recovery – GDP growth's momentum, debt-to-GDP ratio improvements, low budget deficits and an increasingly lower unemployment rate. The current government's policy can be said to have been successful in maintaining sound economic performance whilst targeting low budget deficits[2].

The aim of the present work is to study the macroeconomic impact of an increase in government spending in the triennium from 2016 to 2018 (2016 as an historical period and 2017 and 2018 as forecasted periods) in Portugal, restricted to the government deficit and debt limits foreseen in the Stability and Growth Pact in the context of the Economic and Monetary Union.

The document initially summarizes the fiscal policy constraints within the SGP and thereafter addresses the theoretical concepts underlying the European Commission's method for output gap estimations (and the inputs used in it), discussing its weight on fiscal policy decisions.

Following such discussion, this document provides an overview of the existing literature regarding increases in government spending and debt dynamics implications, focused in fiscal

[1] All figures report to historical periods and were extracted from the European Commission (2017).
[2] According to the European Commission Economic Forecast (Spring 2017), Portuguese "*growth momentum gains pace*" in 2017. EU's Commissioner for Economic and Monetary Affairs, Pierre Moscovici, said in July "*Portugal's economic situation has made impressive improvements*" and "*the reduction of the deficit in Portugal is sustainable and the improvement in public finances is solid*" (Moscovici, 2017).

multipliers and budget elasticities (either for overall budget balance and for the relevant budgetary items).

Using selected inputs, the present work provides an estimation for an increase in government spending circumscribed to the corrective arm provisions of the Stability and Growth Pact.

Ultimately, the document addresses output, employment, and debt implications of a government spending increase in the triennium 2016-2018, namely projecting debt-to-GDP ratio paths, which is followed by a discussion over challenges to fiscal sustainability and compatibility with the overall fiscal policy constraints of the EMU.

The final section concludes the report, summarizes its results, and provides topics for future research.

2. Fiscal policy within the Economic and Monetary Union

The creation of the Economic and Monetary Union (EMU) (1992) represented a step of integration within the European economies which involves the coordination of fiscal policy amongst its members under a common monetary policy (which the European Central Bank [ECB] is responsible for).

The primary objective of the ECB is price stability, as established in the Treaty on the Functioning of the European Union (TFEU). The ECB's Governing Council adopted a definition of price stability in 1998: "(…) price stability is defined as a year-on-year increase in the Harmonised Index of Consumer Prices (HIPC) for the euro area of below 2 %." (European Central Bank, 1998). In 2003, the same institution clarified that the aim was to maintain inflation below, but still close, to 2 % (European Central Bank, 2003).

Fiscal policies have a significant impact on economic growth, macroeconomic stability, and inflation (Santos, et al., 2010). The EMU is composed of sovereign states that retain responsibility for their fiscal policies and, given the absence of national monetary authorities that respond to shocks at a national level, fiscal discipline is specifically addressed within several institutional arrangements[3].

One of particular importance is the Stability and Growth Pact (SGP), which foresees namely thresholds regarding the budget balance and indebtedness (the "Maastricht criteria"[4]) set out to ensure that countries in the European Union pursue sustainable public finances and have a coordinated fiscal policy. The SGP contains two arms: the corrective and the preventive arm.

[3] The TFEU and secondary legislation, which can be consulted in the European Commission website.
[4] The limits imposed by the Stability and Growth Pact are also addressed to as the Maastricht criteria in reference to the criteria originally foreseen in the Treaty on the Functioning of the European Union (TFEU).

The main provisions of the corrective arm of the SGP are the overall budgetary balance restriction of -3 % as a percentage of GDP towards a debt-to-GDP ratio of 60 %, or a convergent path to such debt-to-GDP ratio (European Commission). Its main purpose is to ensure that debt levels comply with those foreseen in the TFEU.

If the above conditions are met, a country is in the preventive arm of the SGP. If, on the other hand, the conditions are not complied with, a country is in the corrective arm and an Excessive Deficit Procedure (EDP) is opened.

In the case of Portugal, the country was in an EDP until 2017, but has managed to be removed from it (after the European Commission's confirmation that its deficit had dropped below the 3% of GDP reference value) as of 16 June of that same year[5]. Therefore, it is subject to the conditions foreseen within the preventive arm of the SGP.

The preventive arm focuses on the economic cycle, setting namely medium-term objectives (MTO) for each member individually, depending on country-specific considerations. The MTO seeks to prevent countries from breaching the budgetary balance restriction (-3 % as a percentage of GDP) over the economic cycle (European Commission).

Standard rules foresee a minimum annual adjustment of the structural balance of 0.5 % of GDP as long as the MTO is not achieved. In the case of Portugal, the MTO budgetary balance is currently set by the European Commission at 0.25 % and will be revised in 2018[6].

The European Commission (Spring 2017) estimated a structural balance of 2.01 % (as a percentage of GDP) for 2016, which coincides with the nominal budget balance. Henceforth, an

[5] Refer to the European Commission's Press Release: "Croatia and Portugal: Deficits below 3% of GDP, procedures closed" (2017).
[6] Refer to the European Commission's assessment of the 2017 Stability Programme for Portugal (2017).

adjustment of around 0.45 pp per year would, in theory, be enough to comply with the structural balance of 0.25 % in 2021.

3. The Medium-term Objective – computation of the structural balance

As highlighted earlier in the document, the structural balance provides an important tool for fiscal policy considerations and planning. It can be described as the current budget balance without taking into consideration the impact of economic cycle and one-off budgetary measures.

3.1. Measuring output gap

"The output gap is an economic measure of the difference between the actual output of an economy and its potential output. Potential output is the maximum amount of goods and services an economy can turn out when it is most efficient – that is, at full capacity. Often, potential output is referred to as the production capacity of the economy."

In International Monetary Fund (2013), p. 38.

If an economy operates at full capacity and all resources are employed at their long-term sustainable rate, then its output should be at potential (Darvas, 2015). As a result, the deviation of the real economic activity's output from its potential – the output gap – is a key factor for assessing economic policy.

In periods of low economic growth, when the output gap is large, aggregate demand can be adjusted accordingly so that the output gap is reduced. On the other hand, if the growth rate of the potential output is low, supply level reforms could be considered instead to increase it (Jarocinski & Lenza, 2016). An output gap (either positive or negative), thus, suggests that an economy is running at an inefficient rate – either overworking or underworking its resources.

From a short-run perspective the output gap should be interpreted as the comparison between the physical (quasi-fixed) capacity of an economy and its effective/actual output developments, showing by how much total demand can develop during a short period without inducing inflationary pressures (Havik, et al., 2014).

