



# Public debt and the risk premium: A dangerous doom loop

Cinzia Alcidi and Daniel Gros

## Abstract

The current environment of low to ‘ultra-low’ interest rates fosters the view that ‘deficits do not matter’. However, debt does matter. Countries with high debt levels often pay a risk premium. The combination of a high debt level with a high risk premium creates self-reinforcing loops. Italy represents a telling example of a negative loop whereby a high debt level, combined with increasing deficits, leads to a higher risk premium and hence higher refinancing costs. Portugal provides the opposite example. A moderate reduction in fiscal deficits has so much improved the outlook for future debt levels that the risk premium has fallen to less than one half of the Italian level, thus reducing the interest payment burden and debt. Low interest rates tempt high debt countries to accumulate further debt. This temptation should be resisted, as the true cost of debt is much higher than perceived.

## Contents

1. Introduction.....	2
2. Average versus marginal cost of debt.....	3
3. Risk premium and debt levels: the doom loop .....	6
4. Front-loading helps break the doom loop .....	7
5. Conclusion .....	9
References:.....	10
<i>Figure 1. Dynamic evolution of debt-to-GDP ratio from different starting levels – alpha =0.04 .....</i>	<i>7</i>
<i>Figure 2. Dynamic evolution of debt-to-GDP ratio from different starting levels – alpha =0.03 .....</i>	<i>7</i>
<i>Table 1. Simulations of debt ratios after 20 years, assuming an average primary surplus of 3% of GDP.</i>	<i>8</i>

Cinzia Alcidi is Senior Research Fellow and Head of Economic Policy Unit and Daniel Gros is Director at CEPS.

CEPS Policy Insights offer analyses of key policy questions facing Europe. As an institution, CEPS takes no position on questions of European policy. The views expressed are attributable only to the authors in a personal capacity and not to any institution with which they are associated.

978-94-6138-731-8

Available for free downloading from the CEPS website ([www.ceps.eu](http://www.ceps.eu))

© CEPS 2019

## 1. Introduction

The view that deficits and higher public debt can be beneficial has received an important boost through the 2019 presidential address of Olivier Blanchard at the American Economic Association: “Public debt and low interest rates”.<sup>1</sup>

The analysis of Blanchard is based on a workhorse model of the economic theory<sup>2</sup> and is intellectually very appealing. He argues that an increase in government debt, for example through higher expenditure, might be welfare enhancing if the growth rate of the economy is higher than the interest rate. The exact result depends considerably on the available production technology, but the key condition for positive welfare effects is the positive difference between the growth rate and the interest rate. Blanchard documents that in the US, historically, the growth rate of nominal GDP has been higher than the nominal interest rate on (federal) government debt. Blanchard uses a weighted average of short- and long-term interest rates on Treasury securities to calculate the interest cost of public debt for the United States to arrive at this result.

Blanchard also acknowledges that higher debt leads to higher risks. Experience shows that, above a certain threshold of debt, the (market) interest rate on public debt increases with the debt level (as a % of GDP). This has been confirmed by many empirical studies.<sup>3</sup>

In practical terms, this empirical regularity is used in Debt Sustainability Analysis (DSA) exercises. For example, the IMF<sup>4</sup> and the European Commission<sup>5</sup> use a simple rule of thumb that the risk premium, defined as the difference between the riskless rate and the interest rate on public debt of any particular country, increases by 3- 4 basis points for every percentage increase in the debt-to-GDP ratio above 60%.<sup>6</sup>

This link between the cost of debt and the level of debt itself is not just a minor inconvenience. It has profound implications for high debt countries, in particular for the high debt countries in the euro area where each government is responsible individually for its own debt.

This contribution focuses on three implications of the feedback loop between sovereign debt and risk premium: i) the true marginal cost of debt is usually much higher than the market interest rate, ii) small differences in the initial debt ratio can lead to very different debt trajectories, and, iii) front-loading the fiscal adjustment helps to break the doom loop.

---

<sup>1</sup> See Blanchard (2019).

