From Contagion to Incoherence
Toward a model of the unfolding Eurozone Crisis

by

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Abstract: Based on an account of the macroeconomic foundations and political economy underpinning European Monetary Union, this paper presents a simple dynamic model of the mutual reinforcement feedback between (a) the Eurozone's contagion dynamic and (b) the policy responses of the European Union, including the creation of new institutions (e.g. the EFSF and ESM), the signing of new treaties (e.g. the Fiscal Past) and, of course, the novel' policies of existing institutions (e.g. the ECB).

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Section 1: Introduction

While contagion within the Eurozone has been perhaps the most discussed dynamic economic process in recent times, it is nevertheless telling that little has been done analytically to capture the interplay between contagion and Europe's institutional responses.[1] This paper offers a simple analysis of the nexus between:

(a) a monetary union whose very design removed internal shock absorbers while, at once, magnifying both the probability and the magnitude of a future crisis,
(b) a political response to the (preordained) crisis that involved the creation of toxic bailout funds which accentuated the crisis,
(c) the underlying macroeconomic imbalances which are in fact deepening, thus rendering the European Union's fiscal and monetary strategies logically incoherent, *and*
(d) a European Central Bank whose decisive intervention to offer medium term financial stability came at the price of reinforcing long term disintegration.

Section 2 discusses the state of the Eurozone before the global financial crisis of 2008, a period during which global capital and trade flows were bestowing upon Europe's elites a false sense of security while, simultaneously, ensuring that the Eurozone would enter the Great Recession as the global economy's most vulnerable bloc. Once the Credit Crunch struck global finance, it set in motion the process that, beginning with the effective insolvency of most of Europe's banks, led to the sequential bankruptcy of members-states and their respective banking systems, with Greece and Ireland as its early victims.

Section 3 then examines analytically Europe's institutional response to the crisis and, in particular, the process that began with Greece's original bailout (May 2010) and soon after occasioned the two bailout funds (the European Financial Stability Facility, EFSF, and, more recently, its permanent replacement, the European Stability Mechanism, ESM). Using a simple dynamic model, section 4 shows why the introduction of these new institutions was bound to accelerate the crisis, spreading the contagion from peripheral nations such as Greece to the Eurozone's core. Its point is that contagion spread *because of* (rather than despite) the very design of the new fiscal institutions.

Section 5 extends the analysis to the two major moves by the European Central Bank, under its third President, Mr. Mario Draghi, which succeeded in arresting the contagion within the financial and bond markets; namely the provision of infinite liquidity to the Eurozone's banks (the long term re-financing, or LTRO, program) and, since September 2012, the announcement of the ECB's readiness to purchase infinite amounts of Spanish and Italian sovereign debt in the secondary markets (the outright monetary transactions, or OMT, program).

However, according to the offered model, the calmness that the ECB has purchased by these means accentuates further the forces of disintegration that are pushing the Eurozone's real economy to breaking point. Section 6 concludes with a discussion of the predicament facing European leaders who are utterly committed, on the one hand, to the Eurozone and, on the other, to policies that lead to its disintegration.

Section 2: Europe's Gold Standard

If the Gold Standard experience of the 1920s taught us anything,[2] it is that fixing exchange rates between economies whose capital utilisation and degree of oligopoly in their manufacturing sectors diverge significantly, especially when underpinned by effectively undifferentiated inflation-targeting monetary policies, is a recipe for large capital flows from the surplus to the deficit nations.

Given that the deficit economies lack the high concentration of networked, globalising conglomerates that can convert automatically such capital inflows into productivity-enhancing investments, the result, naturally, is rampant asset value inflation (e.g. real estate bubbles) in the deficit economies and a growth rate that far exceeds the rate of accumulation in their exportables' sector. In contrast, the surplus economies, whose manufacturing is by definition highly oligopolised, and in fact lack competitors in the deficit nations (e.g. countries like Greece produce no cars), experience high investment rates into productivity-enhancing capital and a considerably lower concomitant growth rate.[3]

The combination of growth rates that exceed (trail) fixed capital formation rates in the deficit (surplus) countries give rise to a tension between (a) the underlying economic reality of a slow burning recession in crucial sectors across the surplus-deficit nation divide and (b) the epiphenomenal growth that seems to typify the whole common currency or fixed exchange rates bloc[4] and in underpinned by a new form of financial exploitation of working and middle classes.[5] At some point, this tension ruptures into a financial crisis which soon turns into a classic debt-deflationary spiral with the burden of adjustment disproportionately placed on the shoulders of the weakest member-states. This is what the world witnessed in the run up to the Crash of 1929 and it is precisely the same process that we witnessed in the Eurozone recently. It is *as if* the common currency's designers chose purposely not to heed the lessons of the dreadful mid-war era that conspired to cause humanity's greatest tragedy.

There are, of course, important differences between the Gold Standard and the Eurozone. One such difference stems from the fact that the creation of a *common* currency, as opposed to fixing exchange rates across different currencies, made it impossible for a deficit nation asphyxiating under the inevitable debt-deflationary spiral to cut itself loose, devalue its currency, and thus cut through the Gordian Knot of debts, bankruptcies and austerity. In an important sense, Greece and Ireland found themselves in 2010 in the situation that Britain would

have faced in 1931 if it had no currency of its own to un-peg from the Gold Standard and, instead, had to create one from scratch so as to devalue it many months later.

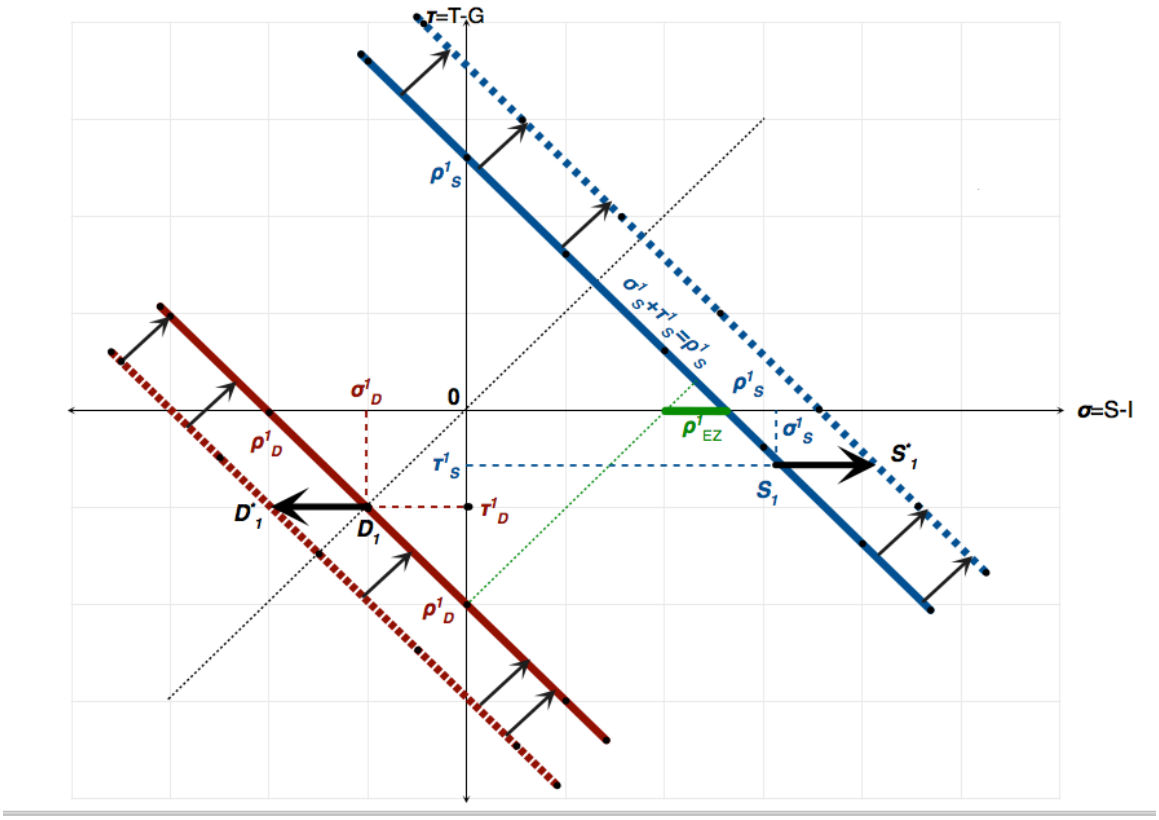
A second critical difference stems from the extent to which our era's financialisation creates hitherto unheard of linkages between real wage differentials, real estate bubbles, sovereign debt instruments and, not least, exotic financial products. When, for instance, real wages were repressed in Germany, following the nation's well-documented 'corporatist response' to the country's re-unification, real estate prices rose fast in the deficit countries while aggregate demand was 'exported' from them to the surplus countries courtesy of the latter's lower growth rate (which was trailing the rate at which new excess capacity was being formed).[6] Meanwhile, overall growth was only sustained with the help of a form of financialisation whose depth and rapidity only modern technology (e.g. computerised trading and alrgorithmic financial models) could sustain.

