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The analyses, opinions and findings of these papers represent  
the views of the authors, they are not necessarily those of the  
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# **Euro area fiscal policy changes: stylised features of the past two decades**

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June 2019

## **Abstract**

The paper provides a narrative of euro area fiscal policy changes since 1997, the year when Maastricht criteria were met for inception of the euro. Changes in the budget balance are decomposed into a discretionary component, a cyclical component and a net residual, with each component broken down in turn into broad categories of expenditure and revenues. The paper then examines the output effects of fiscal changes. We summarise our findings in six stylised features. In brief, fiscal changes and fiscal effects are relatively large. They stem in similar proportions from discretionary actions and from the automatic stabilisers. Discretionary changes tend to involve both revenue and expenditure measures and do not appear systematically driven by cyclical developments. Fiscal changes as a whole have contributed to smooth the euro area growth path, but mostly due to the automatic stabilisers.

JEL: H6, H30, E32, E62

Keywords: fiscal policy; fiscal stance; automatic stabilisers; output smoothing; fiscal multiplier; euro area.

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## 1. Introduction

Fiscal policy changes and their output effects are at the centre of the economic policy debate in Europe. In the Economic and Monetary Union (EMU), fiscal policy remains a national competence subject to the rules of the Stability and Growth Pact (SGP). In this context, the overall fiscal stance of the euro area results from the addition of national fiscal policies and is not a quantum that policy makers target as such. How much attention one should pay to this aggregate stance is controversial but the theme has gained some traction in recent years. Noticeably, in contrast with earlier conventional wisdom, the President of the European Central Bank (ECB) has noted the relevance of the euro area fiscal stance, at least in some circumstances such as when monetary policy is at the zero low bound (Draghi, 2014). The Commission, seeing a potential blind spot in the European policy framework, has instated a European Fiscal Board tasked among others with assessing the appropriate euro area fiscal stance.

Against this backdrop, several papers have asked how one might define a desirable fiscal stance (Bénassy-Quéré, 2016; European Commission, 2016; Bankowski and Ferdinandusse, 2017; European Fiscal Board, 2017). At the same time, relatively little empirical analysis has been undertaken to simply describe actual euro area fiscal changes in a long time series perspective. This paper contributes to filling this gap by providing an overview of fiscal changes since 1997. It focuses on aggregate euro area developments with limited references to the underpinning country-level developments. More specifically, the paper adds to the existing literature in two respects. First, it provides a historical depiction of euro area fiscal changes based on a consistent and robust methodology. Second, it offers an account of the 'fiscal effect' on growth over the same time period. We summarise our findings in the form of six stylised features on euro area fiscal changes and their relation with the cycle.

With regard to our first goal, the description of fiscal developments, we define fiscal changes simply as headline changes in the annual budget balance of general government. We decompose euro area fiscal changes into a discretionary component, a cyclical component and a net residual. Each component is in turn broken down into broad categories of expenditure and revenues, which provides additional granularity for the analysis when that is useful. Moreover, one value added of our methodology lies in capturing the discretionary component of fiscal policy based on a 'semi-narrative' approach, in line with a strand of recent studies. We argue this to be a sounder reflection of policy decisions than the one pictured by traditional indicators such as the change in the structural balance (see section 2). And we (broadly) overcome the practical data limitations associated with such an approach in a time series perspective by exploiting a dataset of fiscal measures put together by euro area central banks (Morris *et al.*, 2014). These choices allows us to pin down the true drivers of euro area fiscal changes in a time consistent manner. We study at the same time the relative sizes of the discretionary, cyclical

and residual components, their cross-correlations, and the composition in terms of revenue and expenditure measures.

As for the second aspect, the 'fiscal effect' on growth, we build (with some adaptations) on the methodology used by previous authors on U.S. data (Cashin *et al.*, 2017). We focus on the short term consequences of fiscal changes for the business cycle. At that horizon the growth effect of fiscal changes works mostly through their influence on aggregate demand, in line with the New Keynesian model and more traditional analysis. Importantly, we consider the effects of all fiscal changes, that is, we consider the growth impact of the discretionary fiscal component but also of the cyclical component and residual items. The effect of the cyclical component can be interpreted as a measure of the automatic stabilisers. Assessing jointly and consistently the impact of both discretionary policy changes and the automatic stabilisers is important to get a complete view of the fiscal effects (as argued forcefully by Fatas and Mihov, 2012, and earlier on by Blanchard, 1993). In general, we analyse the fiscal effect with similar breakdowns as fiscal changes, including therefore also the possibility to examine the effects at a more granular level of revenues and expenditures.

Our main findings can be summarised in the form of six stylised features:

1. Annual fiscal changes are relatively large in the euro area. They average out over the long term but their standard deviation from one year to the next exceeds 1 percent of GDP. That short-run volatility is not surprising in itself, if only given the size of governments, but is worth bearing in mind. Fiscal changes matter macroeconomically.
2. These fiscal changes are driven both by discretionary fiscal policy actions and by the automatic cyclical response of the public accounts to economic developments. Quantitatively, the two contribute to fiscal volatility to broadly comparable extents.
3. Discretionary fiscal changes, either expansionary or restrictive, tend to involve both revenue measures and expenditure changes working in conjunction, and with comparable magnitudes, at a given time period.
4. Discretionary fiscal changes do not appear to be driven in a systematic manner by cyclical developments. There is one clear episode of active counter-cyclical (2008-09) followed by one clear episode of pro-cyclical policies (2012-13). Overall, as emerges also from previous studies, the evidence regarding a possible behavioural response of fiscal authorities to the cycle is mixed (when taking the euro area as a whole, as we do).
5. Fiscal effects on growth are relatively large too, of the order of  $\frac{3}{4}$  percent of GDP on average. Reflecting previous features, fiscal effects stem from both from discretionary policies and the automatic stabilisers, in similar proportions.
6. Automatic stabilisers always contribute to smooth output fluctuations, as could be expected. Discretionary policies have had a more irregular impact over the past twenty years, at times mitigating output shocks but at other

times amplifying them. Overall, fiscal changes as a whole have contributed to smooth growth paths, but mostly due to the automatic stabilisers.

To be sure, these ‘stylised features’ are a reflection of just two decades of fiscal changes in the euro area. The future may differ from the past, so our features are not cast in stone but may also be viewed as benchmarks for assessing subsequent developments. Indeed, looking ahead, there would be scope to improve fiscal management in the euro area, in particular to reduce the ‘noise’ in the discretionary component of fiscal policy and possibly raise the counter-cyclicality of fiscal changes. To be stressed as well, our analysis focuses on short-run fiscal changes and fiscal effects. It de facto leaves aside possible longer-run consequences from fiscal policies, e.g. via hysteresis or supply-side effects.

The rest of this paper is organised as follows. Section 2 summarises our methodology for describing fiscal changes. Section 3 presents the emerging stylised features of euro area fiscal changes over the past two decades. Section 4 introduces the methodology for deriving fiscal effects on output growth and describes the stylised features for fiscal effects. Section 5 presents several sensitivity tests to cross-check the robustness of our results. Section 6 concludes.

## **2. Methodology: analysing fiscal changes**

### ***2.1. A decomposition of fiscal changes***

By fiscal changes we simply mean the variation from one year to the next in the headline balance of general government. Fiscal changes can be analysed at different levels of granularity. Typically, one wishes to have at hands a bird’s eye view of developments but also the option of a more detailed scrutiny of the underlying changes. To cater for both kinds of needs in a consistent manner, we adopt a multi-tiered approach. This is captured in Figure 1 and explained further below.

First, we analyse fiscal changes by splitting the change in the euro area budget balance into three components: a discretionary component, a cyclical component and a residual change:

- The identification of the discretionary component relies on a ‘semi-narrative’ approach. We explain this approach hereafter (see subsection 2.2) and argue that it is superior to common indicators for describing what the fiscal authorities effectively do.
- The cyclical component is based on a standard cyclical adjustment method. We rely on the method used by the European Commission.
- The residual item encompasses the remaining net changes not captured by the other components.

This decomposition brings out the aggregate features of euro area fiscal behaviour, such as the respective magnitudes and correlations between the discretionary and cyclical components of fiscal changes.



Second, we decompose further the discretionary, cyclical and residual components by categories of revenues and expenditures. For this, we consider:

- Three main categories of primary government expenditure: consumption, social transfers in cash and investment. Combined, these categories cover over 90 per cent of primary expenditure. Interest payments are considered distinctly, as they follow a specific pattern.
- Five main categories of government revenues, covering around 90 percent of the total: direct taxes paid by households, direct taxes paid by corporations, indirect taxes, social contributions and capital taxes.<sup>1</sup>

The residual components include interest payments, other items such as non-tax revenues and a net trend component.<sup>2</sup> A formal description of the decomposition and more details on the treatment of each item can be found in Appendix A.

The focus of the study is on the euro area aggregate but the underlying data were compiled for each of the 19 euro area countries for the period 1997-2017. The data for the general government sector and other national accounts aggregates correspond to those published by Eurostat.

## ***2.2. Identifying the discretionary component***

The discretionary component of fiscal policy is traditionally equated with the change in the structural balance (or the change in the structural primary balance). This is an expedient method as structural balances are routinely published. However, it has been increasingly recognised that because of measurement uncertainties, the structural (primary) balance gives a very imperfect gauge of the underlying policy orientation.

The so called 'narrative approach' has been advanced as a possible alternative for evaluating discretionary policy (Romer and Romer, 2010). The narrative approach relies on a 'bottom up' summation of the measures inventoried in budget documents. In turn however, the narrative approach faces two hurdles. First, correctly identifying and costing the relevant spectrum of budgetary measures is far from straightforward in practice. Second, the definition of the 'baseline scenario' on the expenditure side is problematic, both conceptually and empirically.<sup>3</sup>

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1. According to the ESA2010, 'capital taxes' (D.91) consist of taxes levied at irregular and very infrequent intervals on the values of the assets or net worth owned by institutional units or on the values of assets transferred between institutional units as a result of legacies, gifts between persons, or other transfers. On average, they represent less than 1 percent of total revenues in the euro area as a whole.

2. Both revenue changes and expenditure changes include a 'trend component' capturing the growing size of the economy. However, the balance of trend components, which enters into the decomposition of changes in the budget balance, is an order of magnitude smaller than those 'gross' trend components and plays little role in the decomposition.

3. In addition, there is a dearth of reliable data on expenditure measures over a significant time span.

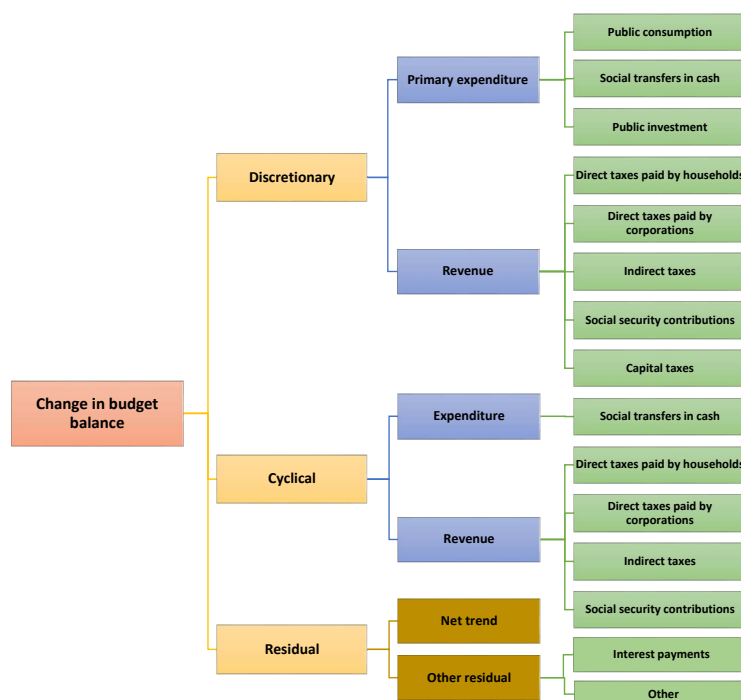


Figure 1: Decomposing fiscal changes

Source: Authors' illustration.

