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Inflation differentials in EMU: what can we learn from the time series evidence?

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Abstract

This note discusses whether the inflation process in Portugal, Ireland, Greece and Spain - countries that after the launch of the euro experienced national inflation rates above the weighted average of the EMU- has different time series properties from the EMU average and explains the possible implications of inflation differentials for the union and the national governments of member-countries. We find that the inflation differentials in Greece, Portugal and Spain are a long-run phenomenon which leads to a continuous real exchange appreciation. We interpret this as evidence for the debt problems that have arisen over the last two years in euro area.

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1. Introduction

It has been eleven years since the beginning of European Monetary Union (EMU) and the introduction of the euro. After a sharp convergence of the inflation rates of the countries initially participating in the monetary union during the nineties national inflation rates started diverging again. Although the European Central Bank (ECB) has done relatively well in relation to price stability in the monetary union as a whole, national inflation rates in some member-countries are well above the 2% objective of the monetary authority (Honohan & Lane 2003).

In currency areas the phenomenon of inflation divergences among regions is not unusual. When the possibility of the exchange rate adjustment is not possible and labor mobility is low, inflation differentials play a key role to the absorption of idiosyncratic shocks. So, inflation divergence is a common characteristic of monetary unions even for the case of US where the heterogeneity among states is much less compared to that of the EMU. Moreover, it is easy to understand that inflation differentials can persist for some time and this can be due to various reasons. This can be due to (i) Balassa-Samuelson effect (ii) differences in business cycles (iii) idiosyncratic shocks and asymmetric adjustment mechanisms to euro area wide shocks (iv) structural differences in labor and product market and (v) different degree of rigidities in prices and wages (DeHaan 2010).

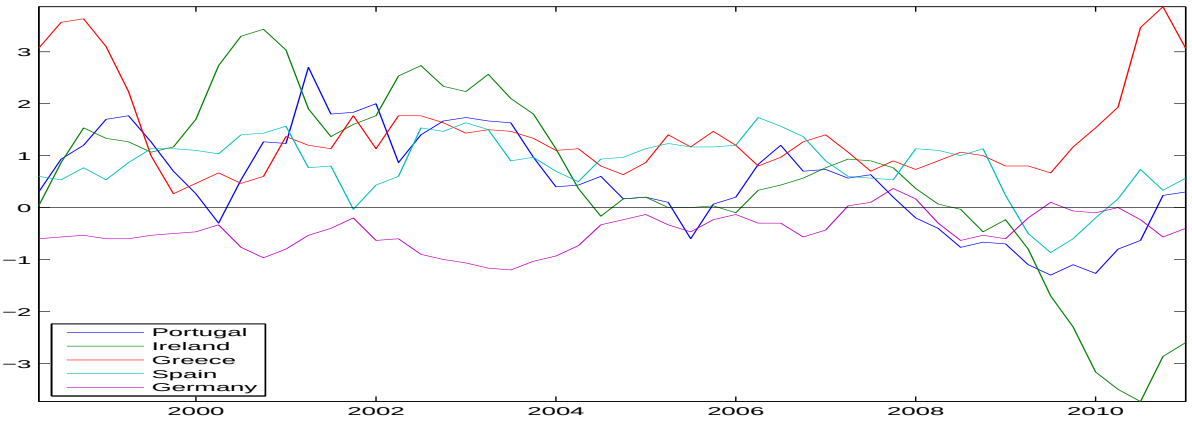
This note discusses whether the inflation process in Portugal, Ireland, Greece and Spain - countries that after the launch of the euro experienced national inflation rates above the weighted average of the union - has different time series properties from the EMU average and explains the possible implications of inflation differentials for the EMU and the national governments of member-countries. For this reason, it is important to obtain some support from the data. To this extent, we present those stylized facts that justify the claim that the inflation characteristics in these countries differ from those in the other countries of the euro area. The existence of long-run inflation differentials questions the effectiveness of the common monetary policy instrument to stabilize inflation expectations. Higher inflation expectations imply lower real – short and long-run – interest rates and deterioration of the terms of trade through reduced competitiveness, characteristics that should not persist over long periods of time since they create imbalances among the EMU members and could possibly lead to the destabilization of the union.