Meanwhile, and at least since 1980, America's twin deficits operated like a huge vacuum cleaner sucking into the United States the net exports of Germany, Japan and later China, thus generating the aggregate demand that their factories craved. At once, almost 70% of these exporters' profits formed tsunamis of capital that gushed into Wall Street *as if* in a bid to finance America's twin deficits, and thus closed the global 'loop' of real and financial surpluses. On the back of these tsunamis, a wave of financialisation developed flooding the banks, including the French and German ones, with untold liquidity.[7]

The combination of accumulating profits in the Eurozone's core (due largely to the repression of Germany's wage share) and abundant toxic, or private, money minted by the financial sector (primarily by the City and Wall Street) ensured that no decent returns could be found in the sluggish Eurozone core itself. It was thus unsurprising that torrents of credit rushed from the surplus to the deficit Eurozone countries in the form of loans and sovereign debt purchases. For twelve years (1997-2008) the capital inflows into the Periphery reinforced themselves by strengthening the demand for the core's net exports, part of which was utilised in helping German multinationals globalise beyond the Eurozone (in Eastern Europe, Asia and Latin America).

Figure 1 offers a snapshot of the relative macroeconomic position of the Eurozone's deficit and surplus member-states in relation to their budget, current account and net investment positions. Letting $\sigma_i = S_i - I_i$, i.e. savings in excess of investment for country i, $\tau_i = T_i - G_i$, i.e. govenrment i's budget surplus, and $\rho_i = X_i - M_i$, i.e. the difference between export income and income spent on imports, while subscripts D and S refer to the deficit and the surplus Eurozone member-states respectively, the downward slopping lines of Figure 1 depict the loci that deficit and surplus countries are constrained on by the standad identities of national income categories.[8] Points D_1 and S_1 reflect the Eurozone's stylised facts prior to the Credit Crunch of 2007 and the Crash of 2008: The deficit countries occupied

a point on their ρ_D contraint which reflected a current account deficit (ρ^1_D<0), a budget deficit (τ^1_i <0) and investment exceeding savings, as a result of the capital inflows from the Eurozone's core (as well as from the City and Wall Street). In contrast, the surplus member-states where finding themselves in the adjacent quadrant since, by definition, their current account was in surplus (ρ^1_S>0). In the meantime, aided by America's energetic aggregate demand global 'production', the Eurozone as a whole experienced a small but discernible trade surplus with the rest of the world ($\rho_{EZ}= \rho^1_D+\rho^1_S$>0).



where: ρ = trade surplus (X-M), τ = government surplus (T-G), σ = un-invested savings (S-I) and subscripts *s* and *d* refer to the $\rho,\sigma\&\tau$ values of the surplus and deficit Eurozone member-states respectively.

D₁ is the pre-Crisis position of the deficit Eurozone member-states
S₁ is the pre-Crisis position of the deficit Eurozone member-states

(All lines are at 45^0 angle to both axis)

Figure 1: Before the Crisis

While deficit countries were protected from exchange rate speculative attacks, they were always open to the threat of a credit crunch. Indeed, a situation like that in Figure 1 (underpinned by a growth rate in the Periphery in excess of that in the Eurozone's core) was simply unsustainable, even in view of the Eurozone's trade surplus with the rest of the world. Put simply, while the deficit nations had a combined debt to GDP ratio well above that of the surplus member-states, the observed anaemic growth rate in surplus nations' nominal GDP, in conjunction with their substantial budget deficits, was placing the surplus countries' debt to GDP ratios in a trajectory that would push them to unsustainable levels above those of the deficit countries.[9]

Moreover, the overwhelming pressure to conform with the Maastricht Treaty's 3% deficit to GDP limit meant that the maintenance of aggregate demand in both surplus and deficit countries necessitated the shifting of their positions in Figure 1 in the direction of the thick arrows: from D_1 and S_1 to D^*_1 and S^*_1 respectively. The reason, of course, was that the Maastricht requirement that the τ's should not sink further into negative territory meant that the only way that the Eurozone's pre-2008 internal dynamic could be maintained was by means of the following feedback loop:

$$\Delta\Re_t = f(\Sigma_{t-1}),\ f(.)>0,\ \text{where } \Re_t=[\rho_D+|\rho_S|],\ \rho_D<0,\ \rho_S>0 \qquad (1a)$$
$$\Delta\Sigma_t = h(\Re_{t-1}),\ h(.)>0,\ \text{where } \Sigma_t=[\sigma_D+|\sigma_S|],\ \sigma_D>0,\sigma_S<0 \qquad (1b)$$

i.e. growing un-invested savings in the surplus countries causing, at constant deficit to GDP ratios, an accelerating flow of capital in the deficit countries which, nevertheless, did nothing to suppress the diverging exporting potential of the two sets of member states, thus occasioning a further increase in $[\rho_D+|\rho_S|]$ which reinforced the flow of capital into the Periphery. And so on until… 2008 struck.

At some point, even without the Wall Street-inspired Credit Crunch and the subsequent Fall of 2008 'moment', something would have had to give. The flow of capital to the deficit countries would inevitably be reversed and they would be pushed towards the same quadrant as that 'occupied' by the surplus member states (i.e. shifting point D_1 down and to the right, as investment declined low enough to turn σ_D negative). At that point, the Eurozone was bound to fall into a familiar debt-recessionary trap, one quite reminiscent to the Gold Standard experience: A 'Catch 22' between fiscal and external rebalancing where, in an urge to restore external balance, the deficit countries are forced into internal devaluation which, at once, aggravates the fiscal balance, i.e. pushing τ_D to levels that were bound to occasion a rise in sovereign yields and, thus, to a crisis like that one we ended up observing.

