

# Shall the European Central Bank Raise its Inflation Target?

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## 1. Introduction

For more than two decades macroeconomists observed a decline in output volatility in most industrialized countries. This period was labeled the “Great Moderation” and not few researchers thought it to last forever. These optimists had to face reality when the housing bubble burst in the US in 2007, causing the biggest recession since decades and quickly affecting the global economy. The unforeseen crisis and the even more surprising strength of its impact put a doubt on the macroeconomic policies of the last years and induced a vivid debate among macroeconomists and policy makers.

Not every commentator was as gloomy as Nobel laureate Paul Krugman, stating that most work in macroeconomics in the past 30 years has been “spectacularly useless at best, and positively harmful at worst”, but also more moderated minds questioned conventional macroeconomic wisdom.<sup>1</sup> Among these were Blanchard, Dell’Ariccia and Mauro (2010) who published an IMF Staff Position Note that got attention from economists, policy makers and the public media. Their article with the telling title “Rethinking Macroeconomic Policy” included among other proposals the heretical question if policy makers should raise inflation targets. What followed was uproar by other economists, central bankers and more or less sage journalists.

After the troubled waters have been calmed somewhat we dare to look for an answer to the question that was asked by Blanchard and his colleagues. We shall attempt to tackle the following question: “Shall the European Central Bank raise its inflation target?” To do so we will weigh the costs and gains of a higher target against each other, or what has been called the “sand” and “grease” effects of inflation.

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<sup>1</sup> Krugman (2009).

As the question of Blanchard et al. was based on the idea that a higher inflation target increases the efficacy of monetary policy, allowing a better reaction to real shocks, we will start with a discussion of this argument in the next section.

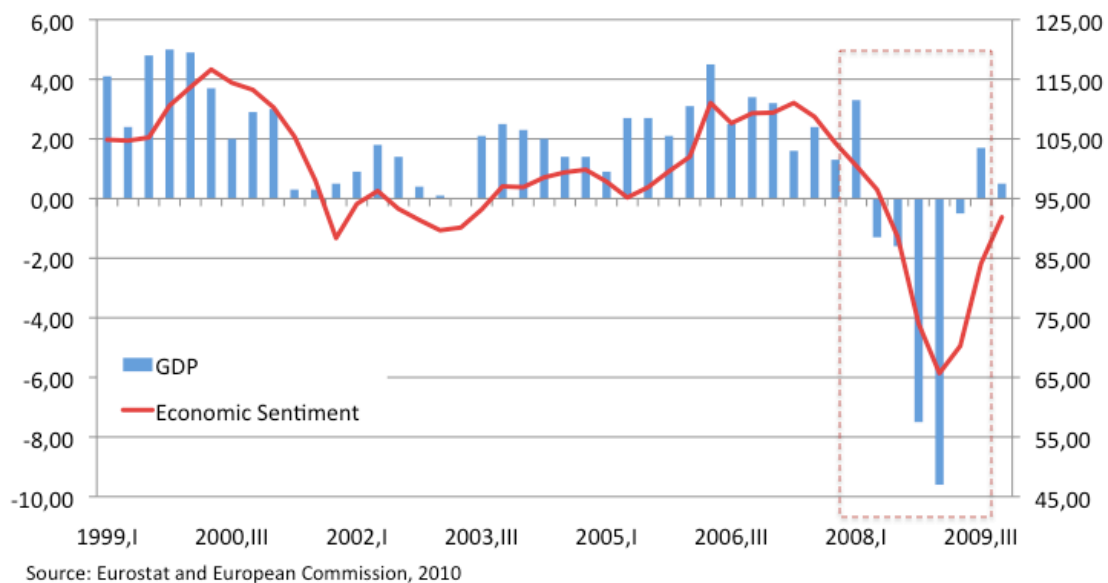
We will then discuss how a higher target might reduce inflation differentials among Euro countries. The latter being a transitory effect, we suggest in section 2.3 that higher inflation will permanently increase the flexibility of European labor markets, easing the adjustment to real shocks, as it mitigates the effects of nominal downward wage rigidity.

The final section on inflation benefits discusses the debt related effects of a higher target. Higher inflation will reduce the value of outstanding debt, which seems to be attractive given the current situation in Greece. We state though that this argument could cause more trouble than it is worth.

Chapter 3 discusses the costs of a higher inflation target. Section 3.1 addresses the danger of a credibility loss of the European Central Bank (ECB), when not sticking to the announced target. The subsequent sections consider the “sand” effects of inflation, starting in section 3.2 with the induction of costly and asynchronous price adjustments. Afterwards we discuss distortions inflation causes in the tax system and by taxing money holdings.

In the last chapter we conclude and make our policy proposal. For the European Monetary Union we state that the current target of 2% should be raised to 3% to 4%.