Measuring the output gap implies a comparison between two economic variables – the actual output and the potential output. Since, contrarily to actual output, potential output cannot be observed, the output gap derives from an estimation of the latter.

Based on the methodology adopted by Perloff and Watcher in 1978, using production function approaches to estimate the output gap and the natural rate of unemployment, the International Monetary Fund (IMF) and the Organisation for Economic Cooperation and Development (OECD) produced their first articles on output gap measurement (Silva, et al., 2016). In fact, production function approaches became the most commonly used framework by international institutions.

Concretely, the methodology followed by the European Commission (EC) for calculating the output gap is based in a production function and used for operational EU policy surveillance. By adopting an economic approach instead of a merely statistical one, the EC considers that it is possible to study the underlying economic factors and to establish a meaningful economic policy. Moreover, an economic estimation method can highlight the relationship between potential output and the NAIRU concepts (Havik, et al., 2014).

In light of the above, the current method followed by the EC[7] for calculating the output gap considers three input elements:

- Capital.
- Labour.
- Trend Efficiency.

Additionally, a medium-term (3-year) extension is considered as way to illustrate what would happen if identified trends were to persist. The medium-term extension considers total factor

[7]Refer to Havik, et al. (2014) for a deeper understanding of the estimation process.

productivity, NAIRU[8], population of working age, average hours worked, and the investment to (potential) GDP ratio.

3.1.1. Capital

Capital refers to actual capital stock, measured as accumulated investment minus amortisation. In the EC production function approach, capital stock is an indicator of the overall capacity of the economy (Havik, et al., 2014). Therefore, the potential output estimation relies on the full utilisation of the capital stock.

3.1.2. Labour

Labour measurement is more complex in the EC production function approach. According to Havik, et al. (2014), the process aims at defining the trend of labour input and contains several steps. Firstly, the maximum possible level for this input is defined namely considering the working age population. Secondly, a de-trended series is obtained considering the participation rate. Ultimately, trend unemployment is calculated to be consistent with stable, non-accelerating, inflation (NAIRU). The trend specification used for the NAIRU implies that the best prediction for the change in the indicator is its current estimate (Darvas, 2013).

3.1.3. Trend efficiency

Trend efficiency refers to the level of output that can be produced with a "normal" level of efficiency, namely exploiting the link between the Total Factor Productivity and the degree of capacity utilisation of the economy. Total factor productivity is not observable and therefore is measured as a residual after considering capital stock and labour input (Havik, et al., 2014).

[8] The EC defines the NAIRU as the unemployment rate at which (wage) inflation remains stable and, hence, introduces the NAWRU as an alternative acronym for the NAIRU concept. For simplification purposes, this document will refer to the "NAIRU" acronym.

3.2. A critical appraisal to the EC methodology

3.2.1. Output gap

The methodology followed by the EC to assess and suggest developments in the countries' fiscal policy stances[9] (namely measuring structural budget balances) largely depends on the concept of output gap (which, on its turn, relies on several other estimations, as discussed earlier).

The correct estimation methodology to adopt is not consensual and relies on a series of uncertainties and controversies (International Monetary Fund, 2013).

Some authors, notably Darvas & Simon (2015), argue that the methodology used to estimate the output gap has major conceptual weaknesses concerning the open economy implications of output gaps and disregarding the incorporation of many input factors. According to Darvas (2013), the inputs used in the estimation process (which are assessed hereinafter) are also vulnerable.

3.2.2. Capital

Before the crisis, physical capacities were settled in sectors that faced several constraints and downturns, proving to be unsustainable (in Portugal, the construction sector is a good example).

The input's assumption in question implicitly presumes that physical capital is easily transferable from one place to another or, otherwise, that it can be used in other sectors of the economy – even after the methodology has been revised, as noted by Darvas (2015)[10]. This is not true and therefore may bias the estimation process.

[9] Refer to section 2 for further detail on the fiscal policy constraints of the Economic and Monetary Union and the Stability and Growth Pact.
[10] Refer to Darvas (2013, 2015).

3.2.3. Labour

The crucial element explaining the labour input variable is the nonaccelerating inflation rate of unemployment (NAIRU) (refer to Box 1 for further details on the underpinnings of the NAIRU).

Theoretically, if an economy operates with an unemployment rate equal to the NAIRU, it is producing at potential output level and inducing no inflation pressure (International Monetary Fund, 2013).

The underlying methodology to estimate the NAIRU tries to separate trend and cyclical components of unemployment, implicitly assuming that the de-trended unemployment series acts as a good representation of the structural factors driving unemployment and that such methodology provides a good proxy for the NAIRU (Heimberger, et al., 2016).

However, according to Heimberger, et al. (2016) most indicators of labour market institutions – employment protection, legislation, union density, tax wedge and minimum wage – do not explain much of the structural unemployment. The authors claim that the empirics of the NAIRU are incompatible with the European Commission's methodology and theoretical framework to estimate it, in which "(…) the NAIRU is modeled as the trend component of the unemployment rate, stripped off all cyclical factors".

The above is in line with what Gechert, et al. (2016) claim: the current estimations used are considerably determined by current unemployment. In fact, according to Darvas (2013) "A major problem with the NAIRU methodology is that the view on the share of "useless" unemployed people can be revised along with the revision of the unemployment rate forecast".

3.2.4. Trend efficiency

Total Factor Productivity (TFP) is one of the main trend efficiency determinants. The EC methodology assumes a smooth path for it, which relies on forecasts for GDP, labour (including NAIRU) and capital.

Therefore, forecasts influence (and may bias) the said assumption. Since forecasts matter even to the revision of previous year output gap estimates, if they turn out to be incorrect, the estimates for the past will be biased as well (Darvas, 2013).

Furthermore, in recent years, large forecast errors have taken place in the European Commission estimates (as an example, refer to Figure I which depicts the European Commission 2016 output gap estimates based on winter and spring of 2016 and 2017 forecasts).

Box I - Some remarks on the underpinnings of the NAIRU

According to Kuh (1966), the output gap theoretical concept was embedded in John Maynard Keynes' famous work dated from 1936, "The General Theory of employment, interest and money", when the author established a relation between unemployment and the rate of change in wages – a decade after Irving Fisher suggested a relationship between the level of unemployment and the rate of consumer price inflation in the United States of America.

From there onwards several authors have discussed the subject, which became gradually more central in economic theory. Notably, in 1958, Phillips wrote an article on "The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1861-1957" which was an empirical approach to what Keynes had already theorised back in 1936 and after which the Phillips Curve was named.