Section 3: Greece and the toxic bailout funds EFSF-ESM

The Eurozone, as is now widely acknowledged, simply lacked the mechanisms that could contain a financial crisis in its midst, like that, say, of South East Asia in the late 1990s.[10] Under the principle of Perfectly Separable Debts, which defined the Eurozone's quasi-constitutional arrangements, and the fact that, uniquely in economic history, the Eurozone featured a Central Bank, the ECB, that lacked a mandate for acting as a lender of last resort either for the Eurozone's banks or for the sovereigns, the scene was set for a sequential bankruptcy of pairs of sovereigns and banking systems. All it took, in view of the utterly intertwined nature of public finance and banking throughout the common currency area, was some financial shock that would set in train the deconstruction process.

As it happened, the requisite shock was gargantuan and came from Wall Street and the City in the form of a comprehensive cessation of inter-bank lending, a sudden withdrawal of the hitherto unbounded liquidity and, importantly, the collapse in the prices of derivative contracts which, for the past eight years or so, had acquired the nature of private money. Meanwhile, the credit rating agencies, caught out by the sudden annihilation of their infamous triple-A pronouncements, were on the look out to make partial amends by 'warning' their customers about the next sharp decline in paper values. It was the difficulties of Dubai's sovereign debt, the first example of 'contagion' from the private to the public debt markets, that caused the agencies to take a closer look at other sovereigns. Greece was the obvious focal point.

Greece was the Eurozone member-state with the highest debt to GDP ratio and, before 2008, the second highest growth rate within the common currency. Capital flows (from French and German banks) were channelled through the Greek state which was then passing them on to the developers (the result being Olympic Games stadia, public infrastructure etc.). Unlike in Spain and Ireland, were the capital flows bypassed the state, creating bubbles in real estate via the Spanish banks (and therefore allowing for the government's budget deficit to be even lower than Germany's), Greece combined a high growth rate (consistently above 4% in real terms) with a large public sector borrowing requirement.[11] As long as the growth rate of nominal GDP was in excess of 7%, while the state was borrowing freely at less than 3%, Greece's debt was perfectly sustainable. Alas, the prerequisite for this was the continuation of the dynamic in Figure 1. Once nominal growth fell below 3% and the credit rating agencies, immediately after Dubai's crisis, began downgrading Greek government bonds,[12] Greece's bond yields rose above 4% and, by early in 2010, the Greek state had became insolvent.

At that point, Greece found itself, for the second time in seventy years, in the odd position of a tiny nation that initiates global tumult! The last time Greece had found itself in that role was months before VE Day in Europe! The reader may recall that the Cold War began not in the streets of occupied Berlin but, six

months earlier, in the streets of Athens (December 1944). While Greece ought to have been just as insignificant then, in the larger scheme of things, it nevertheless managed to experience a savage Civil War that was the first episode of the mighty clash between West and East. The small Mediterranean country was destined, it seems, to begin another sequence of globally significant events in 2010.

When confronted with the reality of Greece's insolvency, the surplus countries, the European Commission and the ECB behaved with the incredulity of someone who just observed a zero-probability event. At first blush, the German Chancellor's reaction was: No default, no interest rate relief, no bailout – the notorious 'Tripple Nein' response that she kept repeating from January to May 2010. By May, of course, it dawned upon Europe's great and good that the bond markets were drying up and contagion was on the cards. Under pressure from Washington and the International Monetary Fund (IMF), they bit the proverbial bullet and 'offered' Greece the world's largest credit line, on condition of a program of severe austerity and so-called 'reforms'.

There was a crucial 'complication' with this super-loan which caused the surplus countries and the ECB to struggle for months in search of a solution. The task they set themselves was to offer this loan collectively to Greece while preserving the principle of Perfectly Separable Debts. To maintain the principle that the Eurozone would have no common public debt (i.e. to ensure that every euro owed or guaranteed could be in principle assigned to a *single* government), the EU component of the Greek loan of €110 billion was to come as a set of 'separate' bilateral loans. So, besides the one third of the monies that would be loaned by the IMF, the rest was to arrive in the form of bilateral loans from individual member states (that would provide separate loan guarantees) to the Greek government. While Greece would be charged only two interest rates, a low one by the IMF and a much higher one by the participating EU member-states (a rate that, at first, exceeded 6%), the interest burden for each of the latter differed, reflecting their respective government bond yields.

A few days after Greece's Bailout Mk1 was announced, in May 2010, Europe also announced the creation of 'special purpose vehicle', known as the European Financial Stability Facility (EFSF), that would be granted €750 billion of loan guarantees for the purpose of ringfencing other vulnerable member-states (Ireland, Portugal, Italy and Spain) and steadying the markets' nerves regarding their capacity to re-finance their debts (especially so in view of the fall of nominal growth rates below the rising yields). At the same time, the ECB began half-heartedly to purchase bonds of these very same countries in the secondary market in a bid to reduce these yields. As this purchasing program was always going to be limited in scope,[13] and under a constant barrage of hostility by the Bundesbank, its impact was always going to be insignificant. Thus, the EFSF was the only real buffer that the Eurozone created, between 2010 and 2012, for the purposes of stemming the contagion.

Greece's overwhelming significance is not due to the fact that it was the first domino to fall. Indeed, the dominoes' metaphor is unhelpful in the sense that, in a domino effect, nothing will happen if the first domino is prevented from tumbling. However, in the case of the Eurozone, Ireland, Portugal, indeed Spain and Italy would have tumbled regardless of Greece. Greece's significance was that the design of its Bailout Mk1 program ended up as the blueprint on which the design of the EFSF was based, which also determined the design of the ESM later. In fact I shall be arguing in the next section that this Greek-bailout-inspired design has the all the hallmarks of a toxic public finance scheme which spread the contagion faster and deeper within the Eurozone, rather than stemming it as per its original intention.

In creating the EFSF, European leaders intended to put together a bailout fund whose very existence would prevent the need for further bailouts. But to arm it with sufficient funds for the purpose of deterring the run on the bonds of Ireland and Portugal, they had to create a peculiar form of eurobond: EFSF-bonds issued on behalf of prospective 'fallen' member-states and backed by the still solvent ones. What made these eurobonds highly toxic and major contributors to the contagion that they were meant to prvent, was the attempt to structure them in a manner that respected fully the principle of Perfectly Separable Debts.

