MACROECONOMIC STABILIZATION IN THE EURO-ZONE

A SIMPLE MODEL AND AN APPLICATION

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Abstract

This paper proposes a simple mechanism to avoid sovereign debt crises in EMU such as the one that we witnessed after 2010. Based on the assumption that the crisis of the single currency had its origins in growing current account imbalances, we develop a mechanism to target competitiveness in the form of the real exchange rate and introduce a governance mechanism that checks excessive inflation divergence when it is about to appear. We suggest to symmetrically address deviations from the ECB's inflation target by imposing a 'fine' on inflation rates that are more than one per cent above the ECB's target of two per cent, and which are immediately redistributed to countries with an inflation rate one per cent or more below the central bank's target. Our simulations show that the main alternative, a fiscal union with a relatively important redistributive component, surprisingly would have exacerbated the crisis of EMU, while an inflation-correcting mechanism along the lines we propose would have dampened the divergences in current accounts at the basis of the crisis of EMU.

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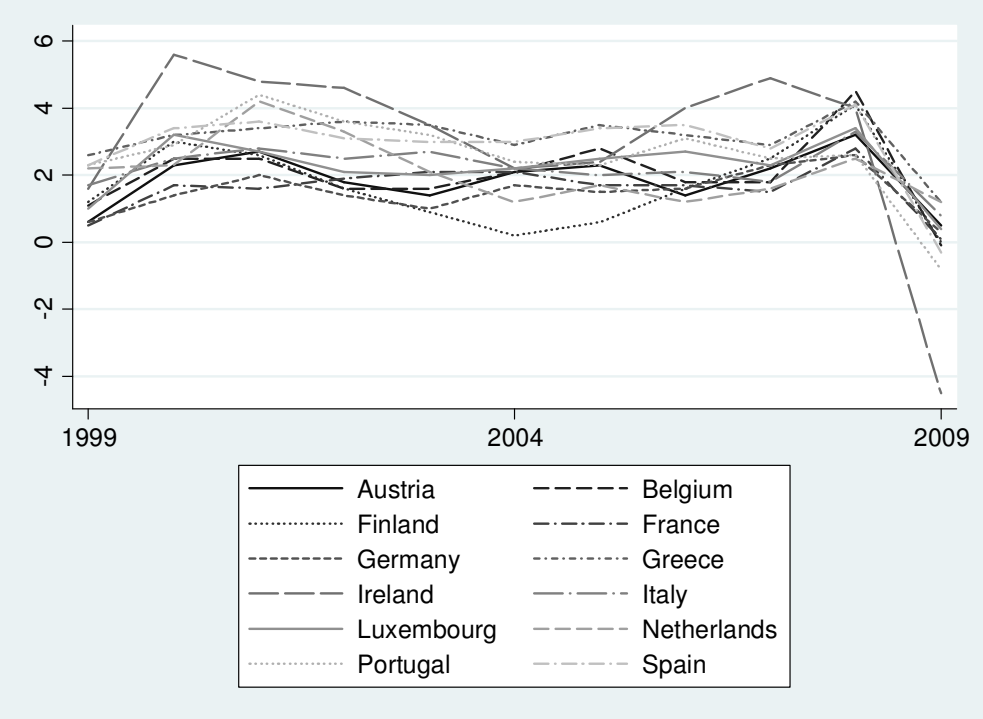
Among the many solutions offered *ex post* as means to prevent the euro crisis that erupted in 2010, some version of fiscal union, and by extension fiscal federalism, in which taxes are to a large extent pooled and then redistributed according to need, may well top the list. Many papers on Economic and Monetary Union in Europe (EMU), starting with Paul Krugman's (1993) insightful 'Lessons from Massachusetts for EMU' have a strong fiscal federalist component, ranging from a larger EU budget over Eurobonds to a fiscal union, in which taxing and spending decisions are shared among the EMU member states. And all of the main policy-making bodies during the crisis – the European Commission, the European Central Bank, or the Federal Chancellery in Berlin – concentrated on the fiscal dimension of the euro-zone crisis.

The logic behind such proposals is simple and straightforward. Since the euro crisis manifested itself as a problem of accumulated sovereign debt, endangering the existence of the single currency and therefore the macroeconomic stability of all EMU member states, solutions have to be found in the sphere of fiscal policy as well. In fact, thus the argument, instituting a fiscal union would largely sort out the unfinished business of the Stability and Growth Pact, which was unable to instill fiscal discipline in EMU, by tying the fiscal hands of all member states not only before but also *after* accession to EMU (Giavazzi 2006; Gros 2012; Wyplosz 2002). It assures that fiscal policy becomes, indeed, a 'matter of common concern', as the Maastricht Treaty (Article 103) proclaimed in the initial architecture of EMU.

We think that the premise underlying this approach is false. Fiscal union may indeed be a necessary component of a monetary union for many reasons, not least as a mechanism to resolve the current sovereign debt problems afflicting the euro-zone through some form of debt mutualization: after all, the aggregate fiscal stance of the euro-zone has been roughly neutral since the inception of the currency, and turning this into a positive externality would have contained variation in interest rates

once the crisis of the euro erupted. However, and importantly, our research suggests that it would not have prevented the crisis that we witnessed in the late 2000s. The reason is simple: that crisis was fundamentally not a result of weak fiscal governance but a result of rapidly and structurally diverging inflation rates among member states, which in turn transformed itself into a balance of payments crisis through the diverging current accounts in the two groups. Between the introduction of the euro in 1999 and the start of the crisis in 2009, the range of inflation rates in EMU increased dramatically from a range between 0.5% in France and 2.6% in Greece to 1.2% in The Netherlands and 4.5% in Ireland in 2009 (OECD Statistics Portal).

