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Thou Shalt Not Breach.

The Impact on Sovereign Spreads of Noncomplying with the EU Fiscal Rules

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Thou Shalt Not Breach: The Impact on Sovereign Spreads of Noncomplying with the EU Fiscal Rules

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Abstract

There is evidence that fiscal rules, in particular well-designed rules, are associated with lower sovereign spreads. However, the impact of noncompliance with fiscal rules on spreads has not been examined in the literature. This paper estimates the effect of the Excessive Deficit Procedure (EDP) on sovereign spreads of European Union member states. Based on a sample including the 28 European Union countries over the period 1999 to 2016, sovereign spreads of countries placed under an EDP are found to be on average higher compared to countries that are not under an EDP. The interpretation of this result is not straight-forward as different channels may be at play, in particular those related with the credibility and the design of the EU fiscal framework. The specification accounts for typical macroeconomic, fiscal, and financial determinants of sovereign spreads, the System Generalized Method of Moments estimator is used to control for endogeneity, and results are robust to a range of checks on variables and estimators.

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I.   INTRODUCTION

Fiscal rules can promote fiscal discipline through several channels. Rules can act as a commitment device, tying the hands of the government and limiting the use of fiscal discretion (Alessina and Tabellini, 1990). Well-designed fiscal rules can bring benefits in terms of enhancing the credibility of governments by revealing that they are committed to fiscal prudence. Furthermore, in a context of imperfect information, rules can also play the role of signaling device by enhancing transparency and revealing the preferences and fiscal plans of the government to the public and financial markets (Debrun and Kumar, 2007). In some cases, rules also serve as a contract to facilitate the formation and stability of political coalitions (Hallerberg et al., 2007).

A rich literature exists on the effects of fiscal rules, mostly focusing on the adoption of rules. The main finding is that fiscal rules seem to be associated with better fiscal performance and a decrease in sovereign risk, in particular if the rules are well-designed and credible (see Eyraud and others, 2018, and De Haan and others, 2004, for a review of the literature). Rules tend to lower sovereign spreads and increase the response of spreads to fiscal variables - accounting for fiscal and macroeconomic characteristics (see e.g. Bayoumi and others, 1995; Poterba and Rueben, 1999; Johnson and Kriz, 2005; IMF, 2009; Iara and Wolff, 2011; Heinemann and others, 2014; Feld and others, 2017). While financial markets seem to reward the adoption of rules, in particular well-designed ones, it is difficult to disentangle between markets rewarding the ability of rules to change current fiscal behavior and their ability to convey useful information about future fiscal policy[2].

While the benefits of adopting fiscal rules have been well researched, there has been only limited analysis of noncompliance with fiscal rules. The existing literature has provided some descriptive analysis of compliance rates across different types of rules (e.g., Andrle and others, 2015; Cordes and others, 2015) or examined the causes of noncompliance (Frankel, 2011; Frankel and Schreger, 2013; Reuter, 2017; and Delgado-Tellez and others, 2017). However, analysis of the effect of rules on the fiscal performance and spreads of compliers versus noncompliers has been missing from the literature.

This paper focuses on noncompliance with the fiscal rules in place in the European Union (EU). It estimates the effect of the Excessive Deficit Procedure (EDP) on sovereign spreads of EU states. In the context of the European supranational fiscal rules, the Excessive Deficit Procedure (EDP) is activated when countries are assessed to be in noncompliance with the EU's fiscal rules, following an assessment by the European Commission (see Appendices for description of the processes).

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[2] Another possibility is that countries may try to bias fiscal forecasts in order to appear to comply with the rules, and some evidence in Gilbert and De Jong (2017) show this bias to be present only for EU countries exceeding the 3%-threshold for SGP, potentially suggesting there is strategic underlying behavior.

Noncompliance with the EU's fiscal rules as reflected by the launch of an EDP has been quite common as most countries have breached either the deficit (3 percent of GDP) or debt (60 percent of GDP) rule, and/or spent considerable time in the EDP. Over the period 1999-2016, there have been 37 country-EDP episodes, as the majority of EU membership (25 out of 28 countries) has been under the procedures, in some cases repeatedly. The EDP episodes are quite persistent, with an average duration of an episode is around 5 years. The majority of the events occurred after the start of the Global Financial Crisis and the European sovereign debt crisis, due to a combination of both deteriorating fiscal positions and a step-up in enforcement of the Stability and Growth Pact (SGP). From the peak in 2010-11 when 25 countries were in the procedure, the number of ongoing EDPs has gradually declined to 9 countries in 2016, through a combination of fiscal consolidation under the programs as well as improved economic environments.

The effects of the noncompliance on spreads is not fully straightforward to predict, as different complex channels may be at play, with possibly opposite effects. Which of the effects is dominant appears to be ultimately an empirical question. Several hypotheses could be considered in the EU context:

- Spreads may not be affected if the EDP procedure is not credible, and, in particular, if financial markets believe that the correction mechanisms associated to the EDP are ineffective. In this case, placing a country under an EDP would not impact future fiscal policy, justifying the absence of response of spreads. A less likely possible reason for no reaction would be if the opening and follow-up of an EDP would be perfectly predictable, and markets would have already fully incorporated the subsequent EC recommendations on fiscal consolidations.
  - Spreads may be reduced for a number of reasons. First, provided that the EDP increases the predictability of fiscal policy, it may reduce the country risk premium and lower spreads. Second, if the correction actions under the EDP are deemed credible and effective, fiscal sustainability prospects may improve. An alternative hypothesis could be that supranational rules are badly-designed (for instance, foster procyclicality, which may undermine debt dynamics), and markets could see noncompliance as a positive development.
  - Spreads may increase after a country is placed under an EDP for a number of reasons. First, the EDP may carry a signaling effect and a reputational loss by conveying information to markets on current (in-year) and future fiscal policy (going beyond the current state of fundamentals) and the attachment of the country to fiscal prudence. If the EDP reveals a problem of fiscal discipline which supersedes market expectations, spreads may increase, especially if the EDP correction mechanism is deemed weak. However, one could contemplate also a very different interpretation, namely that the correction mechanisms under the EDP could be so strong that the negative effect on economic growth, i.e. pro-cyclicality, may ultimately undermine fiscal sustainability. Finally, yet another possible interpretation is that the complexity of the EDP and the facts that decisions are taken in a discretionary, and sometimes nontransparent way, may create greater uncertainty about future fiscal outcomes. The political complexity of the procedure may reveal information

> about the political economy process which may be also interpreted negatively by financial markets.

This paper finds that countries under an EDP tend to have higher sovereign spreads. Based on a sample of 28 European Union members over the period 1999 to 2016, our results indicate that the sovereign spreads of countries noncomplying with the EU supranational fiscal framework, i.e. when countries are placed under an EDP, are on average higher by 50 to 150 basis points than countries in compliance (not under an EDP). The effect is significant even in the pre-sovereign crisis period, suggesting that the results are not driven by the latter part of the sample. However, the impact of an EDP on spreads is higher after the Global Financial Crisis than before, suggesting that the increase in sovereign risk in that period might have outweighed a conceivable dampening effect on spreads from exceptional monetary policy actions by the European Central Bank (ECB).

We find further evidence of differentiation of effects by countries. In particular, the impact of EDP on sovereign spreads is higher for Euro area countries, possibly reflecting more stringent procedures for such members. The coefficient is also significantly larger for recurrent noncompliers, which may point to the importance of credibility effects. Our results are not affected by the inclusion of relevant dummies, such as for the sovereign debt crisis, or IMF programs, nor by the effect of sovereign ratings or specific outliers (such as Greece and Portugal). An interesting result is that the breach of the 3 percent deficit criterion itself does not seem to have a similar effect on spreads, which is suggestive that the EDP procedure contains additional signaling information for market participants.

The paper uses various dynamic panel techniques in order to address estimation issues such as endogeneity and cross-sectional correlation. The baseline specification accounts for typical macro, fiscal, and financial determinants of spreads and uses a System Generalized Method of Moments (GMM) estimator to allow for the most flexibility and robustness in terms of estimation options. Extensive robustness checks on variables and estimators are performed. The main finding is that estimates are rather robust across various specification options, instruments, lag structure, as well as – as mentioned before - various time periods and exclusion of individual countries.

In order to assess robustness, we run an exhaustive search algorithm over the space of reasonable models and find that the EDP coefficient is significant in 60 percent of the regressions at the 1 percent confidence level (and in 85 percent of the regressions at the 10 percent level), similar to robust macro-determinants. As an additional exercise, we conduct a two-stage approach to control for the possibility that the launch of an EDP may itself be partly anticipated. Using "EDP surprises" in a probabilistic framework reveals that these have similar effects on spreads, in terms of magnitudes in a large number of specifications, as the EDP events themselves.

Interpretation of the main result is not straight-forward as different channels may be at play as discussed above. One interpretation is that the EDP provides new information above and beyond the current knowledge on the fiscal variables and macro fundamentals. Markets may also discount the ability of the EDP to correct fiscal imbalances, if there is skepticism that the enforcement mechanism is strong enough to bring the country to compliance and back to fiscal sustainability. Conversely, another interpretation is that the framework could be too strong and may push countries under EDPs to undertake fiscal consolidations which may be pro-cyclical, and would thus worsen the fiscal trajectories. Finally, another possibility is that EDP increases uncertainty.

This may be due to the fact that the EDP's complexity and non-transparence increase uncertainty about future fiscal policies and outcomes.