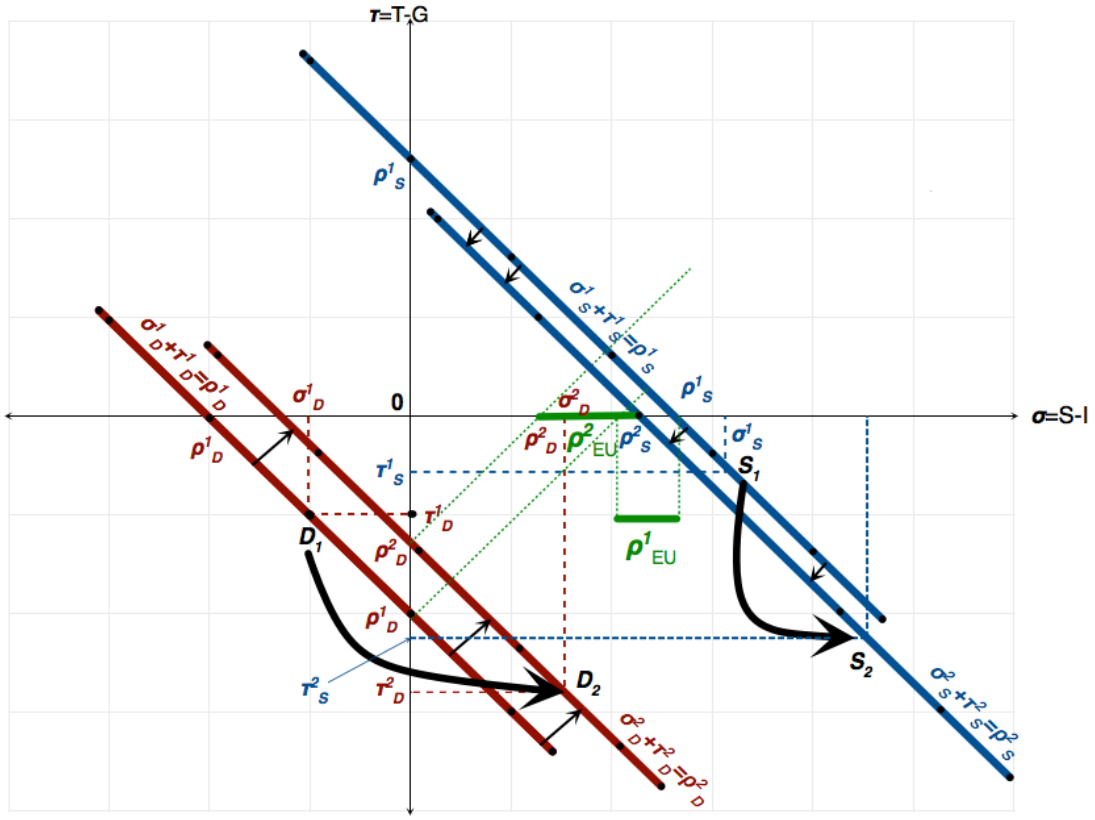
More specifically, at the outset, issues of EFSF-bonds were backed by all N-1 Eurozone countries on behalf of the one 'fallen' member-state that required an EFSF bailout. In principle, each of the N-1 member-states would guarantee a portion of the total amount necessary in proportion to their GDP (relative to the GDP of all N member-states) and retain that slice of debt as its own liability. To keep to the Perfectly Separable Debts principle, each member-state committed to pay market interest rates reflecting its own creditworthiness. The total amount would then be sliced up following the logic of a CDO: synthesised bonds, with each bond containing different slices of German, French, Belgian etc. debt. Crucially, each of these slices, within the same bond, carries its own, country-specific, default risk. So, just like the now infamous CDOs were founded upon a combination of US subprime and higher quality debts, so too the EFSF-bonds represented a mélange of synthesised country-specific risk.

What made EFSF-bonds even worse than Lehman Brothers' CDOs was that their structure was fully cointegrated with the underlying risk. To see this, consider the destructive dynamic inbuilt within the EFSF bonds: Once Ireland had already been tied to an EFSF loan, Portugal found itself on the verge of exiting the markets and a reluctant approach to the EFSF for loans. At that juncture, Portugal would turn, overnight, from an EFSF-guarantor to an EFSF-borrower. The slices of EFSF-bonds previously issued in the context of Ireland's earlier bailout and guaranteed by Portugal would now have to be transferred onto the liabilities of the remaining, N-2, member-states.

In short, with every new member-state that makes the grim transition from guarantor to borrower, a greater burden is shared by the rest. Inevitably, the markets would immediately focus on the new 'marginal' country: the one that is currently borrowing at the highest interest rates within the EFSF in order to loan the money to, say, Portugal. Naturally, its own spreads vis-à-vis the German bund rates will rise until that country (e.g. Spain in all probability) is also pushed out of the markets. And so on, until the band of nations within the EFSF is so thin that they cannot bear the burden of total debt on their shoulders (even if they wish to). At that point, three possible scenaria obtained: (A) the ECB would step in, tear up its charter, and monetise the debt; (B) the surplus countries would have to give up on their cherished principle of Perfectly Separable Debts; or (C) Germany and the remaining solvent, member-states would have to bail themselves out and leave the Eurozone.

Before discussing what actually happened in section 4 below, it is helpful to capture analytically the events that began with the 2007/8 Crash and culminated in 2010 in the Greek Bailout Mk1 just before the EFSF was created. Figure 2 tells the story of how the Crash altered the Eurozone's internal macroeconomic balance, violently interrupting the dynamic of Figure 1 (recall equations 1a and 1b, as well as the thick arrows in that diagram) as capital flows were reversed and, suddenly, investment dried up in the deficit countries therefore pushing σ_D into negative territory.

The Credit Crunch itself ensured that the torrents of capital from surplus to deficit nations at first ceased up and, later, were reversed, as savers in the Periphery orchestrated a massive capital flight in fear of what Mr Draghi was to refer to, euphemistically, as 'convertibility risk'; that is, the Eurozone's possible collapse and a substantial devaluation in the deficit member-states. At once, imports in the deficit countries crashed and local producers, in view of the domestic recession that was fiercer in the deficit than in the surplus countries, pursued more energetically increased exports to the surplus countries. Consequently, we witnessed: A reduction in τ (i.e. an increased budget deficit) in both surplus and deficit countries, positive values of σ throughout the Eurozone, a 'coming together' of their ρ lines (as the net exports of the surplus countries and the net imports of the deficit countries declined simultaneously), and a small initial increase in the Eurozone's collective current account surplus.



D₁ is the pre-Crisis position of the deficit Eurozone member-states and ***D₂*** the position to which the Crisis pushed them. Meanwhile, surplus member-states were being pushed from a position like ***S₁*** to one like ***S₂***.

Figure 2: After the Credit Crunch and Crash of 2007/8 and before 2011

While these tumultuous shifts were occurring in the real sector of the Eurozone's macro-economy, the contagion in the sphere of public finance and banking was taking its toll. After the Greek state had brought down the Greek banks, came Ireland, with its collapsing banks dragging into the mire the state, and within months Portugal followed too. Like a group of mountaineers of different fitness and prowess that are, nonetheless, tied together by means of a single rope (which is foolishly left unattached to the rock face), the 'fall' of the marginal member state transferred considerably weight onto the new marginal member state whose own fall subsequently transferred the combined weight of the two fallen ones onto the newer marginal member etc.

By the summer of 2011, once it was declared that Greece would be needing a second bailout, this time from the EFSF, and that the interest rate of the first bailout would be lowered with the extra costs being shared amongst the remaining fourteen members states, in proportion to their GDP, Spain and Italy (whose defunct banks were already draining their economies fast) were ripe for a

spectacular fall. Without 'covert' ECB support throughout that summer and, without the massive provision of liquidity to *all* Eurozone banks (solvent or not) that came in December 2011 (the so-called LTRO program) the Eurozone would have expired there and then.