<sup>2</sup> Diamond (1965).

<sup>3</sup> Among others Laubach (2009), Ardagna et al. (2007), Engen and Hubbard (2004).

<sup>4</sup> See IMF (2017) on the calculation of debt sustainability for Greece.

<sup>5</sup> This is the calibration used in the projections of debt in the case of Greece.

<sup>6</sup> This risk premium refers in general to long-term (i.e. usually 10-year) debt.

## 2. Average versus marginal cost of debt

A first, the general implication of the empirical regularity that the risk premium depends on the debt level is that the marginal cost of public debt is much higher than the interest rate on public debt (which represents the average cost). Intuitively this is straightforward: if a government incurs more debt, it has to pay interest on that additional debt. However, by incurring more debt the risk premium will increase, thus increasing the cost of refinancing the entire stock of existing debt. This secondary effect can be very significant.

This reasoning can be illustrated more formally. The link between the interest rate on government debt and public debt can be expressed by the following equation:

$$\text{Average cost of debt} \equiv i_t = r_t + \alpha(b_t - 60)$$

Where  $i_t$  the interest rate on public debt,  $r_t$  represents the risk-less rate (e.g. the rate on German government bonds, for a euro government debt). The variable  $b_t$  represents the public debt as percentage of GDP. The second term in this equation represents the risk premium, which depends on the parameter  $\alpha$  and the difference between the excess of the debt to GDP over 60%. The key parameter,  $\alpha$ , represents the strength of the link between debt and the risk premium. As Blanchard (2019) notes, a risk premium is justified for a country with a high debt level because debt might become unsustainable.

The parameter  $\alpha$  could be viewed in several ways. The simplest view would be that a high debt level indicates a chronic inability of the political system of a country to levy enough taxes to pay for government expenditures. As debt increases, so does the temptation for the government to devalue the real value of its debt. In a country with its own currency, this could take the form of (unexpected) inflation, e.g. when the government forces the central bank to finance the deficit by creating additional money. Empirical studies for the US and other countries have thus focused on the real interest rate on government debt. For countries in the euro area, the risk for holders of government debt might be more one of outright default, as in the case of Greece.<sup>7</sup> The risk premium is thus calculated as the difference between the interest rate a specific euro area country pays on its debt, relative to that of a country where the risk of default is perceived as negligible (i.e. Germany). For risk neutral investors the risk premium in either case would be the expected loss of the real value of debt, which in turn is usually given as the probability of default (or inflation) times the expected loss of value in case of default. Another interpretation of alpha would be that it represents the 'risk aversion' of investors. When there is even a low probability of a loss of real value of a long-term government bond there is uncertainty. The price for this uncertainty is a measure of the degree of risk aversion of investors. The higher the degree of risk aversion, the higher the risk premium. This has an important implication: even for a given expected loss, and thus a given degree of uncertainty

<sup>7</sup> Gros (2018) shows that in some cases (e.g. Italy in 2018) the risk premium observed in the market might contain two elements: the potential for a default while remaining in the euro and the potential risk that the country leaves the euro area (and devalues).

about default or inflation, the risk premium might vary over time as the risk aversion of investors changes (see for example Delatte et al. (2017)).

As indicated in the introduction, the parameter  $\alpha$  has been estimated by the IMF to be 0.04 and by the European Commission to be 0.03.<sup>8</sup> These values appear rather small and close to each other. But the additional effect driven by  $\alpha$  represents a considerable amplifier of the debt burden when the debt level increases beyond the 60% of GDP threshold, and even a small difference matters.

For Italy, with a debt-to-GDP ratio 70 points above the 60% threshold, the computed risk premium should thus fall between 210 basis points (based on Commission's calibration of  $\alpha$ ) and 280 basis points (IMF calibration of  $\alpha$ ). Since the beginning of 2019, Italy's risk premium has fluctuated around the upper end of this range.