Figure 1: Inflation rates among EMU member states 1999-2009



It is essential to see that this inflation divergence was an important part of EMU's blueprint: the single interest rate set by the ECB always implied that fast-growing member states with a higher than average (or higher than the ECB's target)

inflation rate would experience very low real interest rates and vice versa, which made monetary policy effectively pro-cyclical (see Walters 1991 for this insight). And to some extent it was a result of bringing together very differently organised capitalist economies into one monetary union (Hall 2012; Hancké 2013; Johnston et al. 2014). The combination of this effectively pro-cyclical monetary policy and differences in economic organization among EMU member states found their expression in an increased divergence of their current accounts: the growth model of one group in the north-west of the continent, clustered around Germany, relied essentially on exports, while in the other group, primarily in the Mediterranean, growth relied on credit and domestic demand (Hall 2012). As a result of this symbiotic economic relationship, the current accounts of the former witnessed a spectacular rise (Germany had a current account surplus of 8.5% of GDP in 2015), while the latter group systematically imported more than it exported, and therefore borrowed more. When private debt in banks turned into public debt because of financial rescue plans, a crisis of the currency was born.

Inflation rate differentials are therefore the key driver in the crisis of EMU and the euro-zone needs a mechanism to counter these structural tendencies towards inflation divergence if it wants to avoid a situation such as the one we have witnessed since 2010. In this paper, we discuss an inflation-based transfer mechanism that would simultaneously dampen demand in high-inflation countries and boost demand in low-inflation ones, thus countering the centrifugal tendencies that are now a part of the design of EMU.

This paper builds on a growing literature on the crisis of EMU that sees it as a combination of variation in the supply-side organization of economies, and especially institutions of economic governance (‘Varieties of Capitalism’, see for example Hall 2012; Hancké 2013), and which is triggered by the current account divergence

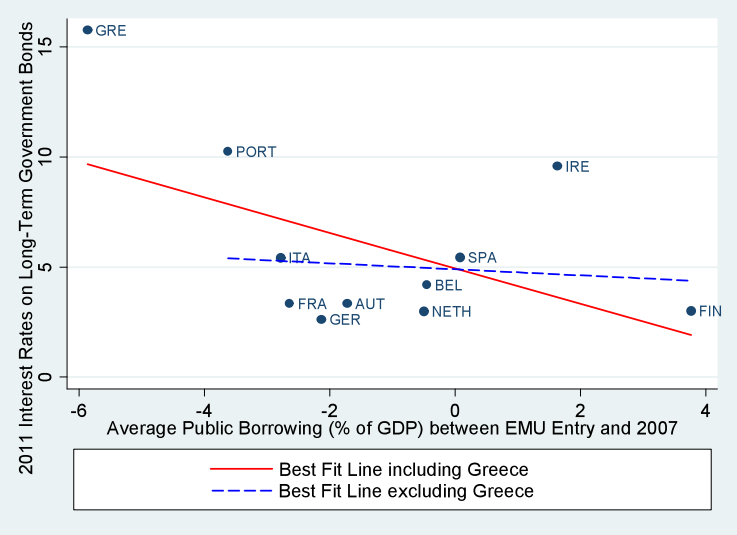
spawned by these differences. It is organised in three parts. The first examines the fiscal position argument. In the second part we present our own argument in extensive detail. The third and final section presents the results of a simulation of our argument on inflation targeting, which demonstrates the positive effects of a moderate inflation tax on the build up of imbalances prior to the euro crisis. We conclude with some key implications of our point.

1. The crisis of EMU and fiscal union

Many, possibly most analyses of the crisis of EMU that has engulfed the continent since 2010 in one way or another emphasize the fiscal roots of the crisis: fiscal profligacy in the southern member states led to unsustainable fiscal deficits and public debt mountains, which became unsustainable in the wake of the financial crisis, when governments were called upon to rescue the financial sector.

