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Self-Fulfilling and Fundamentals Based Speculative Attacks: A Theoretical Interpretation of the Euro Area Crisis

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Abstract: The recent euro area crisis shows some similarities with the fixed exchange rate crisis that affected the European Monetary System in 1992–93. I argue that the theoretical framework to be used in order to analyze them should also be similar. As a matter of fact, in both cases, the point of view of the government (that compares costs and benefits of its action) should be considered together with the point of view of speculators, who look at the state of the economic fundamentals in order to decide whether to launch an attack or not. This allows to represent and to interpret, among other things, both the initial "honeymoon" years of EMU and the recent euro area crisis.

Keywords: euro area crisis, economic fundamentals, self-fulfilling expectations, public debt, speculative attacks
JEL Classification: E65, F34, F36

1 Introduction

The recent euro area crisis[1] shows some similarities with the one that affected the European Monetary System (EMS) in the years 1992–93.

In both cases economists and analysts have been wondering whether the reasons of the crisis had to be found in the weak "fundamentals" of the countries whose assets have been subject to attack (currencies in the first case, government bonds in the second one) or in the role played by self-fulfilling expectations, or maybe in a combination of both.

A parallel between the two crises can also be drawn by considering the literature on speculative attacks on fixed exchange rates that emerged in the

1 For a deep analysis of the reasons behind the euro area crisis see Rehman (2015).

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1990s in order to interpret the latter. According to that literature, it is possible to distinguish three regions of the state of domestic economic fundamentals: a region of absolute strength of economic fundamentals, in which the exchange rate remains fixed and cannot be subject to confidence crises;[2] a region of absolute weakness in which, even in the absence of speculation, the domestic currency is certainly devalued by the central bank due to the low level of its economic fundamentals; and an intermediate, "gray" area (in which economic fundamentals are neither too weak nor too strong), characterized by a multiplicity of exchange rate equilibria, depending on the state of expectations.

The recent euro area crisis can be interpreted along similar lines, although with two main obvious differences.

First of all, the speculative behavior of financial markets focuses on the public debt of sovereign countries, rather than on fixed exchange rates.[3]

Second, the public authority that confronts the private sector is the government, rather than the central bank. As a matter of fact, while in the speculative attacks on fixed exchange rates the central bank has to decide whether to devalue or not (by comparing costs and benefits of pegging the exchange rate), in this second case it is the government that has to take an optimal decision, namely whether it should renege or not on the public debt, by comparing the costs and the benefits of a default.

2 In a situation of full and complete information, and in which markets behave rationally and are not subject to panic, myopia or a wrong state of expectations, nobody of course would be selling a currency at a price which would be lower than the "shadow" one resulting from the correct evaluation of its economic fundamentals, as it is correctly recognized in the literature. It should be acknowledged, however, that information is not always full and complete and markets do not always behave rationally, but may be subject to euphoria, panic, perception biases or any other "emotional behavior", as I would define it, like for example the "irrational exuberance" described by Shiller (2005). If that is the case, then, the area of stability may get smaller (in the case of negatively biased expectations) or larger (in the case of positively biased expectations), even for long periods of time.

3 One of the motivations of the creation of a monetary union was precisely the need to avoid the exchange rate instability of fixed exchange rate systems that may still be subject to confidence and credibility crises, even when the exchange rate peg is declared as "irrevocable". The recent euro area crisis, however, shows that speculation did not disappear but simply changed objective, by moving from sovereign currencies to sovereign debts. The exit of any of the countries adopting the euro, however (during Spring 2015 the exit of Greece was considered by the media as a possible event), would change all this and the euro area might end up looking like an imperfectly credible fixed exchange rate regime rather than a monetary union. This also explains why the Maastricht Treaty did not contain any indication of the possibility for a country to leave EMU once it adhered to it.

Another, more significant, difference is due to the fact that while in analyzing speculative attacks against fixed exchange rates the state of the economic fundamentals is usually considered as objectively determined and given, in the case of attacks against public debt the state of expectations affects the level of the interest rate, and may therefore change the state of economic fundamentals.

Apart from those differences, however, I argue that in the case of speculative attacks against government debt it is also possible to identify three separate regions – one of stability, one of instability and an intermediate “gray” region – as in the case of speculative attacks against fixed exchange rates.

The rest of the article is composed as follows. Section 2 reviews briefly the literature on speculative attacks on fixed exchange rates, Section 3 presents the model of speculative attacks on government debt, Section 4 proposes an interpretation of the euro area crisis, and Section 5 contains some concluding remarks.

2 First and Second Generation Models of Speculative Attacks on Fixed Exchange Rates

According to the literature on speculative attacks on fixed exchange rates, it is possible to distinguish three regions of the state of domestic economic fundamentals.[4]

The three regions emerge as a synthesis of two different interpretations of speculative attacks in fixed exchange rate systems resulting from two different “generations” of literature.

The first one is based on the role played by economic fundamentals, considered by homogeneous *speculators* in deciding whether to attack or not the currency (they will attack as soon as the state of fundamentals exceeds a stability threshold). In this first approach, initiated by Krugman (1979) and simplified by Flood and Garber (1984), currency crises come as a result of some (exogenous) divergent policy followed by the monetary authority. In these models the current exchange rate (e) is assumed to be a function of the current state of the economic fundamentals (θ) and of the expected future variation of the exchange rate itself ($\dot{e}^e$).

4 It should be recognized, however, that the actual state of “economic fundamentals”, can hardly be considered an objectively measurable index. It is rather a subjectively weighted index composed by an equally subjectively determined number of macroeconomic indicators, including public debt/GDP ratio, public deficit/GDP ratio, current account/GDP ratio, and many other potentially relevant macroeconomic variables and indicators. See Cheli and Della Posta (2007) for further details.