The total debt service cost can be represented by the simple product of debt times the interest rate:

$$\text{Interest expense} \equiv b_t \cdot i_t = b_t [r_t + \alpha(b_t - 60)] = b_t r_t + \alpha(b_t^2 - 60b_t)$$

Interest rate expenditure (as a % of GDP) thus increases with the square of the debt to GDP ratio,  $b^2$ . The additional cost of 1% of debt relative to GDP, namely, the marginal cost of debt, can be calculated as follows:

$$\text{Marginal cost of debt} \equiv \frac{\partial(\text{interest expense})}{\partial(b)} = r_t + \alpha(2b_t - 60)$$

And the difference between the marginal and interest rate is given simply by:

$$\text{Marginal cost} - \text{Average cost} = \alpha b_t$$

For a country like Italy with a debt ratio considerably above 60% of GDP, this finding has important implications. The average cost of (new) debt might appear bearable at a risk premium of around 250 basis points. However, the marginal cost of additional debt is much higher than the interest rate. Assuming a debt level of 130% of GDP,  $\alpha = 3$  (measuring interest rate in basis points) and the risk-less rate  $r$  at zero, the difference between marginal and average cost is 390 basis points and the marginal cost of additional public debt 600 basis points ( $=3 \cdot (260-60)$ ). Only less than one half of it is visible in the present interest rate on BPTs.<sup>9</sup>

The marginal cost is of course not directly visible and has little impact on political discussions, but it is very real when it comes to interest payments. The high marginal cost arises from the

---

<sup>8</sup> A recent estimate by the European Commission (2018), limited to the euro area, arrives at a value of 0.047 for  $\alpha$ .

<sup>9</sup> What tends to reduce the marginal cost in the real world is the fact that not all public debt is long-term and that the risk premium is usually much lower on short-term debt. In reality, the average interest rate across all maturities is approximately equal to one half of the rate on the 10-year debt that is the basis for the measurement of the risk premium.

fact that the higher interest rate applies not only to the additional debt, but to the entire stock of debt needing to be refinanced.

The experience of Italy provides a vivid illustration of this. Before the new government was formed in early 2018, increasing confidence in the longer-term stability of public finances, which arose from the prudent policies pursued over recent years, had led to a risk premium of only around 100-150 basis points in 2016/7. Financial markets thus seemed to have had priced Italian debt not on the basis of the actual debt ratio, but the one to be expected in the future. The confidence that there was no danger in the near future led to negative interest rates for short-term debt, even the two-year rates were negative through most of 2017. As result of the short- and long-term credibility, the interest cost of refinancing existing public debt (which also contains some short-term debt) fell to less than 1%. In both 2016 and 2017, the interest rate on new issues of Italian government debt, weighted by maturities, was below 1%.<sup>10</sup>

With these favourable financing conditions, and the explicit commitment to lower future deficits (the 2017 Stability Program foresaw the deficit falling to below 1% of GDP in 2019), the country had embarked on a positive spiral: low financing costs made it much easier to achieve low deficits, allowing a progressive reduction in the debt ratio. Under this virtuous scenario, the debt ratio would have fallen, at first slowly, but then more quickly as lower debt levels entrenched lower interest rate costs.

Today, the confidence in this self-reinforcing virtuous scenario is gone. This is why market interest rates have reacted so strongly to the new fiscal policy, which now implies that the debt ratio will not decline at all. The increase in the deficit for 2019 is not necessarily the decisive element, it is rather that the previous path, which would have resulted in a virtuous feed-back loop of lower debt and lower interest rates, has been abandoned.

Portugal provides the opposite example: a case of the benefits of reducing the debt level. Portugal has a similar debt-to-GDP ratio as Italy (120% and 130%), but lower income per capita, a factor which usually would militate for a higher risk premium. However, the Portuguese government can now refinance its debt at about 150 basis points, a much lower rate than Italy, because its deficit is so low that the debt ratio is projected to decline rapidly, reaching approximately 100% of GDP by 2023, according to the IMF. By contrast, the debt ratio of Italy is projected to remain approximately at its current level of close to 130% of GDP.