**Graph 1 - GDP and Economic Sentiment - Euro Area**  
 Annualized percentage change from the previous period



## 2. Benefits from a Higher Inflation Target

### 2.1 Increased Room for Monetary Maneuvering

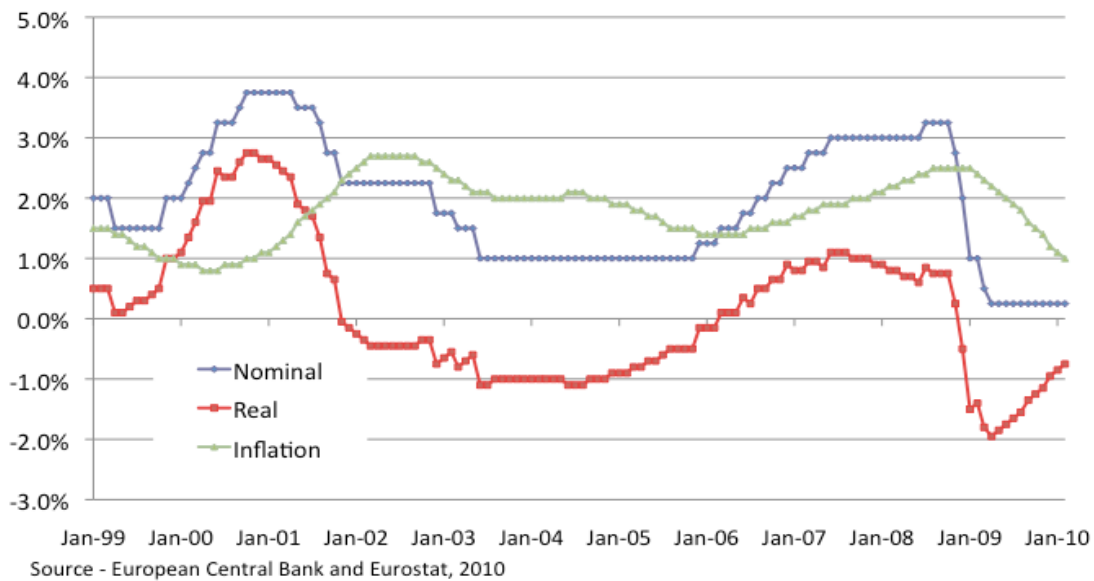
Liquidity traps are proven to be not just a theoretical outcome of the IS-LM model, but a real problem that economies can encounter. The latest significant example was Japan in the 1990s.

Some researchers argue that the current situation in the US and Europe has parallels with the Japanese experience. Krugman (2010) believes that almost all advanced economies are now in a liquidity trap. Blanchard, Dell'Ariccia and Mauro (2010) state in their "Rethinking Macroeconomic Policy" report that "corresponding to lower average inflation is a lower average nominal rate, and given the zero bound on the nominal rate, a smaller feasible decrease in the interest rate." This implies less room for expansionary policy in case of an adverse shock. We will address this issue in the following pages.

Since the creation of the Euro Area and until the most recent crisis, the region experienced positive growth, low unemployment and stable inflation. The

**Graph 2 - Euro Area Interest rates and inflation**

Annual rate



introduction of the Euro was supposed to boost trade and investment and to minimize the differentials across European countries. However, the monetary union faced its first test when the international financial crisis arrived to Europe and spread into the real sector. Never had the Euro Area experienced such a far-reaching and disruptive shock.

As can be seen in Graph 1, economic activity declined sharply. Economic Sentiment dropped in every country of Europe. Recession started in 2008 and lasted until the second quarter of 2009. Last year's first quarter experienced a year-on-year decline in output of 9.6%. Unemployment increased to 10% in January 2010, the highest unemployment rate in the region since the creation of the Euro. Declining demand for products and lower commodity prices pushed core inflation down to 1% in February 2010.<sup>2</sup>

The ECB's and governments' reactions to the crisis were to implement a looser monetary policy and undertake fiscal expansions, respectively. The ECB cut its nominal short-term interest rates. In particular the deposit facility interest rate was reduced from 3% in 2007 to 0.25% in 2010. To provide liquidity to the market, a

<sup>2</sup> European Central Bank (2010) and Eurostat (2010).