Later, in 1960, the relationship argued by Phillips was reported and demonstrated by Solow and Samuelson. The Phillips Curve is a non-linear function, negatively sloped, relating inflation with unemployment which attempts to demonstrate in a systematic manner the relation between these two variables (Santos, et al., 2010).

Despite these approaches to the concept of unemployment and its relationship with inflation, a question remained unanswered: "how much can the economy produce under conditions of full employment?" (Okun, 1962).

Okun introduced the concept of output gap and the corresponding full employment output, which was defined by assumption at 4 %, arguing that it was a "reasonable target", claiming that the full employment goal must be understood as the target of "(…) maximum production without inflationary pressures". According to Okun the 4 % unemployment rate was consistent with 2 % to 3 % inflation rates.

Despite the broad acceptance of the latter's arguments, the theory was not consensual. Notably, Milton Friedman was one of the most vigorous critics of the relation between unemployment and inflation. According to the author what was important was not "(…) inflation per se, but unanticipated inflation (…)" (Friedman, 1976).

The natural rate of unemployment, an idea introduced in the macroeconomic literature by the author, was the rate of unemployment consistent with real forces. According to Friedman, "the "natural rate of unemployment" (…) is the level that would be ground out by the Walrasian system of general equilibrium equations, provided there is imbedded in them the actual structural characteristics of the labor and commodity markets, including market imperfections, stochastic variability in demands and supplies, the cost of gathering information about job vacancies and labor availabilities, the cost of mobility, and so on." (Friedman, 1968).

Friedman's view, amongst other scholars supporting the concept of the natural rate of unemployment, as detailed by Silva, et al. (2016), provided a paradigm change in mainstream macroeconomics. From the mid of the 1930's to the mid of the 1970's, the full employment rate concept (considered compatible with low inflation levels) was replaced by the natural rate of unemployment concept.

Moreover, the paradigm change provided a new consensus around the fact that the natural rate of unemployment of a given economy does not necessarily have to correspond to a low unemployment rate.

According to Charles Adam (1987), "(…) natural unemployment rates have generally been increasing during the past 10 to 15 years (…)", conclusion which the author attributed to the change in structural factors. The argument backs Friedman's theory in support of a natural rate of unemployment which relies on the structural factors of the economy. In fact, Friedman had already said it: "the natural rate (of unemployment) has clearly been rising (…)" (Friedman, 1976), referring to the United States of America.

The natural rate of unemployment, though, is a theoretical concept and can only be implemented in theoretical models since it is not possible to identify moments in time where all price changes have adjusted to their long-run levels (Dias, et al., 2014). The alternative concept, one which can be used as an input in economic modelling, is the NAIRU – a proxy for the natural rate of unemployment (Ball & Mankiw, 2002).

The idea of full employment has thus been replaced with the notion of NAIRU – non-accelerating inflation rate of unemployment. NAIRU is the unobserved unemployment rate which prevails in the absence of cyclical fluctuations and, hence, represents natural unemployment existing independently (Heimberger, et al., 2016).

3.3. How much weight should the MTO have on fiscal policy

Considering the above remarks, it can be pointed out that the MTO (essentially, a target for the structural balance) can misguide economic policy.

Valença (2015) argues that the solidity of the concepts behind the estimation of output gaps should not be reduced only to the reliability of the estimates but to the theory behind them as well.

With respect to the above paragraph, Box 1 already provides some insights regarding the differences between Keynesian and monetarist approaches to the output gap and full/natural unemployment concepts.

Valença (2015) also makes the point that business cycle theory is not unanimous in separating "trend" from "cycle" and, furthermore, that there is no such thing as a "proper allocation of resources" in a complex economy.

Moreover, Martins (2014) argues that the intrinsic methodology for estimations – the production function approach –, has weak methodological and theoretical foundations. The production function, as a methodological tool, was thoroughly discussed during the 1960's[11].

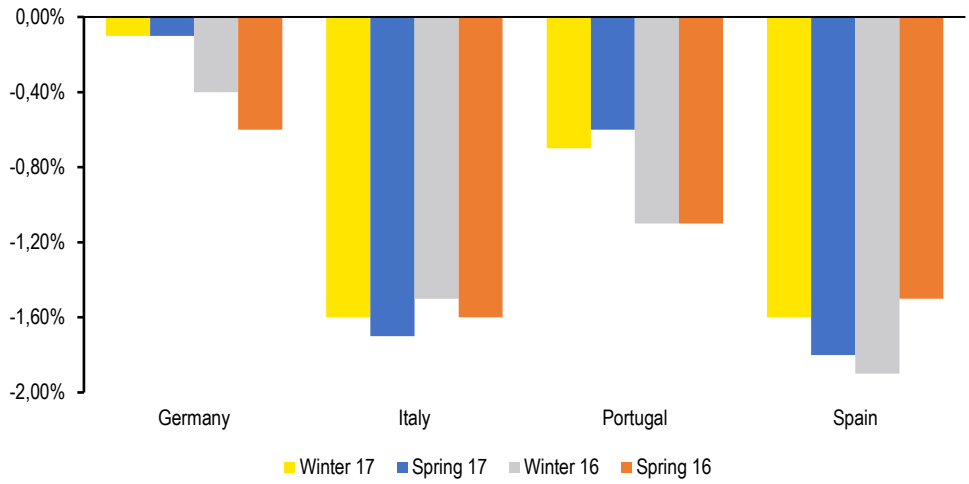
Another argument that can be stressed out focuses on the frequent relevant distinctions between output gap estimates in real time and revised output gap estimates, even for authors who attempt to estimate such indicators, like Forni and Momigliano (2004). The authors recognise that "the misjudgements of cyclical conditions have been significant in many countries and may have induced a systematic bias in fiscal policies for several years" which clearly underlines the uncertainty surrounding the estimations.

[11] The "Cambridge capital controversy" (named after the public debate around the theory and methodology of the production function) marks an extensive discussion around the matter. Backhouse (2014), for example, documents the discussion in further detail.

Furthermore, one of the key elements used in the EC production function, the NAIRU[12], is subject to considerable reviews in the case of countries undergoing major changes and fluctuations in their employment rates (Darvas, 2015), which naturally biases the output gap estimates.

The graphic below shows the evolution of the European Commission 2016 output gap estimates (based on winter and spring of 2016 and 2017 forecasts).

Figure I - Evolution of 2016 estimates for output gap



Source: Author's graphic based on European Commission winter and spring of 2016 and 2017 forecasts.

The variability of these estimates limits the ability for governments to adequately plan their budgets and fiscal policy and, therefore, to act in a timely and temporary manner. It delays fiscal policy decisions and hampers their macroeconomic implications.