By 2023, Portugal might thus pay around 150 basis points on 100% of GDP, which implies a total interest expense of 1.5% of GDP, whereas the cost of debt for Italy might be stuck at 250 basis points on 130% of GDP, giving a total of 3.25% of GDP, more than twice as much as Portugal.

The difference between these two scenarios is 1.75% of GDP. This is the amount saved through a reduction in the debt ratio of 30% of GDP (130 versus 100 in 2023). If a difference in the debt

---

<sup>10</sup> Ministero Economia e Finanze (2018), "Rapporto sul Debito Pubblico 2017", [http://www.mef.gov.it/inevidenza/article\\_0367.html](http://www.mef.gov.it/inevidenza/article_0367.html)

ratio of 30 points causes a difference in the debt service ratio of 1.75%, the implicit marginal cost of debt would be 5.8% ( $1.75/0.3$ ), close to the marginal cost of public debt calculated above.

The clear conclusion is that at a high level of debt, the marginal cost of public debt is much higher than one would expect simply looking at interest rates. Current market rates on Italian debt might look sustainable, but the implicit cost of increasing expenditure is very high.

### 3. Risk premium and debt levels: the doom loop

The assumption that the risk premium, and thus (market) interest rate on public debt, depends on the debt level (as percent of GDP) introduces a significant self-reinforcing mechanism, which can easily lead to widely different debt paths even if the initial conditions change only marginally.

The reason is simple: at a higher debt level, the interest rate cost of debt will be higher not only because there is more debt to service, but also because the cost of each unit of debt (i.e. the interest rate) will increase.

An example can illustrate this mechanism. The IMF uses the rule of thumb that the interest rate is given by the riskless rate plus a risk premium, which increases by 4 basis points for every one percentage point increase in the debt ratio above 60% of GDP. This would imply that the interest rate of a country with a debt-to-GDP ratio of 130% (like Italy today) would be 2.8 percentage points above the riskless rate (e.g. 10-year German government bonds). This formula for the 'spread' yields a result which is close to what one could observe during the summer of 2018 for Italy.

To continue with the general case as an illustration, one can take today's riskless rate of around zero, yielding an interest rate for a country with a 130% debt ratio of 2.8%. The total interest expense on public debt would then be  $1.3 \times 2.8 = 3.64\%$  of GDP.

If the country had a lower debt ratio, say only 110%, the interest rate would be only 2.0%, and the total interest cost for the government would be  $1.1 \times 2.0 = 2.2\%$  (of GDP). This means that as the debt ratio increases from 110 to 130% of GDP, an increase of less than 20%, the interest cost would have increased by over 60% (from 2.2 to 3.6 % of GDP).

Moreover, even seemingly small changes in this multiplier effect of the debt ratio on the risk premium have a very strong impact on debt dynamics. This is illustrated in Figure 1 and Figure 2. The five lines in the chart show the evolution of the debt ratio over 20 years, starting from different levels, e.g. 150% of GDP for the uppermost line (D0150), 140% of GDP for the second line, and so on, with 110% of GDP representing the lowest starting point.

Figure 1 shows the evolution of the debt ratio with the parameter  $\alpha$  equalling 0.04, from the IMF, while Figure 2 uses  $\alpha = 0.03$ , following the Commission assumption. All other assumptions (growth rate, riskless rate and primary balance) are the same in both cases.

A comparison of the two figures shows that this small difference in one parameter leads to a very different dynamic of the debt ratio. At one extreme, i.e. starting from a debt ratio of 150% of GDP, the parameter of the IMF would lead in 20 years to over 320% of GDP, whereas the parameter of the Commission would lead to a debt ratio of 'only' 200% of GDP. In both cases debt would be judged not sustainable. However, comparing the middle line in both panels of the chart shows that, starting from a debt ratio of 130%, the IMF and the Commission would arrive at different conclusions from their respective DSAs. For the IMF this level would be unsustainable, since debt would increase to over 160% of GDP, whereas for the Commission, this debt would be sustainable as it would fall over 20 years to about 110% of GDP.