The paper is structured as follows. In section II, we review the existing literature on the impact of fiscal rules on sovereign spreads. Section III presents stylized facts on noncompliance with the EU fiscal rules and the EDP framework. In section IV, we discuss the methodology and present the main results. Robustness checks are performed in Section V. Section VI exposes possible interpretations and policy implications.

II.   LITERATURE REVIEW

A rich econometric literature documents that numerical fiscal rules can be associated with stronger fiscal performance, in the sense of limiting debt and deficits. However, the strength of the effect differs considerably depending on the type and design of the rules and the national context[3]. In general, tighter and more encompassing fiscal rules are correlated with more fiscal discipline. In particular, some features of the rules such as a strong legal basis and strict enforcement appear to have a beneficial impact on fiscal performance.

Fiscal rules often have an effect on the risk premia of sovereign bonds, in particular if they are well-designed and credible. The argument is that stronger rules can convince the investors that the lower scope for discretion of fiscal policy reduce the risks of future expansionary public finances, and, consequently, the danger of a default. The most conclusive evidence concerning the impact of fiscal rules on the financial markets' risk assessment comes from studies on the US states and Switzerland, where such rules have been regarded as strong and credible by the market participants. Poterba and Rueben (1999), using an indicator reflecting the strength of fiscal rules in the US states, show that states with tighter deficit rules, and more restrictive provisions on the authority of state legislatures to issue debt, actually paid lower interest rates on their bonds. In a related study, Poterba and Rueben (2001) also analyze the reaction of risk premia to unexpected deficit shocks. They find that tighter anti-deficit rules almost completely offset the effect of unexpected deficits on the yields of state governments bonds. Lowry and Alt (2001) show that investors are more forgiving of one-time deficits in states with strict fiscal rules (i.e., the bond yields increase significantly less after a deficit), but respond more sharply to consecutive deficits. Feld and others (2013) look at the effect of fiscal rules adopted by Swiss cantons on their sovereign bonds, and find that stronger rules and a credible no-bailout regime lower spreads.

However, evidence is less conclusive in the case of the European Union or over larger international samples, with the exception of episodes of increased financial market tension. Schuknecht et al.

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[3] This has been documented for: a) US states (see, e.g., Eichengreen and Bayoumi, 1994; Alt and Lowry, 1994; Poterba, 1994; Bohn and Inman, 1996); b)   EU countries (Ayuso-i-Casals et al., 2007; Debrun and others, 2008; European Commission, 2006; Deroose, Moulin, and Wierts, 2006; Debrun and Kumar, 2007, Foremny, 2011); c) Swiss cantons (see Feld and Kirchgässner, 2001; Schaltegger, 2002; Feld and Kirchgässner, 2008; Krogstrup and Wälti, 2008; Luechinger and Schaltegger, forthcoming), d) emerging economies (Kopits, 2004; Corbacho and Schwartz, 2007) e) International datasets (see e.g. Cordes et al. 2015, on the effects of expenditure rules).

(2009) argue that a non-credible no-bailout policy in the federal context of Germany prior to the European Monetary Union (EMU) led to favorable risk premia of the German states. Heppke-Falk and Wolff (2008) provide evidence that a higher probability of receiving a bailout by the federal government tended to reduce the German states' risk premia. Afonso and Strauch (2007) find that the Stability and Growth Pact in the EU, did not restore trust among the investors ex ante and to dampen risk premia. Related studies in the European context are conducted by Iara and Wolff (2011) and Heinemann et al. (2013). They analyze the relationship between numerical fiscal rules and government bond spreads for a panel of Euro area countries. Using the fiscal rule index provided by the European Commission, both studies only find a very weak effect of fiscal rules on bond spreads. The effect is generally only sizeable in periods of extremely high risk aversion in the markets (Iara and Wolff, 2011). However, the International Monetary Fund (IMF, 2009) does not find that the presence of fiscal rules affects the spreads of 22 OECD countries.

Few studies actually consider the effects of noncompliance with fiscal rules. Reuter (2017) looks at determinants of compliance with numerical fiscal rules in EU countries and finds that the presence of sanctions or correction mechanisms is a key factor. Other studies discuss various cases of noncompliance with fiscal rules, however, without applying an econometric analysis. Cordes and others (2015) provide examples of countries which abandoned expenditure rules for various political and economic reasons. Budina and others (2015), in addition to putting together the IMF dataset on fiscal rules, also discuss noncompliance during the crisis as a cause for the move towards a "next generation" of fiscal rules. Eyraud and Wu (2015) present descriptive evidence on the noncompliance with European fiscal rules. Gaspar, Eyraud and Poghosyan (2017) provide evidence of fiscal procyclicality, excessive deficits, distorted budget composition and poor compliance with fiscal rules in the euro area. DNB (2016) provides descriptive evidence that compliance with European fiscal rules is relatively good in bad economic times, but much worse in good economic times, rendering fiscal policy procyclical. Afonso and Strauch (2004) considers the impact of the first breach of the SGP which occurred in 2002, when the SGP procedures were implemented for Portugal and for Germany. Using daily and weekly data, they find only a small significant reaction of interest rate swap spreads to the EDP-related events in 2002 (the change in swap spreads, when significant, was at most 5-10 basis points with no persistence of the market reaction).

III.   STYLIZED FACTS

We start by presenting stylized facts on the breaches of European supranational fiscal rules, focusing on the Excess Deficit Procedure (EDP). Our purpose is to describe the evolution through time of these events, their duration and frequency by groups of countries.

A. The European Fiscal Framework
Since the start of the European Monetary Union (EMU) in 1999, the European fiscal framework centered around the Stability and Growth Pact (SGP) - an agreement among the member states of the European Union, to ensure that fiscal discipline would be maintained and enforced in the

monetary union, in order to prevent monetary policy spillovers from excessively lax fiscal policies in individual members[4]. The SGP has been anchored by the so-called Maastricht 3 percent deficit and 60 percent debt criteria. If a member state breaches the SGP's outlined maximum limit for government deficit and debt, it moves from the 'preventive' arm to the 'corrective' arm, which means that the surveillance of its fiscal policies and request for corrective action will intensify potentially through the declaration of an EDP. However, there are various escape clauses in assessing the breach of the SGP criteria which make the declaration of an EDP not automatic. The corrective arm implies a higher level of scrutiny and enforcement mechanisms, including the possibility of imposing economic sanctions on euro area countries that do not take adequate action to remedy the excessive deficit, including fines that range from 0.2 to 0.5 percent of GDP.

The SGP has evolved substantially over time[5]. With many countries failing to exercise a sufficient level of fiscal responsibility during pre-crisis boom years[6] coupled with the weaknesses revealed during the financial and sovereign debt crisis, a number of SGP reforms have been introduced in recent years. The main milestones in the development of the framework are the following major reforms as potential structural breaks: the 2005 reforms, the 2011 Six Pack, the 2012 Fiscal Compact, and the 2013 Two Pack (see Annex 3 for details).

This paper bases the identification of noncompliance events on EDP episodes - rather than the breach of the deficit or the debt criterion. More specifically, we will define EDP events starting from the date of the Council's decision to announce the existence of an excessive deficit and the opening of an EDP procedure, and respectively the abrogation of such a procedure[7] (see Annex 4). The rationale for using the EDP procedure rather than the numerical rules themselves has to do with the complexities of the procedure and its evolution through time. The corrective arm contains a complex set of rules and assessments, with several exit clauses which involve judgement and forecasts, which go beyond the simple numerical thresholds. For example, the procedure has an important forward-looking component, in that it is also based on an assessment of whether the fiscal deficit is likely to exceed three percent in-year and in the near future, through multi-year forecasts of fiscal variables entail substantial political negotiations, which may themselves affect market expectations or increase uncertainty. The existence of an EDP procedure offers the most coherent and clear way of identifying noncompliance with the SGP, in addition to arguably offering the clearest market signal.

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[4] All EU member states are automatically members of both the EMU and the SGP, however, more binding and stringent procedures apply to euro area members, as well as the possibility of financial sanctions, than for non-members (see Annex 2 for details).

[5] See Annex 2 for a timeline.

[6] See Allard and others, 2013 and IMF (2015) among others.

[7] EDP procedure dates are taken from the European Commission (EC) website (https://ec.europa.eu/info/node/4287/).

B. Track Record of Compliance with European Fiscal Rules

We find that breaching the European fiscal rules has been more the norm than the exception (see Figure 1). Over the period 1999-2016, one can identify 37 EDP country episodes (see Table 1 for a complete list). This corresponds to 203 event-years, or about 48 percent of our sample.[8] Most countries have breached either one or both deficit and debt rules and/or spent time in the EDP for significant periods of time. There are only three exceptions: Estonia, Luxembourg and Sweden, which have never been in an EDP. Repeated noncompliers were common. Out of the 25 member countries which experienced EDPs, 13 experienced one episode, 11 countries experienced two episodes and 1 country experienced three episodes.

The majority of event-year episodes (155) happened in the post-GFC period. Noncompliance rates rose from 21 percent pre-crisis to 63 percent post-crisis. Prior to the GFC, relatively few (13) EDPs were opened, starting with the first EDPs opened for France and Germany in 2003. The number of countries under the EDP increased during the financial crisis, to 24 procedures (out of 27 members) in 2010-11, raising questions about whether the procedure was contributing to pro-cyclicality in the European Union, as discussed in Eyraud, Gaspar and Poghosyan (2017). Following this peak, countries gradually exited the EDP through a combination of fiscal effort and improved fundamentals. At the end of our sample, in 2016, the procedure was still open for 9 members.