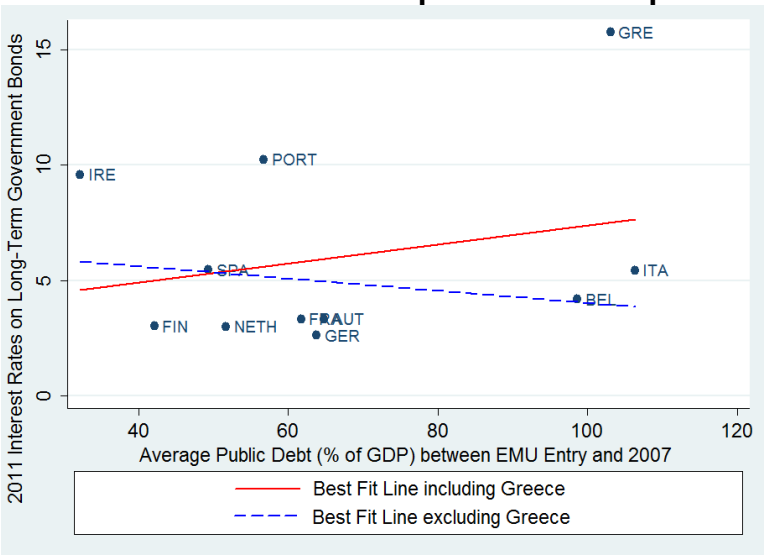
The causes of the crisis implied by this view are almost certainly wrong. Many countries with problems during the crisis, such as Spain and Ireland, actually ran fiscal surpluses before 2009, while Belgium, with a debt above 100% of GDP since the 1970s, seems to have escaped the sovereign debt crisis of EMU entirely unscathed. A more systematic analysis of the relation between pre-2007 deficits and 2011 interest rates on sovereign bonds across EMU member states (in Figures 1 and 2) reveals a very weak link, which, when excluding the Greek outlier, collapses entirely (the relation is measured as simple correlations, on the methodological assumption that if no significant relation shows up in such a simple bivariate analysis, it is highly unlikely that more demanding statistical analysis would show a stronger link). The same is true for the relation between pre-2007 debt and 2011 interest rates (Fig. 2 and 3). Fiscal profligacy before the crisis seems to bear no relation to yields on government debt after.

Figure 2: 2011 interest rates and pre-crisis deficit performance



Best fit line (including Greece): y = -0.81x + 4.94 (R^2=0.257)
Best fit line (excluding Greece): y = -0.14x + 4.90 (R^2 = 0.012)

Figure 3: 2011 interest rates and pre-crisis debt performance



Best fit line (including Greece): y = 0.04x + 3.23 (R^2=0.063)
Best fit line (excluding Greece): y = -0.03x + 6.67 (R^2 = 0.050)

Source: Johnston et al. 2014: 1776-7.

One other, more constructive way in which the fiscal situation of EMU has been introduced has been through the argument that one of the key causes of the crisis was the lack of a political (i.e. fiscal) union; or, conversely, that the institution of

a political (i.e. fiscal transfer) union would be a solution to the crisis; or, at the very least, a political union would have helped avoid the crisis (Bordo *et al.*, 2011; Enderlein *et al.*, 2012; Enderlein *et al.*, 2013; Van Rompuy, 2012; Henning and Kessler, 2012; Marzinotto and Wolff, 2011; Fuest and Peichl, 2012; IMF, 2013).

Whichever way we approach this version of the political (fiscal) union argument, at its core resides some form of fiscal federalism, in which a part of the revenue in wealthier member states is redistributed through a central tax pool to poorer member states. Such a system has its attractions, not least because it has been shown to work relatively well in existing fiscal federations such as Australia, Switzerland and Germany. The call for more sustained fiscal integration is, in fact, largely based on how fiscal union operates in these successful federations; since these are highly politically integrated jurisdictions, the future of EMU lies, *mutatis mutandis*, in becoming a more integrated political jurisdiction, with a strong fiscal component.

Below we compare two scenarios to assess the effects of a hypothetical fiscal union – a baseline scenario that reflects the world we actually live in ('Reality'), and one that introduces a fiscal federalism correction factor ('FEQ', for 'Fiscal equalization'). The data for Table 1 – as for all the subsequent tables in our simulations – are gathered on a quarterly basis[1]. We use a set of the 11 early euro members that entered stage three of EMU in 1999 plus Greece entering in 2001: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain. The output indicator that we concentrate on is the effect of fiscal equalization on inflation, consistent with our underlying view of the

[1] The source for GDP is the Eurostat Website (last accessed on 04 August 2014).
The source for the quarterly inflation data is the ECB Website (last accessed on 04 August 2014).

EMU crisis as a problem of inflation leading to current account imbalances, which in turn led to fiscal imbalances.

The results of the comparison between the world that we have experienced between 2000 and the onset of the financial crisis of 2007-08, on the one hand, and the FEQ scenario on the other, are reported in Table 1. The right-hand column on financial equalization refers to a system very similar to the one that exists now under the EU's Cohesion Funds: if the GDP per capita (in PPP terms) of a member state is or falls below a certain threshold, it receives funding from the considerably wealthier member states. We put the threshold at 85% of the average GDP per capita for all EMU member states; the extent of the redistribution from wealthier to poorer member states is such that after the transfer no country has a GDP/cap below that threshold.

The redistribution mechanism has three stages (described in more detail in Annex 1). In the first stage we identify the countries with a GDP/cap below 85% of the average GDP/cap for all EMU member states. That allows us to calculate how much these countries would have to receive (collectively and individually) to raise their GDP/cap to 85% of the EMU average. This amount will in the second stage be taken from the wealthier countries according to their relative wealth: a country with a GDP/cap which stands at 120% of the EMU average will contribute considerably more than a country where the GDP/cap is at 105% of the EMU average. The distribution key thus reflects the relative weight in EMU GDP of the contributing member states. In the third and final stage the effects on the inflation rates of the countries are calculated. To do this we conservatively assume a rather small effect on the inflation rate, namely that an increase in nominal GDP of 1% in a receiving country yields an inflation effect of only 0.25%. (It is worth pointing out that this is a very conservative estimate: a simple regression with country fixed effects yields a correlation between GDP growth and inflation of 0.45 to 0.55 for all of the OECD

between 1960 and 2000, depending on statistical controls such as unemployment, central bank independence etc.) We introduce such a conservative estimate of the effect here for two reasons. One is that the effect of GDP growth on inflation is clear in theory, but very hard to estimate given collinearity and other potential interactions. The other is methodological: if a clear effect is visible when assuming a very small inflationary effect – thus stacking the cards against our argument – it will definitely be present if transfers have a larger effect. Table 1 thus presents the most moderate effect of fiscal transfers from wealthy to poor member states on domestic inflation rates.