Figure 1. Dynamic evolution of debt-to-GDP ratio from different starting levels –  $\alpha = 0.04$

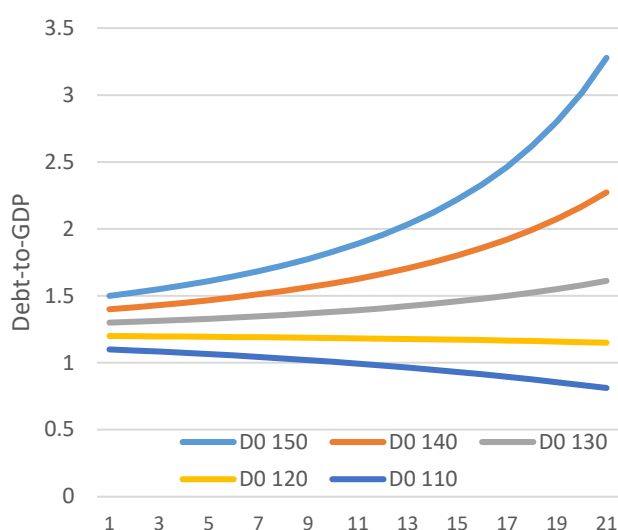
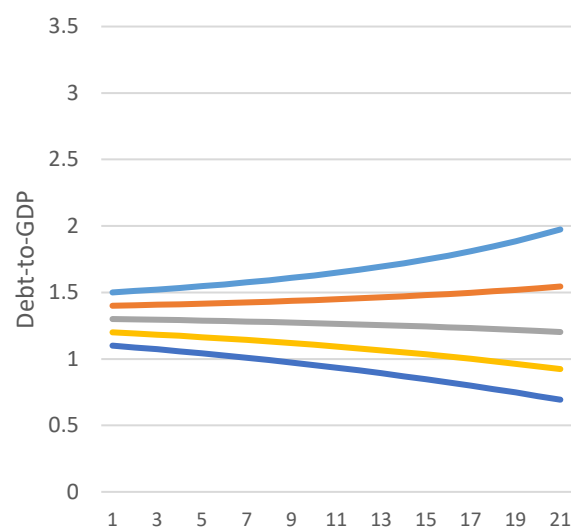


Figure 2. Dynamic evolution of debt-to-GDP ratio from different starting levels –  $\alpha = 0.03$



Source: own calculations assuming 3% primary surplus, risk-free rate equal to growth rate and risk premium increasing with 4 basis points for every percentage point increase in debt ratio above 60% of GDP (IMF assumption, left-hand panel) or increasing by 3 basis points for every percentage point increase in debt ratio above 60% of GDP (Commission assumption, right-hand panel).

Note: D0 110 stands for Debt at time 0, equals 110% of GDP, D0 120 stands for Debt at time 0, equals 120% of GDP, etc.

These illustrative calculations show that under realistic parameter constellations a debt ratio of 130% of GDP constitutes a critical threshold, where the line between sustainability and unsustainability is very thin. With a debt ratio above this 'reference value', a government might struggle to cope with the cost of debt. Below this value, however, a positive loop of debt reduction can occur.

#### 4. Front-loading helps break the doom loop

This link between levels of debt and the risk premium means that once a country has a high debt level it becomes increasingly difficult to get debt down again. This has an important implication for the time profile of a debt consolidation plan (and the attendant DSA). A front-

loaded adjustment that brings the debt ratio down early is much more likely to result in a finding that debt is sustainable than when the adjustment is back-loaded.

An example can illustrate this finding: It is regularly assumed that a primary balance of 3% of GDP represents the maximum than can be expected from any country over the long run. But an average 3% primary balance could be distributed differently over time. In a front-loaded adjustment, the country might run a primary balance of 4% of GDP for the first decade of a twenty-year period and a second decade one of only 2% of GDP. The other extreme would be a back-loaded adjustment, which does the opposite: the first ten years with a surplus of only 2% of GDP followed by a surplus of 4% of GDP for the remainder. The results of this thought experiment are tabled below, in the last and first column, respectively. The column in the middle assumes a constant primary surplus of 3% of GDP over the entire period. The table uses  $\alpha = 0.03$ , following the Commission assumption (3 bps per percentage point of debt-to-GDP ratio above 60%).