Moreover, it is assumed that the private sector forms its expectations in a rational way and it is able to check whether the current money supply and the future expected variation of it are consistent with the central bank's commitment to a fixed exchange rate ($\overline{e}$). In order to do so, speculators compare the latter with the 'shadow' exchange rate ($\tilde{e}$) that they expect to prevail in a free float regime. As soon as the state of the "fundamental" variable represented by money creation increases to a level that is expected to be incompatible with the pegging of the exchange rate, the private sector, by taking into due account the transaction cost (t), reacts in order to avoid the losses resulting from an unanticipated devaluation, and the central bank is forced to abandon the parity even before the natural exhaustion of foreign reserves. There exists, then, a unique critical level for the economic fundamental below which everybody attacks the currency and above which nobody does it. This is represented by Figure 1 below.

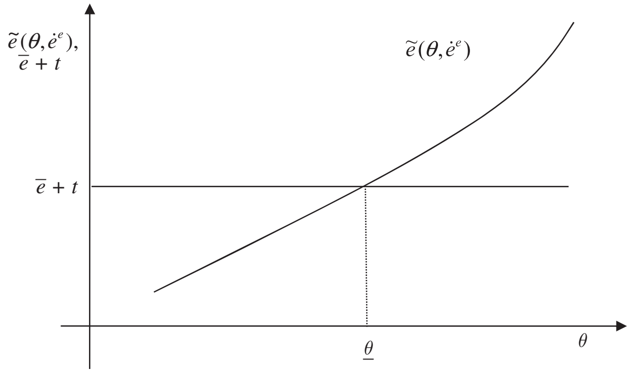

Figure 1: The speculative attack occurs as soon as $\overline{e}+t=\tilde{e}(\theta,\dot{e}^e)$.

The second approach is based instead on the role played by self-fulfilling expectations, when the *central bank* compares costs and benefits of the defense of the fixed exchange rate and devalues if the former exceed the latter.

In this second approach, corresponding to the "second generation" of currency crises models, speculative attacks arise because of self-fulfilling expectations: given that the central bank's optimal policy is determined endogenously, if all speculators attack the currency (namely if a proportion of speculators equal to 1 sells it), the cost for the central bank of defending the exchange rate parity will certainly exceed the benefit of its defense so that the optimal decision for the central bank will be to devalue, thereby validating in a self-fulfilling way the initial negative expectation (prophecy) of speculators. However, there is a critical level at which fundamentals are so weak (namely θ is so high), that even if no speculators attack (i. e. there is a 0 proportion of speculators attacking), the cost of the defense will exceed the benefit of it, and the exchange rate will be devalued with certainty. For values of $\theta > \overline{\theta}$, then, there is instability for sure (see Figure 2 below).

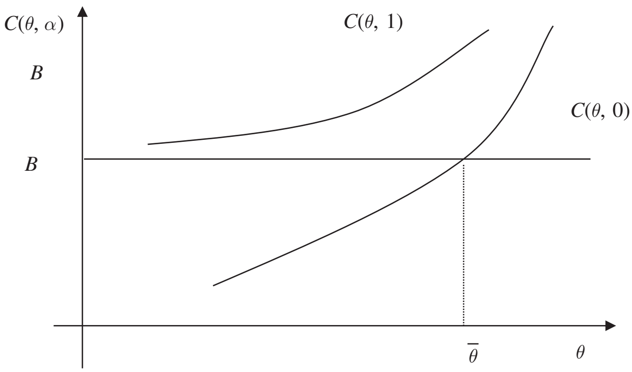

Figure 2: Central bank's costs and benefits of fixing the exchange rate.

While some of these second generation models seemed to prove that negative shifts of expectations may cause the abandonment of a fixed exchange rate system even in presence of sound fundamentals, either considering the role played by foreign reserves (Obstfeld 1986) or referring to a costs-benefits analysis (Bensaid and Jeanne 1997), other works re-established the role played by fundamentals even within this approach: self-fulfilling speculative attacks can only be successful when fundamentals are "weak", that is when they are in the unstable region, identified in the first generation models.

As a matter of fact, Obstfeld (1995, 1996), by merging the first and the second generation of literature, proved the existence of three different regions for the fundamentals of an economy (see Figure 3 below): (1) a region of stability, for $\theta < \underline{\theta}$ (where $\underline{\theta}$ indicates the lower critical level of the fundamental as determined in the first generation of speculative attacks models), so that no speculators have convenience to launch an attack on the currency since by doing so they would lose money, and no devaluation takes place; (2) a region of instability, for $\theta > \overline{\theta}$, (where $\overline{\theta}$ indicates the upper critical level of the fundamental, as determined in the second generation of speculative attack models), in which θ is in such a bad state that the monetary authority finds too costly to defend the parity even if nobody attacks, so that the currency will be devalued with certainty; and (3) the so called "gray" region, for $\underline{\theta} \leq \theta \leq \overline{\theta}$, where anything can happen: the exchange rate will be maintained if only "few" speculators attack, while the central bank will be obliged to devalue if a "high" proportion