The length of an EDP is relatively long, with an average of 5½ years over the period 1999-2016 (see Figure 2). EDPs are slightly longer after the GFC, with an average above 5⅔ years, while closer to 5 years before the GFC. Simple descriptive statistics lend some support the view that the EDP has been constraining fiscal policy, although it has delivered less adjustment than planned. To investigate in a stylized way whether the corrective mechanism had led to fiscal adjustment, we plot the average annual planned and actual fiscal adjustments (change in the budget balance ratio over the subsequent 3 years) in countries under an EDP and countries outside the EDP (see Figure 3 for the entire distribution of average consolidations). Over the period 1999-2016, the planned median adjustment for countries under an EDP was 0.7 percent of GDP per year; however, the actual delivered adjustment was somewhat lower at 0.52 percent of GDP. In contrast, for countries outside an EDP, the median average planned consolidation was 0.17 percent of GDP, while the actual outcome was a deterioration of the fiscal balance by an average of 0.29 percent of GDP. This suggests that the EDP indeed served as a mechanism to constrain fiscal policy although actual consolidation undershot the target.

IV.   EMPIRICAL ANALYSIS AND RESULTS

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[8] The year of reference for the EDP is taken as the time of publication of the EC Report. See Annex 4 for more details.

A. Panel model specification

This section investigates econometrically the relationship between government bond yield spreads and the EDP. Our empirical strategy builds upon a large literature on the determinants of government bond yields spreads (see Afonso and others, 2015; Heinemann and others, 2014; Iara and Wolff, 2011, etc.). The benchmark specification is a single equation model linking the yield spread on long-term government bonds to macroeconomic and fiscal fundamentals, financial market information, political and institutional variables and a number of relevant dummies. As the objective of our empirical analysis is to compare levels of sovereign spreads for countries under an EDP to countries not under an EDP, the main modification is that we introduce a dummy variable for EDP events into this otherwise standard model of spread determination.

More specifically, we estimate the regression:

$$Spread_{i,t} = \alpha + \beta Spread_{i,t-1} + \sum_{j=1}^{K} \beta_j X_{j,i,t} + \beta^{EDP} EDP\_dummy_{i,t} + \gamma_i + \epsilon_{i,t} \qquad (1)$$

where $Spread_{i,t}$ is the country i's 10-year sovereign spread to the US, $X_{j,i,t}$ is a set of explanatory determinants of sovereign spreads to be detailed below, $EDP\_dummy_{i,t}$ represents a dummy variable that takes the value one for the year when country i is under an EDP and the value zero otherwise and $\epsilon_{i,t}$ represent measurement errors and random shocks[9].

Drawing from the literature on determinants of sovereign spreads, the following macroeconomic, fiscal, and financial variables are included in $X_{j,i,t}$:

- Macroeconomic variables: real GDP growth rate, inflation and the short-term interest rate. GDP growth is expected to have a negative sign as sovereign risk should decrease with high levels of GDP growth. Inflation and short-term interest rates are expected to have positive coefficients as they both lead to higher long-term yields, other things equal. Higher inflation signals overheating of the economy which is expected to increase sovereign risk and lead to higher short-term rates. Short and long-term (sovereign) rates are expected to be correlated along the yield curve.
- Fiscal variables: net lending and public debt, both as a share of GDP. Net lending is expected to have a negative coefficient since higher deficits signal higher sovereign risk. Debt is expected to have a negative sign, as higher debt levels are typically signaling unsustainability issues and therefore also increases sovereign risk. Given markets react to contemporaneous available information, both variables are included using real-time values known to market participants.
- Financial market risk aversion: the EU VIX (volatility of put and call options on the EURO STOXX 500), to proxy for changes in European risk-aversion. A broad literature suggests that market risk perceptions are expected to have a positive impact on spreads.
- Competitiveness: the real-effective exchange rate to capture external competitiveness. A real appreciation worsens competitiveness and should increases spreads.

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[9] In addition, country fixed effects are included to capture all remaining time-invariant country-specific factors that are not explicitly controlled for.

- Time dummies. We include a dummy for the sovereign debt crisis (2009-2012, essentially since the start of the Greek crisis until the announcement of OMT by the ECB), to account for the generalized increase in spreads during this period.

The benchmark model is estimated for a panel of 28 European Union countries[10] over the period 1999–2016. Macroeconomic and competitiveness variables are taken from the IMF's WEO database. Fiscal variables are taken from the European Commission real-time database; this means that the net lending and debt variables correspond to official in-year projections from Stability and Convergence Programs.[11] The EU VIX index is taken from Bloomberg (ticker VSTOXX) and averaged annually. The use of fiscal variables constrains the analysis to annual frequency. However, one of the advantages of yearly frequency is that it filters some of the noise present in the short-term reaction of financial markets. In addition, the use of yearly frequency may partially address another potential criticism, namely, that some of these EDP events and their consequences are anticipated maybe up to several months in advance.

B. Estimation details

Several estimators have been employed in the literature. The fact that the left-hand variable is persistent, calls for the use of a dynamic panel setting, especially given potentially endogenous variables. A typical choice is the Arellano-Bond approach which provides estimators designed for situations with 'small T, large N' panels, with right-hand variables that are not strictly exogenous - correlated with past and possibly current realizations of the error -, fixed individual effects (implying unobserved heterogeneity) and heteroskedasticity and autocorrelation within individual units' errors, but not across them.

A significant issue in this type of regressions is endogeneity, which may stem from several sources. First, higher sovereign spreads can raise countries' fiscal deficits and result in countries being placed under an EDP (reverse causality). Second, endogeneity can be the result of unobservable fiscal preferences, such as the attachment to fiscal prudence. Third, in a dynamic specification, the presence of the lag of the dependent variable also introduces an endogeneity bias. Given that endogeneity could seriously bias the estimates, a system GMM estimator is preferred. Indeed, it has been demonstrated that system GMM estimator has a lower bias and higher efficiency than other typical estimators, including widely used fixed effect and first-differences GMM estimators - when the number of individuals is small and there is some persistency present in the series (see Soto, 2009).[12]

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[10] The panel is unbalanced. Every country enters the panel in the year in which it joins the European Union and the Maastricht criteria apply. When estimating the effect on CDS spreads, the sample is shorter (generally from 2004-5) as such data is only available since that period. Various robustness exercises which have been conducted with respect to the sample period are detailed in the robustness section.

[11] See https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/stability-and-growth-pact/stability-and-convergence-programmes_en

[12] The original Arellano–Bond estimator (often entitled difference GMM, since it first-differences the equation) is a Generalized Method of Moments estimator that instruments the differenced variables that are not strictly exogenous with all their available lags in levels. A potential weakness in the original Arellano–Bond estimator was revealed in later work by Arellano and Bover (1995) and Blundell and Bond (1998). The lagged levels are often rather poor instruments for first differenced variables, especially if the variables are close to a random walk. The Arellano and

Our preferred system GMM is implemented using Roodman's procedure (Roodman, 2009). We model the following variables as strictly exogenous covariates: GDP growth, inflation, the short-term rate, the EU VIX and the REER. We further treat as predetermined variables: the lagged spread and debt at time *(t-1)*, based on the fact that they are potentially correlated with past errors - so these are instrumented GMM-style using first lag and deeper. We consider as endogenous variables the deficit at time *t* and the EDP dummy, as these variables are potentially correlated with present errors - so these are instrumented GMM-style using second lag and deeper. Additionally, our system GMM also uses additional exogenous instrumental variables relevant to the literature on fiscal rules (e.g. government fragmentation, checks and balance, inflation targeting, etc., as in Badinger and Reuter, 2017).

Further specification choices key to system GMM include lag length, applied transformation and finite-sample correction. With GMM with a T of up to 17, the number of instruments could be very large (quadratic in T), which makes it be necessary that we reduce the number of instruments through restricting the number of lags (we specify in the baseline that only lags 2–4 are to be used in constructing the GMM instruments). In terms of transformation, our preferred specification uses the forward orthogonal deviations (FOD) transformation and makes the finite-sample correction to the two-step covariance matrix proposed by Windmeijer (2005). The section on robustness explores the implications of alternative specification choices on the main results.

C. Results

The estimation results are in line with the previous literature using similar models of spread determination. In order to enable comparison with a model without noncompliance, we estimated Equation 1 without the EDP dummy for the entire sample in Table 2, Column 1. Macroeconomic variables, fiscal variables and financial market risk aversion are all found to be significant determinants of the sovereign spread, have the expected signs and are also in line with previous literature in terms of magnitudes. The lagged spread is an important determinant, although other economic determinants play important roles as well. GDP growth lowers spreads, while inflation increases them, as do hikes in the short-term rate. Higher deficits and debt levels put upward pressure on spreads, risk aversion is another important driver, while competitiveness (REER) also seems to affect concerns about growth and hence fiscal sustainability. All variables are highly significant at least at the 5 percent confidence level.

Including our key variable of interest, the EDP dummy, leads to slightly different results depending on the estimation period. Table 2 column 2 presents the results of the estimation over the entire sample period of 1999-2016. While some of the regression results are largely similar to column 1 (with some slight differences like the lower persistence of spreads and fiscal variables being less significant – which is in line with other literature, see e.g. Alfonso et al., 2015; Heinemann et al., 2014; and Iara and Wolff, 2014), the main result is that the estimated EDP coefficient is significant

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Bover (1995) modification of the estimator includes adding the original equation in levels (hence the name system GMM). The advantage is that in this case additional instruments can be used – namely the variables in levels are instrumented with suitable lags of their own first differences – which increases efficiency. For the system GMM estimator, instruments may be specified as applying to the differenced equations, the level equations or both.

and positive. On average, countries under an EDP experienced sovereign spreads higher by 62 basis points, compared to countries not under an EDP.