2. Motivation

Turning to the behavior of inflation in recent years, from the beginning of the euro and after, Figure 1 depicts the annual inflation differentials vis-a-vis the euro area for a subset of euro area countries. We can observe that positive inflation differentials were apparent from the very beginning of the EMU for Greece, Ireland, Spain and Portugal while at the same time Germany appeared to have inflation rates lower than the average of the currency as a whole. It can be clearly seen that inflation divergence was apparent from the very first years of the union. While it was declining during mid 2000s it started rising again into unprecedented levels.

A crucial issue for inflation divergence in a monetary union that must concern policy makers is whether these differentials constitute a part of the natural process of convergence between the member countries - a ”catch-up” mechanism from different initial conditions at price levels - or are a permanent phenomenon which may manifest a clear separation between countries that have persistently inflation rates above the average of the monetary union and countries that are near or below this average. If this is the case, then the first cluster of countries may develop serious problems of deterioration in their balance of payments, loss of competitiveness

Figure 1: Inflation Differentials



and large external debt; problems that cannot be allowed to persist for too long. Countries that exhibit such characteristics would normally resort to the solution of devaluating their currency. However, in the case of a monetary union things are different as the devaluation of the currency is not possible anymore.

A univariate autoregressive of order one model is used to examine whether the inflation differentials in these countries is a zero mean process or not:

$$\pi_t^i - \pi_t^{EMU} = c + \gamma(\pi_{t-1}^i - \pi_{t-1}^{EMU}) + \sigma\omega_t \tag{1}$$

where π_t^i and π_t^{EMU} are the national inflation rate and the average inflation rate of EMU respectively and ω_t is white noise normally distributed with zero mean and one standard deviation. Time series evidences seem to suggest that inflation differentials in Greece, Portugal and Spain are permanently different from zero, explaining partly why these countries are currently facing a debt crisis. In the case of Ireland the hypothesis that inflation differentials dissipate over long periods of time seems to get significant support from the data. The hypothesis of no long-run inflation differentials is summarized by

$$E\left(\pi_t^i - \pi_t^{EMU}\right) = \frac{c}{1-\gamma} = 0 \tag{2}$$

meaning that

$$c = 0 \tag{3}$$

This model has been estimated using Bayesian inference and the first prior moments regarding c and γ are motivated by the hypothesis that $(\pi_t^i - \pi_t^{EMU})$ is a white noise process, meaning that $c = 0$ and $\gamma = 0$. The model can be reexpressed in the following format