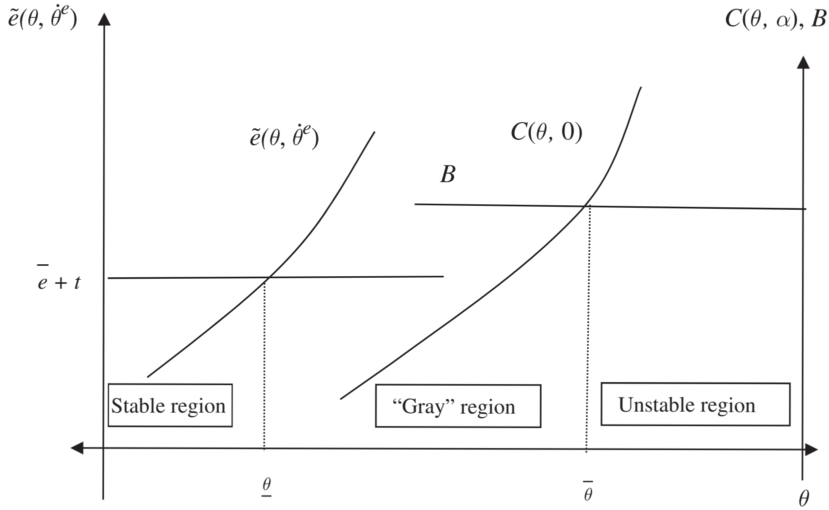

Figure 3: The stable ($\theta < \underline{\theta}$), the unstable ($\theta \geq \bar{\theta}$) and the "gray" ($\underline{\theta} \leq \theta < \bar{\theta}$) regions.

of speculators attack (see Morris and Shin (1998) and Goldstein (2012) for a similar graphical representation).

An attack against a currency, then, will only be successful if fundamentals are "weak". This means that as soon as $\theta \geq \underline{\theta}$, the fixed exchange rate system is already in a region of potential instability. However, the exchange rate will only collapse at the critical value $\underline{\theta}$ if all speculators join in the attack by coordinating their actions. If they do not manage to coordinate (or if not all of them are aware of the "true" bad state of the fundamentals), the proportion of speculators attacking the currency will be less than 1 and, as a result, the cost for the central bank of defending the currency may not exceed the benefit, so that the exchange rate parity may be kept.

3 A Simple Model of Speculative Attacks on Public Debt

In what follows I present a simple model to show that a similar setting can be used in order to represent the case of speculative attacks on public debt.[5]

5 In Della Posta (2016) I consider instead the case of speculative attacks against external debt, namely both the public and private debt held by foreign residents.

3.1 Government's Cost-Benefit Comparison

Let's consider a "fundamental" variable represented by the public debt/GDP ratio (b), as taking value between 0 and 1.

The government may default on the public debt if the benefit of doing so exceeds the cost. The cost of default on the debt, C, is assumed to be the constant reputation price that the government would pay independently from the level of the ratio. The benefit, B, instead, increases with b, since the higher the ratio – namely the weaker the level of the "fundamental" – the more costly its repayment will be (De Grauwe 2012). If the private sector fully believes in the stability of public debt (so that nobody is selling government bonds since nobody anticipates the risk of a debt default, a situation corresponding to a "good" state of expectations), the point at which the benefit function meets the cost function identifies the critical level $\bar{b}$ below which the government will not default on the debt (in Figure 4 below, the symbol $\rho^g = 0$ represents a zero proportion of speculators attacking the currency with a "good" state of expectations). The position of the benefit curve, however, is affected by the market confidence on the stability of b, namely on the state of expectations and the market's fear that there may be a default on the debt. As a result, the worse the state of expectations (namely the higher the market fear and panic), the more leftward the benefit curve will shift – implying a higher proportion of

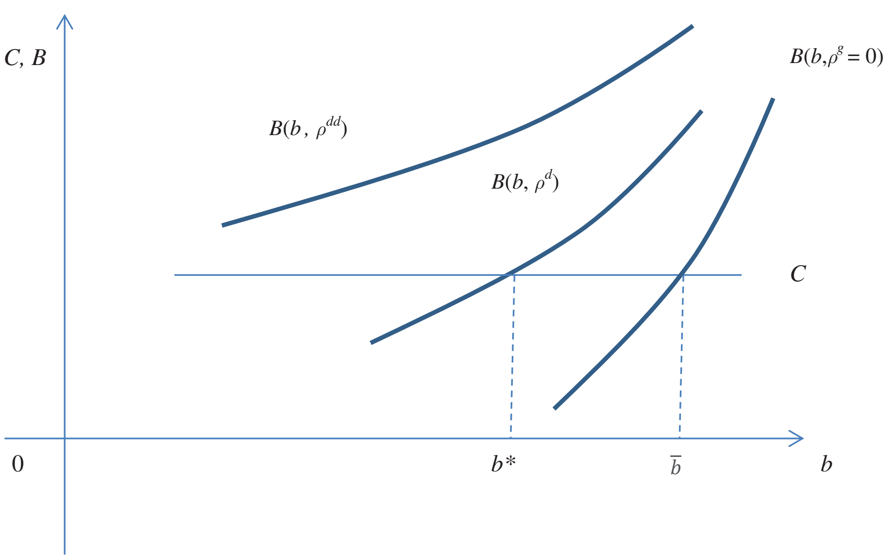

Figure 4: Government's comparison between costs and benefits of a default.

market participation in the attack [6] – and the lower the critical level b^*, above which there will be a default on the debt (in Figure 4 below, ρ^d indicates the proportion of speculators attacking public debt when the state of expectations is "bad").

In the case of an "extremely bad" state of expectations, in which the whole market expects a default ($\rho^{dd} = 1$), the benefit of defaulting will exceed the fixed cost of doing it, no matter how strong (namely how low) the level of the economic fundamentals is. This is to introduce, then, the possibility that a speculative attack on public debt may have a self-fulfilling nature and therefore a multiplicity of stable equilibria (see Figure 4 above, based on the one presented by De Grauwe 2012).