Table 2 column 3 presents the results of the estimation over the period 1999-2008, i.e. before the European sovereign debt crisis. Arguably, this period was characterized by spread-compression and not sufficient differentiation between European sovereigns. The sharp rise in spreads following the 2009-11 sovereign crisis in Europe as well as the subsequent reforms of European fiscal framework can also be identified as a major structural break. We find that pre-2009, the spreads of countries under an EDP exceed those of countries not under an EDP by about 53 basis points, which is slightly lower than for the entire sample, yet remains very significant. This confirms that the results are not driven by the sovereign crisis and subsequent reforms of the European fiscal framework. An alternative way to test for post-crisis effects is to run a specification with an interaction term between the EDP dummy and a dummy for the period pre- and post-2009 (Table 2, column 4). The results show again that the estimated EDP coefficient is higher in the post Global Financial Crisis period (1.19 compared to 0.78). This result is interesting, and seems to suggest that the rise in sovereign risk due to the sovereign debt crisis may have outweighed the dampening effects on yields of the quantitative easing performed by the European Central Bank (we investigate the effect of ECB's operations separately below).

One possible concern is that some of the information content of the EDP may be anticipated by market participants and the average spread at annual frequency will not capture such anticipation effects. As a robustness test, we use an alternative definition of the dependent variable as the average of sovereign spread from the date the European Commission publishes its first EDP report till the end of the year, to better capture the impact of the EDP procedure on spreads. The results, presented in Table 2 column 5, are in line with the main baseline, the EDP coefficient is still significant and positive at 0.63, and fiscal indicators (net lending) seems to gain more significance.

Further robustness checks show that the main findings are not affected by the inclusion of a sovereign crisis dummy (Table 2, column 6) or an IMF program dummy (see Table 2, column 7), both of which are found to be not significant, while the EDP dummy retains its relevance.

Discriminating by the average sovereign rating does contain information for spreads (see Table 1 column 8). While the coefficient on ratings is significant at 0.14, and it possibly reduces the information content and the significance of the EDP dummy, however, the latter coefficient still remains large (0.56) and significant at the 10% level. This seems to support the idea that the EDP procedure contains information which goes beyond what is captured by the sovereign rating itself.

Table 3 contains more specifications which test robustness to various subsamples of countries and to the inclusion of further controls. We run our baseline model on euro area countries only and find that the EDP coefficient is higher (0.85) for euro area members (Table 3, column 1). The fact that noncompliance is raises spreads more for monetary union countries may be providing evidence that stronger enforceability of the rule increases the market reaction to deviating from it, as only euro area members are subject to the full extent of the procedures under the corrective arm of the SGP.

We further introduce an additional dummy for core EU members (defined as countries that joined the EU prior 2004). While core EU members have in general lower spreads over the entire period by almost 100 basis points, the estimated impact of an EDP is still similarly significant and large at 0.79 (Table 3, column 2). To gauge whether the results are not driven by particular outliers, we remove Greece and Portugal from the sample (Table 3, column 3). Results on the EDP coefficient are still highly significant (0.71) and the remainder of the regression is largely unchanged.

Further, a specification to control for recurrent noncompliers, defined as a dummy variable cumulating EDP counts over the 1999-2016 period, is estimated in Table 3, column 4. We show that recurrent noncompliers have spread on average higher by 114 basis points, compared to countries not under an EDP. This points to the importance of the signaling channel, as such a significant record of past fiscal profligacy may reflect the absence of genuine commitment to fiscal discipline, or some other structural weakness (e.g. institutional).

An interesting result is that the breach of the 3 percent deficit numerical criteria by itself does not seem to matter (Table 3, column 5). When replacing the EDP dummy with a dummy for the breach of the 3 percent deficit rule only (dummy equal to 1 when the real-time deficit exceeds 3 percent), the coefficient is not statistically significant. This is an interesting result, suggesting that while the debt and deficit level do matter for financial markets (as included in the regression), the breaches of numerical threshold themselves are not regarded by market participants as having similar importance as the launch of an EDP procedure. This result is suggestive of the fact that the EDP is interpreted by financial markets as containing information which goes beyond the fiscal information available publicly at that time, possibly related to additional fiscal forecasts, effect on political processes, or other considerations.

To investigate the potential impact of central bank quantitative easing, we constructed a variable to account for the European Central Bank's Public Sector Purchase Program (we use the log of cumulative debt securities holding in EUR millions – available from the ECB's website). The estimated coefficient is not significant and the EDP coefficient remains positive and significant at 0.58 (see Table 3, column 6 ECB).

To control for forward looking behavior and anticipations effects for fiscal performance, we also run a regression where the fiscal balance and debt are forward-looking (year t+1). Results are reported in Table 3 column 7 and are in line with the baseline regression and the EDP effect is similar (0.62).

Finally, we test whether fiscal spillovers are at play with the currency union, we introduced the aggregate fiscal balance for the EU countries (computed as the weighted average of fiscal balances in the EU) in Table 3, column 8. The estimated coefficient is not significant and the EDP coefficient is still positive and significant (0.67), supporting the view that the EDP dummy is not capturing spillovers from an aggregate worsening of the fiscal stance or spill-overs from other EU countries.

The analysis is subject to a number of caveats. In particular, the results rest on key assumptions, like the validity of the model we posited is valid for all countries, absence of significant omitted variables, no important structural breaks, etc. Given the available data and the short sample size, there are limitations as to what can be done to address some of these concerns. However, in the

next subsection we provide details of results when we perform an exhaustive search model-type estimations and control for the EDP "surprise effect".

V.   ROBUSTNESS CHECKS

A. Results from An Exhaustive Search Method

As the GMM estimator is sometimes criticized for the instability of its estimates, we undertake a more complete exploration of the robustness of our results by implementing an original routine which conducts an exhaustive search in the space of possible models[13]. More specifically, we loop across specification which keep the endogenous and pre-determined dependent variables fixed in all regressions (namely the lagged spread, lagged debt, current deficit and EDP dummy). At the same time, we allow the exogenous dependent variables to be permutated freely (growth, inflation, short-term rate, VIX, REER, IMF program dummy and crisis dummy), as long as the regressions include at least 4 of these determinants. We also allow permutation of instruments among: checks and balance, government stability, government polarization, government stability, law and order, and political risk rating. For the GMM-style instruments, we allow the lag limits to go to 2 for the first lag to 7 for the end lag. We allow both for Arellano-Bond (difference GMM) and system GMM estimation; for the latter, and also allow for one-step and two-step robust estimations.

We present the entire "cloud" of results, which allows us to evaluate parameter stability under alternative models. Our main finding is that countries under an EDP have sovereign spreads on average higher by 50 to 150 basis points, compared to countries not under an EDP. The EDP coefficient is significant in 85 percent of the regressions at a 10% confidence level and in 60% of the regressions at a 1% confidence level. These ranges provide strong evidence that there is a financial market penalty associated with an EDP under a large number of reasonable specifications.

Further coefficient "clouds" in Figure 4 confirm that the regressions are reasonable also for the other coefficient estimates. In particular, the lagged dependent variable is found to be very significant as well, and does not exceed 0.6 in most specifications. Output growth, inflation, the short-term rate, the VIX, the REER and IMF program are also found to be of the expected sign and statistically significant in large shares of the estimations. We notice interesting results regarding the fiscal variables. Debt turns out to be of the expected sign (positive) in a large share of the specifications. The sign of the coefficient of net lending appears the most difficult to ascertain, due to what appears to be a "split" between positive, negative and insignificant values the later dominate). These results point to the possible collinearity with the EDP dummy, which incorporates information about fiscal variables, and in particular is most highly correlated with the deficit. This is a concern which we try to address in the following section. However, the key finding from this robustness exercise is that the EDP coefficient turns out significant and large in the large majority of regressions, dominating the fiscal variables themselves. This may suggest that the EDP

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[13] This is similar to the global search regression GSREG routine of Gluzmann and Panigo (2013), however, developing our own code allows us more flexibility in terms of specifying the options for system GMM.

process it contains important information for markets, which go beyond the information captured in the fiscal variables.

B. The effect of EDP "surprises"

A possible criticism of the main result may be that market participants are able to anticipate EDP events so that the EDP itself may not be very informative above and beyond what the fiscal position or macroeconomic data would suggest. In order to test this possibility, we employ a two-stage approach. First, we identify the "anticipated" components of an EDP, by running a probabilistic model (logit) to determine the likelihood of countries being placed under an EDP (using lagged explanatory variables in Equation 1, i.e. GDP growth, inflation, the short-term rate, debt, net lending, VIX, the REER, including time effects). The estimation yields good fit values (Pseudo R-square of 91 percent) and reasonable results pointing to a strong predictive power of the lagged deficit and debt (Table 5). The residuals extracted of this regression arguably capture the "EDP surprise"/"news" effect, which goes beyond the explanatory power of fundamentals.