In this study, the evaluation of the discretionary component relies on a so called 'semi-narrative' approach. This combines a bottom up approach on the revenue side based on estimations of the direct budgetary effects of revenue measures (as per the narrative analysis) with a top-down approach on the expenditure side where the growth of expenditure is benchmarked on potential growth. This mixed approach to measuring the discretionary component of fiscal policy has been justified further and used in several recent studies (see European Commission, 2013; Carnot and de Castro, 2015; Cashin *et al.*, 2017). The key advantage is of offering a more faithful reflection of what the budgetary authorities effectively do when economies are exposed to shocks that are ill-captured by standard tax and spending elasticities.

A common practical hurdle for implementing a semi-narrative approach in a historical perspective is the lack of reliable and consistent data series. However, the paper by Morris, Rizza *et al.* (2014) presented a new data set for measuring discretionary (or action-based) fiscal policy, drawing on the experience of compiling estimates of the impact of fiscal policy measures within the European System of Central Banks (ESCB). This dataset is anchored in the information collected by public finance economists in the context of regular ESCB projection exercises. Reporting is based on standardised questionnaires following commonly agreed

principles and conventions.<sup>4</sup> Overall, the dataset benefits from the specific expertise of public finance country desks when interpreting budget documents and fiscal data, while being subject to a process of peer review, to ensure that the data is compiled in a sufficiently consistent and harmonised way across countries.

In our paper, we draw on this source to construct the discretionary component of revenue. The consolidated dataset provides discretionary tax and social contributions measures for the 1998-2017 period at an annual frequency. The data are available for the entire period or close to it for most countries and in particular for large countries with the exception of Spain, where the series starts only in 2007. Both permanent and temporary measures are considered. As a robustness check, we also verified the information from this dataset against other sources, in particular the data from the AMECO database of the Commission, in which information on revenue measures is available from 2010 onwards (see section 5).

On the expenditure side, a positive discretionary impulse occurs when actual expenditure growth exceeds potential growth (in nominal terms), and a negative discretionary impulse corresponds to actual expenditure growth below potential growth. This approach is top down in the sense that it does not rely on a bottom-up identification of expenditure measures, as is done on the revenue side. Given the difficulties highlighted above, this represents a simple and consistent solution for capturing the behaviour of fiscal authorities on the expenditure side. Moreover, the breakdown of the discretionary component by expenditure categories gives valuable information on the sources of expenditure pressures.<sup>5</sup>

### 3. Results: stylised features of euro area fiscal changes over 1997-2017

Before examining annual changes, Figures 2 and 3 summarise cumulative fiscal trends over the past twenty years. The deficit has been reduced from 3.1 percent of GDP in 1997 to 1.0 percent in 2017. This is not really a trend as the scope of deficit reduction depends on the choice of dates and may be reversed. A more robust observation is that fiscal changes have been close to neutral on average but with lots of variation by time periods.

In terms of composition, the long-run trend on the revenue side has been an increase in both household direct taxation and indirect taxation, together with a decline in social contributions. On the expenditure side public consumption and

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4. In the context of the regular projection exercises, the representatives of the National Central Banks of the EU Member States make available this information to the Working Group on Public Finance, a sub-committee of the ESCB Monetary Policy Committee. The information was kindly provided to the authors under the condition that its confidential status is preserved.

5. A conceivable alternative would be using differentiated benchmarks for each expenditure categories, as a reflection of differing 'trends' by types of expenditures. However, these differentiated trends would be difficult to pin down. Besides, one would lose the key property that an overall growth of expenditure in line with trend GDP growth corresponds to a neutral discretionary expenditure path.

social transfers have slightly increased as a share of GDP while public investment has fallen. The most dramatic evolution is a vast diminution of interest expenditure. In spite of the large increase in the debt stock, the euro area average interest rate on public debt declined from 6.8 percent in 1997 to 2.2 percent in 2017.

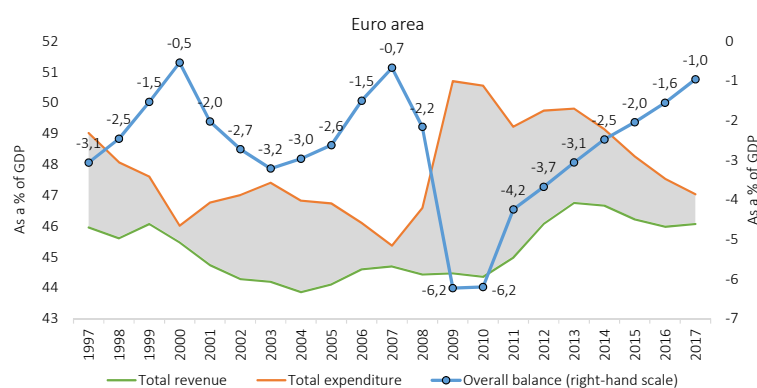


Figure 2: Overall balance, revenue and expenditure

Source: Eurostat.

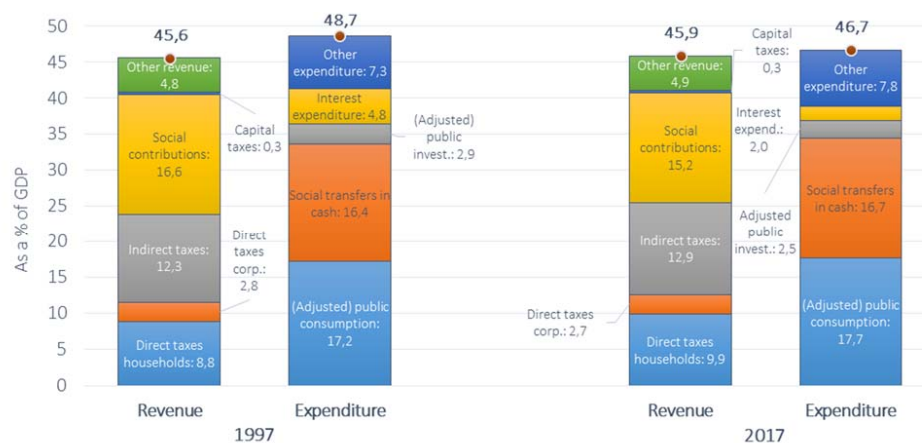


Figure 3: Breakdown of euro area revenue and expenditure in 1997 and 2017

Sources: Eurostat, ESCB and authors' calculations.

Note: Total revenue excludes receipts from EU funds used to co-finance expenditure. Total expenditure excludes, beyond the use of EU funds, proceeds from the sale of UMTS licences and the impact of the public support to the financial sector. Public consumption is adjusted by excluding the items that do not affect the budget balance (i.e. consumption of fixed capital and net operating surplus). Adjusted public investment excludes the co-financing by EU funds. See Appendix 1 for further details on the data.

### 3.1. Annual fiscal changes: stylised features

We start with three stylised features of euro area annual fiscal changes:

1. Fiscal changes are relatively large in the euro area. They average out over the long term but their standard deviation from one year to the next exceeds 1 percent of GDP.
2. These fiscal changes are driven both by discretionary fiscal policy actions and by the automatic cyclical response of the public accounts to economic developments. Quantitatively, the two contribute to fiscal volatility to broadly comparable extents.
3. Discretionary fiscal changes, either expansionary or restrictive, tend to involve both revenue measures and expenditure changes working in conjunction, and with comparable magnitudes, at a given time period.

A fourth feature of fiscal changes will also be found, namely that discretionary fiscal changes do not appear to be driven in a systematic manner by cyclical developments. We defer the examination of this more complex issue to subsection 3.3.

Table 1 and Figure 4 presents the contributions of the discretionary, cyclical and net residual components to overall fiscal changes. The standard deviation of the change in the budget balance stands at 1.14 percent of GDP. This indicates the typical magnitude of fiscal changes from one year to the next. It is a relatively large number, testifying to the important volatility of annual budgetary outcomes. By contrast, the 20-year mean of this series is close to zero. Hence our first stylised feature: fiscal changes are important on an annual basis but neutral on average. That short-run volatility is not surprising in itself, if only given the size of governments in the euro area, but is worth bearing in mind. Fiscal changes matter macroeconomically.

	TOTAL balance	Discretionary component	Cyclical component	Residual component (inc. net trend)
TOTAL balance	1,14			
Discretionary component		0,62	0,34	-0,17
Cyclical component			0,77	-0,09
Residual component (inc. net trend)				0,30

Table 1. Contributions to overall fiscal changes | standard deviations in percent of GDP in the diagonal and correlation coefficients in the other cells

Source: Authors' calculations.

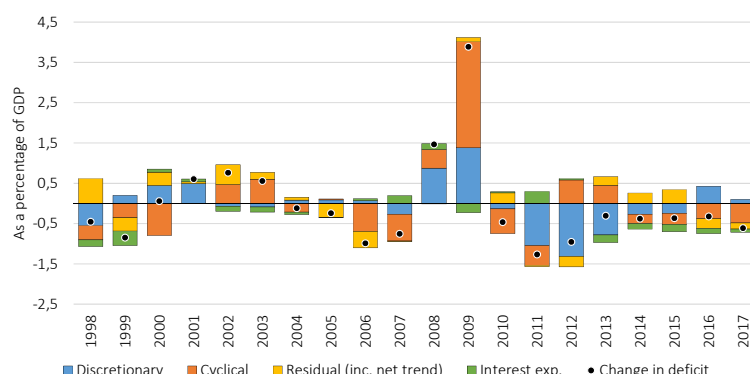


Figure 4: Breakdown of the change in the euro area deficit

Source: Authors' calculations.

The second stylised feature is that the volatility of headline fiscal outcomes comes from both discretionary actions and from the automatic stabilisers, in roughly equivalent proportions. This is illustrated in the diagonal cells of Table 1, which shows standard deviations of nearly 2/3rd of GDP for discretionary policy and 3/4th - of GDP for the cyclical component.<sup>6</sup> Together with the small positive correlation between the two (more on this below), this accounts for the bulk of the volatility of the budget balance. There is also a contribution from the residual component, but it accounts for less than 10 percent of the total. Overall, this is an important finding: fiscal volatility in the euro area stems from both discretionary policies and from the automatic stabilisers.

The third stylised feature focuses on the composition of the discretionary component. Table 2 reports a decomposition of variance that is similar to Table 1. Two observations are immediate: first, discretionary changes in revenue policies contribute as much to fiscal changes as do discretionary changes in expenditure policies. In other words, governments appear to recourse in equal measure to tax and to spending measures. The second observation is that of a positive correlation (0.54) between the two sides of the budget. A tightening of expenditure generally comes with increases in taxes and conversely, cuts in taxes tend to be accompanied by looser expenditure policies.