This is similar to the conclusion reached by Obstfeld (1986) in the different context of fixed exchange rates. It should be noted, however, that the fear of a default on public debt (corresponding to a high proportion of speculators attacking) that induces a leftward shift of the benefit curve, determines an excess of supply of government bonds, a fall in their price and a higher interest rate on them which, in turn, weakens the stability condition of public debt, thereby self-validating the initial fear. This is what will be addressed more in detail in the following paragraph.

3.2 Speculators' Decision to Attack Based on Economic Fundamentals

De Grauwe (2012), limits his analysis to the comparison between costs and benefits of a default for the government without considering – at least explicitly – the optimization process of speculators, namely their convenience to attack. I extend his analysis – referring indirectly to the "fundamentals" approach initiated by Krugman (1979) – by adding to the point of view of the government (which compares costs and benefits of a default on public debt), the point of view of market participants, who will anticipate correctly – if their information is full and complete and if they form their expectations in a rational way – what is the critical level of the public debt/GDP ratio above which public debt is not sustainable anymore and at which, then, they should all start selling the public bonds that they hold.

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6 A situation of panic implies a high proportion of speculators attacking. This occurs because of strategic complementarities ("I attack just because I fear that all the others will attack"). This is precisely what characterizes the "beauty contest" example introduced by Keynes in order to explain why speculation does not necessarily focus on fundamental variables.

This is obtained by considering the public debt/GDP stability condition[7]:

$$db = (f - t) + (i - g)b \leq 0 \qquad [1]$$

This means that for all values of b such that eq. [1] is satisfied, the public debt/GDP ratio is sustainable since it will not explode to infinity in the future: speculators, then, have no reasons to attack a stable and sustainable public debt.[8]

It needs to be further observed that the nominal interest rate, i contains a risk premium component that increases with b. De Grauwe and Ji, 2013, however, show that such a risk premium changes depending on the "good" or "bad" state of expectations and not only on the actual state of fundamentals. When the state of expectations reflects "good" conditions, the nominal interest rate i^g (where superscript g refers to the "good" state of expectations) can be considered as given by a linear equation depending on an exogenously given benchmark interest rate ($\bar{i}$)[9] and a debtor's risk premium. In the case of a "bad" state of expectations, instead, the nominal interest rate reacts non linearly, and in particular more than proportionally, to the public debt/GDP ratio than in the case of "good" expectations, as we will see more in detail below.

In the case of a "good" state of expectations, then, the interest rate is determined linearly by the value taken by b, depending on the sensitivity parameter α, so that:

7 This is a modified version of the equation proposed by De Grauwe (2014), in which he considers the overall fiscal deficit, rather than the primary deficit, thereby ignoring the role played by the interest rate on public debt. More precisely, the equation he considers is: $db = d - gb$, where d is the fiscal deficit/GDP ratio and the other symbols are the same as above. This equation allows him to rationalize the Maastricht criteria, by observing that public debt would be stabilized (namely db = 0) with a 3 % fiscal deficit/GDP ratio and a 60 % public debt/GDP ratio, only if the nominal GDP growth takes a value of 5 % (composed by 2 % inflation rate and an optimistic 3 % real GDP growth rate).

8 The stability condition reported in equation (1) above can be derived easily by considering the dynamic equation of public debt:

$$dB = (F - T) + iB$$

where B is the steady state level of public debt, F is constant level of government expenditure, T is the constant level of taxation – so that ($F - T$) is the constant primary deficit – and i is the constant nominal interest rate to service the public debt. From the equation above, by dividing through by the nominal GDP, thereby considering the public debt/GDP ratio, it follows that:

$$db = (f - t) + (i - g)b$$

(Low case letters refer to the ratio of the respective capital letter with GDP, and g is the constant rate of growth of nominal GDP).

9 In the euro area context it is not difficult to think of $\bar{i}$ as the benchmark provided by the interest rate on German public debt.

$$i^g = \bar{i} + \alpha b \quad [2]$$

The stability condition for public debt with a "good" state of expectations becomes, then:

$$db^g = (f - t) + (\bar{i} + \alpha b - g)b \leq 0$$

If for simplicity we assume that the primary deficit is equal to 0, still considering the case of a "good" state of expectations, the stability region is included in the range $(0, \underline{b}^g)$, where $\underline{b}^g$ indicates the value the of the public debt/GDP ratio below which the stability condition is satisfied and no speculator, therefore, will sell public debt bonds. Equation $db = \alpha b^2 - (g - \bar{i})b$ reaches its minimum at the level of $b = \frac{g - \bar{i}}{2\alpha}$ and has a zero value at points $b = \underline{b}^g = \frac{g - \bar{i}}{\alpha}$ and $b = 0$ (see Figure 5 below corresponding to the case in which $g - \bar{i} > 0$).

Figure 5 below also shows both the case of a constant primary surplus and the case of a constant primary deficit.

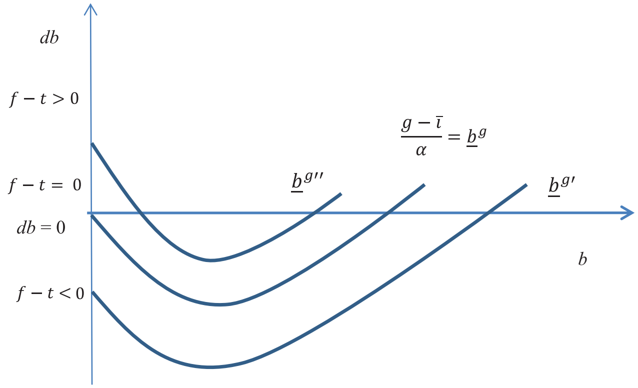


Figure 5: Sustainability functions identifying different critical values of b, depending on the value of the primary deficit/surplus.