In the second stage, we use these EDP "surprises" instead of the EDP dummy in Equation 1, and run the robust search regression algorithm in order to generate the entire spectrum of results (Figure 5). We find that the "EDP surprises" are still significant in a large number of cases (38% of the regressions at 10% confidence). Although this result is weaker than the main result, it reflects only one part of the information captured by the EDP, which may be more closely related to the signaling channel. It is interesting that the "news" component of the EDP is still highly significant (and of similar magnitudes of around 50-150bps) as the EDP dummy itself.

VI.   INTERPRETATION OF THE RESULTS AND POLICY IMPLICATIONS

This paper finds that that sovereign spreads are higher when European countries are under Excessive Deficit Procedures (EDP). Based on a sample of 28 European Union countries over the period 1999 to 2016, and controlling for endogeneity, macroeconomic, fiscal, and financial fundamentals, we find that sovereign spreads of countries placed under an EDP are on average 50 to 150 basis points higher than countries in compliance. The market correction has increased after the Global Financial Crisis in spite of unconventional monetary policies, but has also been significant in the pre-crisis period.

In addition, the spread increase associated with the EDP is higher for Euro area countries and for recurrent noncompliers. The results hold to extensive robustness checks and are not affected by the inclusion of dummies for the sovereign debt crisis, IMF programs, nor by the effect of sovereign ratings or particular outliers. We also find that the breach of the 3 percent deficit criterion itself does not seem to have a similar effect on spreads, which is suggestive that the EDP procedure may contain additional signaling information for market participants.

Interpretation of the main result is not straight-forward and different channels may be at play. One interpretation is that the EDP provides information above and beyond the current knowledge on the fiscal variables and macro fundamentals. For example, the information contained in an EDP may be new information and signal fiscal plans and preferences of countries, which may be

interpreted as negative news by financial markets (a worse fiscal trajectory than currently expected).

Our finding of significant spread reaction to being placed under the EDP could also be suggestive of some issues with the framework itself. For example, the result may reflect fears that countries who are put into an EDP have to undertake fiscal consolidation which may be pro-cyclical, which would thus worsen the fiscal trajectory (as it seems to have been the case in 2009, at least, when escape clauses were not yet operational). Alternatively, markets may discount the ability of the EDP to correct fiscal imbalances, if there is skepticism that the enforcement mechanism is strong enough to bring the country to compliance and back to fiscal sustainability. The inconsistent and arbitrary application of the SGP, coupled with the weak compliance and enforcement mechanisms, may have weakened its credibility and increased the spread correction associated with an EDP.

Finally, another possibility is that EDP increases uncertainty. This may be due to the fact that the EDP's complexity and non-transparence increase uncertainty about future fiscal policies and outcomes. This may explain why markets may struggle to interpret the implications of a breach for the future fiscal path (e.g. differentiate whether the breach to the fiscal rules was the result of a series of very bad shocks or it reflects the weakening of the government's commitment to fiscal discipline, thus whether the breach is temporary or more persistent).

More thorough investigations of the detailed features of the European fiscal framework would be required in order to draw normative conclusions from such an analysis. However, we tentatively interpret our results as potentially lending support for a reexamination of the European fiscal framework, by enacting reforms which could improve the design of the EDP, in the direction of increasing its credibility, transparency, automaticity, including by reducing its complexity and pro-cyclicality.

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Table 1. Closed and Ongoing Excess Deficit Procedures

	Initial Report [Report]	Decision [Opening]	Abrogation [Closure]
Austria	7-Oct-09	2-Dec-09	20-Jun-14
Belgium	11-Nov-09	2-Dec-09	20-Jun-14
Bulgaria	12-May-10	13-Jul-10	22-Jun-12
Croatia	15-Nov-13	21-Jan-14	12-Jun-17
Cyprus	12-May-04	24-Jun-04	11-Jul-06
	12-May-10	13-Jul-10	17-Jun-16
Czech Republic	26-Apr-04	5-Jul-04	3-Jun-08
	7-Oct-09	2-Dec-09	20-Jun-14
Denmark	12-May-10	13-Jul-10	20-Jun-14
Estonia	--	--	--
Finland	12-May-10	15-Jun-10	12-Jul-11
France	**2-Apr-03**	**7-May-03**	**30-Jan-07**
	18-Feb-09	**27-Apr-09**	**ongoing**
Germany	19-Jan-02	21-Jan-03	5-Jun-07
	7-Oct-09	2-Dec-09	22-Jun-12
Greece	19-May-04	24-Jul-04	5-Jun-07
	18-Feb-09	27-Apr-09	25-Sep-17
Hungary	12-May-04	5-Jul-04	21-Jun-13
Ireland	18-Feb-09	27-Apr-09	17-Jun-16
Italy	7-Jun-05	28-Jul-05	3-Jun-08
	7-Oct-09	2-Dec-09	21-Jun-13

	Initial Report [Report]	Decision [Opening]	Abrogation [Closure]
Latvia	18-Feb-09	7-Jul-09	21-Jun-13
Lithuania	13-May-09	7-Jul-09	21-Jun-13
Luxembourg	--	--	--
Malta	12-May-04	5-Jul-04	5-Jun-07
	13-May-09	7-Jul-09	4-Dec-12
	21-May-13	21-Jun-13	19-Jun-15
Netherlands	28-Apr-04	2-Jun-04	7-Jun-05
	7-Oct-09	2-Dec-09	20-Jun-14
Poland	12-May-04	5-Jul-04	8-Jul-08
	13-May-09	7-Jul-09	19-Jun-15
Portugal	22-Jun-05	20-Jul-05	3-Jun-08
	7-Oct-09	2-Dec-09	12-Jun-17
Romania	13-May-09	7-Jul-09	21-Jun-13
Slovak Republic	12-May-04	5-Jul-04	3-Jun-08
	7-Oct-09	2-Dec-09	20-Jun-14
Slovenia	7-Oct-09	2-Dec-09	17-Jun-16
Spain	**18-Feb-09**	**27-Apr-09**	**ongoing**
Sweden	--	--	--
United Kingdom	11-Jun-08	8-Jul-08	22-Nov-17
United Kingdom	21-Sep-05	11-Jan-06	9-Oct-07

Table 2. Main Results (1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag of the LT spread over the US	0.40***	0.36***	0.90***	0.41***	0.34***	0.35***	0.24**	0.47***
GDP growth	-0.08**	-0.09***	-0.04**	-0.08***	-0.09***	-0.08**	-0.11***	-0.13***
Inflation	0.17**	0.16**	0.08*	0.19***	0.16**	0.15*	0.16*	0.11
Shot-term interest rate	0.28***	0.27***	0.14***	0.34***	0.27***	0.26***	0.25***	0.20***
Gov't debt	0.03**	0.03*	0.00	0.02	0.02*	0.01	0.02	0.01
Net lending	-0.13**	-0.07*	0.05	-0.02	-0.08**	-0.10*	-0.07	0.03
VIX	0.82***	0.94***	1.23***	0.95***	0.93***	1.08***	1.02***	1.18***
REER (CPI)	0.05**	0.04*	0.01	0.03**	0.04*	0.03*	0.03	0.01
EDP		**0.62****	**0.53****		**0.63****	**0.62****	**0.86*****	**0.56***
EDP before 2009				0.78*				
EDP after 2009				1.19***				
Sovereign crisis dummy						4.32		
IMF program							0.940	
Sovereign rating								0.14***
Constant	-10.40***	-9.17***	-5.65***	-9.08***	-9.06***	-8.70***	-9.04***	-5.12
Number of observations	366	364	184	364	364	364	364	364
Number of countries	28	28	27	28	28	28	28	28
Number of instruments	25	25	25	26	25	25	29	29
Arellano-Bond test for AR(1) in first differences (Pr > z)	0.06	0.05	0.03	0.08	0.06	0.15	0.12	0.04
Arellano-Bond test for AR(2) in first differences (Pr > z)	0.05	0.16	0.29	0	0.04	0.19	0.11	0.31
Hansen test of overid. restrictions (Pr > z)	0.21	0.43	0.08	0.27	0.433	0.330	0.480	0.16
Hansen test of exogeneity of instruments (GMM)	0.11	0.20	0.08	0	0.21	0.140	0.47	0.19
Hansen test of exogeneity of instruments (IV)	0.48	0.48	0.13	0.20	0.51	0.44	0.52	0.04
Period	1999-2016	1999-2016	1999-2008	1999-2016	1999-2016	1999-2016	1999-2016	1999-2016
Lag structure				(2 4)				
Estimator				System GMM two-step robust				

(1) Benchmark model estimated without the EDP dummy.

(2) Baseline model estimated over the full sample period (1999-2016).

(3) Baseline model estimated before the Global Financial Crisis, i.e. before 2009.

(4) EDP interacted with dummy variable taking the value 1 from 1999 to 2008 and from 2009 to 2016.

(5) Baseline model with alternative definition of the dependent variable: Spread after the European Commission issues EDP report.

(6) Sovereign crisis dummy (taking the value 1 starting 2010 onwards)

(7) IMF crisis dummy (taking the value 1 when country is under an IMF program).