But before we look at these developments in greater detail, let us throw some analytical light on the toxic effects of the EFSF's design and, in particular, of its CDO-like bonds.

Section 4: The EFSF-reinforced contagion

To begin with, let us define the Eurozone's marginal member state (MMS), at any point in time, as the member state that: (a) continues to refinance all of its debt normally from the bond markets, but (b) pays the highest interest rate, among member-states that continue to have full access to the bond markets. In simpler language, the MMS is the next state to 'fall' into the EFSF's bosom if the contagion continues. Whether on not the MMS will manage to maintain its full access to capital markets boils down to the evolution of its interest rate spread vis-à-vis German bund interest rates.

Naturally, the literature on the determinants of the spreads within the Eurozone has expanded in proportion to the spreads themselves.[14] However, as De Grauwe and Ji (2012) have recently shown, the determination of Eurozone-wide spreads is largely non-linear and reflects swings in expectations that defy conventional backward looking macro-modelling efforts. For our purposes, it suffices to capture the MMS' spread by a simple expression like (2) below

$$s = s(r - g, \Omega, \frac{D+P}{Y}, F, \lambda, B) \qquad (2)$$

where:

- r is the nominal interest rate at which the MMS can borrow
- g is its nominal growth rate
- Ω takes a positive value if g falls below some threshold g^*
- D,P are the MMS's levels of public and private debt respectively
- Y is the MMS' GDP
- F is the MMS's net capital inflows
- λ is the proportion of D that is held domestically, and
- B is the burden on the MMS from its participation in the EMS-EFSF programs for already 'fallen' member states.

An EFSF- program (e.g. Ireland's) removes the prospect of immediate default by the already 'fallen' states at the expense of boosting the MMS's burden from shouldering the cost of the EFSF loan guarantees for the 'fallen' ones. Expression (3) concerns this burden shouldered by the MMS, which analogous to the aggregate debt of the nations already in EFSF programs:

$$B = B(\sum_{i=1}^{F} D_i) \qquad (3)$$

where *F* is the number of 'fallen' member states or, equivalently wards of the EFSF.

Clearly, the following signs of the first order derivatives of expression (3) seem reasonable assumptions regarding the tendency of the MMS' spread *s* to fluctuate:

$$s'_{r-g} < 0,\ s'_{\Omega} < 0,\ s'_{\frac{D+P}{Y}} < 0,\ s'_{F} > 0,\ s'_{\lambda} > 0,\ s'_{B} > 0 \qquad (4)$$

Even if all other things were equal, the very structure of EFSF-bonds (as described in the previous section) guaranteed that, every time a member-state dropped out of the bond markets (i.e. *F* increased by one), the new MMS's $B(\sum_{i=1}^{F} D_i)$ burden would rise and hence, courtesy of (2), the MMS' spread *s* would rise giving the dynamic of contagion a fresh impetus.

Letting *p* be the average subjective probability estimate that the MMS would fall out of the bond markets, it is clear that *p* is an increasing function of *s* while the opposite also holds. A certain non-linearity seems to be involved in the manner in which average opinion regarding the capacity of a member state to refinance its debt responds to the said state's spread *s* (see De Grauwe and Ju, 2012) Analytically, this is equivalent to presuming some threshold s^* such that when $s>s^*$ the subjective value of *p* accelerates. Equation (5) captures this simply:

$$p = \Phi[(s-s^*)/\beta] \qquad (5)$$

where Φ(.) is a standard cumulative normal distribution, *β* is a parameter whose value is analogous to the rate of increase in *p* as the MMS's spread *s* approaches s^*, while s^* is the threshold value of *s* such that the moment *s* exceeds s^*, the subjective probability of the current MMS falling out of the markets exceeds 50%; i.e. p>½. This threshold level of *s*, s^*, is in turn determined by the rate at which the MMS's public debt requires refinancing (*R*) and the expected level of debt as a percentage of the MMS's GDP. In short,

$$s^* = s^*(R, D/Y) \text{ with } \frac{\partial s^*}{\partial R} < 0, \frac{\partial s^*}{\partial D/Y} < 0 \qquad (6)$$

Expressions (2) to (6), taken together, give rise to the analysis of Figure 3(a). In a standard cross diagram, Figure 3(a) demonstrates the manner in which the EFSF's design exarcebated the crisis and reinforced the contagion.

The northeast part of the diagram is a simple downward sloping 45^0 degree line which the Eurozone treads every time another of its member states falls out of the market and into the EFSF's lap (note that the vertical axis represents *N*, the number of member states with full access to money markets while the horizontal

axis features *F*, the number of states that have 'fallen' into EFSF programs). When, for instance, the system reaches point 1 in the cross diagram's northeast part, and the number of 'fallen' states equals F_1, the new MMS's EFSF liabilities rise to B_1, thus pushing its spread to level s_1 and, consequently the probability of this state also 'falling' out of money markets climbs to level p_1. This heigthened perception of an imminent 'fall' boosts the MMS's spreads to such an extent that the MMS' government is forced to approach the EFSF for a loan. Thus, the MMS joins the ranks of member-states *F*, thus pushing F from F_1 to F_2. Immediately, the new MMS's EFSF-burdens or liabilities (in the context of the EFSF-bond design) rise to B_2, its spread to s_2 etc. etc.

A type of hitherto unknown cobweb is thus woven around the functions in Figure 3(a) with a potential gradually to bring down the Eurozone. Ironically, the cobweb in question springs directly from the institutional design that the Eurozone created in order to... avoid contagion. Perhaps the ironic twist herein is the inevitable homage that Europe must pay to the crisis for creating a noxious scaffolding by which to prop up a badly designed edifice.

And as if this were not enough, an EFSF program came with strings attached amounting to perhaps the most severe pro-cyclical austerity since Herbert Hoover. Importantly, the singeing austerity drive afflicts both the 'fallen' member states and the new MMS whose government is told in no uncertain terms that, if it wants to count on future EFSF assistance, it must impose deep cuts in spending and sharp regressive taxes forthwith. The combination of these 'measures', in the middle of a credit crunch, a debt crisis, and a substantial recession, naturally push down both expected and actual nominal GDP growth rates (*g*). From expression (2), the result is that the *s*(.) curve in the southwest part of Figure 3(a) shifts out from the solid to the dashed position as the nominal growth rate falls from *g* to *g*'. For every level of EFSF liability by the MMS, i.e. for every level of *B*(*F*), there now corresponds a higher interest rate spread *s* for the current MMS. In short, the cobweb's hold on the Eurozone, which was guaranteed by the toxic structure of the EFSF, is strengthened by the austerity which comes as a prerequisite for EFSF membership either as an intra-marginal or as a marginal member of the 'fallen' states set.

Figure 3(a) is static in nature, even though an implied difference equation dynamic has been superimposed on it in order to illustrate the cobweb-like contagion effect. To give it a genuinely dynamic element, we need to add a set of differential equations that capture the mutual reinforcement process binding together (a) changes in interest rate spreads ($\dot{s}$), and (b) the fluctuations ($\dot{p}$) in the markets' all important perception regarding the chances that a member state is about to lose full access to the bond markets.