In fact, in March 2016, the ministers of finance of eight Euro Zone countries (including the Portuguese minister) wrote a letter to the EC suggesting "significant changes in the common

[12] "*The potential output gap is calculated with reference to potential output as estimated via a production function, where the (…) difference between actual unemployment and the NAWRU play a key role*" (European Commission, Spring 2017).

methodology on potential growth and output gap estimation"[13], which is in line with other institutional remarks.[14]

On the other hand, Jarocinski and Lenza (2016) suggest that the output gap procedure should incorporate the distinction between output gap estimates resulting from the combinations of the modelling features commonly used in economic literature, and then ranked by their ability to forecast inflation. Thus, they propose a different approach to the estimation process although still relying on the estimations' conclusions.

In line with this reasoning, Darvas & Simon (2015) propose a new structural model to estimate equilibrium level of output and exports. In their work, they recognise that the effects of excess demand are not symmetric across tradeable and non-tradeable sectors.[15]

Other authors argue that the uncertainty surrounding these estimations should imply that lower weight is given to them, like Gechert et al. (2016), who suggest that less weight should be given to the output gap estimations when addressing fiscal policy because of the difficulty to estimate the indicator in a robust manner.

Valença (2015), on the other hand, suggests that the concept of output gap should be entirely disregarded and replaced by a panel of macroeconomic indicators, allowing for a more flexible evaluation of a country's macroeconomic conditions.

As discussed in this section, the unreliability of estimates is widely acknowledged. A sound economic policy should not be constrained by potentially biased rules; therefore, the medium-term objectives foreseen in the SGP should be addressed with due contempt.

[13] Letter addressed by eight ministers of Finance to VP Dombrovskis and Commissioner Moscovici (2016).
[14] Refer, for example, to the Eurogroup statement of 23 November 2015 (Eurogroup, 2015).
[15] Foreign demand can only fil the output gap in the non-tradeable sector.

4. Fiscal multipliers and budget balance semi-elasticities

4.1. Fiscal multipliers

Fiscal multipliers[16] measure the short-term impact of discretionary fiscal policy on output, providing an estimate for the changes in output as a response for changes in fiscal components (Santos, et al., 2010).

The accurate estimation of fiscal multipliers is determinant in assessing economic growth and fiscal policy measures.

4.1.1. Determinants and size of fiscal multipliers

The computation of fiscal multipliers is often lengthy, and results are not consensual in the literature (Afonso, et al., 2015).

Whilst the first estimation models (namely using DSGE and SVAR approaches), in the early 1990s, suggested first-year multipliers between 0 and 1 (Batini, et al., 2014), the initially suggested results have been contested, and different findings can be identified in more recent literature.

Although some empirical studies narrow the government spending multiplier within the range 0.5-1, other studies suggest a higher interval, between 0.8-1.5, as reported by Ramey (2011).

Furthermore, some suggestions that the size of multipliers depends on the economic cycle have become very relevant. Castro, et al. (2013) put forward that fiscal multipliers tend to be twice as large in times of crisis in small euro area economies, and that one-year ahead fiscal multipliers also tend to be exacerbated. According to the authors, government consumption multipliers can increase from 1.2 in normal times to around 2 in crisis periods.

[16] The fiscal multiplier is the ratio between changes in GDP, with respect to the potential GDP, after an exogenous change in budgetary spending compared to its baseline.

In fact, Blanchard & Leigh (2013) suggest that the underestimation of fiscal multipliers early in the financial crisis significantly contributed to significant forecast errors. According to the authors, multipliers used at the start of the crisis averaged about 0.5. However, they concluded that actual multipliers were actually significantly higher (substantially above 1).

Studies show a wide range for the magnitude of theory-consistent fiscal multipliers, and evidence shows that the size of the multiplier depends on a large set of structural factors (e.g., trade openness, labour market rigidity, size of automatic stabilizers, the debt level, etc.) and conjuncture factors (state of the business cycle and degree of monetary accommodation of fiscal shocks)[17].

According to what Batini, et al. (2014) suggest, based on Mineshima, et al. (2014), overall "normal times" first-year multipliers are of around 0.6 (0.75 for government spending and 0.25 for government revenue, assuming that 2/3 of the fiscal adjustment falls within the expenditure side), which is in line with Keynesian theory, explaining that the size of revenue-based fiscal multiplier tends to be smaller than expense-based ones[18].

4.1.2. Persistence of fiscal multipliers

Another important factor when assessing fiscal multipliers is to ascertain their persistence over time. Model-based and econometric studies suggest that the output effect of an exogenous fiscal shock lasts for five years, usually assuming a U-shape non-linear path. According to Batini, et al. (2014) and Coenen, et al. (2012), the maximum point of this U-shape path occurs in the second year of the shock.

[17] Refer to Batini, et al. (2014).
[18] Such reasoning is intuitive and relies on the fact that, when revenue-based measures are considered (e.g., tax cuts), households can save a part of their additional after-tax income, contrarily to spending-based measures.

Moreover, permanent shocks tend to be more persistent than temporary ones, although its persistency depends on the fiscal instruments used. While the European Commission (2010) suggests that a permanent change in indirect taxes, government consumption and transfers has short-term output effects of around five years, the effects of permanent changes in public investment or corporate taxes tends to be longer – sometimes permanent, assuming the long-run values (Coenen, et al., 2012). This is explained because these effects tend to impact the productive capacity of the economy and thus the potential output.

4.2. Fiscal multipliers – the case of Portugal

In the case of Portugal, Afonso & Sousa (2011) suggest a remarkable persistence of government spending, which mitigates fiscal authorities' actions namely by imposing difficulties to acting in a timely and temporary manner.

Despite this, Afonso & St. Aubyn (2009), using a VAR approach, report the existence of positive effects of public investment on output and therefore a positive multiplier for this budgetary component.

Different results arise using a different technical approach – using the PESSOA model, Almeida et al. (2013) reach different conclusions: multiplier of 1 for public consumption, 0.2 for transfers to households, and 0.6 for transfers to households with liquidity constraints.

Finally, Pereira & Wemans (2013), using a SVAR approach, also report the existence of positive effects (average one-year cumulative) of 0.2 for public consumption, 1.7 for the compensation of employees and -1.2 for direct taxes. Amongst other results, the authors also estimate the average cumulative responses, on a three years basis, for these variables.

Table I - Fiscal multipliers with persistence

	Public consumption	Employees compensation	Goods and services
Contemporaneous	0.10	0.40	0.00
1st year	0.10	1.40	-0.10
2nd year	0.20	1.90	-0.10
3rd year	0.30	2.10	-0.10
Cumulative multiplier (1 year)	0.20	1.70	-0.30

Source: Pereira & Wemans (2013).