Table 1: Comparing EMU without and with fiscal equalization

REALITY 2000-2006		**Financial Equalization (85% of GDP)**	
N Over 3%	97	N Over 3%	119
N Under 1%	8	N Under 1%	8
Over 3%	81.6	Over 3%	137.5
Under 1%	3.7	Under 1%	4.7
Max	5.7	Max	6.0
Min	-0.2	Min	-0.2
Mean	2.54	Mean	2.7
Std.Dev	1.03	Std.Dev	1.2

The results of this simulation are sobering: had EMU been a fiscal union in which funds are redistributed from wealthy to poor member states, the divergence in inflation rates at the basis of the current account problems in EMU would, compared to the baseline model of what actually happened, actually have increased. According to the statistics in Table 1, the number of periods for all countries during which inflation rates were above 3% ('N over 3%') would increase from 97 in the existing world to 119 in the FEQ simulation, while the cumulative percentage points over 3% (the total percentage over the period across all countries above 3%, called 'over 3%' in the table) would rise massively from almost 82 to almost 138. This last measure is

best thought of as the cumulative aggregate deviation from the 2% target – how 'bad' the digressions were rather than whether inflation rates in every member state deviated more than one percent either side from the 2% inflation target in any quarter (an analogy is the number of speeding tickets, and the amount by which drivers violate the speed limit).

This surprising result is the effect of a combination of the pro-cyclicality of monetary policy in EMU for its member states and institutional differences between inflation rates in wealthier member states in the north (where coordinated wage bargaining and export-dominated aggregate demand regimes dominate the growth model), and the relatively poorer countries in the south, where domestic demand has historically played a larger role and more of the organization of the economy was organized around the state. Budgetary transfers from the richer countries in the north (DE from now on) to the poorer ones in the south (RE for Rest of Europe) thus fan inflation in RE and depress demand and prices in DE. The outcome is what we see: more not less divergence.

Fiscal union may be a useful thing for EMU in many ways, in other words, but it is definitely not the panacea that it is often held to be. While some form of risk sharing through redistribution probably would have helped alleviate the sovereign debt crisis once it erupted, there is no evidence whatsoever in our data to support the argument that it would have been a stabilising governance mechanism prior to the crisis.

2. Governing macro-economic stabilization in EMU: targeting excessive inflation

If fiscal policy is neither the problem nor the solution, what is? Resolving this conundrum is a lot easier if we think about the crisis of EMU as a balance of payment

crisis among sovereign nations who share a single currency and therefore a single interest rate. As Johnston et al. (2014: 1778-9) demonstrate, relative competitiveness prior to the crisis is a much better predictor for problems with sovereign debt during the crisis than fiscal positions. The mechanism is simple: if the current account turns negative, financial markets exact a premium to cover the risk that a country will have to borrow in future to finance its imports without the certainty that it will be able to service its debt.

The key mechanism revolves around relative competitiveness and is determined by the real exchange rate (RER), which expresses the price of foreign goods in the home currency, divided by the price of the same goods and services, produced at home and traded (see Carlin & Soskice 2006: 296 ff. for more details). The RER is mathematically expressed as the nominal exchange rate *e* multiplied by the ratio of domestic prices p_d over foreign prices p_f: $RER = e^*(p_d/p_f)$. Since $e = 1$ in a monetary union, competitiveness in a monetary union is solely a function of relative price levels between economies (Johnston et al. 2014: 1780). As this implies, higher inflation rates than those of the main trading partners leads to a loss of competitiveness and vice versa.

In a monetary union, the configuration of individual (sovereign) economies with a single monetary policy highlights a crucial perverse effect of the single interest rate on the real exchange rate. Imagine, for ease of exposition, that the monetary union under consideration, EMU, consists of two equally-sized economies, DE and RE, and that DE has an inflation rate of 1% while RE's inflation rate is 3%. The EMU-wide average inflation rate is therefore the ECB's target rate of 2%, and the central bank's (nominal) interest rate is commensurate with that target. The real interest rate (the nominal interest rate minus the prevailing inflation rate), however, will be higher in countries with low inflation than in those with high inflation. In the second period,

therefore, the inflation rate in DE will fall (or growth stalls) because monetary policy is too tight, and rise in RE because monetary policy is too loose. In short, monetary policy has de facto become pro-cyclical and inflation rates between DE and RE are set on a divergent path: inflation will again rise in RE and fall in DE.