In case of a constant primary surplus $(f < t)$ the curve shifts downwards and, as the economic intuition suggests, the stability region (by considering only the positive solution) gets larger (the new critical level $\underline{b}^{g'}$ is larger than $\underline{b}^g$), since now the primary surplus makes sustainable even a larger public debt:

$$\underline{b}^{g'} = \frac{(g - \bar{i}) + \sqrt{(g - \bar{i})^2 - 4\alpha(f - t)}}{2\alpha} > \underline{b}^g = \frac{(g - \bar{i})}{\alpha}$$

In the case of a primary deficit, instead, the curve shifts upwards and the stability region gets reduced to the range $0 - \underline{b}^{g''}$.

In the case of a "bad" state of expectations, the nominal interest rate reacts more to the public debt/GDP ratio than in the case of "good" expectations. Without loss of generality, then, we can think of function i^d (where superscript d refers to the "bad" state of expectations) as follows:[10]

$$i^d = \bar{i} + \alpha\sqrt{b} \qquad [3]$$

In the case of eq. [3] above, in which the market revises negatively the risk premium on public debt, the stability area would get reduced compared to the case of eq. [2]: while in the case of a linear relationship between interest rate and public debt, the stability region would be represented by the interval $(0 - \underline{b}^g)$, in the non-linear case above, characterized by a more than proportional interest rate sensitivity to b, it would become $\left(0 - \underline{b}^d\right)$, where $\underline{b}^d < \underline{b}^g$. Still considering the case in which the primary deficit/surplus will be equal to 0, then, in a negative state of expectations, the critical value separating the stable from the unstable region (ignoring the negative solution) will be $\underline{b}^d = (\frac{g - \bar{i}}{\alpha})^2$. For plausible values of $(g - \bar{i}) < \alpha$ it turns out that $\underline{b}^d < \underline{b}^g = \frac{g - \bar{i}}{\alpha}$, as clearly shown in Figure 6 below.

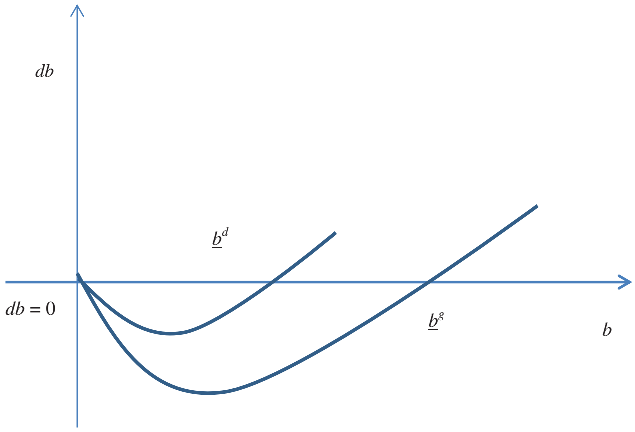


Figure 6: Sustainability condition with two different interest rate reaction functions corresponding to "good" and "bad" states of expectations (in the case of a zero primary deficit).

10 This is just one of the many possible non-linear equations applying to the case of $0 < b < 1$. Needless to say, for $b > 1$, the case of a larger interest rate reaction to the public debt/GDP ratio would be represented by an exponential function of b in which the power is greater than 1.

What precedes implies that the state of the fundamentals of a country is not independent of the state of expectations (reflected in the interest rate on public debt), since a permanent change in the evaluation of the risk premium to be assigned to public debt, changes the stability condition of the public debt itself.

This explains by itself the fact that countries characterized by similar public debt/GDP ratios but by a different state of expectations will experience different situations, some of them being subject to speculative attacks, some not being attacked.

Needless to say, when information is full and complete and expectations are taken rationally, the interest rate on public debt should be determined by a stable relationship with b. Reality however, where "emotional behavior" plays a role, obliges us to acknowledge that expectations may change even when fundamentals do not and interest rates reflect those changes.

3.3 Government's Cost-Benefit Comparison and Speculators' Optimal Decision Considered Jointly

As we have seen above, in the literature on speculative attacks in fixed exchange rates, speculative attacks can be self-fulfilling, producing multiple equilibria in the intermediate region. Something similar happens when considering a speculative attack against public debt: by joining Figure 4 and Figure 5 we obtain a figure that resembles closely Figure 3 above. As a result, the range of values that can be taken by b is divided in three regions, as in the case of fixed exchange rates: the region $0 - \underline{b}$ characterized by stability; the region $\bar{b}$ -1 characterized by instability, and the intermediate gray area $\underline{b} - \overline{b}$ characterized by multiple equilibria.

A worsening of the state of expectations – implying panic and a larger market participation in the attack – shifts B upwards. However, as we have argued above, if the revised level of interest rate is expected to be constant in the future, the shift in expectations (not necessarily justified by a similar shift in the underlying state of the fundamentals) also affects the public debt sustainability equation through its effects on the interest rate, thereby reducing the area of stability. As a result, even a public debt level which would be otherwise stable if not subject to speculative attacks may turn out to be unsustainable when the state of expectations worsens in a self-fulfilling way, independently from the state of the fundamentals.

Nominal interest rate i may increase, then, not only because a higher b implies a higher risk premium on it, but also because the market perception of risk may increase with the worsening of public debt, thereby modifying the public debt sustainability equation, and reducing the area of stability. This is what happened in the euro area, as it will be discussed in Par. 4 below.