Our third feature is therefore that discretionary actions stem from both sides of the budget with generally mutually reinforcing effects. Member States do not offset cuts in taxes by slower expenditure, or vice versa, in order to maintain a close to

6. Table 1 uses a basic variance decomposition of a variable that is the sum of several variables:  $Var(\sum_{i=1}^N X_i) = \sum_{i=1}^N Var(X_i) + 2 \sum_{1 \leq i < j \leq N} Cov(X_i, X_j)$ . This is a purely accounting decomposition. It can be noted that a fraction of the volatility in the cyclical component may reflect (and indeed, does) an endogenous reaction to the discretionary component of fiscal changes. For simplicity we do not try to correct for this possibility in Table 1, but we will do so when analysing fiscal effects (see section 4).

	TOTAL DISCRETIONARY	Revenue discretionary	(-) Expenditure discretionary
TOTAL DISCRETIONARY	0,62		
Revenue discretionary		0,36	0,55
(-) Expenditure discretionary			0,34

Table 2. Contributions to the discretionary component | standard deviations in percent of GDP in the diagonal and correlation coefficients in the other cells

Source: Authors' calculations.

neutral overall discretionary policy. Instead, expenditures and tax policies generally add to each other. In the next subsection, we go into a more disaggregated analysis of revenues and expenditure discretionary changes.

### 3.2. Contributions to revenues measures and discretionary expenditure

Using the second-tier of our decomposition framework, one can gain additional insights on the composition of fiscal changes that drive aggregate developments. This is what we do now. Figure 5 presents the country distribution of revenue measures<sup>7</sup> while Figure 6 provides the breakdown of these measures by revenue categories. For the euro area, the mean absolute value of annual discretionary revenue measures is 0.3 percent of GDP. This is the order of magnitude of active revenue measures that are put in annual budgets. There are however clear offsetting effects between countries in most periods, so the amounts are often larger at country level.

The biggest tax hikes are observed in the period 2011-13, where the effect cumulates to higher revenues of about 2 percent of GDP. This episode is also characterised by simultaneous tax increases across countries, with very different amplitudes. In terms of tax reduction, the largest cuts in the sample are observed in the years 2000-2001, where they sum to close to 1 percent of GDP for the euro area, and to a lesser extent 2008-09.

In terms of the composition of changes in taxation, one notable feature is that increases in indirect taxation were implemented almost continuously throughout the whole period, albeit with a temporary reversal at the peak of the financial crisis. A more erratic pattern emerges concerning direct taxation and social security contributions, with more oscillations between cuts and raises. The suspicion is that governments have overall tried to reduce these revenue sources but been forced to increase them when room for manoeuvre was limited. Indeed, the whole range of

7. Appendix B presents a similar chart for each of the considered revenue categories.

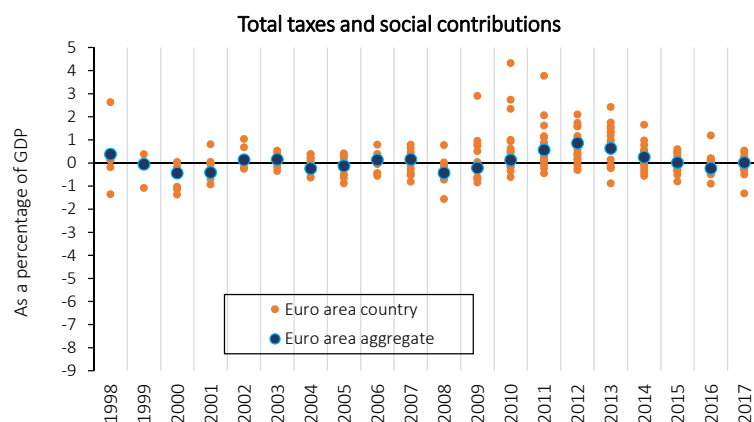


Figure 5: Discretionary revenue measures in the euro area

Source: ESCB and authors' calculations.

tax instruments was mobilised in the early 2010s for raising revenues as part of the consolidation process. There are some signs of return to the 'preferred pattern' of governments in the most recent years, with some cuts in direct taxes and to a lesser extent social contributions, while indirect taxes continue to be slightly increased.

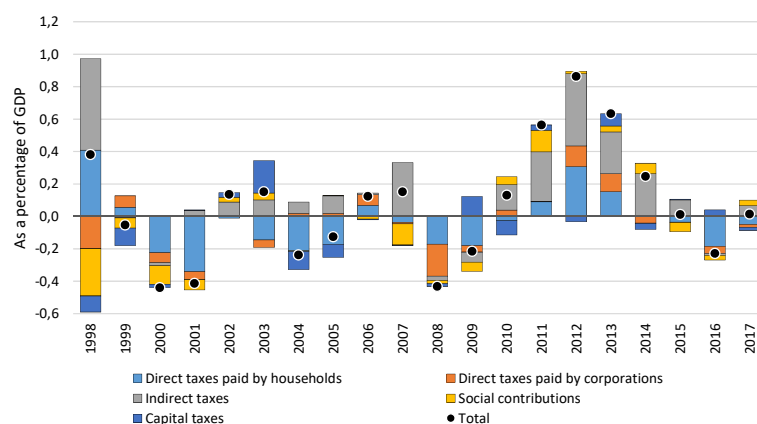


Figure 6: Breakdown of discretionary revenue measures in the euro area

Source: Authors' calculations.

The results obtained for the discretionary component of total expenditure (i.e. discretionary components of adjusted public consumption, social transfers in cash and adjusted public investment) are shown in Figure 7. The mean absolute value of annual discretionary expenditure measures is about  $\frac{1}{4}$  percent of GDP (to be compared with 0.3 percent of GDP on the revenue side). There is large dispersion



between countries. In fact, when compared with revenue measures, one observes a higher cross-country dispersion over the entire horizon. At the euro area level, the most significant expansion occurred in 2008-2009, where the cumulated stimulus over those two years exceeds  $1\frac{1}{2}$  percent of GDP. The second most significant episode is the consolidation of the early 2010s, which totals over 1 percent of GDP over 2011-13.

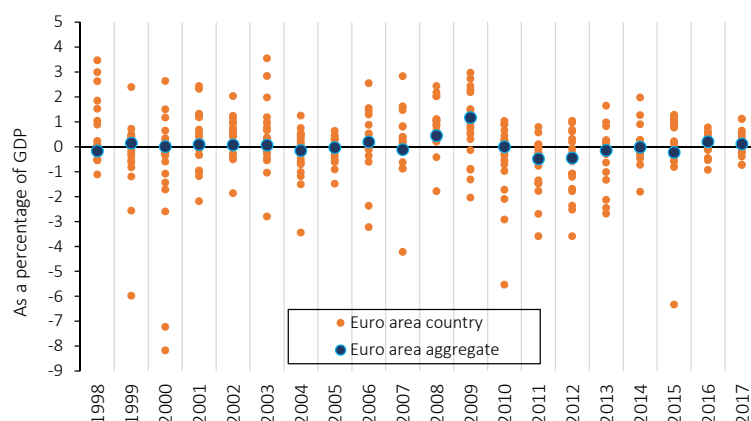


Figure 7: Discretionary expenditure in the euro area

Source: Authors' calculations.

Note: The outlier in 2015 corresponds to the case of Ireland as real potential GDP grew by almost 25 per cent in that year.

In terms of composition (Figures 8 and 9), all categories of spending contribute meaningfully to discretionary expenditure changes. A striking feature (Figure 9) is the considerably higher volatility of (adjusted) public investment. This explains the important contribution of this item to discretionary changes in spite of its relatively low share in GDP in level terms. Another apparent feature is the overall downward trend of public investment over the past two decades, especially as a result of important drops in the crisis years (2010-14). By contrast, public consumption and social transfers brings a positive contribution to discretionary expenditure on average, albeit with notable fluctuations from one year to the next.

### 3.3. Does discretionary policy respond to the cycle?

The fourth stylised feature expands on earlier observations by looking at the connection between the discretionary component and the cyclical component:

4. Discretionary fiscal changes do not appear to be driven in a systematic manner by cyclical developments. There is one clear episode of active counter-cyclicality (2008-09) followed by one clear episode of pro-cyclical policies (2012-13).

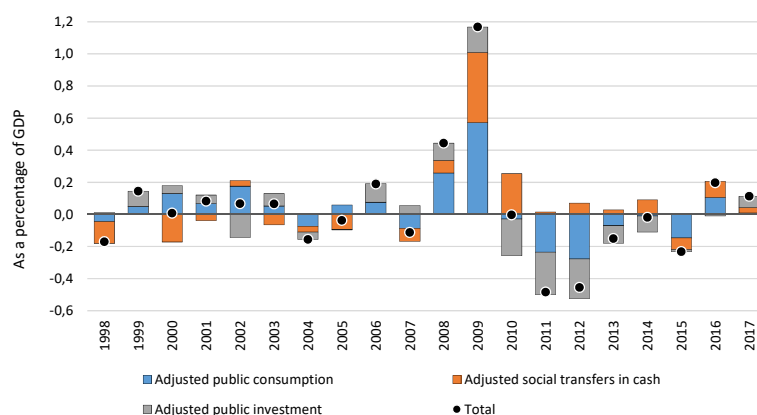


Figure 8: Breakdown of discretionary expenditure in the euro area

Source: Authors' calculations.

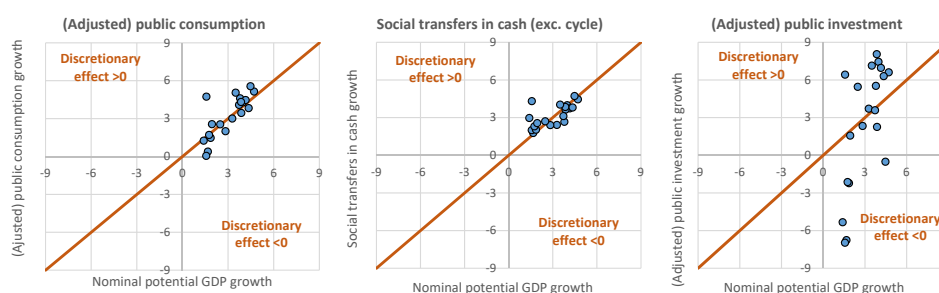


Figure 9: Measurement of discretionary effects in expenditure items

Source: Authors' calculations.

To get to this conclusion, we need to examine the correlation between discretionary policy and the cycle while being mindful of reverse causalities. Over the sample there is a positive, though not very large, correlation coefficient between the discretionary fiscal component and the cyclical component (0.34 in Table 1). At first sight, this would suggest that discretionary policies and the automatic stabilisers tend to work in synchronisation. Active fiscal contractions are (mildly) associated with positive cyclical momentum and/or active fiscal expansions with (mildly) associated negative cyclical momentum.<sup>8</sup> On closer inspection however, this finding is far from robust. Figure 4 makes clear that there is in fact one,

8. That observation could itself receive two (non-exclusive) interpretations: i) counter-cyclical discretionary policy (fiscal authorities react to growth in a counter-cyclical manner); ii) negative multipliers. The latter interpretation is rather implausible. But the former one does not hold either in a robust manner, as explained in what follows.

but only one, case of synchronisation, specifically the years 2008-2009. That spells corresponds to the early phase of the global crisis when the collapse in the economy was cushioned by both the automatic stabilisers and by the countercyclical fiscal stimulus. At the same time, the sample also shows a significant episode of pro-cyclical contraction during the second phase of the past crisis (the 'double dip' of 2012-13), and an episode of pro-cyclical fiscal expansion in the boom years of 1999-2000.