The pro-cyclical nature of the EMU regime is clearly illustrated in an analysis by Van Poeck (2010). He calculates the 'optimal' interest rate for all EMU member states during the 2000-09 period, following the so-called Taylor rule in monetary policy making (Taylor 1993). Technically a Taylor rule predicts the interest rate adjustment by giving equal weight to deviations from the inflation target and from potential output in an economy. While expressing inflation-aversion, this rule is considered more balanced than a standard inflation-targeting rule that only or primarily targets inflation since it also includes economic growth among its targets. Table 2 presents a comparison of the optimal interest rate given by such a Taylor rule with the actual real interest rate that each of twelve of the sixteen member states faced (expressed as the nominal ECB interest rate minus the prevailing inflation rate in the country). A negative sign implies that monetary policy was, on average over the period, too tight for that country, and a positive sign the opposite.

Table 2: Difference between domestic interest rate following a Taylor rule and the actual Euro interest rate (averaged 2000-09 and 2000-04)

	2000-09	**2000-04**
Austria	-0.33	-0.88
Belgium	0.21	-0.20
Finland	-0.36	-0.56
France	-0.15	-0.11
Germany	-0.45	-0.71
Greece	1.49	1.55
Ireland	1.81	3.63
Italy	0.16	0.40
Luxembourg	1.44	1.42
Netherlands	0.39	1.19
Portugal	0.86	2.10
Spain	1.25	1.81

Source: Van Poeck 2010: 55

During the period 2000-09, the ECB's interest rate was higher than it should have been, considering the evolution of real growth and inflation, in Austria, Belgium, Finland, France and Germany; and it was too low in Greece, Portugal, Spain and Italy.

Compare this outcome with the situation before the introduction of the Euro: if inflation rose in a country, the national central bank would raise the nominal (and in principle also the real) interest rate to bring inflation under control, and would loosen monetary policy in countries with lower inflation (Carlin & Soskice 2006: 27-201). In that set-up, the central bank of each country acts counter-cyclically. In EMU, the institution of a centralized monetary policy means that national central banks are no longer able to target domestic inflation rates, and the ECB is both constitutionally prohibited and technically unable to do so (as it targets the aggregate EMU-wide inflation rate). The pro-cyclicality of monetary policy is, in other words, part of the institutional design of EMU (Walters 1991; Carlin 2011; Hancké 2013).

This takes us back to the real exchange rate. When inflation rates between two closely integrated economies, i.e. that trade a lot with each other and little outside the dyad, diverge substantially, the one with the higher inflation rate suffers, all other things equal, a significant loss in competitiveness as a result of the appreciation of its real exchange rate, which, in turn, leads to a deterioration of its current account as it pays more for imports than it gains through exports. This is where the problem manifests itself as a problem of (private and public) debt: the country with the higher inflation rate will have to borrow to finance its consumption. However, since financial markets are (in principle) aware of the reasons for the country's debts, they will slowly raise the risk premium attached to the country's debt. Once a banking crisis hits, most or all private debt becomes public debt (as a result

of financial sector bail-outs) and the risk premium on government bonds rises quickly in the high-inflation countries because of their poor competitiveness performance. A slowly developing balance of payments crisis thus transforms itself into a sovereign debt crisis – exactly as we witnessed in EMU over the last decade.

The second step in our argument follows logically from this analysis. If indeed relative inflation rates are the core of the problem, and monetary policy is de facto pro-cyclical, but national central banks are no longer able to influence domestic inflation rates directly, what is needed is a mechanism for inflation control at the national level that in effect compensates for the absence of the national central bank. The idea we propose here is in design a distant cousin of the Stability and Growth Pact but modifies it in key aspects: we introduce a mechanism that simultaneously tempers excessively high inflation (and not debt) *and* (symmetrically) compensates for excessively low inflation to avoid current account imbalances building up. Since inflation rates are crucial inter-regional (and, in EMU, inter-country) adjustment mechanisms, we leave some margin. We assume, following the logic of the Bank of England's famous letter to the Chancellor of the Exchequer in the UK, that a deviation up to 1% is a relatively benign, 'normal' adjustment, and that inflation rates above a 1% symmetric deviation from the 2% target are likely to lead to imbalances. Note that this allows, in net terms, a possible annual adjustment of 2% across member states, which is a relatively wide adjustment corridor. Translated into our earlier stylized world: if inflation rates fall below 1% in DE, they would automatically rise above 3% in RE (and *vice versa*, because it does not matter where the imbalance originates). In that case, RE would transfer a ‘fine’ to DE, thus countering the divergent trends in inflation rates between these two economies, as DE would receive a stimulus and RE a constraint on its inflationary growth rate.

As an illustration, consider the following state of the world: a country has either a low inflation rate (below 2%) or a high inflation rate (above 2%); in the equally sized DE and RE situation used above the low inflation country is DE, and the high inflation country is RE. As a result of the pro-cyclical monetary policy, inflation rates between DE and RE diverge (but average 2%, the central bank's target rate), up to the point where DE will face a 1% and RE a 3% inflation rate. If inflation now rises further in RE, RE has several options. The first is to use domestic institutions and policies to bring inflation back down – through a more restrictive fiscal policy, for example, or through some form of coordinated wage setting such as a social pact or a looser form of a central incomes policy. Both will have the same negative effect on inflation, and it remains within the 3% boundary. (Note that it does not matter in this situation if excessive inflation is the result of a demand shock, an asset boom or of wage push. Fiscal policy can address the first through a cut in expenditure, and the second through transaction taxes that would lower volume, while incomes policies or social pacts are responses to the latter.)