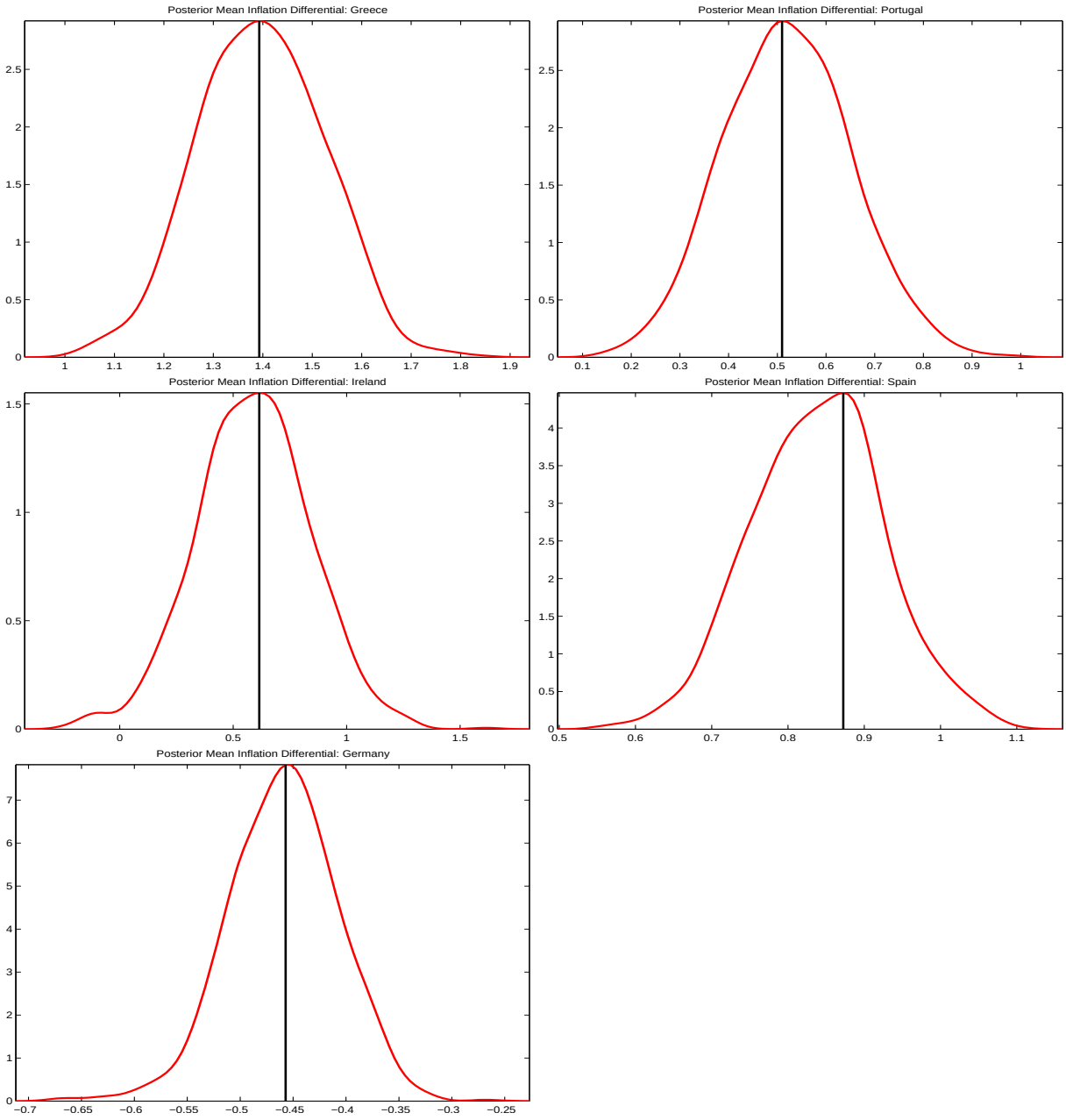
$$\pi_t^i - \pi_t^{EMU} = \beta x_t + \sigma\omega_t \tag{4}$$

where $\beta = \begin{bmatrix} c & \gamma \end{bmatrix}$ and $x_t = \begin{bmatrix} 1 \\ \pi_t^i - \pi_t^{EMU} \end{bmatrix}$. I assume independent normal and inverse gamma prior distributions for β and σ, respectively, and their posterior distribution is estimated using the Gibbs sampler (see Koop 2003, for a detailed discussion). The data are taken from EUROSTAT database and the measure used here for inflation rate is the HCPI in a quarterly frequency. The sample-period for this estimation is between 1998Q2 and 2010Q3.

3. Time Series Evidence

Figure 2 illustrates the posterior distribution of $\frac{c}{1-\gamma}$ for Greece, Portugal, Ireland, Spain and Germany, while the mode of this distribution is given by Table I. Both quantities have been calculated using a non-parametric kernel density estimator (see Canova 2005, for a detailed discussion). The results are quite revealing, as it can be seen – both from Figure 2 and Table

Figure 2: Posterior Unconditional Mean Distribution



I – inflation differentials are not only non-zero in the long-run but also the hypothesis that $E(\pi_t^i - \pi_t^{EMU}) = 0$ gets almost zero support in all countries– with an exception of Ireland.