To keep the analysis simple, suppose that, in addition to expressions (2) and (5), we now have differential equations (7) and (8) adding the dynamic link between *p* and *s*:

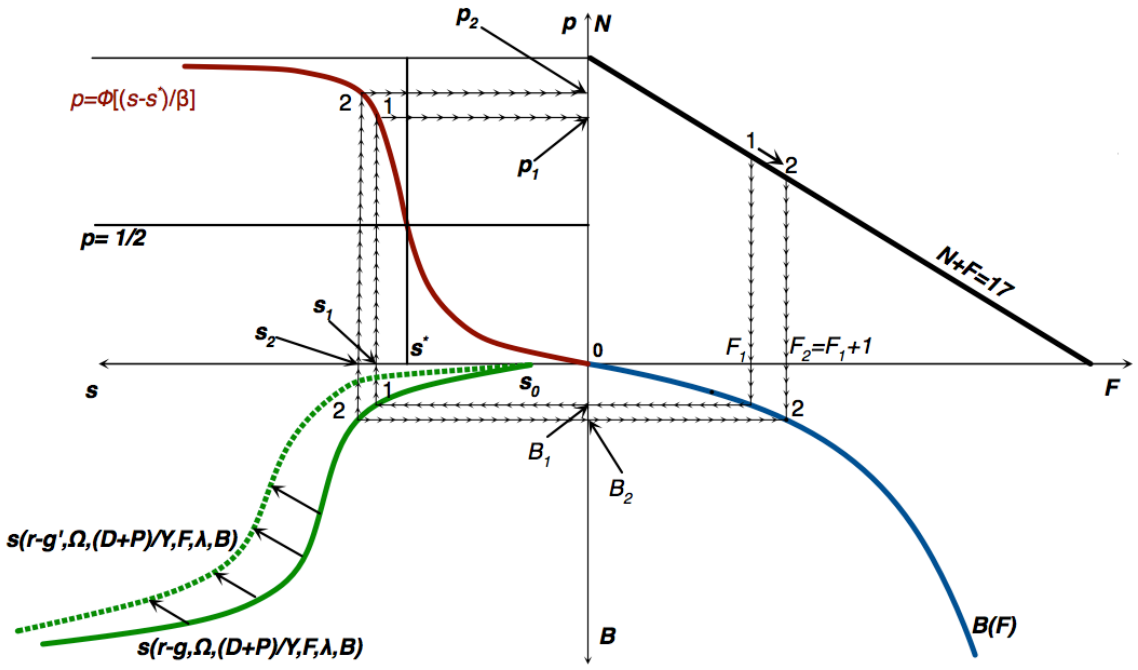


Figure 3a: EFSF-induced contagion

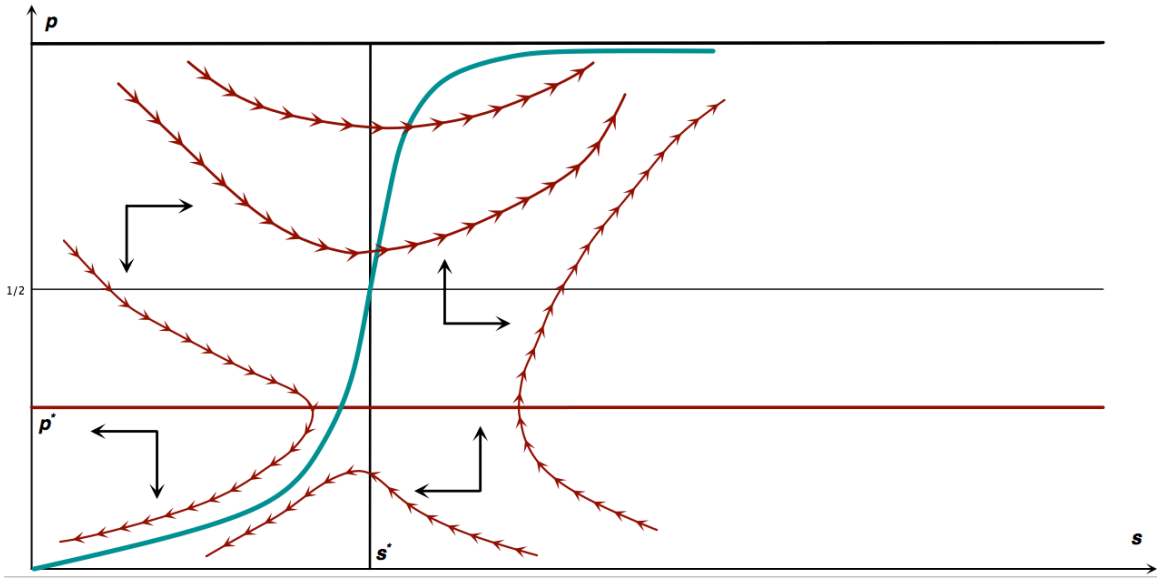


Figure 3b: Austerity's helping hand

$$\dot{s} = \eta + \theta(p - p^*) \quad (7)$$

$$\dot{p} = \xi + \varphi(s - s^*) \quad (8)$$

The phase diagram corresponding to equations (7) and (8) is presented in Figure 3(b), completing the geometry of the contagion caused both by the Eurozone's original design and, importantly, by the design of its first bailout fund, the EFSF (and its successor, the ESM, which conforms to exactly the same structure).

Section 5: The Fiscal Pact and the ECB's 'extraordinary' (LTRO & OMT) programs

By the summer of 2011, the contagion reached Italy and Spain and the dynamic of Figure 3 had become evident to all. However, the surplus countries, with Germany (but also Finland) in the leading role, insisted that the EFSF-ESM should neither be leveraged by the ECB's balance sheet nor funded by some form of non-toxic, homogeneous, eurobond (in place of the CDO-like EFSF-bonds). Instead, they were pushing mightily in favour of the so-called Fiscal Pact; a legally binding commitment by member states to achieve a structural deficit of no more than 0.5% of GDP in perpetuity. Never before in economic history has logical incoherence been given a constitutional expression that reality is bound to wreck.

To see the folly in the Eurozone's Fiscal Pact, and how it goes beyond a mere pro-cyclical austerity drive (that is, almost inconceivably placed on the European Union's statutes), let us take a look at the transition from Figure 1 (the pre-Crisis era) to Figure 2 (the period between the Credit Crunch and the passage of the Fiscal Pact) and then to Figure 4 below. Having experienced a forced shift from the pre-Crisis positions D_1 and S_1 to positions D_2 and S_2, the Fiscal Pact exerts unrelenting pressure on both deficit and surplus countries to engineer a path that will now take them to positions like those of D_3 and S_3. But to get to such points in the diagram, the current accounts of *both* surplus and deficit countries must yield surpluses (as their respective ρ loci are pushed toward the dashed lines) and the Eurozone must, as a whole, become the mercantilist scourge of the rest of the planet (in the sense that its combined net exports must reach the unfathomable level depicted in the diagram by ρ^3_{EZ}). And all that while the euro is buffeted by forces that are causing it to appreciate in relation to all major currencies whose Central Banks, unlike the ECB, are energetically engaging in quantitative easing.