Figures 7 and 8 below represent the three regions (stable, unstable and “gray”) in the case respectively of a “good” and a “bad” state of expectations.

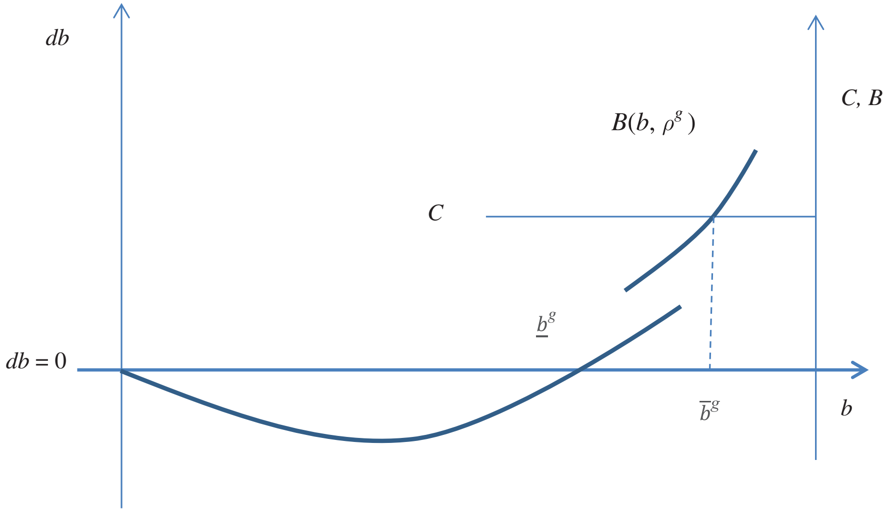


Figure 7: Stable ($b < \underline{b}^g$), unstable ($b > \bar{b}^g$) and intermediate ($\underline{b}^g \le b \le \bar{b}^g$) regions with a “good” state of expectations.

The case of an “extremely bad” state of expectations (represented in Figure 9 below with superscript *dd*), in which all market participants join the attack against public debt, might be characterized by instability even for levels of public debt which are close to zero. This would be the case if the risk premium on the nominal interest rate increased to unsustainable levels under the pressure of a bad state of expectations, independently of the level of public debt. In those cases, that may represent no more than a theoretical curiosum, the intermediate region would disappear and the two critical levels of public debt determining respectively the stable and unstable regions would coincide and would be equal to 0 ($\underline{b}^d = \bar{b}^d = 0$).

4 Speculative Attacks on Public Debt and the Euro Area Crisis

The graphical approach presented above allows to interpret the first years of EMU and the euro area crisis.

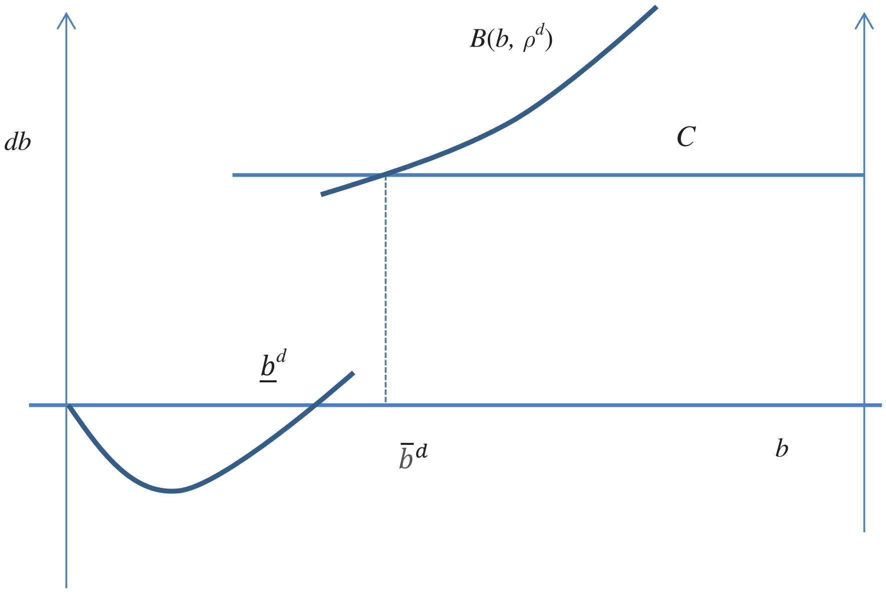


Figure 8: Stable ($b < \underline{b}^d$), unstable ($b > \bar{b}^d$) and intermediate ($\underline{b}^d \leq b \leq \bar{b}^d$) regions with a “bad” state of expectations.