The overall visual impression is that there is no systematic pattern between the discretionary part of fiscal policy and cyclical developments. Indeed, the very sign of the correlation changes when excluding the year 2009. Figure 10 presents a simple regression between the discretionary fiscal change and the change in the output gap. The correlation is positive in the full sample (left-hand side chart) but turns negative when excluding the year 2009 (right-hand side chart).<sup>9</sup> The conclusion also seems to depend somewhat on the choice of the cyclical indicator, as illustrated by using the level of the output gap instead of the change in the output gap.<sup>10</sup> In that case, the regression line fitting the cloud of points indicates a weak evidence of pro-cyclical fiscal policies. This is consistent with the results obtained by Bénassy-Quéré (2016).

A more in-depth examination of the issue would require an econometric estimation dealing properly with the likely presence of reverse causality. The issue is that the contemporary output gap is affected in return by discretionary fiscal decision, hence a classic case of endogenous regressors. We defer this more formal study to future work. However, the visual evidence is already suggestive that there is no strong systematic response of discretionary fiscal policy to the cycle. This conclusion is also consistent with a reading from the empirical literature on the cyclical response of fiscal policy based on panel of countries. Notably, in a meta-analysis Golinelli and Momigliano (2009) shows the importance of specification assumptions and finds that many studies conclude that policies tend to be acyclical, though as many point to pro-cyclicity and a few to counter-cyclicity.<sup>11</sup>

9. On a country by country basis and relying on the change in the output gaps to measure the cyclical momentum, Eyraud *et al.* (2017) find evidence of some pro-cyclicity. Evidence of mild pro-cyclicity in a panel dataset of EU countries is also found by European Commission (2019).

10. The choice between the two indicators (level or change in the output gap) is a recurrent theme in the empirical literature with no clear settled choice (see notably Turrini, 2008, who considers different definitions of pro-cyclicity). In theory the level of the output gap is by definition the right measure to assess the amount of slack. In practice, the change in the output gap offers an interesting alternative, as it is measured with less uncertainty and also as it gives a better idea of the contemporary 'momentum' in the economy. Our view is that both approaches may be worth trying, with conclusions holding under both approaches being more robust.

11. Based on panel of OECD countries, the systematic analysis by Egert (2010) concludes that overall discretionary fiscal policy behaves in a neutral or at best weakly counter-cyclical manner. There is however evidence of differentiated behaviours at the individual country level. These conclusions are rather close to those reached on a more updated sample by Caprioli *et al.* (2017), which finds evidence of acyclicity overall, together with signs of counter-cyclicity in 'core countries' only.

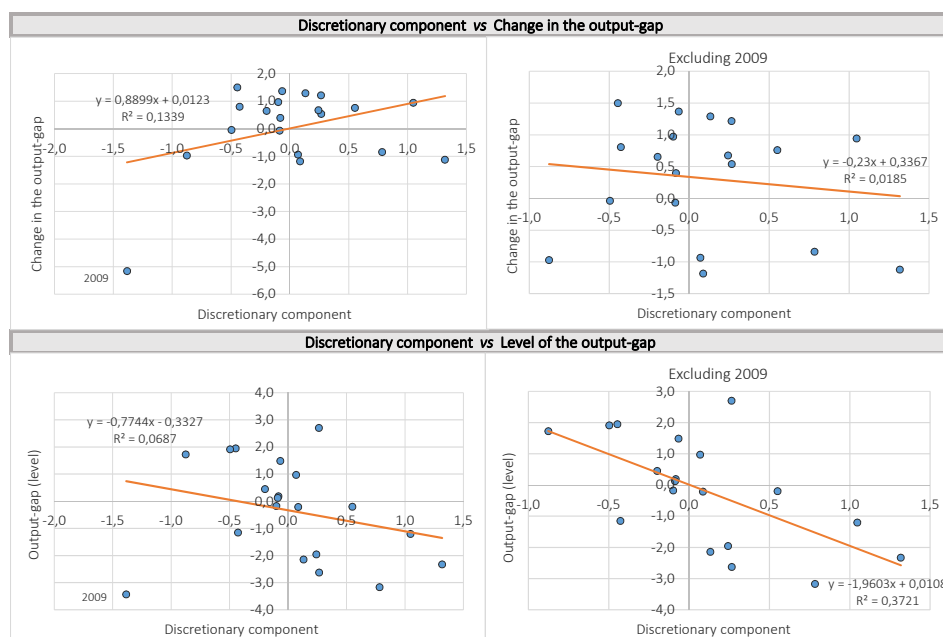


Figure 10: Relation between the discretionary component and the economic cycle

Source: Authors' calculations.

Two additional observations may be worth noting on this analysis. First, it could also be interesting to perform it using 'real time data', as there may be differences between the behaviour that fiscal authorities thought they were having and the one they effectively followed with hindsight. Second, results could differ if a separate analysis for good and bad times was carried out. Again, we leave this for possible future work.

#### 4. The computation of fiscal effects

In this section, we provide an account of the 'fiscal effect', understood as the effect of fiscal changes on output growth. Our focus is on the short-run effect. For that, we rely on a conventional set of dynamic multipliers. We assume that, in line with the New Keynesian mainstream model and traditional analysis, fiscal policy affects output in the short run by raising aggregate demand in an environment of sticky prices where businesses find it profitable to expand supply.

When quantifying fiscal effects on GDP, we consider all fiscal changes. That is, we do not limit ourselves to the discretionary component as often done but also include the fiscal effects from other fiscal changes, in particular the cyclical automatic stabilisers. In this respect our approach is similar to the empirical work of

Cashin *et al.* (2017) on the U.S. It is also in line with the long-held view that when assessing the total effects of the public finances on the economy, endogenous fiscal developments should be considered together with discretionary changes (Blanchard, 1993; Fatas and Mihov, 2012).

In terms of empirical methodology, we rely on a pragmatic approach. A critical ingredient is the choice of multipliers for revenues and expenditures. Similarly to Cashin *et al.* (2017), we select a plausible set of estimates, based on the empirical literature and own judgement (see below). This unavoidably entails simplifying assumptions. In our view, these are reasonable approximations for the purpose of gauging short-term GDP effects. A more formal presentation of the methodology features in Appendix A.

#### **4.1. Selection of fiscal multipliers**

The fiscal multiplier is the percentage change in real GDP that follows a fiscal shock of 1 percent of GDP. Empirically the literature on fiscal multipliers is voluminous and not always consensual. One agreed point is that the multiplier has no single value. It depends on the nature and conditions of the fiscal shock. One well-documented feature is the dependence of the multiplier on the fiscal instrument.

In this respect, the common wisdom is captured by a recent meta-analysis (Gechert, 2015; Gechert *et al.*, 2015). Those authors find that in normal conditions, public consumption multipliers are on average close to 1 and about 0.3/0.4 larger than tax and transfer multipliers. This difference reflects the facts that government expenditure on goods and services enters the GDP accounting identity; and that a fraction of disposable income changes is absorbed by private saving changes. In addition, it is generally agreed that public investment multipliers are bigger than those on general spending while multipliers for corporate income taxes tend to be lower than for other tax changes (but higher in the longer term).

In this work, we follow this common wisdom and differentiate the multiplier by fiscal instruments (Tables 3 and 4). We choose values that are close to the averages from the empirical literature, as reported in Gechert (2015). In line with that study and the approach of Cashin *et al.* (2017), we assume that peak multipliers exceed impact multipliers and are reached within two years. Beyond the second year, multipliers are assumed to gradually fade out so as to reach zero at a 10-year horizon.<sup>12</sup> In addition, we admit, as these authors, that discretionary fiscal impulses

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12. This choice of fading out appears in line with the mainstream view but is in part conventional. We have tested alternative choices, such as no fading out (as in Cashin *et al.*, 2017, which however implies a permanent GDP effect of fiscal demand shocks) or a different pace of fading out. The choice does not have a major bearing on results, which are mostly driven by the short term multipliers, but it is not entirely negligible either.

entail slightly bigger GDP effects than the cyclical and residual components of fiscal developments.<sup>13</sup>

Our calibration of multipliers reflects a middle-of-the-road set of choices. Inevitably, it remains partly subjective. Many other factors affect the size of multipliers. Among frequently found ones are the openness of the economy, the monetary regime and the strength of the fiscal position. In addition, multipliers may vary very much throughout the economic cycle. They are generally higher in economic downturns, notably for transfer multipliers. We evaluate the possible consequences of this latter fact in a sensitivity analysis (section 5). We do not take into account all the other possible factors, the importance of which is surrounded by significant uncertainty.

COMPONENT	TYPE	YEAR 1	YEAR 2
<b>Discretionary</b>			
	Direct taxes paid by households	0,5	0,7
	Direct taxes paid by corporations	0,3	0,5
	Indirect taxes	0,6	0,7
	Social contributions	0,5	0,7
	Capital taxes	0,4	0,5
<b>Cyclical</b>			
	Direct taxes paid by households	0,5	0,6
	Direct taxes paid by corporations	0,1	0,1
	Indirect taxes	0,5	0,5
	Social contributions	0,5	0,6
<b>Trend</b>			
	All items	0,5	0,6
<b>Residual</b>			
	Direct taxes paid by households	0,5	0,6
	Direct taxes paid by corporations	0,1	0,1
	Indirect taxes	0,5	0,5
	Social contributions	0,5	0,6
	Capital taxes	0,3	0,3
	Other revenue items	0,2	0,2

Table 3. Selection of fiscal revenue multipliers

Source: Authors' calculations.

#### 4.2. Fiscal effect: Stylised features

We now come to the last two of our stylised features, which pertain to fiscal effects:

5. Fiscal effects on growth are relatively large too, of the order of  $\frac{3}{4}$  percent of GDP on average. Reflecting previous features, fiscal effects stem from both from discretionary policies and the automatic stabilisers, in similar proportions.

13. That assumption is consistent with the notion that advertised fiscal changes have a bigger impact than other changes not altering the expectations of agents.

COMPONENT	TYPE	YEAR 1	YEAR 2
<b>Discretionary</b>			
	Adjusted public consumption	0,9	1,0
	Social transfers in cash	0,5	0,7
	Adjusted public investment	1,1	1,2
<b>Cyclical</b>			
	Social transfers in cash	0,5	0,6
<b>Trend</b>			
	All items	0,5	0,6
<b>Residual</b>			
	Other expenditure items (inc. interest payments)	0,5	0,6

Table 4. Selection of fiscal expenditure multipliers

Source: Authors' calculations.

6. Automatic stabilisers always contribute to smooth output fluctuations, as could be expected. Discretionary policies have had a more irregular impact over the past twenty years, at times mitigating output shocks but at other times amplifying them. Overall, fiscal changes as a whole have contributed to smooth growth paths, but mostly due to the automatic stabilisers.

Figure 11 plots the total fiscal effect on GDP growth, computed as outlined in Appendix A, together with the total fiscal changes (which as above, is simply the change in the headline budget balance, graphed here with a negative sign for ease of comparison). The two series are obviously highly correlated. However, one observes some differences and it is interesting to reflect on those. On the whole, Figure 11 illustrates the insight that the change in the deficit is a rough-and-ready indicator of the fiscal effect on GDP (Blanchard, 1993).

Differences between fiscal changes and fiscal effects can be traced to two factors: one is that fiscal multipliers differ from unity. Moreover, for a given fiscal change, the mix of fiscal instruments impinges on the multiplier. The overall tendency is for fiscal effects to be of lower magnitudes than fiscal changes, as multipliers are on average below one. The other source of differences between fiscal changes and fiscal effects originates in lags. Non-contemporary fiscal changes continue to exert a small incremental impact on fiscal effects.