According to the "bucket approach"[19] Portugal would be likely to have a medium to large overall fiscal multiplier (ranging from 0.5 to 1.3). Despite only providing a rule of thumb for context purposes, the results are rather in line with the literature reviewed.

Moreover, the rule of thumb focuses only on first-year multipliers, and argues that second and third year multipliers could be 10 to 30 percent higher, which is also in line with the revised literature.

Finally, it is important to notice that while a conventional multiplier of 0.5 was used by the IMF when designing the adjustment program for Portugal, the institution has revised in 2012 such multiplier to 0.8 (Eichenbaum, et al., 2016).

Below, in section 5, a multiplier of 0.8 is assumed, in line with the reference value revised by the IMF in 2012. Recent studies have also used a spending multiplier of the same size – refer to Cabral, et al. (2017).

4.3. The budgetary elasticities

Budgetary elasticities are important to ascertaining how the budgetary components will react to GDP changes (Santos, et al., 2010).

[19] Refer to Batini, et al. (2014).

The main budgetary items for which elasticities are normally computed are corporate tax revenues, personal income tax revenues, revenues from social security contributions and current spending. Moreover, the overall budget balance semi-elasticity is also normally assessed based on the individual components (Afonso, et al., 2015).

In the specific case of Portugal, Girouard & André (2005), in an OECD work used for EU fiscal surveillance until 2013, reported a semi-elasticity of 0.46 for the overall budget balance (versus a change of 1 percent in GDP): this is, for each GDP increase of 1 the total budget balance increases 0.46 percent.

More recently, the semi-elasticities were revised by Mourre, et al., (2014) and estimated in 0.51. In line with this authors' work, a semi-elasticity of 0.51 is considered below, in section 5.

5. Assessing macroeconomic impact

5.1. Government spending frontier (2016-2018)

According to European Commission (2017) historic and forecasted statistics, the budget balance (as a percentage of GDP) was negative in 2.01 % in 2016 and was forecasted to be negative in 1.76 % and 1.86 % in 2017 and 2018, respectively. The projections are more conservative than those of the Portuguese Government[20], which forecasted a budget balance (as a percentage of GDP) of 1.5 % and 1.0 % in 2017 and 2018, respectively.

For neutrality reasons, this document's baseline projections will consider the figures forecasted by the European Commission. Notwithstanding, a comparison between the figures projected in the document and the ones projected by the Government (including and excluding fiscal stimulus) can be found in Appendix I.

When compared to the corrective arm budgetary restrictions in place in the Economic and Monetary Union, specifically to government deficit restrictions of 3 % and convergence to a debt-to-GDP ratio of 60 %, such percentages are, respectively, distanced by 0.9 pp, 1.5 pp, and 1.95 pp, from the "government net spending frontier", this is, not breaching the corrective arm conditions.

Therefore, government could have decided to increase spending (or decrease revenue)[21] and provide an additional fiscal impulse to the economy.

To measure such implications on output, it is critical to perceive how output changes when fiscal components change (fiscal multipliers), and how the budget balance will change in reaction to changes in its fiscal components (budgetary elasticities).

[20] For further detail, please refer to the Stability Program presented by the Portuguese Government (Ministério das Finanças, 2017).
[21] This assumes, in line with the reviewed literature, an overall fiscal multiplier greater than zero.

The following assumptions were considered based on the reviewed literature:

- Overall fiscal multiplier: 0.8, with contemporaneous persistence.
- Budget balance semi-elasticity: 0.51.

A sensitivity analysis for the fiscal multiplier, based on the projections hereinafter, can be found in Appendix II, which concludes that the critical multiplier – the multiplier that would entail a neutral impact on the debt-to-GDP ratio patio[22] – would be around 0.58.

Under these assumptions, the maximum possible increase in government spending within the corrective arm restrictions was estimated, taking into account the feedback effect (refer to section 5.2.3 for more detail). In line with the remarks in section 3, the limitations imposed by the preventive arm of the SGP were not taken into consideration.

Table II – Government net spending frontier (% of GDP)

	2016	**2017**	**2018**
Budget balance	-2.01	-1.76	-1.86
Maximum budget balance	-3.00	-3.00	-3.00
Target ∆ budget balance	-0.99	-1.24	-1.14
∆ Government expenditure[23]	1.67	2.09	1.92

Source: Author's computations based on European Commission (2017).

[22] According to the European Commission (2013) "A "critical" multiplier can then be defined as the value of the multiplier for which a fiscal shock would leave the public debt ratio unchanged".
[23] ∆ Government expenditure was computed under the assumptions mentioned and through the following equation: ∆ Government expenditure = [Target ∆ Government lending / Budget balance semi-elasticity x Overall fiscal multiplier – 1].

5.2. Macroeconomic impact

5.2.1. Output

Considering increased government expenditure (as a percentage of GDP) of 1.67 pp, 2.09 pp, and 1.92 pp, in 2016, 2017, and 2018 respectively, the implications on output can be derived.

Considering the fiscal multiplier, an exogenous fiscal shock of such measure would imply an increase in GDP growth of 1.33 pp, 1.67 pp, and 1.54 pp in each of the years under consideration.

Such an increase in output would, of course, be different, had a different overall fiscal multiplier been considered.

5.2.2. Unemployment

According to Okun (1962), there is a direct relationship between the unemployment gap and output growth, which suggests that a deviation of output from its potential implies an opposite change in unemployment.

There have been several attempts to measure the Okun Law. According to Ball, et al. (2012), some authors (for example, Mankiw) argue that a one percent deviation of output from potential causes an opposite change in unemployment of half a percentage point.

It is generally accepted that the Okun Law is a stable relationship in most countries, despite the variability of the coefficient of relationship – which measures an effect of a one percent change in output on the unemployment rate – varying across countries (Ball, et al., 2012).

According to these authors, the coefficient for Portugal is equal to 0.268 for each percent drop in GDP. Inverting the coefficient, a one percentage point change in the unemployment rate occurs when output changes by around 3.7 pp, which, considering the effect on output, would held an

overall increase (accumulated over 3 years) of 1.22 pp, as illustrated in the table in the below. The aggregate increase would correspond to a net job creation of roughly 64 thousand[24].

Table III - Impact on unemployment according to Okun Law

	2016	2017	2018
Okun inverted coefficient	3.70		
Δ GDP	1.33	1.67	1.54
Δ Unemployment	0.36	0.45	0.41

Source: Author's computations based on the coefficient of relationship, as estimated by Ball, et al. (2002).

5.2.3. Government budget balance

The government budget balance would immediately deteriorate by -1.67 pp, -2.09 pp, and - 1.92 pp in 2016, 2017, and 2018.