For the Fiscal Pact's aims to be feasible, without such a Eurozone-wide über-mercantilist push, investment must rise significantly above savings in both deficit and surplus countries. However, the chances of this happening are non-existent while the Eurozone is caught up in the web of wholesale recession and of a credit system at an advanced stage of disintegration. As a result, the austerity drive pushes growth rates into negative territory, annihilates imports into the deficit countries, maintains a steady stream of liquefied asset capital that flows from the deficit to the surplus nations and, in a predictably self-defeating manner, fails to squeeze fiscal deficits sustainably. In terms of Figure 4, both sets of countries are stuck in the southeast quadrant with falling GDP, increasing

unemployment, increasingly decimating credit circuits, and underlying pubic finances that push the system (as depicted in Figure 3) to breaking point.

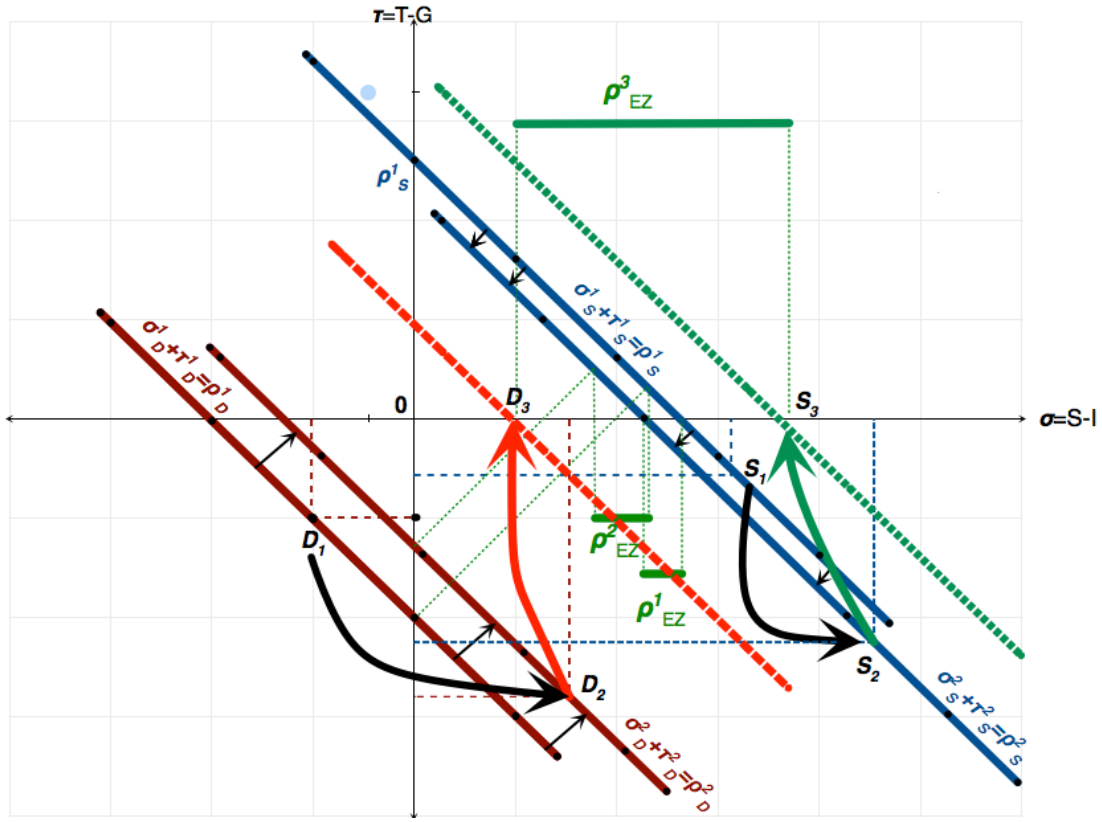


Figure 4: The folly of the Fiscal Pact

Arguably, the Eurozone would have expired some time in 2012 if it had been left to the combined mercies of the EFSF-ESM toxic bailout scheme and the specious Fiscal Pact. The reason it is still with us is the twofold intervention by the ECB. Its first incarnation came in December 2011 and January 2012 when its President made it clear that no bank would be allowed to fail. By announcing the LTRO, or 'long term re-financing operation', program, and pitching it at the €1 trillion level, the ECB eliminated the tail risk of an insolvent bank being allowed to default on its debts to other banks. Of course, this was not enough to prevent our 'cobweb' from strangling Spain and Italy (recall Figure 3). Indeed, by July 2012 the situation had turned so critical that the President of the ECB chose to speak openly about the Eurozone's collapse (to which he referred with the euphemism of 'convertibility risk') and, at once, to warn that he would do "whatever it takes" to stop it. The "whatever it takes" part arrived later, in September 2012, in the form of the OMT (or 'outright monetary transactions') program.

The OMT constituted a simple threat, by the ECB, that (if need be) the central bank would purchase as much short term Italian and Spanish debt from the Italian and Spanish banks as it was necessary to inflict losses on the short-

sellers of Italian and Spanish bonds. While OMT financing was also conditional on Italy and Spain being placed under a full EFSF-ESM austerity program, bond traders refrained from testing Mr Draghi's commitment for two reasons: First, because of the Beauty Contest effect (i.e. each bond trader believed that average opinion among bond traders was that, for the time being, it does not pay to mess with Mario) and, secondly, because Mr Draghi and the EU hinted at a willingness to consider Madrid's and Rome's existing austerity policies as *de facto* austerity compacts, at least in the short run.

In analytical terms, the ECB's President, through the central bank's combined LTRO-OMT programs, succeeded in boosting significantly the s* threshold level in equations (6) and (8). Diagrammatically, that meant a rightward shift in the Φ(.) function in Figure 5 as s* rose to s**. Thus, as a result of this shift, (*s*,*p*) bundles falling in the diagram's shaded area no longer cause contagion to spread. Whereas prior to the ECB's LTRO-OMT interventions, point A would put the Eurozone on a north-eastern trajectory that inexorably increased both *s* and *p*, the ECB's intervention ensured that the currency union would be on a tame southwestern trajectory leading the (*s*,*p*) bundle toward lower values. In this sense, it would not be incorrect to proclaim Mr Draghi as the Eurozone's saviour, at least in the short-run.