(8) Regression including sovereign rating average

Table 3. Main Results (2)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag of the LT spread over the US	0.51***	0.44***	0.34***	0.51***	0.52***	0.47***	0.37***	0.44***
GDP growth	-0.13*	-0.13***	-0.08***	-0.09**	-0.08***	-0.08**	-0.06**	-0.10***
Inflation	0.28***	0.13**	0.12*	0.13**	0.140	0.15**	0.14**	0.18***
Shot-term interest rate	0.12	0.18**	0.27***	0.31***	0.22***	0.24***	0.27***	0.18**
Gov't debt	0.01	0.01	0.02*	0.01	0.02	0.02		0.02
Net lending	0.08	0.03	-0.09**	0.01	-0.03	-0.03		-0.06
VIX	0.27	1.14***	1.01***	0.94***	0.80***	0.94***	0.91***	1.08***
REER (CPI)	0.02	0.01	0.04*	0.02	0.03*	0.04	0.04**	0.05*
EDP	**0.85***	**0.79**	**0.71***			**0.58*	**0.62**	**0.67**
EU members before 2004		-0.98*						
Recurrent noncompliers				1.14***				
Deficit above 3% dummy					0.76			
ECB PSPP						0.05		
Gov't debt - forecast (t+1)							0.03*	
Net lending - forecast (t+1)							-0.03	
Aggregate EU fiscal balance								0.120
Constant	-4.26	-4.76	-8.82***	-6.48**	-7.54**	-8.61***	-9.06***	-9.83***
Number of observations	215	364	347	364	338	364	364	364
Number of countries	19	28	26	28	28	28	28	28
Number of instruments	25	25	25	37	25	25	25	25
Arellano-Bond test for AR(1) in first differences (Pr > z)	0.07	0.09	0.03	0.07	0.02	0.12	0.06	0.04
Arellano-Bond test for AR(2) in first differences (Pr > z)	0.11	0.25	0.06	0.10	0.09	0.45	0.04	0.11
Hansen test of overid. restrictions (Pr > z)	0.95	0.13	0.34	0.08	0.20	0.07	0.43	0.14
Hansen test of exogeneity of instruments (GMM)	0.84	0.05	0.18	0.21	0.10	0.04	0.21	0.08
Hansen test of exogeneity of instruments (IV)	0.32	0.43	0.34	0.08	0.60	0.36	0.51	0.40
Period				1999-2016				
Lag structure				(2 4)				
Estimator				System GMM two-step robust				

(1) Baseline regression estimated on euro area members only.

(2) Baseline regression with core-EU members: dummy taking the value 1 when country joined the EU before 2004.

(3) Regression estimated on the EU sample excluding Greece and Portugal.

(4) Variable constructed as the cummulative numbers of EDPs openned across time by country.

(5) Dummy variable taking the value 1 when the in-year deficit is estimated above 3 percent of GDP.

(6) Variable constructed as the (log) amount (EUR) of country's ECB Public Sector Purchase Program by year.

(7) Regression with forward-looking fiscal variables

(8) Variable constructed as the aggregate fiscal balance of EU members (overall nominal fiscal balance devided by overall EU GDP).

Table 4. Result of the Logit model to predict EDP

|	(1)
GDP growth (t-1)	0.26*
Inflation (t-1)	-0.19
Shot-term interest rate (t-1)	0.53
Gov't debt (t-1)	0.08*
Net lending (t-1)	-2.30***
VIX (t-1)	0.92
REER (CPI) (t-1)	0.06
Constant	-10.40***
Number of observations	313
Number of countries	28
Pseudo R-square (McKelvey & Zavoina)	0.91
Wald test	35.74***
Time fixed effects	YES
Period	1999-2016
Robust standard errors	YES