Notwithstanding, taking into account the feedback effect resulting from the increase in GDP growth, the deterioration of the budget balance would be counteracted, as shown in the table below.

Table IV - Government budget balance (% of GDP)

	2016	2017	2018
Δ Government expenditure	1.67	2.09	1.92
Δ GDP growth	1.33	1.67	1.54
Direct impact on budget balance	-1.67	-2.09	-1.92
Feedback effect	0.68	0.85	0.78
Δ Overall budget balance	-0.99	-1.24	-1.14
New budget balance	-3.00	-3.00	-3.00

Source: Author's computations based on European Commission (2017).

[24] Figure used for illustration purposes, considering total labour force as of 2018, according to AMECO (European Commission, 2017), multiplied by 1.22%.

5.3. Debt-to-GDP ratio path

5.3.1. Baseline scenario

To assess the implications on the debt-to-GDP ratio, a baseline projection was designed. The baseline projection bears the following assumptions:

- From 2015 until 2018 figures correspond to the ones observed and forecasted by the European Commission (EC) (2017).
- The nominal GDP growth from 2019 onwards remains constant at the rate forecasted by the EC for 2018.
- From 2019 (including) onwards, the budget balance is reduced by 0.5 pp until it reaches -0.5 pp (2021), which is assumed to remain constant thereafter.
- The implicit SFA (stock flow adjustment) is assumed until 2018. From 2019 onwards a SFA of 0 is considered.

Table V - Debt-to-GDP ratio path: Baseline scenario (% of GDP)

Base case	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2030**	**2040**	**2050**
Budget balance	-4.36	-2.01	-1.76	-1.86	-1.36	-0.86	-0.50	-0.50	-0.50
GDP growth	3.71	3.02	3.22	3.01	3.01	3.01	3.01	3.01	3.01
Government debt	128.99	130.35	128.46	126.19	123.87	121.12	94.46	74.64	59.90
Implicit SFA	-1.29	3.14	0.41	-0.38	-	-	-	-	-

Source: Author's computations based European Commission (2017).

The baseline scenario shows that the debt-to-GDP ratio path is already in a downwards direction in 2016 (the increase in stock of gross public debt is explained by a higher SFA, which offsets the downward trend).

From 2017 onwards, the debt-to-GDP ratio path is gradually declining until a government debt as a percentage of GDP lower than 60 % is achieved in 2050 (59.90 %).

The results are rather in line with the projections of Aubyn, et al., (2017) and the assumptions undertook translate a moderately conservative scenario, this is, maintenance of the fiscal policy and of Portuguese and worldwide economic conditions.

Moreover, the debt-to-GDP ratio path projected for the baseline scenario is in line with the European Commission's considerations, this is, presenting a moderately downward trend.

5.3.2. Scenario including fiscal stimulus

Under this scenario, the baseline scenario assumptions were also considered, added by the inputs regarding the fiscal stimulus scenario, as described earlier in this document. The modifications in relation to the baseline scenario can be summarized as follows:

- The nominal GDP growth in 2016, 2017, and 2018 corresponds to the one forecasted by the European Commission, added by the fiscal stimulus GDP growth projected in section 5.2.1.
- The budget balances in 2016, 2017, and 2018 correspond to the ones forecasted by the EC, added by the fiscal stimulus budget balance impact projected in section 5.2.3.
- From 2019 (including) onwards, the budget balance is assumed to be the same as the baseline scenario (in line with the contemporaneous effect of the fiscal stimulus).

Table VI - Debt-to-GDP ratio path: Fiscal stimulus scenario (% of GDP)

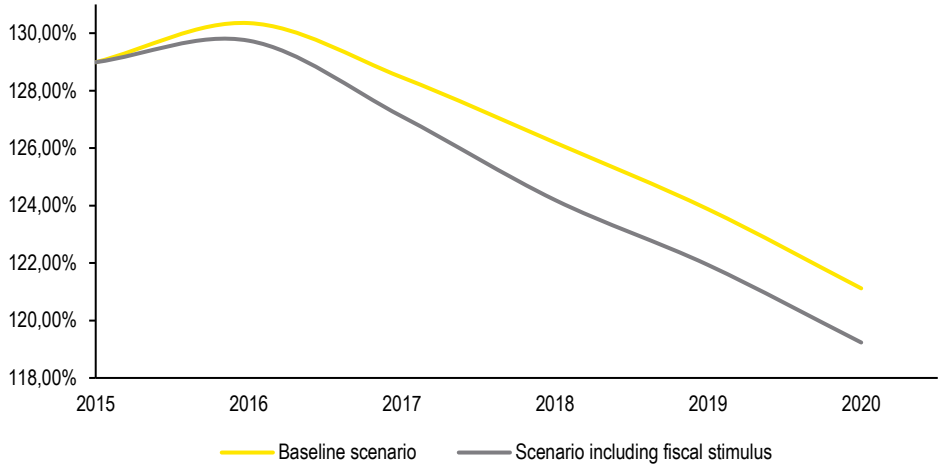
Base case	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2030**	**2040**	**2050**
Baseline budget balance	-4.36	-2.01	-1.76	-1.86	-1.36	-0.86	-0.50	-0.50	-0.50
Fiscal stimulus budget balance	-4.36	-3.00	-3.00	-3.00	-1.36	-0.86	-0.50	-0.50	-0.50
Difference (in pp)	**-**	**-0.99**	**-1.24**	**-1.14**	**-**	**-**	**-**	**-**	**-**
Baseline GDP growth	3.71	3.02	3.22	3.01	3.01	3.01	3.01	3.01	3.01
Fiscal stimulus GDP growth	3.71	4.36	4.89	4.54	3.01	3.01	3.01	3.01	3.01
Difference (in pp)	**-**	**1.34**	**1.67**	**1.53**	**-**	**-**	**-**	**-**	**-**
Baseline government debt	128.99	130.35	128.46	126.19	123.87	121.12	94.46	74.64	59.90
Fiscal stimulus government debt	128.99	129.74	127.10	124.19	121.93	119.23	93.06	73.60	59.12
Difference (in pp)	**-**	**-0.61**	**-1.36**	**-2.00**	**-1.94**	**-1.88**	**-1.40**	**-1.04**	**-0.77**
Implicit SFA	-1.29	3.14	0.41	-0.38	-	-	-	-	-

Source: Author's computations based on European Commission (2017).

Since the underlying assumptions for the fiscal stimulus is that this is an extraordinary measure, only in place in each year, the assumptions regarding the nominal GDP growth and the budget balance from 2019 onwards remain the same as in the baseline scenario.