With an initial debt-to-GDP ratio of 140%, a front-loaded adjustment would achieve a rough stabilisation, but a back-loaded one would result in a steep increase in the ratio, to over 170%, a difference of about 30 percentage points. In this case, a back-loaded adjustment would have meant that the debt is not sustainable. But sustainability could have been achieved (just) with a strongly front-loaded programme, while still preserving the same average primary balance over the two periods.

As mentioned earlier, a debt-to-GDP ratio of 130% appears to be a critical level. Above that level, even a front-loaded consolidation does not lead to a debt reduction.

*Table 1. Simulations of debt ratios after 20 years, assuming an average primary surplus of 3% of GDP.*

Initial debt-to-GDP ratio	Debt-to-GDP ratio after 20 years: different primary surplus paths		
	Back loaded	Evenly distributed	Front loaded
1.5	2.24	2.02	1.84
1.4	1.71	1.56	1.43
1.3	1.31	1.19	1.10
1.2	0.98	0.90	0.83
1.1	0.72	0.67	0.62

*Note:* In green, stabilising or falling outcomes; in red, outcomes associated with higher debt.

*Source:* Authors calculations.

These results provide some justification for the insistence of the ESM (and also the IMF) to front load the fiscal adjustment. It is essentially a choice between ‘pain without end’ (slow adjustment) or a ‘painful ending’ (quick adjustment).

One could of course argue that that a front-loaded adjustment leads to such a fall in GDP that the ratio does not decline. However, while this may be the case if the adjustment takes place during an acute financial crisis, the argument is not valid during normal times. Almost all existing macroeconomic models imply that a permanent fiscal adjustment leads initially indeed



to lower output, but over the longer period considered here (10 years) output returns to its equilibrium level. Gros (2011) provides a discussion of the short-term dynamics of the debt-GDP ratio.

## 5. Conclusion

With very low interest rates, it is tempting for governments to spend more. However, while risk-free rates hover around zero in the euro area, risk premia are definitely greater than zero for some countries. High debt countries should take the feedback loop from higher debt levels to higher risk premia into account in the formulation of their spending plans. The contrasting experiences of Italy and Portugal, which now has a much lower risk premium and a declining debt-to-GDP ratio, show that the pay-off from a firm fiscal adjustment can be very high. This is confirmed by model calculations which show that a front-loaded fiscal consolidation can be more beneficial than one that is back-loaded.

This contribution has focused on the longer-term link between risk premia and public finances. The conclusions that high debt creates a danger of doom loops will be reinforced if one takes into consideration the spill-over effects for the private sector. The financing costs of banks and large enterprises are usually linked to the risk premium on the sovereign. This implies that a higher debt level is likely to depress growth. It is this channel which leads to the conclusion that for a high debt country a fiscal expansion can be contractionary.<sup>11</sup> Low risk-free rates should not be taken as a justification to increase public debt, which cannot be financed at a risk-free rate.

---

<sup>11</sup> See for instance Blanchard and Zettelmayer (2018). A logical implication of this analysis that a fiscal contraction can (but does not have to be) expansionary.