Figure 1. Evolution of Number of EU Countries under the EDP
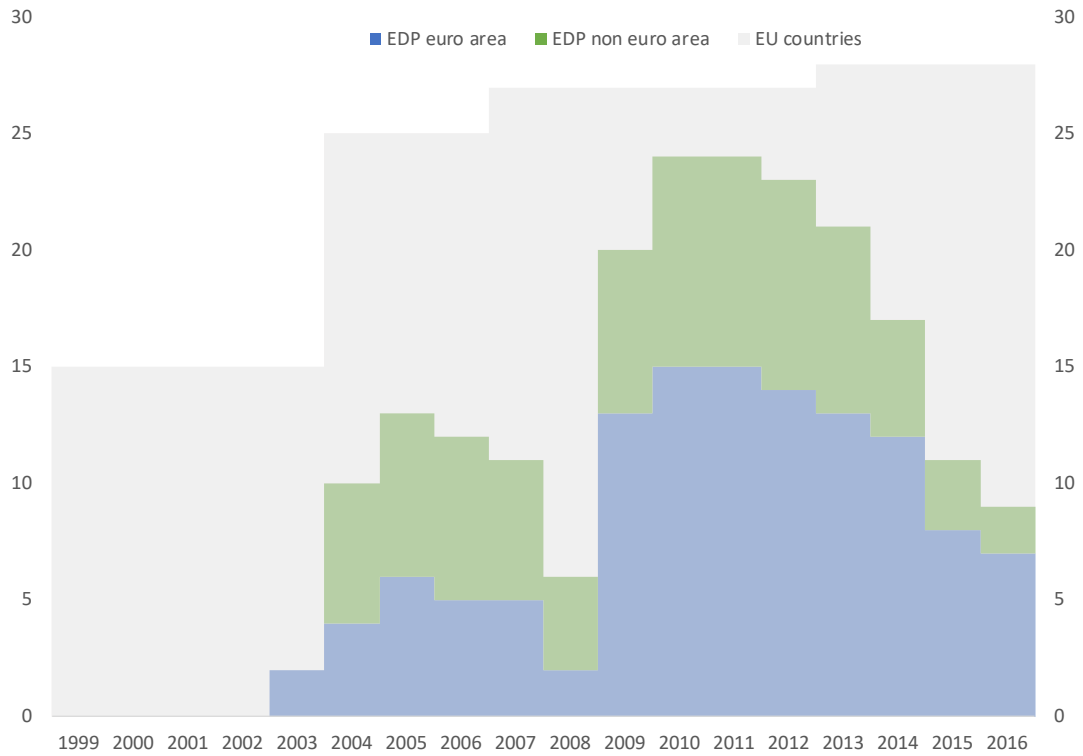
Figure 2. Average Duration of EDP Episodes
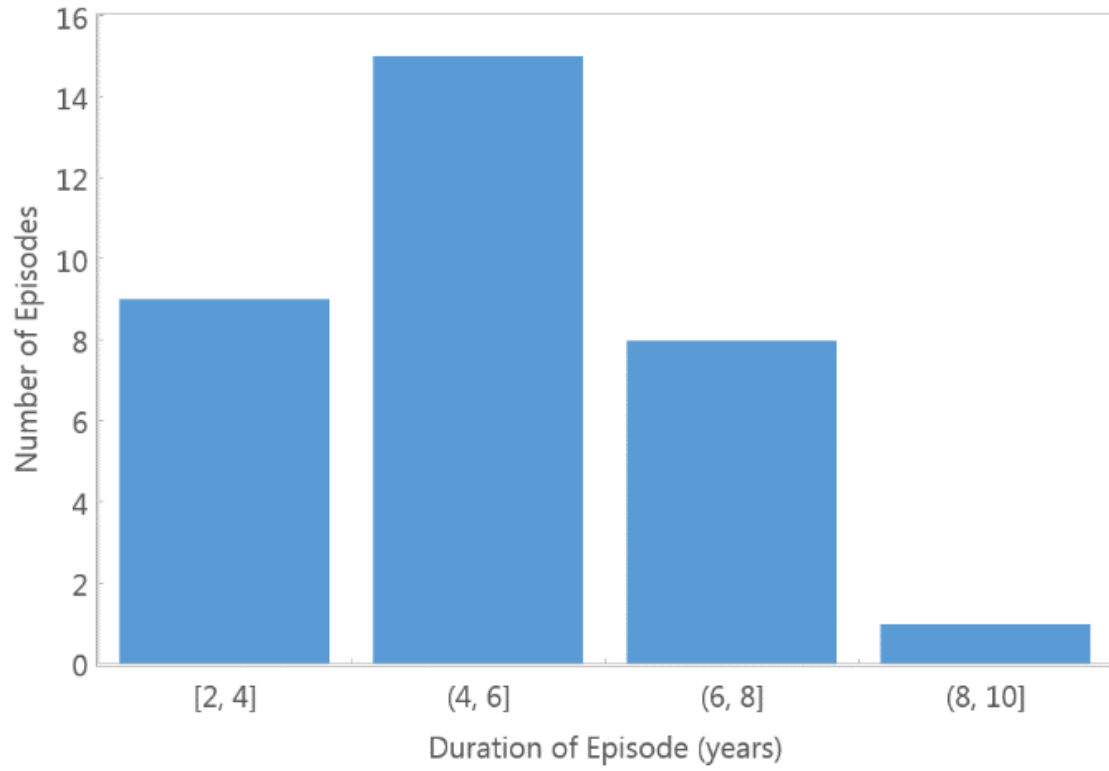
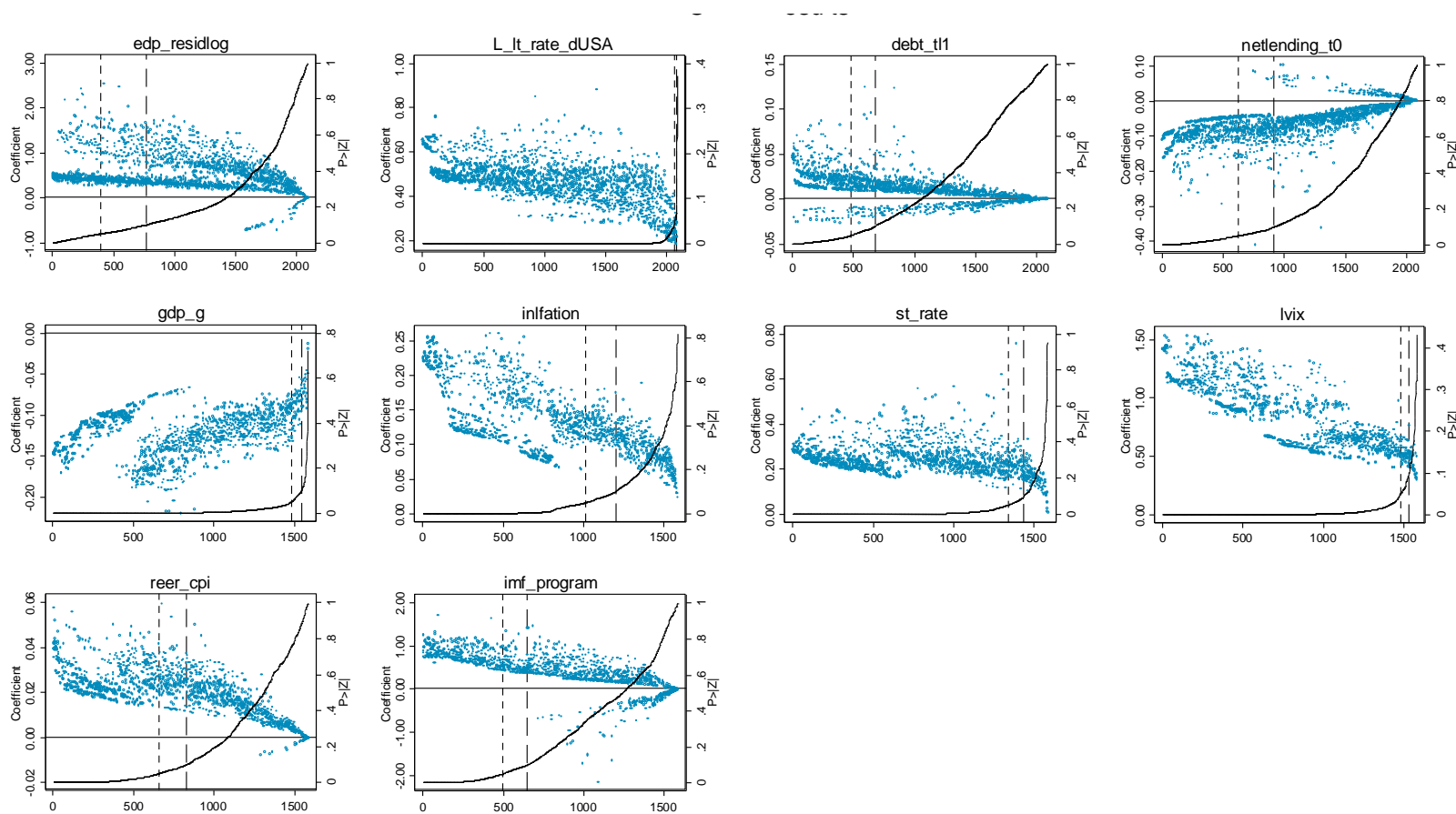# Figure 3. Average Planned Yearly Improvement in Budget Balance/GDP
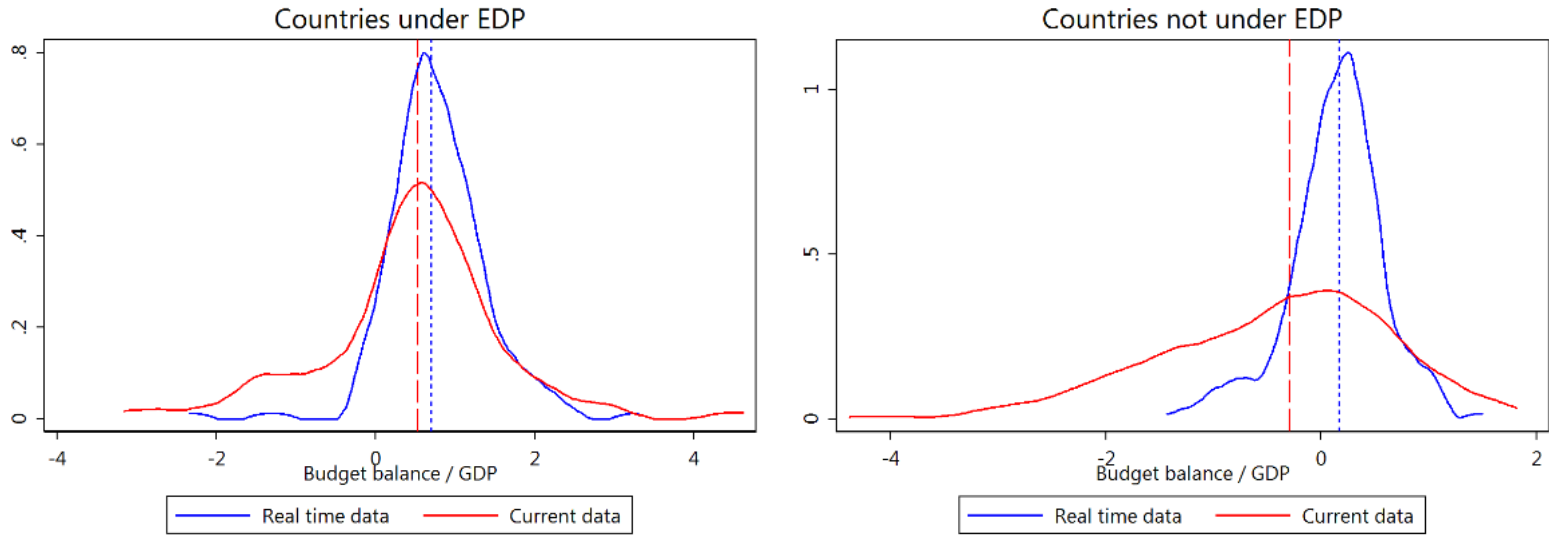
Figure 4. Results from an Exhaustive Search Method: Baseline Estimation
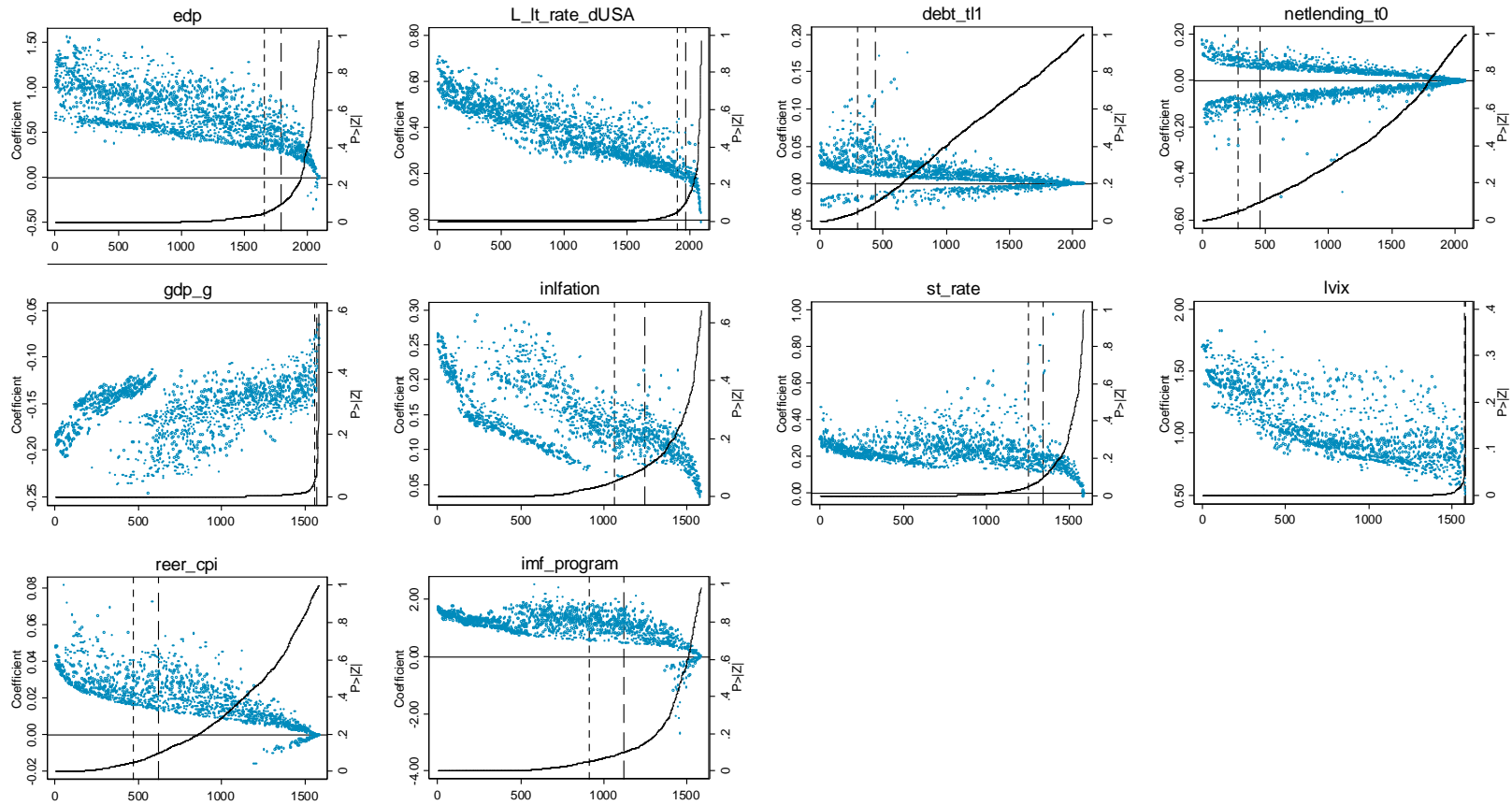
Arranged from most to least significant coefficient; Short dash: 0.05 ; Long dash: 0.10

Figure 5. Results from an Exhaustive Search Method: EDP "Surprises" Estimation

Arranged from most to least significant coefficient; Short dash: 0.05 ; Long dash: 0.10

ANNEX 1. DATA

The data was obtained from the IMF's World Economic Outlook (WEO), the European Commission's Annual macro-economic database (AMECO) database, the European Central Bank and Datastream.