While fiscal effects are typically a bit smaller than fiscal changes, one interesting exception is the years 2012-13. In that case the (negative) fiscal effects are larger for two reasons: first, the lagged fiscal effects from consolidation in previous years. For instance, the consolidation from 2011 still weighs on GDP growth in 2012. Second, the composition of fiscal changes had an influence: as noted earlier, the consolidation of the early 2010s included a large reduction in public investment, the budget item with the highest multiplier.

Overall, as for fiscal changes, fiscal effects are broadly neutral on average over twenty years. Their annual standard deviation is  $\frac{3}{4}$  percent. This number therefore represents the typical effects of the public finances on euro area GDP growth. By

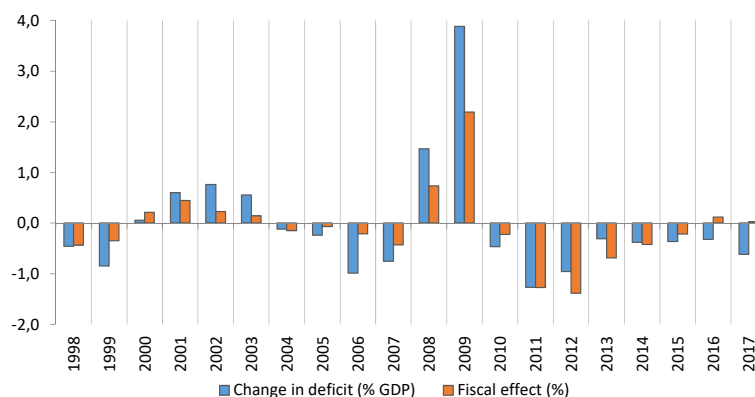


Figure 11: Fiscal changes and fiscal effects

Source: Authors' calculations.

way of comparison, note that the standard deviation of euro area GDP growth stands at 1¾ percent over the period.

This shows that fiscal changes are among the essential drivers of the euro area business cycle, unsurprisingly given the mere size of budgets in the euro area. However, fiscal changes do not necessarily contribute to output volatility. In fact, the opposite holds almost by construction for the automatic stabilisers. The next relevant issue is therefore to examine the decomposition of fiscal effects between those due to discretionary components and those reflecting the automatic stabilisers and residual changes.

Figure 12 and Table 5 present the decomposition of the fiscal effects and of its volatility. The contribution from the cyclical component (referred here as 'adjusted cyclical') is the one corresponding to the automatic stabilisers.<sup>14</sup> We find that a bit more than half of fiscal effects stem from discretionary fiscal policies. That is, in the absence of any discretionary impulse over the period (zero discretionary component throughout), the volatility of the fiscal effect would be reduced by 53 percent. The automatic stabilisers account for the bulk of the rest. Hence stylised feature (5).

Like with for fiscal changes, discretionary fiscal effects are only weakly correlated with the automatic stabilisers. The main episode of mutually reinforcing action is the deep recession in 2008-09, when fiscal stimulus packages worked in tandem with automatic stabilisers. Leaving that episode apart, the discretionary fiscal effect and the cyclical fiscal effect exhibit no regular pattern, so these two effects either add

14. When carrying out this decomposition, we take into account the fact that part of the cyclical component of fiscal changes is an endogenous reaction to discretionary fiscal policy. Our methodology avoids any double counting related to this issue. This is why we dub the corresponding series 'adjusted cyclical'. See Appendix C for details.



up or mitigate each other. The contribution from the residual component plays a limited role on fiscal effects.

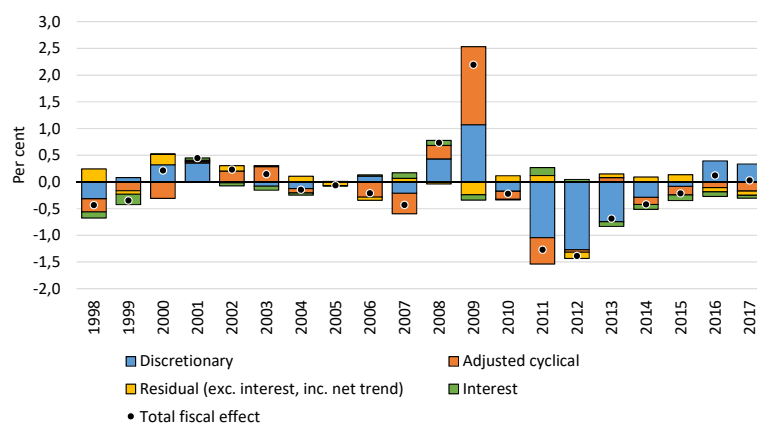


Figure 12: Fiscal effects

Source: Authors' calculations.

	TOTAL fiscal effect	Discretionary effect	Cyclical effect	Residual effect
TOTAL fiscal effect	0,74			
Discretionary effect		0,53	0,08	-0,01
Cyclical effect			0,40	-0,01
Residual effect				0,15

Table 5. Contributions to the fiscal effect | standard deviations in the diagonal and correlation coefficients in the other cells

Source: Authors' calculations.

As noted, the effect of the automatic stabilisers is to unambiguously smooth out the output path. We can gauge the magnitude of that smoothing by comparing GDP growth as observed with GDP growth in a fictitious scenario where we neutralise the part of fiscal effects due to the automatic stabilisers. That experiment shows that the volatility of GDP growth is reduced by about 16.5 percent thanks to the automatic stabilisers. While studies on the automatic stabilisers are relatively rare, that magnitude is among the ballpark range of existing estimates (see notably

in't Veld *et al.*, 2013, which proposes estimates of 13 percent and 27 percent, based on two different benchmarks for defining the automatic stabilisers).<sup>15</sup>

The picture is more mixed for the effects of discretionary policy. Overall, it contributes to reducing GDP volatility over the sample (by 8 percent). Again, this estimate is obtained by comparing the volatility of observed GDP growth with that under a virtual scenario where the discretionary fiscal component is 'turned off'. However, closer inspection reveals that this limited benefit is entirely due to the 2009 stimulus episode. This finding only mirrors the previous result that discretionary fiscal changes appear overall 'acyclical', in the sense of not being clearly responsive to the cycle in a systematic way. Hence stylised feature (6).<sup>16</sup>

What would have happened if discretionary fiscal policy had been smoother since the inception of the euro? The answer is given in Figure 13, which plots actual GDP growth against a counterfactual scenario where fiscal discretionary changes are assumed to be zero throughout the time period (while the automatic stabilisers are assumed to remain working). This experiment confirms that discretionary action supported the economy in the 2009 trough but then was a major factor in the ensuing double dip of the early 2010s.

## 5. Sensitivity analysis

### 5.1. Measurement of revenue measures

The difficulties in the construction of a reliable and well-documented database for discretionary revenue measures are widely acknowledged among fiscal experts and researchers. The quantifications of the impact of such measures is frequently done by governments at the time of the elaboration of their annual and medium-term budgetary plans. However, the data and assumptions underlying their calculation are often not communicated to the general public in a transparent way. Thus, the replication and assessment of these estimates is problematic. In addition, there should be cases where, in light of the outturn data, the ex-ante estimates should be revisited. This ex-post revision rarely occurs. Cross-country studies or long periods of analysis face an additional strain related with the use of different

15. The careful reader might note that Figure 12 features almost no supporting contribution from the automatic stabilisers during the downturn of 2012-13. This is at first surprising. The automatic stabilisers did limit the growth consequences of the discretionary contraction at the time, but that part of the automatic stabilisers is accounted for in the contribution from the discretionary component (see also footnote 14). The absence of any other supportive contribution from the automatic stabilisers in 2012-13 reflects the fact that absent the discretionary consolidation, growth would have been broadly in line with potential – in other words and all else equals, the downturn was entirely attributable to the fiscal tightening, according to this framework. The contrast is evident with the early 2000s, where a fiscal expansion launched in the boom period (1999-2001) was followed by a neutral discretionary stance letting the automatic stabilisers smooth out the 2002-03 downturn.

16. A study by the IMF based on a broad panel of countries comes to a similar conclusion (International Monetary Fund, 2015).

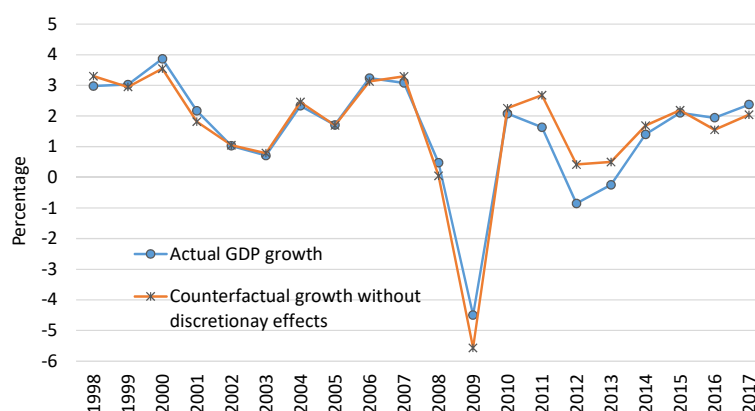


Figure 13: Real GDP growth rate: observed and corrected for discretionary fiscal effects

Sources: Eurostat and authors' calculations.

reporting conventions in the several documenting sources and the potentially very high number of experts involved. This is an area where EU requirements in the context of fiscal surveillance could help in the future, including by mandating a more systematic assessment of measures by fiscal councils.

In this respect, as mentioned in subsection 2.2, the use of ESCB information minimises and overcomes some of the challenges in the construction of a database referred to above. Still, as a robustness check, a comparison with the information contained in the European Commission database AMECO, with data available from 2010 onwards, is worthwhile. As illustrated by Figure 14, the differences are negligible in all years, with the 2010 as the main exception. A more detailed analysis by tax category shows that the differences between the measurements of discretionary measures in the two databases never exceed 0.1 per cent of GDP (with the unique exception of measures affecting indirect taxes in 2010).

## 5.2. Assessment of the cyclical component

As mentioned above and detailed in Appendix A, cyclical developments are evaluated on the basis of the European Commission methodology. The aggregated cyclical component of the balance available in the AMECO database is decomposed by revenue category using the respective individual elasticities. Figure 15 illustrates the contribution in levels of the different categories of taxes and social contributions for the revenue cyclical component. By construction the components are proportional to the output gap. It is shown that all four main categories of revenues contribute to a broadly similar extent to the cyclical component of revenues.

The results are crucially dependent on the computation of the output-gap and on the value of the budgetary semi-elasticity. One possible comparison is with cyclically components obtained through a disaggregated methodology, as adopted

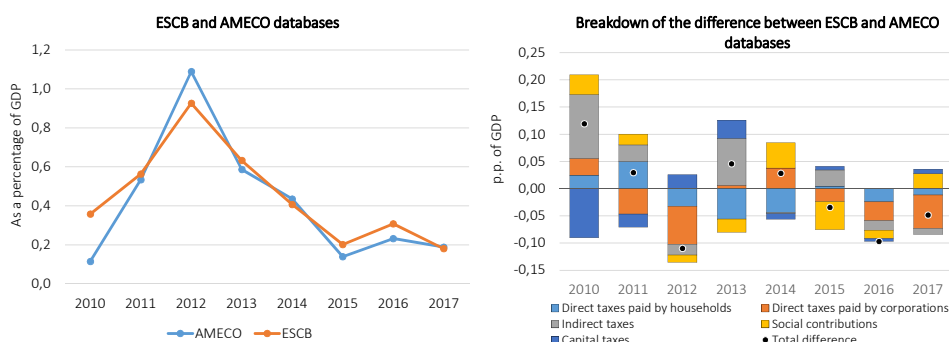


Figure 14: Discretionary revenue measures in the euro area: ESCB vs AMECO databases

Source: Authors' calculations.