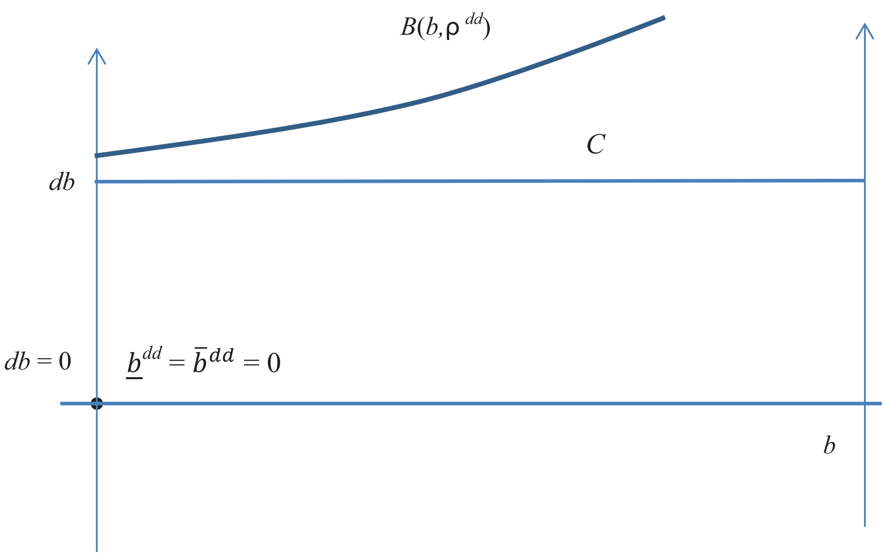
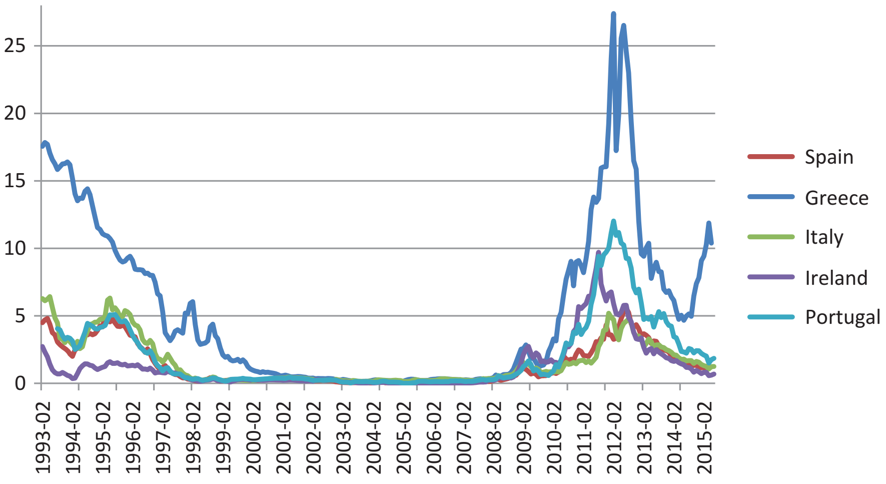


Figure 9: Fully unstable region with an “extremely bad” state of expectations ($\rho = \rho^{dd} = 1$).

It is widely acknowledged that during the first years of life of EMU many peripheral euro area countries enjoyed a "honeymoon effect"[11]: financial markets assigned an overoptimistically low risk premium to their public debt, by reducing dramatically the interest rate on their government bonds, compared to the interest rate applied by the markets in the years preceding EMU. By considering as permanent such a low risk premium, then, the stability region of those countries became larger.

Things changed when the global financial crisis induced the intervention of some of the national fiscal authorities belonging to the euro area (Ireland is the main example), so as to increase their *b*. When that happened, the "honeymoon effect" that characterized the first years of EMU came to an end because of a dramatic change in the state of expectations. As a matter of fact, as already observed above, De Grauwe and Ji (2013), prove that in the middle of the euro area crisis the relationship between *i* and *b* changed and turned out to be nonlinear, with the interest rate being affected more than proportionally by the public debt/GDP ratio.

Data (see Graph 1 below) also show the dramatic change over time of the interest rate spread of some euro area countries.



Graph 1: 10-year government bonds interest rate spread of euro area crisis countries vis à vis Germany.
Source: Elaboration of the author on data from ECB, statistical data warehouse.

11 This is the expression that Krugman (1991) used in order to define the leeway on fundamentals enjoyed by a central bank establishing a credible target zone. In future research I may apply the target zones methodology to investigate further the current problem.

For both reasons (higher b and higher interest rate spread resulting from a worsening of the state of expectations), some euro area countries then, moved from the region of stability $0 - \underline{b}^g$ of Figure 7 to the potentially unstable region $\underline{b}^d - \bar{b}^d$ of Figure 8 characterized by multiple equilibria and by the possibility of self-fulfilling crises.[12]

Other countries, like for example the US or the UK, were characterized by a different public debt sustainability equation, reflecting a lower interest rate sensitivity to b or even a different functional form reflecting a higher credibility level. The result was that, in spite of a similar pubic debt/GDP ratio (see for example the UK, compared to Spain (S), or the US compared to the overall euro area), the interest rates on the US and UK public debt was much lower. This implies that in the US or the UK the critical levels $\underline{b}^{US}$ or $\underline{b}^{UK}$ separating the region of stability from the region of multiplicity of equilibria was larger than the one characterizing some of the euro area countries. In turn, this would explain why the US and the UK were not subject to speculative attacks in spite of the equally high public debt/GDP ratios (see Figure 10 below).

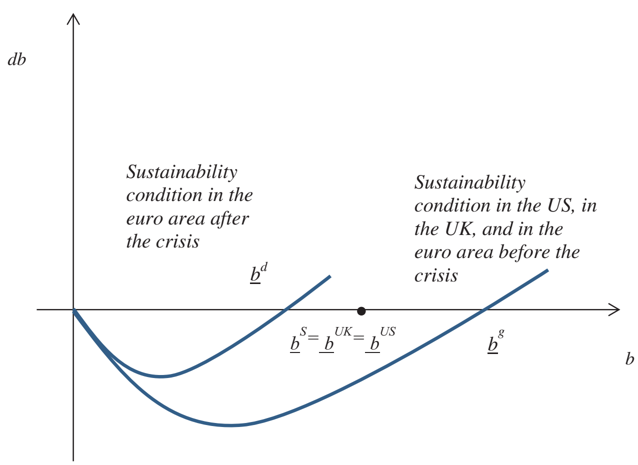


Figure 10: Sustainability conditions in the euro area and in stand alone countries.