Table I illustrates that the nominal trend heterogeneity among EMU members is vast. For instance, in Greece inflation is on average 1.3% higher than the EMU one, while in Germany the CPI index grows by 0.5% less than the average EMU one. In order to fully appreciate the implications of having different nominal trends in a common currency area let us consider the

Table I: Long-Run Quarterly Inflation Differentials

Countries	*Greece*	*Portugal*	*Ireland*	*Spain*	*Germany*
Posterior Mode	1.330%	0.510%	0.615%	0.873%	-0.457%

following Uncovered Real Interest Rate Parity (URIRP) condition (see Gali & Monacelli 2005, how URIRP can be derived from a DSGE model)

$$r_t^i - E_t\pi_{t+1}^i = r_t^{EMU} - E_t\pi_{t+1}^{EMU} - E_t q_{t+1} + q_t \tag{5}$$

where r_t^i and π_t^i are the nominal interest rate and the inflation rate in country i, r_t^{EMU} and π_t^{EMU} are the respective variables for the currency as a whole and q_t is the real exchange rate for country i. The nominal interest rate in a monetary union is common for all the countries – unique monetary policy instrument, $r_t^i = r_t^{EMU}$ –, meaning that

$$E_t\Delta q_{t+1} = E_t\pi_{t+1}^i - E_t\pi_{t+1}^{EMU} \tag{6}$$

The steady-state version of this equation implies

$$\Delta q = \pi^i - \pi^{EMU} = \frac{c}{1-\gamma} \tag{7}$$

that the real exchange rate – level – is non stationary.

From equation (7) we can clearly see that a simple but valid way of measuring the competitiveness in a member country relatively to the rest of the monetary union is the inflation differential. It is well known that one of the most serious problems for the member-countries of the south Europe after the introduction of the euro is the continuous loss of competitiveness. This is clear from the assessments on their competitiveness by international organizations i.e. according to the World Economic Forum rankings of the EU27 in the global competitiveness index 2010-2011 , Greece is 27th while Spain and Portugal although ranking higher also seem to loose competitiveness every year.

4. Policy Implications

The previous section illustrates that long-term inflation differentials lead to a continuous real exchange rate appreciation. If labor productivity does not rise significantly to offset the loss in competitiveness caused by the exchange rate appreciation, then large imbalances – excess borrowing – are built up and they have to be confronted by adopting austerity measures and rescue packages.

The question that immediately arises is why these inflation differentials actually exist in the first place. The significant degree of heterogeneity – both in labor and financial markets – among EMU members reduces substantially the effectiveness of the common monetary policy instrument (Angeloni & Ehrmann 2007) when EMU countries do not commit to the Stability and Growth Pact (SGP) (Uhlig 2002).

Let us summarise the ECB's reaction function with the following "Taylor Rule"

$$r_t = \gamma_r r_{t-1} + (1-\gamma_r)\left[\gamma_\pi\left(\pi_t^{EMU} - \pi^{EMU}\right) + \gamma_y y_t^{EMU}\right] + \sigma_r\varepsilon_t^r \tag{8}$$

where the policy maker adjusts the nominal interest rate to bring the aggregate inflation measure

– π_t^{EMU} – back to its target – π^{EMU} – and to close the aggregate output gap y_t^{EMU} (see for instance Smets & Wouters 2007). As we can see from the above equation the policy maker reacts to aggregate and not to individual country's measures. This implies that if, say, inflation in Greece is well above the target and inflation in the rest sixteen members is below π^{EMU} then the ECB must decrease the interest rate to bring π_t^{EMU} back to the target, meaning even higher inflation in Greece. The mechanism is as follows: higher inflation implies lower real interest rate and this further means that long-term interest rate is also lower. This boosts consumption and investment – approximately 80% of the demand – and higher demand puts further pressures on inflation. It should be highlighted that the high real exchange rate lowers import inflation and, consequently, CPI inflation. However, this is a small component of the later index and this decrease is not strong enough to offset the rise in the domestic inflation.