The decrease in government debt imposed by the fiscal stimulus considered gradually declines, after reaching a peak of -2.00 pp difference, until it reaches a difference of -0.77 pp in 2050.

Figure II - Debt-to-GDP ratio path until 2020 (baseline vs. fiscal stimulus scenarios)



Source: Author's computations based on European Commission (2017).

5.4. Discussion of results

The results obtained show that the GDP growth would respond in a positive fashion to a fiscal stimulus (along with a moderate decrease in the unemployment rate) which is only possible since a multiplier higher than 0 was assumed.

Regarding the debt dynamics' implications, the budget deficit should be expected to increase as well as the nominal debt stock. However, the GDP growth would more than offset such increase and present a more accentuate downward trend when compared to the baseline scenario.

As a result, government debt as a percentage of GDP would decrease when compared to the baseline scenario (the numerator increases less than the denominator of the aforementioned ratio).

The conducted analysis departs from the fact that the adopted measures are temporary, thus preventing implications on future budget balances. Similarly, the present analysis has assumed that no crowding-out effect[25] (contemporaneous or lagged) would occur.

The abovementioned assumption derives from the implicit assumption that the economy is below its potential – a more expansionary fiscal policy would only place the economy closer to its potential, increasing demand to match supply and closing the output gap.

Although the document does not numerically assess the implications of a fiscal stimulus in the structural balance, as measured by the European Commission for purposes of the preventive arm of the Stability and Growth Pact (SGP), an increase in the budget deficit would breach the MTO objectives if the economy's capacity would remain unchanged (but still below potential).

Finally, it should be noted that the figures were projected taking into account the "government net spending frontier" under the corrective arm of the SGP. However, were the Portuguese Government to adopt a more expansionary fiscal policy, it would be advisable to target a lower than 3 % budget deficit to mitigate the risk of a budgetary slippage and, consequently, entering into an Excessive Deficit Procedure.

[25] The crowding-out effect, in economic literature, is broadly described as the reduction in private investment or consumption as a result of an increase in public investment (Santos, et al., 2010).

6. Conclusion

The aim of the present work was to estimate the macroeconomic impact of a fiscal stimulus in the Portuguese economy in 2016-2018 within the current fiscal policy framework.

Ignoring the restrictions imposed by the preventive arm of the Stability and Growth Pact, and taking only into consideration the ones imposed by the corrective arm of the Pact, the results suggest that the government net spending could have been set to target a budget deficit of 3.0 % in 2016, 2017, and 2018, without breaching such conditions.

Considering a fiscal multiplier of 0.8 and a budget semi-elasticity of 0.51, the results demonstrate that an increase in government net spending by 1.67 pp, 2.09 pp, and 1.92 pp in 2016, 2017, and 2018, respectively, would place the budget balance in the 3 % budget deficit threshold in each year.

The increase in government net spending would imply an immediate deterioration of the budget balance by 1.67 pp, 2.09 pp, and 1.92 pp in 2016, 2017, and 2018, respectively, partially offset by the positive feedback effect resulting from the increase in GDP: 0.68 pp, 0.85 pp, and 0.78 pp in 2016, 2017, and 2018.

As a result, the aggregate impact on the budget deficit would be 0.99 pp, 1.24 pp, and 1.14 pp, thus reaching the targeted budget deficit (3 %) in each year under analysis.

The unemployment rate would decrease in around 1.22 pp (aggregately for the three years), which would correspond to a net job creation of roughly 64 thousand.

In terms of the debt-to-GDP ratio path, the fiscal stimulus scenario presents a ratio of 124.19% in 2018, depicting an accumulated improvement of 2.00 pp in 2018 when compared to the baseline scenario, which is explained by an increase in nominal GDP growth higher than the deterioration of the budget balance.

A debt-to-GDP ratio of 59.12% would be reached in 2050, presenting a difference of 0.77 pp to the baseline scenario. The convergence path of the ratio to the baseline projections results from considering that the economy would work under the baseline assumptions after 2018.

Nevertheless, as this research demonstrates, there is enough budgetary slack (when compared to the 3 % deficit threshold) to provide a fiscal stimulus with positive macroeconomic impacts, which reinforces the importance of reassessing the methodology used by the European Commission to estimate the structural balance.

Although it was not within the scope of the present work to suggest alternatives to that methodology, there is room for future improvements in that line of research. In fact, despite of the existent of work in that area, it would be interesting to estimate the macroeconomic impacts of having considered revised output gaps and structural balance indicators in previous years in Portugal.

Due to the revision of the medium-term objectives foreseen in the Stability and Growth Pact in 2018, a negotiation of such objectives (setting lower structural balance requirements) would broaden fiscal policy options under the preventive arm of the Pact.

Appendices

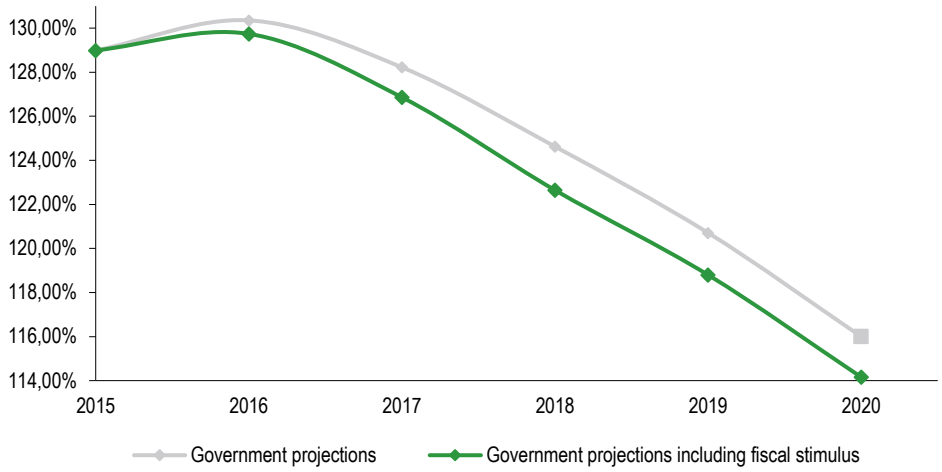
Appendix I

The results included in section 5 of the document use projections from the European Commission (2017), along with other author's assumptions (refer to section 5 for further detail).

However, section 5 does not take into consideration projections made by the Portuguese Government and included in the Stability Program[26], which are taken into consideration hereinafter:

- The nominal GDP growth from 2017-2020 projected by the Portuguese Government.
- The budget balance from 2017-2020 projected by the Portuguese Government.
- The implicit SFA projected by the EC is assumed until 2018. From 2019 onwards a SFA of 0 is considered.