The variables used in this paper are the following:

Euro high yield rate: Effective yield of the BofA Merrill Lynch Euro High Yield Index tracks the performance of Euro denominated below investment grade corporate debt publicly issued in the euro domestic or eurobond markets, from Datastream (code MLEHY3E(RY)).

Government debt: General government consolidated gross debt, EDP (based on ESA 2010) and former definitions (linked series) (% of GDP at current prices), from the European Commission SCPs database.

Government fiscal balance: Net lending (+) or net borrowing (-) of the general government, EDP (% of GDP at current prices), from the European Commission SCPs database.

Gross domestic product: Gross domestic product at 2010 reference levels, from AMECO (code OVGD).

IMF program: Dummy to indicate whether the country had a borrowing arrangement with the IMF on that year.

Long term rate: Nominal long-term interest rates (10-year bond yield), from AMECO (code ILN).

Population: Size in millions of people, from WEO (code LP).

Rating average: Sovereign long term foreign currency debt rating on a scale of 1 (AAA) to 20 (CC). Average of Moody's, Standard and Poor's and Fitch ratings.

REER: Real effective exchange rate, based either on CPI (code EREER_CPI) or on unit labour cost (code EREER_ULC), from the IMF's Global Data Source database.

Short term rate: Nominal short-term interest rates, from AMECO (code ISN).

VIX: Measure of the implied volatility of EURO STOXX 50 index options, from Datastream (code VSTOXX).

ANNEX 2. HISTORY OF THE STABILITY AND GROWTH PACT

The Stability and Growth Pact has evolved over time along with the EU's economic governance rules.

2015: SGP Flexibility

The Commission issues guidance on how it will apply the SGP rules to strengthen the link between structural reforms, investment and fiscal responsibility in support of jobs and growth.

2014: SGP review

A review of the 'Six Pack' and 'Two Pack' rules , which was called for in the legislation, determined that the legislation had contributed to the progress of fiscal consolidation in the EU. The review highlighted some strengths as well as possible areas for improvement.

2013: Fiscal Compact

The importance of the budgetary targets set by the SGP's preventive arm (the Medium-Term Objectives), are strengthened by a law known as the 'Fiscal Compact', which is part of an inter-governmental treaty known as the Treaty on Stability, Coordination and Governance (TSCG).

Two Pack

Adherence to the SGP is further strengthened by new laws, known as the 'Two Pack,' which reinforces economic coordination between Member States and introduces new monitoring tools.

2011: Six Pack

The SGP is made more comprehensive and predictable with a major enhancement of the EU's economic governance rules through a collection of new laws, known as the 'Six Pack'. The monitoring of both budgetary and economic policies is organised under the European Semester.

2005: SGP amendment

EU lawmakers amend the SGP to allow it to better consider individual national circumstances and to add more economic rationale to the rules to be complied with.

- Surveillance and coordination are strenghtened.
- The excessive deficit is clarified and made faster.

1999: Corrective rules

The SGP's corrective rules enter into force.

1998: Preventive rules

The SGP's preventive rules enter into force.

1997: Stability and Growth Pact

EU Member States agree to strengthen the monitoring and coordination of national fiscal and economic policies to enforce the deficit and debt limits established by the Maastricht Treaty. The Stability and Growth Pact is born.

1992: Maastricht Treaty signed

EU Member States sign the Maastricht Treaty, paving the way for the creation of the euro as the common currency of the EU. The treaty limits government deficits to 3 % of GDP and public debt levels to 60 %, so as to enable countries to share a single currency.

Source: European Commission

ANNEX 3. SUMMARY OF REFORMS OF THE CORRECTIVE ARM OF THE SGP

Rule	1997	2005	2011	2013
Deficit	**Deficit below 3%**	Deficit below 3%	Deficit below 3% or, **if debt above 60%, should be sufficiently diminishing based on 1/20th criterion**	Deficit below 3% or, if debt above 60%, should be sufficiently diminishing based on 1/20th criterion
Escape clauses	**Exceptional circumstances defined as GDP contracting by 2% a year**	**Exceptional circumstances redefined as negative output gap or protracted below potential growth**[14]	Exceptional circumstances defined as negative output gap or protracted below potential growth, as well as other "relevant factors"[15]	Exceptional circumstances defined as negative output gap or protracted below potential growth, as well as other "relevant factors"

Note: bold denote new elements.
Source: Vade Mecum on the Stability and Gowth Pact – 2017 Edition, available at
https://ec.europa.eu/info/publications/economy-finance/vade-mecum-stability-and-growth-pact-2017-edition_en,
retrieved on Jan 12, 2018.

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[14] For example, the SGP provides two main exception clauses with regard to the opening of an EDP on the basis of the deficit criterion: 1) the deficit has declined substantially and continuously and has reached a level close to 3% of GDP; 2) the excess is only exceptional and temporary, and the deficit value is still close to 3% of GDP. Other escape clauses (exceptional deficit) are considered to be a deficit above 3% of GDP which results either from: an unusual event outside of the control of the MS and with a major impact on its public finances; or a severe economic downturn (defined as a negative real growth of GDP or as an accumulated loss of output during a protracted period of very low real growth of GDP relative to its potential).

[15] Other "relevant factors" to be taken into consideration in evaluating the breach of the deficit criterion include: developments in the medium-term economic position, developments in the medium-term budgetary positions and developments in the medium-term government debt position, as well as any other factors which the country considers relevant (including debt incurred in the form of bilateral and multilateral support between Member States in the context of safeguarding financial stability, and the debt related to financial stabilisation operations during major financial disturbances). Assessing the breach of the debt criterion also contains various escape clauses (relevant factors) such as: structural reforms improving the sustainability of public finances, pensions reform and other and other factors that country deems significant.

ANNEX 4. CHART-FLOW OF THE EXCESSIVE DEFICIT PROCEDURE OF THE STABILITY AND GROWTH PACT
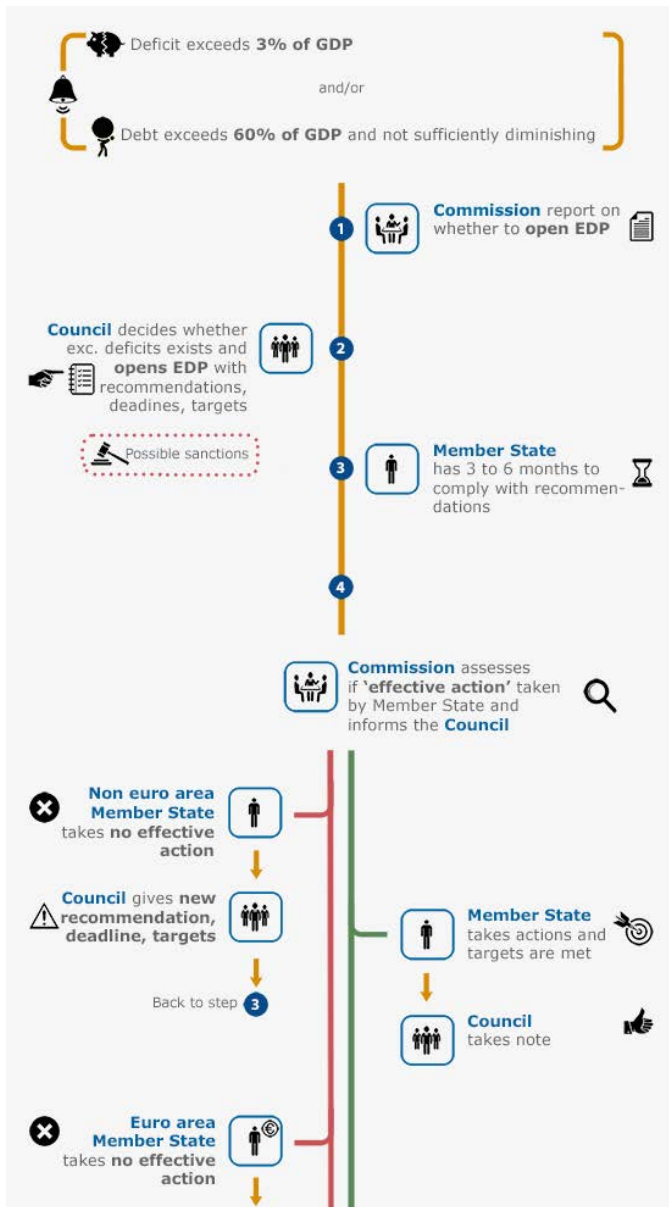
Source: European Commission, see http://ec.europa.eu/economy_finance/graphs/2014-11-10_excessive_deficit_procedure_explained_en.htm, retrieved on Jan 12, 2018.