Note: The data for Italy in the years 2011-2013 in the AMECO database was corrected on the basis of expert knowledge.

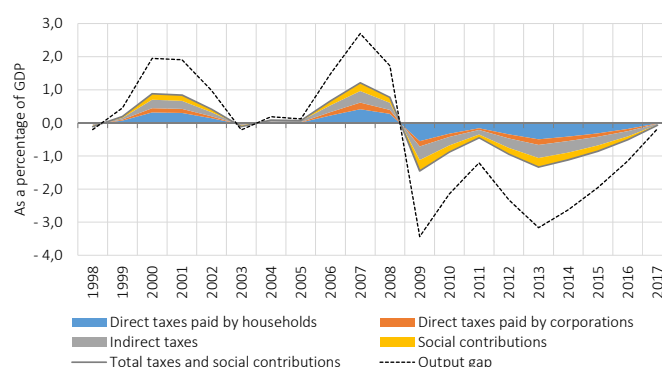


Figure 15: Cyclical component of revenue: euro area | in levels

Sources: European Commission and authors' calculations.

by the ESCB (Bouthevillain *et al.*, 2001).<sup>17</sup> Figure 16 illustrates that comparison. The differences are significant, albeit more so when comparing levels than changes (only the latter are used in this study). Peak differences in changes are reached in the crisis period (0.6, 1.3 and 0.6 p.p. of GDP from 2008 to 2010) but much smaller values are observed in other years, hovering between 0-0.3 p.p. of GDP.

According to the methodology used in this paper, any mismeasurement in either the discretionary or the cyclical component is reflected in the residual component. In the case of taxes and social contributions, the residual may also reflect the existence of revenue windfalls/shortfalls. These may stem, for instance, from composition

17. The methods followed by other international organisations (IMF, OECD) are closer to the Commission's. However, the ESCB has recently reviewed its method.

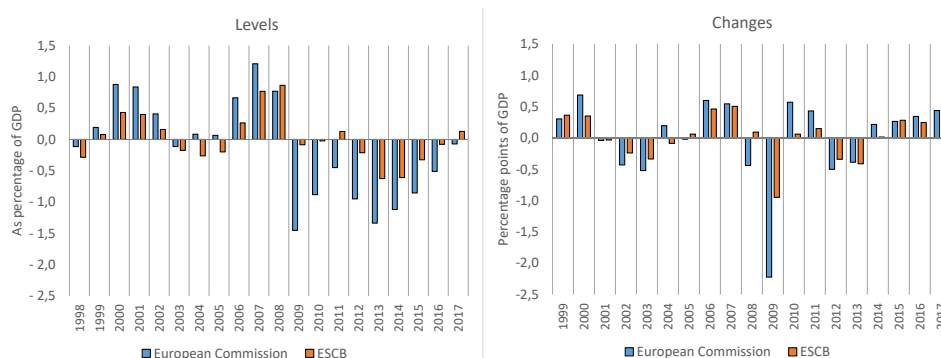


Figure 16: Cyclical component of revenue in the euro area: European Commission vs ESCB

Sources: European Commission, ESCB and authors' calculations.

effects, differentiated evolutions between the underlying tax bases and nominal GDP or changes in the effectiveness of tax collection. In our calculations, the residual averages close to zero over the sample period for the euro area.

One question that is often posed is whether the residual correlates with the economic cycle, which could indicate an imperfect measurement of the cyclical component. To assess this, Figure 17 plots for each year the residuals for total taxes and social contributions and the change in the output gap. No clear relation exists between the two variables, with observations spread over all four-quadrants of the chart. However, when focusing only on the residual of direct taxes paid by corporations, a positive relation emerges, suggesting an underestimation of the cyclical component, both in good and bad times. This goes along the work by Morris *et al.* (2009) that showed, using estimates based on the ESCB tax bases, revenue windfalls and shortfalls with a tendency to exhibit a cyclical pattern in the 1998-2007 period, notably due to the development of profit-related taxes. Overall, we do not see a strong case for departing from conventional estimates, except perhaps for corporate income taxes.

### 5.3. Choice of benchmark growth for discretionary expenditure

A key uncertainty of our decomposition stems from the choice of benchmark potential growth for measuring discretionary expenditure. There are in fact two choices to consider:

- *Real potential growth*: it is well known that the practical notion of potential growth can be more or less smooth. In the EU fiscal rules framework, this is recognised in the so called expenditure benchmark, which uses a 10-year smoothed series of potential growth for assessing expenditure developments. Our baseline measure, by contrast, relies on the usual 'annual' potential growth published by the Commission.

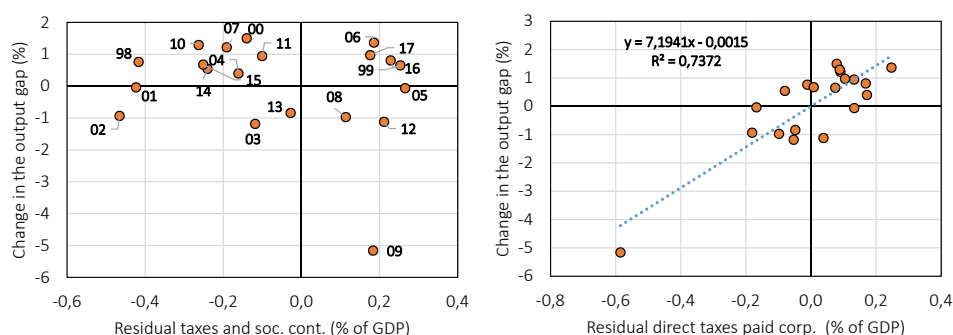


Figure 17: Residuals and change in the output gap in the euro area: total taxes and social contributions and direct taxes paid by corporations

Source: Authors' calculations.

- *Price inflation*: by default we rely on the observed annual change in the GDP deflator to express potential growth in nominal terms (or equivalently, to deflate public expenditure before comparing it to real potential growth). But again, using a smoother metric of inflation that purges some of the short-term annual noise could be a more meaningful choice for benchmarking the orientation of public spending.

Schematically, the 1997-2017 sample contains two phases, with the first half sample featuring somewhat higher growth and inflation than the second one. There is no simple answer to the question of how much smoothing is ideal. It is however essential to recognise the sensitivity of results to assumptions on that point. To do this, we construct several alternative series of (nominal) potential growth, and we compute the alternative metrics of the discretionary expenditure corresponding to each of these benchmarks. To provide a maximum gauge of the involved uncertainty, we test fully smoothed versions of benchmark nominal potential growth by: **i)** fully smoothing real potential growth over the sample period; **ii)** fully smoothing GDP inflation, and; **iii)** fully smoothing both at the same time. The results for these three alternative metrics, together with the baseline case used in the previous sections, are shown in Figure 18 and Table 6.

The discretionary changes that can be identified with a great degree of assurance are those that stand out under an array of plausible benchmarks. This is the case when the bars in Figure 18 are all of the same signs. It holds for some of the developments that we have highlighted above: the stimulus of 2008-09 and the contraction of the early 2010s. At the same time, differences in the sizes of the bars gives an indication of the uncertainty over magnitudes. Another feature suggested by the sensitivity analysis concerns the pre-crisis period: while expenditure policy looks broadly neutral according to the baseline measure up to 2007, the alternative metrics suggest that it could in fact be considered

expansionary. The mirror of that judgement pertains to the latest years, especially 2016-17, which appears mildly expansionary with our default benchmark but neutral or even mildly restrictive in alternative approaches. Table 6 additionally shows that, unsurprisingly, the discretionary expenditure component gets increasingly volatile as the adopted benchmark potential growth gets smoother. This suggests that the fully smoothed version is a rather extreme assumption. Overall, this sensitivity analysis suggests that results of the baseline assumptions are qualitatively robust, but amplitudes are not.

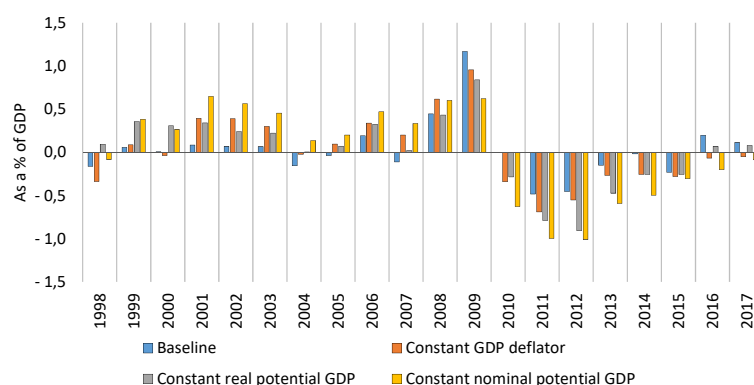


Figure 18: Expenditure discretionary component: sensitivity to different measurement benchmarks

Source: Authors' calculations.

	Standard deviation (expenditure discretionary)	Correlation coefficient (with revenue discretionary component)
Baseline	0,34	0,54
Constant GDP deflator	0,40	0,61
Constant real potential GDP	0,42	0,74
Constant nominal potential GDP	0,54	0,69

Table 6. Expenditure discretionary component: volatility and correlation with revenue component

Source: Authors' calculations.

#### 5.4. Sensitivity to bad-times multipliers

The possible dependence of fiscal multipliers to the state of the economy is recurrently addressed in the literature. As mentioned before, several authors find that the fiscal multipliers estimates are significantly higher during economic downturns than in average economic circumstances or in boom periods (see Gechert *et al.*, 2015, for a meta-analysis). This effect differs by instruments: it appears to

be stronger for social transfers, often explained by the increased share of liquidity constrained agents in downturns, and less so in the remaining expenditure, with tax multipliers also showing a small reaction in bad economic times.

In our paper we carry out a sensitivity analysis of our results by increasing the baseline multipliers. For the sake of simplicity, in bad economic times all first year revenue multipliers were increased by 25 per cent, expenditure multipliers with the exception of social transfers by 50 per cent and social transfers' multipliers by 75 per cent. The state of the economy was defined on the basis of observed real GDP growth rates with normal times corresponding to the average growth in the 1998-2017 period  $\pm$  0.5 standard deviations (annual real GDP growth between 0.6 and 2.5 per cent). Four years were identified as bad economic times: 2008, 2009, 2012 and 2013.

Figure 19 presents the results of the analysis. It is apparent that the outcomes are not much modified qualitatively, although again there are some non-negligible quantitative differences, specifically in the largest downturns (2008-09 and 2012), where fiscal effects are magnified.

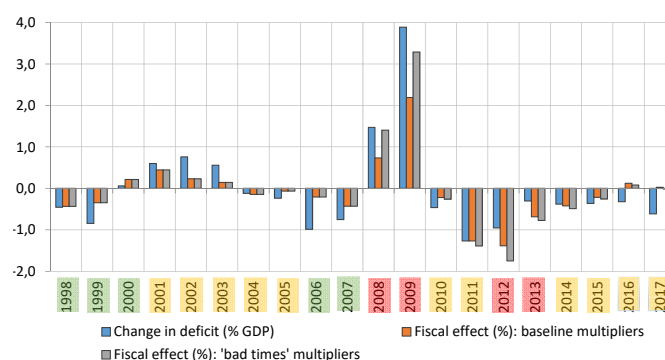


Figure 19: Fiscal effect: sensitivity to 'bad-times' multipliers

Source: Authors' calculations.