During the "honeymoon" days, then, the interest rate function was of a linear type, reflecting a high confidence in public debt sustainability, and implying

12 In the case of Italy and Spain, however, the move to the unstable area occurred even with a relatively unchanged public debt/GDP ratio.

a rather large stability region. At the same time, the *B*-*C* relationship was reflecting a high market confidence, so that the region of instability was very narrow and confined only to extremely high levels of public debt, as shown in Figure 11 below:

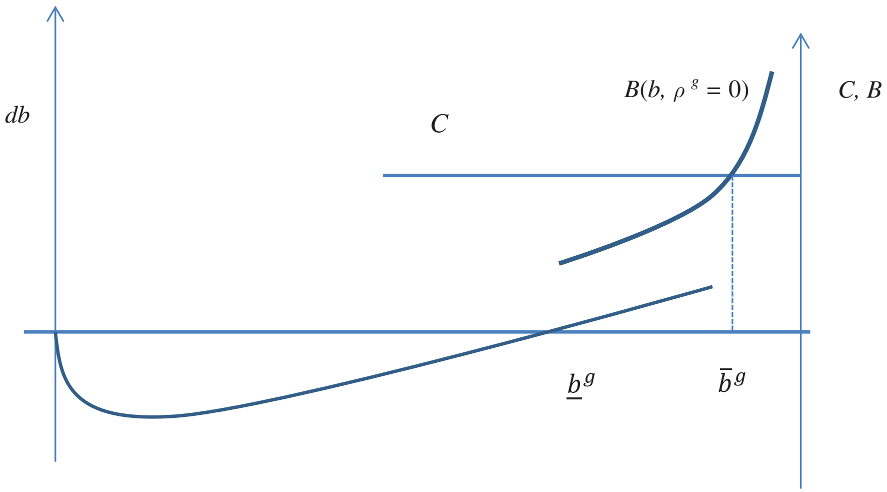


Figure 11: The "honeymoon" years of EMU.

Almost a decade later, in some Eurozone countries, the need to intervene to save national banks (the most relevant case being Ireland and Spain) or more generally the need to respond to the difficulties of the global financial and economic crisis (Portugal, Italy and Greece[13]), however, changed the situation.

The benefits of default increased dangerously due to the attacks on public debt resulting from the reduced confidence in its sustainability. In some of the weaker countries of the euro area the crisis implied, therefore, both a leftward shift of the *B* function, and a change in the structure of the interest rate function (as proved by De Grauwe and Ji 2013 as argued above). As a result, lower critical levels of both $\underline{b}^d$ and $\bar{b}^d$obtained (see Figure 12 below).

The public debt/GDP ratio moved then from the stable region ($0 - \underline{b}^g$) of Figure 11 into the unstable region above the critical level $\underline{b}^d$ of Figure 12. – partly because it increased, but mainly because of the change of the sustainability condition – in which a multiplicity of equilibria is possible, depending on the

13 The case of Greece, however, is completely different from the other ones, since it even implied the cheating on public accounts by a former government.

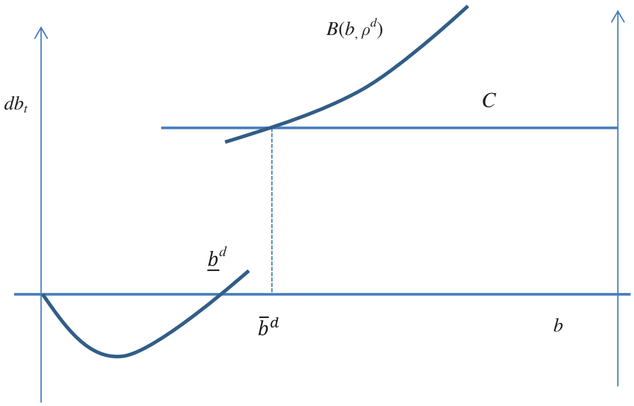


Figure 12: The euro area crisis.

state of expectations of the private sector and depending on the presence of institutions capable to reassure the markets.

What remains to be explained is the reason why the same increases in public debt or the same economic crisis determined a different evolution in the state of expectations in countries like the UK or the US on one hand and the euro area crisis countries on the other hand. One quite relevant difference is that in the UK or in the US central banks could play the role of lenders of last resort and reassure the markets, so as to avoid the occurrence of self-fulfilling crises.

The euro area, instead, is characterized by a different institutional set up in which the Maastricht Treaty forbids explicitly the ECB to play the role of lender of last resort, in order to avoid the risk of moral hazard by the participating countries.

It is only when this was reversed with the celebrated "whatever it takes" Draghi speech in the summer of 2012 that market confidence was restored and the stability region enlarged again.

5 Concluding Remarks

The literature on speculative attacks on fixed exchange rates – that found application to interpret the 1992–93 EMS crisis – merged two competing explanations (the one based on diverging fundamentals, and the one based on self-fulfilling attacks) within a single framework, and identified three regions for the level of fundamentals: the region of stability, in which fundamentals are so strong that no attack will ever take place; the region of instability, in which fundamentals are so weak that even if no speculators join in the attack a devaluation will take place; and an intermediate region in which fundamentals are neither so strong to rule out the risk of an attack, nor so weak to generate an attack with certainty.

Within this "gray" region, a multiplicity of equilibria is possible, so that an attack will take place only if speculators are able to coordinate their actions.

In this paper I argue that the recent attacks on public debt in the euro area can be interpreted in a similar way.

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