RE now faces two possible outcomes: either these attempts to reduce inflation succeed, or they do not. If they do, the price level in RE is back to its optimal level below 3%, and no further action is required. But if they do not, RE pays an inflation 'fine', which immediately reduces demand in RE and thus leads to a fall in inflation.

Switching to the other side of the monetary union: the inflation overshoot in RE will have mirror effects in DE, where inflation will have fallen to below 1% – forced by the restrictive monetary policy resulting from the single nominal interest rate. DE will now receive the sum that RE was fined as a transfer, in principle to allow for a temporary demand boost. DE has two options: save it (to pay off debt, say) or spend it. If DE decides to save it, it will forego the demand boost, and the sum will be

transferred to a fund (held by, for example, the European Investment Bank, which could use it immediately in DE or save it as a buffer to spend during a downturn). Assuming that DE would rather use it than lose it, DE can decide to spend the money. It will then receive a short-term demand boost and, ceteris paribus, witness a rise in inflation to the optimal level between 1% and 3%.

In a Keynesian world, this would signal the end of the story, at least until the next time inflation rates start to converge: DE receives a boost and RE an inflation-tempering fine. DE can spend it on whatever it wishes, as long as it spends it and does not save it (akin to Keynes's famous pot of gold). But in a world in which supply also matters, there is a problem: imagine that DE decides to spend it on infrastructure, education and other public investment projects. The short-term effect is the same demand boost that occurs if DE decided to spend it on consumption. But the longer-term effects may, ironically, be perverse: investment in DE would result in a rise (rightward shift) of the feasible, non-inflationary growth rate and/or higher labour productivity in DE. Since we assume inflation to be determined by the relation between labour productivity and wages (inflation rises when nominal wage growth outstrips productivity increases), DE's investment would effectively force its inflation rate down again in the medium and long run, which would annihilate the overall inflation convergence. To prevent such a scenario, DE would ideally only be allowed to spend the transfer on consumption, for example through a reduction in VAT, which, being a highly regressive tax, would disproportionately benefit low-income groups, who would be able to consume more as a result.[2]

Targeting inflation in the way we present here has several advantages over alternatives. First of all, it is a relatively simple way to substitute for the absence of the national central bank capable of controlling domestic inflation in EMU, and thus

[2] Our thanks to Jonas Pontusson and Lucio Baccaro for discussions on this point.

also prevent pro-cyclical monetary policy to produce dramatic current account divergences across the euro-zone. Secondly, it is symmetric in targeting both excessive inflation and disinflation: if German wage-setters adopt a de facto beggar-thy-neighbour policy, and thus push their inflation rate below 1%, their zeal is tempered by the enforced Keynesian boost they receive, while cheap money in southern Europe is made more expensive through the outward transfer of a not insignificant sum. Third and finally, the mechanism produces inter-temporal solidarity. Crudely put, Greece, Portugal, Spain and Ireland would have been net contributors during their boom years before 2008, to Germany and France, where growth was low and stalling. That would have made it easier for Germany to help those countries when they entered the austerity period later on (when fiscal consolidation was deemed necessary after the rescue of the banks). The mechanism we propose thus also manages to balance discipline (by incentivizing governments to avoid a fine) and solidarity – both essential components of a well-functioning monetary union, but both also, and especially the latter, in short supply at the moment.

3. Simulation of an inflation-targeting regime within EMU

In the analysis that follows, we introduce three simulations that build on this argument. We impose a 'fine' for every year that a country runs an inflation rate of 3% or above, and give a bonus to every country with an inflation rate below 1% – i.e. the ECB's 2% target rate ± 1%. In part, we take our inspiration for this 'fine' from the Stability and Growth Pact, much derided (and not without reason, since it imposed a pro-cyclical fiscal policy) but not entirely devoid of logic as a disciplining device. What we add is a crucial symmetric component, which pushes up inflation in those EMU member states that risk a severe disinflation. Since the value of any fine is ultimately

arbitrary, we run the simulation with several values of the inflation fine: 0.5%, 0.75% and 1% of the GDP.

The idea behind the exercise is that the fine on inflation will produce a structural disinflationary effect because it reduces inflationary growth. Simultaneously, this sharpens political incentives to lower inflation, because the short-term effect is a fiscal tightening – never a pleasant prospect for governments. We also added a dynamic element to mimic better how an economy responds to such a fiscal contraction: if the fine is imposed in Q1 of a given year, 25% of the effect will occur in Q2, 50% of the effect in Q3, and 25% again in Q4. In order to avoid unnecessarily harsh punishment, we cap the fine at 3% of GDP. The formal representation of the simulation model is available in Annex 2. Table 3 presents the results of these simulations.

Table 3: EMU without and with inflation fines

REALITY 2000-2006		**INFLATION FINE 0.5% GDP**		**INFLATION FINE 0.75% GDP**		**INFLATION FINE 1.00% GDP**	
N Over 3%	97	N Over 3%	93	N Over 3%	89	N Over 3%	85
N Under 1%	8	N Under 1%	7	N Under 1%	7	N Under 1%	7
Over 3%	81.6	Over 3%	67.60	Over 3%	62.0	Over 3%	57.34
Under 1%	3.7	Under 1%	3.37	Under 1%	3.63	Under 1%	3.89
Max	5.7	Max	5.57	Max	5.50	Max	5.44
Min	-0.2	Min	-0.2	Min	-0.2	Min	-0.2

Source: Own calculations based on data from the ECB and Eurostat.