Figure III - Debt-to-GDP ratio path until 2020 (government projections vs. government projections with fiscal stimulus)



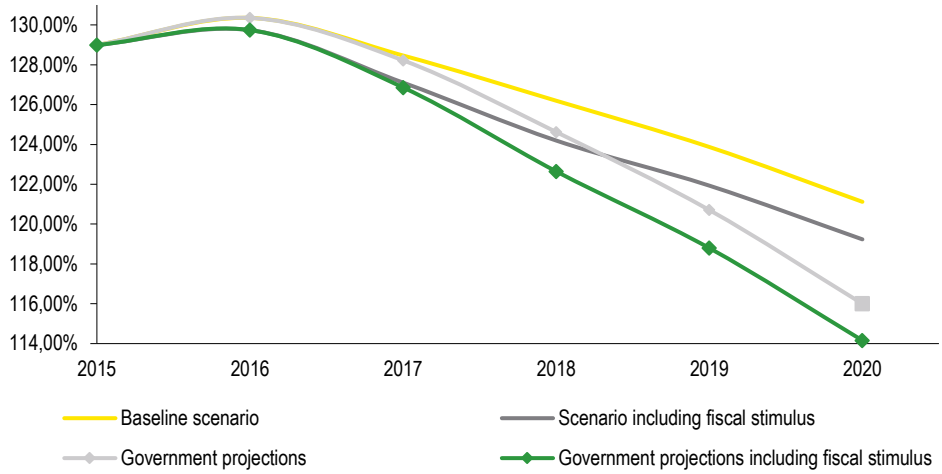
Source: Author's computations based on European Commission (2017), and Ministério das Finanças *(2017)*.

[26] Refer to Ministério das Finanças (2017) for further detail.

The figure above shows that the remarks included in section 5 remain valid, this is, under the assumptions undertook a fiscal stimulus would reinforce the downward trend of the nominal stock of debt as a percentage of GDP.

The picture below includes all four scenarios depicted in the document (both in section 5 and in Appendix I).

Figure IV - Debt-to-GDP ratio path until 2020 (all scenarios)



Source: Author's computations based on European Commission (2017), and Ministério das Finanças *(2017)*.

The Government projections are rather more optimistic than the ones considered in the main document and therefore configure a more accentuate downward trend. The general conclusions in terms of trend remain unchanged regardless of the scenarios chosen.

Appendix II

The fiscal multiplier assumed in the projections included in section 5 is 0.8. Notwithstanding, a general sensitivity exercise was done considering the implications in the budget balance, with feedback, had different fiscal multipliers, and different budget balances semi-elasticity, been considered, as demonstrated in the table below.

Table VII – Ranges for the change in the budget balance, with feedback

Fiscal multiplier	Budget balance semi-elasticity		
	0.46	**0.51**	**1**
0.5	-0.77	-0.75	-0.50
0.59	-0.73	-0.70	-0.41
0.8	-0.63	-0.59	-0.20
1	-0.54	-0.49	0.00
1.2	-0.45	-0.39	0.20

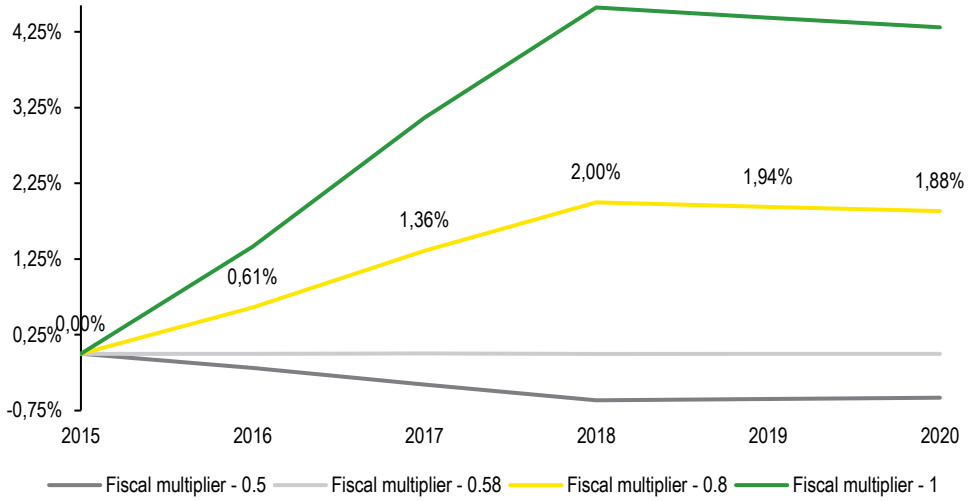
Source: Author's computations.

The results show that an increase of the fiscal multiplier and an increase of the budget balance semi-elasticity decrease the negative impact of a fiscal impulse in the budget balance. The first result is explained because of the increase in GDP growth induced by the fiscal multiplier. The second result is explained because the budget balance semi-elasticity measures how the budgetary components will react to GDP changes.

Had a fiscal multiplier of 1 been considered along with a budgetary semi-elasticity of 1, the impact in the budget balance, with feedback, would have been neutral. The increase in government spending would increase in the same amount the GDP (via a fiscal multiplier of 1) and thereafter the budget balance (via a semi-elasticity of the budget balance of 1). A fiscal multiplier higher than 1 would have held positive implications on the budget balance, had a semi-elasticity of 1 been considered.

Furthermore, using the debt-to-GDP path projections and different fiscal multipliers, a sensitivity analysis was done, as depicted in the graphic below.

Figure V - Sensitivity analysis for differences in debt-to-GDP paths, compared with the baseline projections, using different fiscal multipliers



Source: Author's computations.

The results show the range of implications in the differences in debt-to-GDP paths compared to the baseline projections. A critical multiplier of around 0.58 was computed, as shown in the grey line, which demonstrates an identical situation to the baseline projections.

The fiscal multiplier considered in the document's alternative scenario is depicted in yellow and is labelled.

As expected, a multiplier of 1 would have resulted in higher differences when compared to the baseline scenario, this is, a faster convergence path until 2018 and also a higher convergence to the nominal stock of debt (as a percentage of GDP). On the other hand, a negative multiplier would have held an increase in the nominal stock of debt (as a percentage of GDP).

Appendix III

Whenever computed, the government debt-to-GDP ratio path followed from the dynamic debt equation below, with all variables as ratio of the GDP:

$$D_t = D_{t-1} - d_t + SFA_t \quad (1)$$

where *D* is the nominal debt stock, *d* is the budget deficit and *SFA* is the stock-flow adjustment.

The stock-flow adjustment explains the difference between the change in government debt and the government deficit/surplus for a given period.

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