## 6. Final remarks

We have examined euro area fiscal changes over the past twenty years. We find that fiscal changes, while neutral on average, are relatively large from one year to the next, of the order of 1 percent of euro area GDP on average, with high variations. Both automatic responses of the public finances to the economic cycle and discretionary fiscal policy contribute, in similar proportions, to fiscal changes. In the discretionary component, tax measures and expenditure policies typically work in conjunction, i.e. they tend to be restrictive at the same time and expansionary at the same time. Overall however, discretionary fiscal policy follows a somewhat erratic pattern, bearing no systematic relation to the cycle.



Fiscal effects on growth are relatively large as well, of the order of  $\frac{3}{4}$  percent of GDP on average, stemming again both from discretionary policies and the automatic stabilisers. While automatic stabilisers intrinsically contribute to mitigate growth fluctuations, discretionary policies have had a more irregular impact. There is one major episode of active counter-cyclical policy (2008-09) and one significant episode of pro-cyclical policies (2012-13). Looking ahead, the experience suggests overall that there is some scope to improve the management of the euro area fiscal stance compared with past experience.

From a methodological perspective, our work provides a framework for assessing in a consistent manner both fiscal changes and fiscal effects on growth. Fiscal effects include both the effects of the discretionary stance and those of the automatic stabilisers. Moreover, our framework permits an analysis at different levels of granularity, either taking a fully aggregate perspective or entering into the details of revenues and expenditure developments. We have also adopted an approach to measuring the discretionary component of fiscal policy that is more robust than the traditional indicators of the structural balance and exploits the richness of our dataset. At the same time, there remain several important uncertainties in empirical evaluations of both fiscal changes and fiscal effects. The sensitivity tests permit to identify those conclusions that are robust to these uncertainties.

This study could be expanded in several directions. One possible endeavour would be a more in-depth analysis of the cyclical behaviour of discretionary policy. For instance, it could be that discretionary policy as conceived in real time differs from the way it is assessed ex post. Moreover, while we have focused on the aggregate fiscal changes of the whole euro area, one could investigate within the same framework the contributions of each country to the aggregate outcomes. This could be interesting in order to compare the empirical features of fiscal changes and fiscal effects across countries.

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## Appendix A: Description of the methodology

### A.1. Data

The data used in the study for the general government revenues, expenditures and GDP, correspond to national accounts data as published by Eurostat. Potential output is taken from the Commission's AMECO database. Revenue measures are taken from the ESCB dataset as explained in subsection 2.2.

Fiscal changes are defined as changes from one year to the next of the budget balance of general government. The data is corrected for the impact of the support to the financial sector affecting capital expenditure as reported by Eurostat<sup>18</sup>, as well as from the proceeds for the sale of UMTS licenses.<sup>19</sup> These (typically one-off) effects are large and 'pollute' the economic analysis of fiscal changes. Removing these items reduces the volatility of fiscal changes, which in this sense is underestimated by our study. For simplicity the fiscal effects also neglect these transactions, which are not well captured with a 'traditional' fiscal multiplier framework.

The decomposition on the revenue side involves a breakdown into six revenues categories: **1)** direct taxes paid by households, **2)** direct taxes paid by corporations, **3)** indirect taxes, **4)** social contributions, **5)** capital taxes and **6)** other revenue items.

The sixth revenue category (other revenue items) includes non-tax revenues. For non-tax revenues, revenue from European Union Funds used to co-finance expenditure, recorded as both current and capital receipts, is excluded from the analysis. An analogous correction is applied on the expenditure side, leaving the change in the headline balance unaffected.

On the expenditure side, four categories are considered: **1)** public consumption (adjusted as indicated below), **2)** social transfers in cash, **3)** public investment (adjusted), and **4)** other expenditure items.

Public consumption is drawn from the national accounts but it is adjusted by excluding the items that do not affect the budget balance, i.e. consumption of fixed capital and net operating surplus. Adjusted public consumption encompasses

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18. See

<http://ec.europa.eu/eurostat/web/government-finance-statistics/excessive-deficit/supplementary-tables-financial-crisis>.

19. According to a Eurostat Guidance Note of March 2017, from the April 2017 notification onwards new contracts (mobile phone licences, exploration rights and other licences or permits) signed in 2016, 2017 or later will have to be recorded as rent instead of as a disposal of a non-financial asset (negative expenditure). Eurostat granted a transition period for this changeover in the recording of contracts signed prior to 2016. As such, the current recording in National Accounts of UMTS proceeds in the 19 participant member states is heterogeneous.

compensation of employees, intermediate consumption and social transfers in kind.<sup>20</sup> Social transfers in cash are taken as such from the national accounts.

Adjusted public investment expenditure excludes the co-financing of investment expenditure by European Union funds. Consistently with the approach adopted on the revenue side, the co-financing of current expenditure by European Union funds is also not considered in the analysis, and the ‘other expenditure item’ is modified accordingly. As noted, the adjustments related to European Union funds are neutral on the budget balance, affecting only the analysis by revenue and expenditure items. Even if not deficit neutral, the co-financing of both current and capital expenditure by EU funds should be eliminated as it does not represent a government impulse in each country’s economy but rather an external one, not falling under the scope of this study.

Cyclical developments are evaluated on the basis of the European Commission methodology. The aggregated cyclical component of the balance is available in the public AMECO database. For each Member State it is estimated as the product of the output gap and the overall budgetary semi-elasticity (Mourre *et al.*, 2014). This aggregate budgetary semi-elasticity is itself a weighted average of the individual elasticities of the different cyclical revenue and expenditure categories. The first four categories of revenues are assumed to behave cyclically while on the expenditure side, only social transfers in cash do. These choices merely replicate the standard cyclical adjustment method of the Commission.

## **A.2. The basic breakdown of the changes in the budget balance**

In this part of the Appendix, we present the decomposition of the change in the headline budget balance into a discretionary component, a cyclical component, and residual terms. The discretionary and cyclical components are themselves broken down into revenues and expenditure contributions. In part A.3 of the Appendix, we present the second tier of the decomposition, whereby revenues and expenditures are split out by categories.

$R_t$  and  $E_t$  are total revenues and total expenditures respectively. The objective is to break down the change in the budget balance, which is  $\Delta R_t - \Delta E_t$ . The rest of the notations is as follows:  $RM_t$  is the incremental budgetary impact of new revenue measures in year  $t$ . This is the discretionary component from revenues in our narrative approach.  $ED_t$  is the discretionary component on the expenditure side, as defined further below.  $RC_t$  and  $EC_t$  are the cyclical component on the revenue and expenditure sides respectively. Potential growth is noted  $\hat{Y}_t^{PN}$ . It is

20. In line with the national accounts definition, public consumption includes in addition taxes on production paid minus subsidies received by general government in the provision of public goods. By assumption, when that amount is negative, it is assigned to the revenue side. Similarly, receipts from the sale of goods and services, a general government revenue, also enter negatively in the national accounts definition of public consumption. These details are taken into account when computing the other revenue and expenditure items, such that a full breakdown of the budget balance is obtained.

expressed in nominal terms, using the observed GDP deflator to do the conversion from the real rate.

On the revenue side, we use the following accounting decomposition:

$$\Delta R_t = R_t - R_{t-1} = \underbrace{RM_t}_{RD_t - \text{Discretionary component}} + \underbrace{(RC_t - RC_{t-1})}_{\Delta RC_t - \text{Cyclical component}} + \underbrace{[(R_t - RC_t) - (R_{t-1} - RC_{t-1}) - RM_t]}_{\text{Remainder}}$$

This shows the discretionary revenue component, the cyclical revenue component and a remainder. In addition, it can be intuitive to express the remainder term as follows:

$$\underbrace{\hat{Y}_t^{PN}(R_{t-1} - RC_{t-1})}_{RT_t - \text{Trend component}} + \underbrace{[(R_t - RC_t) - (1 + \hat{Y}_t^{PN})(R_{t-1} - RC_{t-1}) - RM_t]}_{RR_t - \text{Residual component (akin to an 'elasticity} \neq 1 \text{ effect)'}}$$

We dub the left side term the ‘trend component’ because it simply reflects the fact that revenues grow in an expanding economy. While the term may be non-small in absolute value, it plays a very limited role in practice in our decomposition as it cancels out at first order with a similar term on the expenditure side, as shown below. The right-hand term is an expression of windfalls and shortfalls in revenues as compared with a basic assumption of unitary elasticity of revenues to growth. To the extent that revenues eventually grow in line with GDP, the term is expected to broadly average out over the medium to long term (it does indeed). On annual basis, this residual component is non-negligible.

On the expenditure side, the following accounting decomposition is used:

$$\Delta E_t = E_t - E_{t-1} = \underbrace{[(E_t - EC_t) - (1 + \hat{Y}_t^{PN})(E_{t-1} - EC_{t-1})]}_{ED_t - \text{Discretionary component}} + \underbrace{(EC_t - EC_{t-1})}_{\Delta EC_t - \text{Cyclical component}} + \underbrace{\hat{Y}_t^{PN}(E_{t-1} - EC_{t-1})}_{ET_t - \text{Trend component}}$$

The expenditure discretionary component corresponds to the difference between the current level of expenditure and the level observed the year before ‘revalued’ with potential growth.<sup>21</sup> It is however the cyclically-adjusted levels of expenditure

21. If expenditure grows in line with potential growth, the discretionary impulse is deemed to be neutral. Cashin *et al.* (2017) follows another convention by interpreting any growth of expenditure in real terms as discretionary (technically, this equates to using the growth of the GDP deflator instead of nominal potential growth in the previous formula). While this is in part a matter of convention, a drawback of that choice is that discretionary expenditure components are by construction expected to be significantly positive on average, just as a reflection of trend growth in the economy (this is indeed what Cashin *et al.* (2017) finds). It is in our view preferable that discretionary policies be characterised as neutral when the expenditure ratio remains constant on a steady state path.

that are used for this computation. The 'trend component' appears as a residual in this decomposition and has a similar form than on the revenue side.

Putting together the expenditure and revenue formulas, one obtains the breakdown of the change in the balance:

$$\Delta R_t - \Delta E_t = (RM_t - ED_t) + (RC_t - RC_{t-1} - EC_t + EC_{t-1}) + \text{elasticity} \neq 1 \text{ effect} + \hat{Y}_t^{PN} \underbrace{[(R_{t-1} - RC_{t-1}) - (E_{t-1} - EC_{t-1})]}_{\text{Previous year structural balance}}$$

The expression on the right hand side is used for the first-tier decomposition of fiscal changes. It comprises four terms. The first term is the discretionary component. The second term is the cyclical component. The last two terms comprise together the residual component: the third term corresponds to the revenues windfalls and shortfalls (elasticity  $\neq 1$ ); the fourth and final term is the product of potential growth and the structural balance. This is a term which is an order of magnitude smaller than the others. It is in this sense that the 'trend terms' broadly cancel out as mentioned above.

### ***A.3. The detailed breakdown of the changes in the budget balance***

In this part, we show how the first-tier decomposition provided in part A.2 is expanded into a second-tier decomposition by disaggregating to categories of revenues and expenditures. Part A.2 broke down fiscal changes into a discretionary component, a cyclical component and a net residual component. The second-tier decomposition presented here involves sixteen components.

The sixteen components of the second-tier disaggregation are: five discretionary revenues components and three discretionary expenditure components; four cyclical revenues components and one cyclical expenditure component; the net trend component; the interest payments, which are kept as a separate expenditure category; and a net residual. This corresponds to the disaggregation from Figure 1 in the core text. It is also captured in Table A.1 (where, for the sake of comprehensiveness, the residuals appear category by category instead of being regrouped in a single net residual).