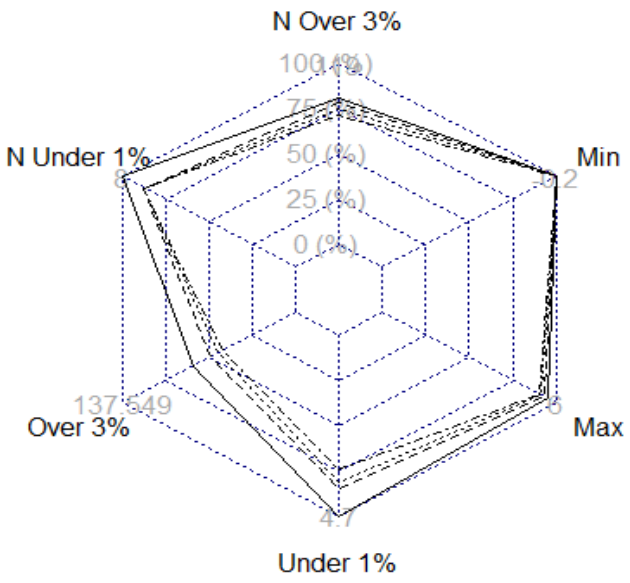
The results of this simulation are quite encouraging for our argument. The number of periods when countries run an inflation rate over 3% (and below 1%) drops significantly when set against the baseline of what actually happened in EMU between 2000-06. More importantly, perhaps, the cumulative aggregate inflation rate

above 3% (the extent of the digression) drops impressively from 82 in the world that we lived in to around 68 in the weaker first simulation. All other measures go in the right direction for our argument, with standard deviations dropping against the baseline model as well. The same holds across the two specifications that impute slightly stronger values of the fine of 0.75% of GDP and 1% of GDP (except for a slight increase in the total under 1% in the latter case of a large fine). These results suggest rather convincingly that a mechanism which targets excessive divergence in inflation rates lowers both the number of periods with an excessively high inflation rate and the cumulative aggregate deviation from the 2% inflation target. Put in real-world terms: our correction mechanism significantly reduces the inflation divergence that we identified as the core adjustment problem of EMU. Without this structural divergence in relative inflation rates, the current account problems would not have occurred quite as vehemently as we saw in the 2000s, and the crisis of EMU could have been averted.

Figure 4 is a synthetic representation of the key results of this analysis in the form of a spider diagram, highlighting each of the dimensions of our proposed inflation-targeting regime. In figure 4, the maximum values on each axis in the diagram correspond to the fiscal equalization (FEQ) model discussed earlier. We used these because they were the highest in all categories compared to the values in the actual evolution of EMU and compared to the inflation-based simulations. The solid line represents the values for the actual data in EMU ('Reality'), which are below or equal to the values of the FEQ model. The cumulative aggregate inflation rate above the 3% threshold in particular is roughly 40% lower in reality than in the FEQ model and the number of periods above the 3% threshold is roughly 20% lower in reality than in the FEQ model.

The three dotted lines represent the values corresponding to the three models of inflation fines. In this case, the cumulative aggregate inflation rate above the 3% threshold is up to 30% lower in the inflation-targeting models than in 'reality' and the number of periods above the 3% threshold is up to 12% lower.

Figure 4: Comparison between the FEQ simulation, 'reality', and the inflation fine simulations



It is worth addressing a practical point here: while our inflation-targeting mechanism is theoretically fiscally neutral because of its symmetry (in principle all sums received are cancelled out by the amount contributed), it may not be in practice. Yet in practice it is possible that one country has an excessive inflation rate and none of the others in EMU have excessively low inflation rates below 1%. However, while this is unlikely to last very long, since the high-inflation country in

effect will, in the limiting case, see its exports drop to zero, if it persisted, one could imagine a buffer fund (run by the European Investment Bank for example), which holds the cash associated with a temporal digression against the inflation target and transfers it in the future to a country with low inflation. Alternatively, the EIB could deploy it as a fiscal stimulus fund during recessions. Either way, it would still combine a disciplining effect with a modicum of inter-country solidarity – exactly as it meant to do.

4. Conclusion

This paper has argued that a mechanism that corrects excessive divergence from the ECB's 2% inflation target would have dampened the current account and related balance of payments problems that built up in the Euro-zone before the sovereign debt crisis. An alternative model, which includes a significant fiscal redistribution, performs much worse – worse even than the already quite dangerous world that we entered in 2010. If the crisis of EMU is understood as a problem of divergences in current accounts among EMU members, the inflation-correcting mechanism that we propose and tested would have been a much better governance system in EMU. It would definitely have tempered, and possibly largely neutralised, the endemic divergent tendencies in EMU. It targets excessive inflation differentials, the immediate cause of the current account divergences in EMU, by forcing up excessively low inflation and forcing down excessively high inflation. The outcome is that no country would face a persistent, large and growing, current account deficit, which forces it to borrow and the sovereign debt crisis would, perhaps with the exception of Greece, not have manifested itself quite as dramatically as it did.