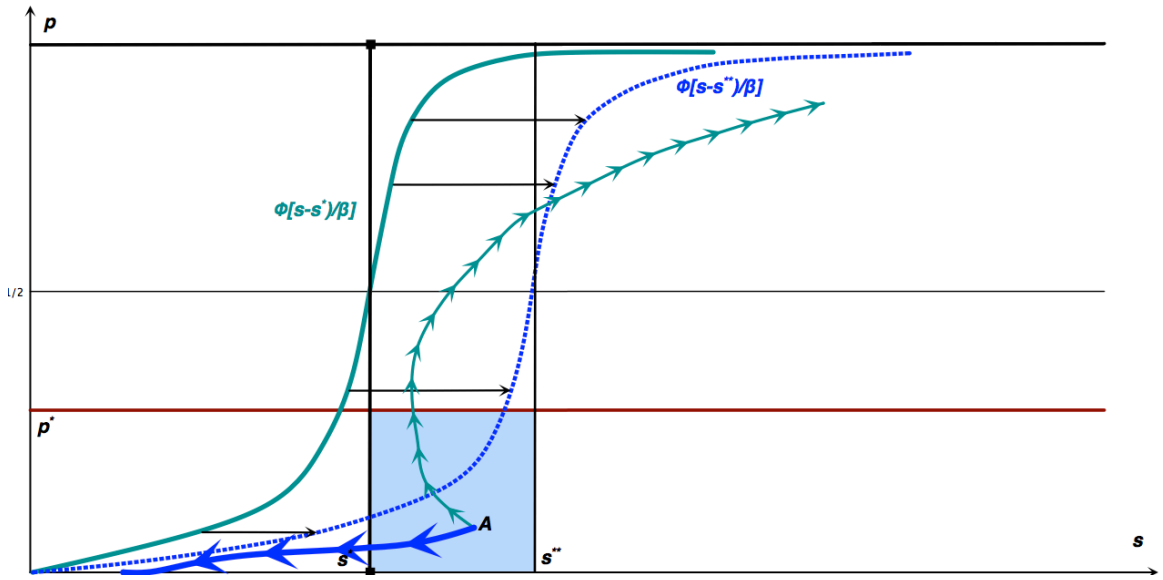


Figure 5: The Draghi (LTRO-OMT) effect

The added bonus for the European Union, and the German government in particular, was that the LTRO-OMT effects make it possible to claim that its austerity-heavy crisis-fighting policies have 'succeeded' even in cases of already 'fallen' member-states, e.g. Ireland and Portugal. Come to think of it, Ireland's crisis was qualitatively similar to Spain's: its sovereign debt was lower than Germany's until its real estate sector imploded, exposing its banks to a mountain of debts which were then transferred onto the state's shoulders. So, if the OMT

program makes it possible for Spain to pretend that it retains full access to the money markets, why can Ireland not maneuver itself, with the ECB's assistance, into a Spain-like situation: i.e. out of its EFSF program while remaining a ward of the troika and, thus, under the same dark cloud of unrelenting austerity?

Which brings me to the Faustian bargain underpinning the ECB's LTRO-ECB programs: To get Germany's government on side, especially regarding the OMT program, Mr Draghi had to commit all the coercive powers of the ECB to imposing ruthlessly the Fiscal Pact upon the deficit member states. Which means that the Eurozone remains on a path to disintegration since, in terms of Figure 4, the illogicality is maintained at the level of its real macro-economy. Put briefly, the arrows toward positions D_3 and S_3 are simply infeasible. Which means that putting all of the ECB's energies into pushing the deficit nations in that direction will only accelerate the recession, bring investment into deeply negative territory, and lead proud countries like Italy and Spain to a condition of Greece-like un-governability.

Section 6: Conclusion

The Eurozone was founded on two principles: First, that its central bank would be explicitly banned from acting as a lender of last resort (for states and/or banks facing insolvency). Secondly, an unbending principle of Perfectly Separable Sovereign Debts. Thus the scene was set for contagion following a financial crisis that could readily cause pairs of national banking systems and states sequentially to titter on the verge of bankruptcy. Europe's reaction was to establish a new institution EFSF-ESM that would borrow on behalf of its (still_ solvent member-states in order to prevent sovereign defaults. Alas, the structure of that 'special purpose vehicle' was such that, with its bonds redolent with the whiff of toxic derivatives, deeper and faster contagion followed. At some point, in a bid to prevent the European Monetary Union's disintegration, the ECB stepped in. But to be allowed to step in (with its LTRO and OMT programs) the ECB first had to accept the surplus countries' politicians Faustian bargain: In exchange of being unshackled from the prohibition from acting as a lender of last resort, the ECB had to commit to using its coercive powers in order to impose the greatest austerity upon the weakest member-states. And thus the ECB-based 'solution' worsens the fundamental Eurozone's macroeconomic conundrum so as to bring temporary stability to the inter-bank and bond markets.

This paper offered a simple model of the above. Its conclusion is that, at this stage of the Eurozone Crisis, the ECB's intervention has arrested contagion at the expense of greater macroeconomic incoherence. And since the latter always, inevitably, reinforces the former, all celebrations of the Crisis' taming are likely to prove pure folly.

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NOTES

[1] See Arestis and Sawyer (2012) for a review of the literature from which this interplay is largely absent and Holland and Varoufakis (2011,2012) for a discussion of this interplay as well as a proposal for how it could be short-circuited.
[2] See Hansen (1938).
[3] See Halevi and Lucareli (2002).
[4] See Priewe, J. (2007).
[5] See Bryan, D. and M. Rafferty (2006).
[6] See Niechoj et al (2011).
[7] See Varoufakis et al (2011) and Varoufakis (2012,2013)
[8] From the standard identities Y=C+I+G+X-M (where Y=gross domestic product, or GDP, C=consumption, I=investment, G=government expenditure, X=export-generated income, and M=income spent on imported goods and services) and Y=C+S+T (where S=domestic savings and T=taxes), it turns out that S+T=I+G+X-M or (S-I)+(T-G)=(S-I).
[9] Consider the simple case of (i) a deficit that is a fixed portion (-τ) of GDP; i.e. at time t the budget deficit equals (-τ)Y_t and (ii) of a nominal GDP that is growing at the stable rate of g. Nominal debt $D_t = D_{t-1} - \tau Y_{t-1}$ and the debt to GDP ratio is given by $[D_t/Y_t] = [D_{t-1}/Y_t] - \tau[Y_{t-1}/Y_t]$. Substituting that $Y_t = (1+g)Y_{t-1}$ in the debt to GDP ratio above, we derive the difference equation: $[D_t/Y_t] = [D_{t-1}/Y_{t-1}][1/(1+g)] - [\tau/(1+g)]$. As long as $-[\tau/(1+g)]>0$, this difference equation yields an equilibrium debt to GDP ratio equal to $-\tau/g$. Prior to 2008, the deficits member-states' growth rate was higher, on average, to that of the surplus member-states while their budget deficits were lower, albeit not much lower. In brief, $-[\tau_D/g_D] = -(a/b)[\tau_S/g_S]$ member, where a and b are assumed to be parameters. From the above, it is clear that as long as $b>a>1$, the surplus countries' debt to GDP ratio would eventually surpassed that of the deficit member-states. To offer a realistic example, suppose that (as it was the case prior to 2008), average nominal GDP growth rates in the surplus countries was no more than g_S =1.5% whereas in the deficit ones it was closer to g_D =3%. At the same time, the average deficits were in the vicinity of $-\tau_D$ = 4% and $-\tau_D$ = 3% respectively. Had these rates been kept constant, the deficit member-states' debt to GDP ratio would tend to an unsustainable 133.3% while the surplus nations' would converge upon a Japan-like 200%. It is highly unlikely that the capital flows that sustained the pre-2008 reality could be preserved under such a scenario.
[10] The parallel here is poignant since South Korea and Thailand collapsed also as a result of a sudden halt in capital inflows. The difference, of course, was that cutting the peg with the US dollar was a political decision that could be, and was, taken in a few hours. In sharp contrast, the deficit Eurozone member-states had no such option. Trying to imagine where S. Korea and Thailand would be today if they had no capacity to sever their peg conjures up unspeakable horrors.
[11] See Gibson et al (2011) and Priewe (2012).
[12] See Eijffinger, S.C.W. (2012)

[13] See De Grauwe, P. (2011).
[14] See for example Attinasi et al (2009), Arghyrou and Kontonikas (2010), Gerlach et al. (2010), Schuknecht et al. (2011), Caceres et al. (2010), Caporale and Girardi (2011) and Gibson et al (2011).