## References

- Alcidi C. and D. Gros (2018), “Debt Sustainability Assessments: The state of the art” In-Depth Analysis, Requested by the Econ Committee of the European Parliament, [http://www.europarl.europa.eu/RegData/etudes/IDAN/2018/624426/IPOL\\_IDA\(2018\)624\\_426\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/IDAN/2018/624426/IPOL_IDA(2018)624_426_EN.pdf).
- Ardagna, S., F. Caselli and T. Lane (2007), "Fiscal Discipline and the Cost of Public Debt Service: Some Estimates for OECD Countries," *The B.E. Journal of Macroeconomics*, pp. 1-35.
- Blanchard, O. and J. Zettelmeyer (2018), “The Italian Budget: A Case of Contractionary Fiscal Expansion?” PIIE, <https://piie.com/blogs/realtime-economic-issues-watch/italian-budget-case-contractionary-fiscal-expansion>.
- Blanchard O. (2019), “Public Debt and Low Interest Rates” American Economic Association (AEA) Presidential Address at the AEA annual meeting, <https://piie.com/commentary/speeches-papers/public-debt-and-low-interest-rates>.
- Delatte, Anne-Laure with Julien Fouquau and Richard Portes (2017), « Regime-Dependent Sovereign Risk Pricing During the Euro Crisis”, *Review of Finance*, Volume 21, Issue 1, March 2017, Pages 363–385.
- Diamond, P. (1965), National debt in a neoclassical growth model. *American Economic Review*, 55(5-1):1126–1150.
- Engen, E. M. and R. G. Hubbard (2004), "Federal Government Debt and Interest Rates," *NBER Working Papers 10681*.
- European Commission (2018), Quarterly Report on the Euro Area Vol. 17, N.4, Chapter I, [https://ec.europa.eu/info/sites/info/files/economy-finance/ip100\\_chap\\_i\\_sovereign\\_bond\\_dynamics\\_in\\_the\\_ea.pdf](https://ec.europa.eu/info/sites/info/files/economy-finance/ip100_chap_i_sovereign_bond_dynamics_in_the_ea.pdf).
- Fuest, Clemens and Daniel Gros (2019), “Government debt in times of low interest rates: the case of Europe”, *EconPol Policy Brief*,16/2019, [http://www.econpol.eu/publications/policy\\_brief\\_16](http://www.econpol.eu/publications/policy_brief_16).
- Gros, Daniel (2011), “Can austerity be self-defeating?”, *Voxeu.org*, 29 November 2011, <https://voxeu.org/article/can-austerity-be-self-defeating>.
- Gros, Daniel (2018), “Italian risk spreads: Fiscal versus redenomination risk”, *Voxeu.org*, 29 August, <https://voxeu.org/article/italian-risk-spreads-fiscal-versus-redenomination-risk>.
- IMF (2017), Greece : Request for Stand-By Arrangement-Press Release; Staff Report; and Statement by the Executive Director for Greece, <https://www.imf.org/en/Publications/CR/Issues/2017/07/20/Greece-Request-for-Stand-By-Arrangement-Press-Release-Staff-Report-and-Statement-by-the-45110>.
- Laubach, T. (2009,) “New Evidence on the Interest Rate Effects of Budget Deficits and Debt.” *Journal of the European Economic Association*, June.



## ABOUT CEPS

Founded in Brussels in 1983, CEPS is widely recognised as the most experienced and authoritative think tank operating in the European Union today. CEPS acts as a leading forum for debate on EU affairs, distinguished by its strong in-house research capacity and complemented by an extensive network of partner institutes throughout the world.

### Goals

- Carry out state-of-the-art policy research leading to innovative solutions to the challenges facing Europe today
- Maintain the highest standards of academic excellence and unqualified independence
- Act as a forum for discussion among all stakeholders in the European policy process
- Provide a regular flow of authoritative publications offering policy analysis and recommendations

### Assets

- Multidisciplinary, multinational & multicultural research team of knowledgeable analysts
- Participation in several research networks, comprising other highly reputable research institutes from throughout Europe, to complement and consolidate CEPS' research expertise and to extend its outreach
- An extensive membership base of some 132 Corporate Members and 118 Institutional Members, which provide expertise and practical experience and act as a sounding board for the feasibility of CEPS policy proposals

## Programme Structure

### In-house Research Programmes

Economic and Finance  
Regulation  
Rights  
Europe in the World  
Energy and Climate Change  
Institutions

### Independent Research Institutes managed by CEPS

European Capital Markets Institute (ECMI)  
European Credit Research Institute (ECRI)  
Energy Climate House (ECH)

### Research Networks organised by CEPS

European Network of Economic Policy Research Institutes (ENEPRI)  
European Policy Institutes Network (EPIN)