Critics might accuse us of ivory tower thinking – as political scientists often do when they criticise similar proposals by economists. But there are two counterpoints

to consider in that regard. One is that our mechanism explicitly points at politics: governments in high-inflation countries have policies and institutions at their disposal, or can try to create those, which would allow them to avoid being punished. That is roughly what happened during the Maastricht process in the run-up to EMU, when governments in many southern European economies instituted social pacts or some form of centralised income policies to meet the convergence criteria (Pochet 2002; Hancké & Rhodes 2005).

The other counterargument is that our proposal may appear abstract. To some extent this is true; but it is also based on a deeper political-economic understanding of the problems of EMU than silver bullet proposals that sometimes impose draconian fiscal discipline through single measures. That said, we are sensitive to the question of political feasibility: under which conditions would a member state accept a fine on inflation? Our main answer for now is that by making governments responsible, and by introducing a mechanism that balances incentives, discipline and solidarity, we ought to be closer to political acceptance than we would be with technocratic proposals that are imposed externally. We are fully aware that this proposal may never see the light of day in Brussels – but that should not stop us from bringing it up, based as it is on solid foundations in the dirty-hands world of political economy.

The big advantage of the idea presented here is that it explicitly accepts that EMU is a very complicated political-economic arrangement that needs different parties to act in concert – but not necessarily all doing the same thing at the same time. If the crisis of EMU tells us one thing, it is that the one-size-fits-all policy paradigm on which EMU is based has clearly met its limits. A measure of decentralization is, we think, a good idea, as long as governments face reasonable constraints and incentives to nudge them towards a common target. Hence a

mechanism balancing discipline and solidarity gets us closer to a functioning EMU than the narrow disciplining approach that has prevailed – and failed – in EMU.

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Annex 1: Logical model for the Fiscal Equalization simulation

k: country belonging to the set of EU12

i: receiving country belonging to the set of EU12

j: paying country belonging to the set of EU12

INF_{ti}: Inflation at time t of country i

GDP_{ti}: GDP at time t of country i (in constant prices)

GDP_PC_{ti}: GDP per capita at time t of country i (in constant prices)

α : Equalization threshold (standard: below 85%)

β: Paying threshold (standard: above 100%)

γ: Coefficient of correction (standard: 0.25)

δ: Maximum equalization as % of GDP ('cap', standard: 5%)

$c_{t+1,i}$: Correction value at time t+1 of country i

Country i is at time t receiving if: $GDP\_PC_{ti} < \alpha * \frac{\sum_k GDP\_PC_{tk}}{k}$

Country j is at time t paying if: $GDP\_PC_{tj} > \beta * \frac{\sum_k GDP\_PC_{tk}}{k}$

Country i receives: $c_{t+1,i=}$ (1-α) $* \frac{\sum_k GDP\_PC_{tk}}{k} * POP_{ti} - GDP_{ti}$

But country i cannot receive more than a maximum cap-value:

Thus if $c_{t+1,i} > \delta * GDP_{t+1,i}$ then $c_{t+1,i} = \delta * GDP_{t+1,i}$

For the contributing countries their relative strength compared to the other contributing countries determines their share of the sum of all corrections.

Country j pays: $c_{t+1,j=} \frac{GDP_{tj}}{\sum_j GDP_{tj}} * \sum_i c_{t+1,i}$

The effect on the inflation is for every country k:

$INF_{t+1,k} = INF_{t+1,k} - \frac{C_{t+1,k}}{GDP_{t+1,k}} *$ γ

Annex 2: Logical model for the inflation fine simulations

i: country belonging to the set of EU12

INF_{ti}: Inflation at time t of country i

GDP_{ti}: GDP at time t of country i (in constant prices)

d_{ti}: Distance from inflation rate to ECB-target of 2% (d_{ti}= $INF_{ti} - 2\%$)

α: inflation fine (Standard for the three different models: 0.5; 0.75: 1)

β: Trigger value of correction (standard: 1%)

γ: Coefficient of correction (standard: 0.25)

δ: Coefficients for medium-term effect (Standard: 0.25; 0.5; 0.25)

$c_{t+1,i}$: Correction value at time t+1 of country i

The calculation of the correction values is the following:

if d_{ti} > β then

$$c_{t+1,i} = GDP_{ti} * \alpha * \delta_1$$

$$c_{t+2,i} = GDP_{ti} * \alpha * \delta_2$$

$$c_{t+3,i} = GDP_{ti} * \alpha * \delta_3$$

if d_{ti} < -β then

$$c_{t+1,i} = -GDP_{ti} * \alpha * \delta_1$$

$$c_{t+2,i} = -GDP_{ti} * \alpha * \delta_2$$

$$c_{t+3,i} = -GDP_{ti} * \alpha * \delta_3$$

The effect on the inflation is the following:

$$INF_{t+1,i} = INF_{t+1,i} - \frac{C_{t+1,i}}{GDP_{t+1,i}} * \gamma$$

$$INF_{t+2,i} = INF_{t+2,i} - \frac{C_{t+2,i}}{GDP_{t+2,i}} * \gamma$$

$$INF_{t+3,i} = INF_{t+3,i} - \frac{C_{t+3,i}}{GDP_{t+3,i}} * \gamma$$