This higher demand, which is accommodated by the absence of the monetary authority's reaction, is usually financed by debt – either private or public. This, clearly, cannot be sustainable and the recent debt crisis in the EMU revealed exactly this problem. Someone can argue that the recent downgrades of the Greek, Irish and Portuguese government bonds reveals exactly the above effect of inflation differentials. To be more specific, the replacement of the national currencies by the euro is only a currency change that cannot eliminate the systemic risk caused by persistent and chronic structural problems which are mainly reflected on the "twin deficits" i.e. the public and current account deficits, and this systemic risk is now embedded in nominal bond yield. The introduction of the euro expunged not only the exchange risk uncertainty but also the possibility of correction of macroeconomic imbalances such as loss of competitiveness, through a de facto devaluation of the exchange rate. Before the creation of the EMU, when a country faced a deterioration in the deficit of the current account the devaluation of the national currency seemed to be the best and less controversial solution. Moreover, the euro appeared to provide a shield of protection for those countries that had experienced not only many but also severe devaluations in the past. But, there ain't no such thing as a free lunch,and this is the case with the common currency which means that the markets are now focusing on the budget deficit and government debt and require higher costs of borrowing in the country by increasing spreads, an aspect which often follows the deterioration of credit capacity. In other words, the risk of a currency devaluation in the past, is now the risk of a downgrade of government bonds.

The crucial question is what has to be done in the near future to avoid similar situations of fiscal crises in the euro area. There is a consensus among academics and policy makers that there is an imperative need for improvement in SGP (Schalck 2006, 2011). According to some proposals a combination of the re-enforcement of SGP – being part of each country's constitution – and the implementation of structural reforms seems to be indispensable. These reforms should be aimed at the creation of more flexible markets and the improvement of the production factors, with the objective of increasing the growth rate of productivity and the potential output of the economy. These would be adequate and sufficient conditions for putting all member-countries in the same trajectory of growth and phenomena of asymmetries between them would be only temporary.The structural reforms, with an emphasis on micro-reforms will make the economies who suffer from low competitiveness more flexible in dealing with negative shocks i.e. less vulnerable to various shocks that can come from either the demand or the supply side. Such reforms are of particular importance especially for countries like Greece, where persistent inflation differentials led to a continued weakening of competitiveness, which has been a root cause of macroeconomic instability since 2009. With respect to the re-enforcement of SGP, fiscal discipline in a monetary union is of primary concern for eliminating inflation differentials. This has to do with the role of expectations about further increase of inflation differentials

within the eurozone. Through the mechanism of inflation expectations, persistent large fiscal deficits give a signal to the markets that relative production costs will increase in the future and the markets discount this by forming higher inflation expectations today which decreases prices for government bonds. On the other hand, there are those who argue that policy makers should take into account the heterogeneity among member countries and increasing the flexibility of SGP would be a change towards the right direction for the future of EMU. Fiscal coordination is compatible with the SGP and moreover by increasing the flexibility of policies EMU can avoid situations where strict policies can harm further the growth of the countries that are in bad fiscal position.

5. Conclusions

This note tries to provide some explanation to the debt crisis in euro area. From the beginning of the common monetary policy inflation differentials were apparent among member-countries in EMU and according to the time series evidence we have so far, this divergence seems to be a long-run phenomenon for Greece, Portugal and Spain. The continuous real exchange rate appreciation of the countries of south Europe has led to a significant loss of competitiveness and the creation of persistent current account deficits. The evidence does not show that inflation differentials will be eliminated in the near future, something that poses numerous doubts about the future of the euro area without major changes in the current framework especially in terms of fiscal rules. The creation of a new framework for national fiscal policies seems to be more urgent than ever before.

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