The first item to break down is the discretionary revenue component  $RM_t$ . We simply write:

$$RM_t = \sum_{i=1}^5 RM_t^i$$

where  $RM_t^i$  is the discretionary revenue measures for revenue category  $i$ .

	Discret.	Cyclical	Residual	
			(Net) trend	Other
Revenue				
Direct taxes paid by households	Yes	Yes	Yes	Yes
Direct taxes paid by corporations	Yes	Yes		Yes
Indirect taxes	Yes	Yes		Yes
Social contributions	Yes	Yes		Yes
Capital taxes	Yes	No		Yes
Other revenue items	No	No		Yes
Expenditure				
Adjusted public consumption	Yes	No	Yes	Zero
Social transfers in cash	Yes	Yes		Zero
Adjusted public investment	Yes	No		Zero
Other expenditure items	No	No		Yes

Table A.1. Disaggregation by budgetary item and component

Source: Authors' calculations.

On the expenditure side, the discretionary component is similarly broken down into:

$$ED_t = \sum_{i=1}^3 ED_t^i$$

where  $ED_t^i$  is the discretionary expenditure for category  $i$ , defined as

$$ED_t^i = E_t^i - (1 + \hat{Y}_t^{PN})E_{t-1}^i \quad \text{for } i = 1, 3$$

For  $i = 2$ , we need to correct for the cyclical part of expenditure, so the formula is instead:

$$ED_t^2 = (E_t^2 - EC_t^2) - (1 + \hat{Y}_t^{PN})(E_{t-1}^2 - EC_{t-1}^2)$$

Next, the cyclical components are decomposed. For revenues, we have:

$$RC_t = \sum_{i=1}^4 RC_t^i$$

where each cyclical revenue category is computed as  $RC_t^i = \varepsilon_R^i * OG_t * R_t^i$ , with  $\varepsilon_R^i$  the elasticity of revenue item  $i$  to the output gap  $OG_t$ .



On the expenditure side, the decomposition is rudimentary as only one expenditure category, specifically social transfers in cash, is assumed to respond automatically to the cycle, thus:

$$EC_t = EC_t^2 = \varepsilon_E * OG_t * E_t$$

with  $\varepsilon_E$  the elasticity of total expenditure to the output gap.

Finally, we define the trend components of each revenue and expenditure categories and residuals for revenue categories as we do for aggregate quantities. The trend components for each category are not informative for our purposes, so only the total net trend component is useful in practice.<sup>22</sup> The revenue residual components may be useful on a category by category basis in order to explore further the origin of large aggregate windfalls or shortfalls in revenues. On the expenditure side, there are no residuals by construction, except for the 'other expenditure items'. The latter comprises interest payments, which we sometimes separate out in the interpretation of results.

#### **A.4. The calculation of fiscal effects**

For the computation of fiscal effects on GDP growth, and given our focus on the first two years impact, 60 multipliers had to be defined. On the basis of the previous notation, these multipliers can be simply expressed as follows:

$$\begin{aligned} &M_{Y1}(RM^i) \text{ and } M_{Y2}(RM^i) \text{ for } i = 1, 2, 3, 4, 5 \\ &M_{Y1}(\Delta RT^i) \text{ and } M_{Y2}(\Delta RT^i) \text{ for } i = 1, 2, 3, 4, 5, 6 \\ &M_{Y1}(\Delta RC^i) \text{ and } M_{Y2}(\Delta RC^i) \text{ for } i = 1, 2, 3, 4 \\ &M_{Y1}(\Delta RR^i) \text{ and } M_{Y2}(\Delta RR^i) \text{ for } i = 1, 2, 3, 4, 5, 6 \\ &M_{Y1}(ED^i) \text{ and } M_{Y2}(ED^i) \text{ for } i = 1, 2, 3 \\ &M_{Y1}(\Delta ET^i) \text{ and } M_{Y2}(\Delta ET^i) \text{ for } i = 1, 2, 3, 4 \\ &M_{Y1}(\Delta EC^2) \text{ and } M_{Y2}(\Delta EC^2) \\ &M_{Y1}(\Delta ER^4) \text{ and } M_{Y2}(\Delta ER^4) \end{aligned}$$

Accordingly, for each revenue or expenditure item, the total fiscal effect in period  $t$  will be given by the following expression (considering, as an example, discretionary measures in indirect taxes):

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22. As mentioned, the trend components simply reflect the fact that revenues grow in an expanding economy. The underlying base of any revenue category may behave differently than GDP, both in the short and long run. Such a differentiated evolution will be captured by the residual component of the concerned revenue category.

$$F(RM^3)_t = M_{Y1}(RM^3).RM_t^3 + M_{Y2}(RM^3).RM_{t-1}^3$$

## **Appendix B: Breakdown of discretionary revenue measures in the euro area**

In our paper, the construction of the discretionary measures database relied on the information collected by public finances economists within the ESCB in the context of regular projection exercises. The reporting through detailed (and standardised) questionnaires allowed for a rich classification of revenue measures. The figures below show the results obtained, not only for total taxes and social contributions but also for each of the five categories considered.

The database has full coverage in terms of countries only for 2010 onwards, which is consistent with the smaller number of orange circles up to that year. For the five biggest euro area countries with the exception of Spain, however, data are available for the entire period under analysis. For the euro area as a whole the series is broadly centred, i.e. tax hikes and tax cuts broadly offset each other over the sample, and the same occurs in each revenue category. It is, however, noticeable the magnitude of the increases in indirect taxation, and also in direct taxes paid by households, in several countries during the years from 2009 to 2014. In terms of number of measures and their respective impact, it is clear the reduced importance of capital taxes in the entire period analysed.

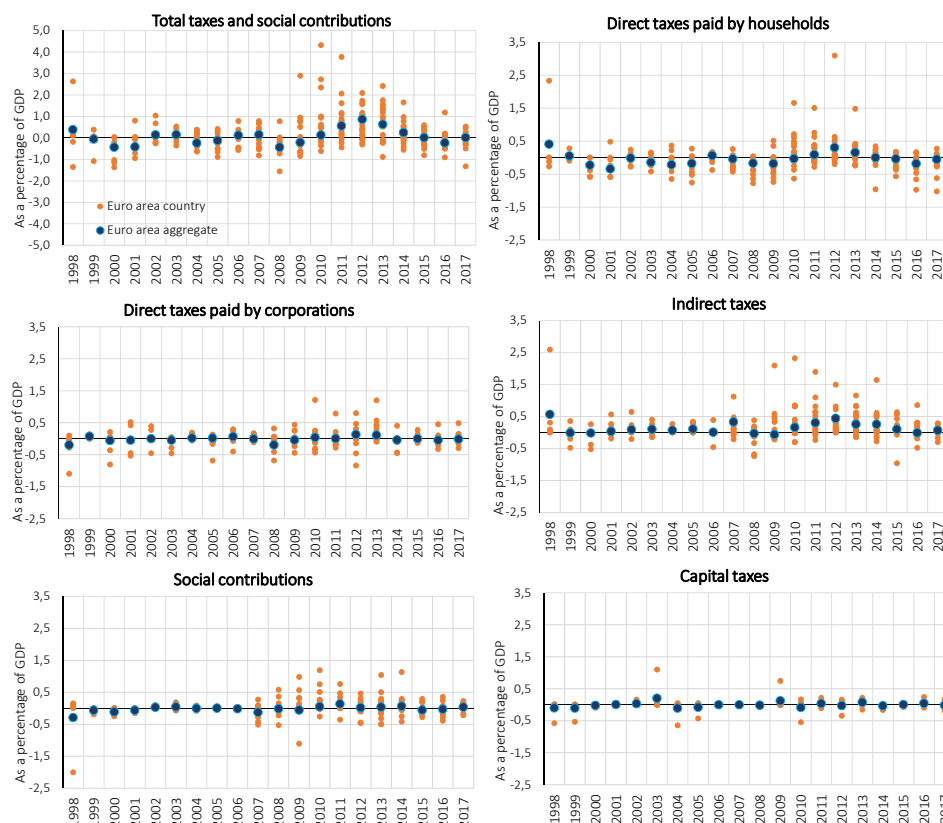


Figure B.1: Discretionary revenue measures by tax category

Source: Authors' calculations.

## Appendix C: The correction of the automatic stabilisers effect

According to the methodology adopted in this paper, the impact of fiscal policy on economic activity is measured distinguishing the effects of discretionary policy and those of the automatic stabilisers. However, the two effects are not independent as discretionary policy-action affects output, which, on its turn, impacts the cyclical component of the budget balance and, ultimately, the automatic stabilisers effect. With recourse to a very simplified version of an economy, it is shown in this annex that the elimination of this double accounting requires an adjustment to the automatic stabilisers effect. This one corresponds to subtracting the product of the output effect of discretionary fiscal policy by the semi-elasticity of the budget balance and the (overall) tax multiplier.

Consider a very simple economy with only private and public consumption where:

$$C = c(Y - T)$$

$$T = tY + \bar{T}$$

$$G = \bar{G}$$

In the absence of discretionary fiscal policy  $\bar{T} = \bar{G} = 0$  the effect of automatic stabilisers would correspond to  $m_T tY$ , where  $m_T$  is the tax multiplier and  $tY$  is the cyclical component of the budget balance. However, with discretionary policy action the double accounting problem emerges.

Let's consider the output level of the economy written as a function of the expenditure and taxes multipliers:

$$Y = C + G = \frac{1}{1-c}G - \frac{c}{1-c}T = m_G G - m_T T$$

However, as taxes have an endogenous component, GDP can be re-written as a function of the discretionary component of taxes and a modified version of the expenditure and taxes multipliers:

$$Y = m_G G - m_T (tY + \bar{T}) \iff Y = \frac{m_G}{1 + m_T t} G - \frac{m_T}{1 + m_T t} \bar{T} = m'_G G - m'_T \bar{T}$$

The relation between the two pairs of multipliers follows directly:

$$m_G - m'_G = m'_G m_T t$$

$$m_T - m'_T = m'_T m_T t$$

The impact of automatic stabilisers on GDP is equal to the difference between the total and the discretionary impact of fiscal policy on GDP, i.e.:

$$\underbrace{Y^{AS}}_{\text{Automatic stabilisers effect}} = \underbrace{(m_G G - m_T T)}_{\text{Total impact}} - \underbrace{(m'_G G - m'_T \bar{T})}_{\text{Discretionary impact}}$$

Putting together the last three equations and simplifying, we obtain the following expression:

$$Y^{AS} = -m_T t[Y - (m'_G G - m'_T \bar{T})] = \underbrace{-m_T tY}_{(1)} - \underbrace{[-m_T t(m'_G G - m'_T \bar{T})]}_{(2)}$$

where (1) is the automatic stabilisers impact in the absence of discretionary fiscal policy and (2) is the adjustment with discretionary fiscal policy. As such, in order to

derive the correct impact of automatic stabilisers, the output effect of the cyclical component of the budget balance has to be deducted by the product of the output effect of discretionary policy ( $m'_G G - m'_T \bar{T}$ ) by the taxes multiplier ( $m_T$ ) and the semi-elasticity of the budget balance to GDP ( $t$ ).

In our paper,  $m_T$  was set at 0.4, which broadly corresponds to the average first year impact revenue multiplier, and  $t$  was assumed to equal the euro area average semi-elasticity of the budget balance implicit in the cyclical component of the AMECO database (0.54).

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