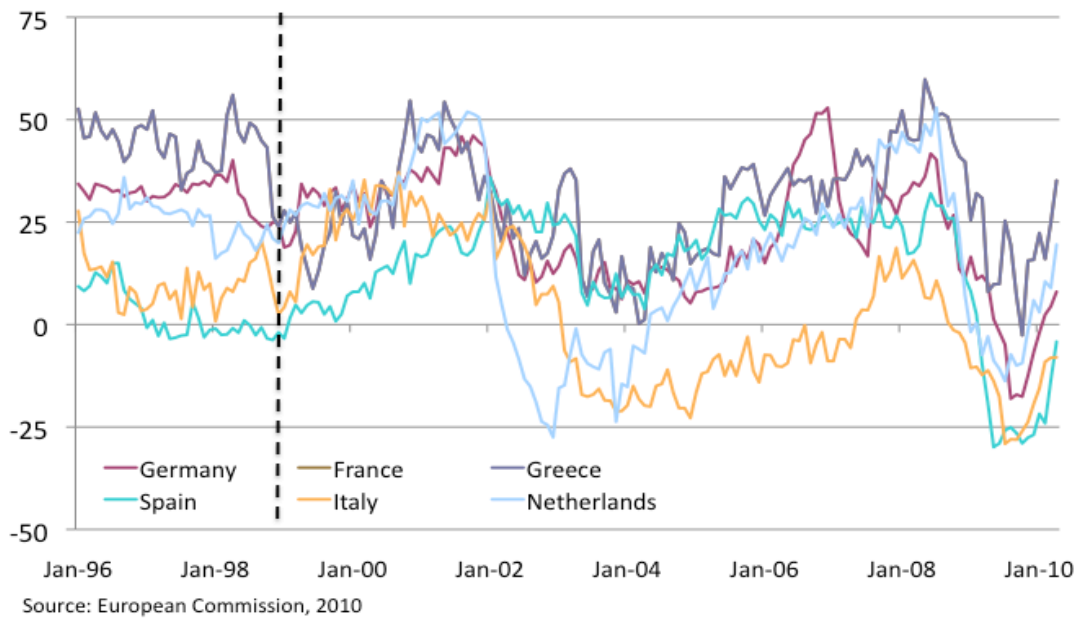
wider range of collateral was accepted and new long-term open market operations were introduced.

As the real interest rate is the nominal interest rate subtracted by the expected inflation rate, changes in the nominal interest rates and expected inflation are translated into movements in the real interest rate, thereby having consequences in the real economy.

To conduct expansionary monetary policy in recessions, central banks lower the nominal interest rate, but this tool is limited by its zero lower bound. Under the IS-LM model, money demand becomes infinitely elastic when interest rates are zero and then changes in money supply have no effect on interest rates, spending or output. Krugman (2000) explains this effect by stating that bonds and money become equivalent assets, so monetary policy in which bonds are exchanged for money becomes ineffective when nominal interest rates are zero. Cash is then held as a store of value like bonds in excess to the cash needed for buying goods. The increase in money supply will have no impact on prices, as people believe it to be a temporary intervention of the central bank that will be reversed in the future. In this scenario the central bank is unable to create higher inflation expectations and therefore cannot induce lower real interest rates. This is what is called a liquidity trap.

If inflation expectations are low and the nominal interest rate is zero, the real interest rate will be higher than optimal. In this case, a higher expected inflation would be the way to reduce real interest rates. But once expectations are low, not much can be done to commit to higher inflation. Blinder (2000) claims that once an economy reaches the zero lower bound and still needs stimulation there are few ways to do it. Depreciation of the currency, open-market operations, commitment to a moderate inflation target or an increase of the monetary base will not work if implemented separately, but can work if they are used together. In light of this it seems much better to avoid the liquidity trap in the first place. A higher inflation rate ex-ante may help to do so, as it anchors inflation expectations at a higher level. The

**Graph 3 - Price trends over the next 12 months - European Commission Survey**



nominal-real interest gap would be wider, enhancing the possibility to cut nominal interest rates in adverse scenarios. The latter is what Blanchard et al. had in mind in “Rethinking Macroeconomic Policy”.

In line with the latter, McCallum (2001) finds that the chances of getting into a zero lower bound constraint depend on the inflation target and the long run average real interest rate. He claims that if the sum of the inflation target and the average real interest rate is 5%, then the chances to get into the zero bound constraint are less than 1% per quarter-year. However, if the sum is 3% as it was in the Euro Area before the slump, the chances of a liquidity trap go up to almost 5.6% per quarter-year. In this case, any increase in the target rate will diminish the chances of a zero lower bound constraint in the future.

Since the international financial turmoil started, the European Central Bank cut its nominal short-term interest rates and annual inflation dropped to 1%. Moreover, economic growth is below trend. These being the three requirements for liquidity traps, it is not implausible that the EMU is in one. However, according to the IMF (2010) monetary loosening seemed to have worked efficiently as the credit market is functioning and inflation expectations are anchored in the target range. Supporting



this view, data from the European Commission show that inflation expectations dropped in 2008, but increased at the end of 2009 and beginning of 2010. In particular, Graph 3 shows that since February 2010 most surveyed individuals think that prices will increase more rapidly or at the same rate like in the last 12 months (1%).

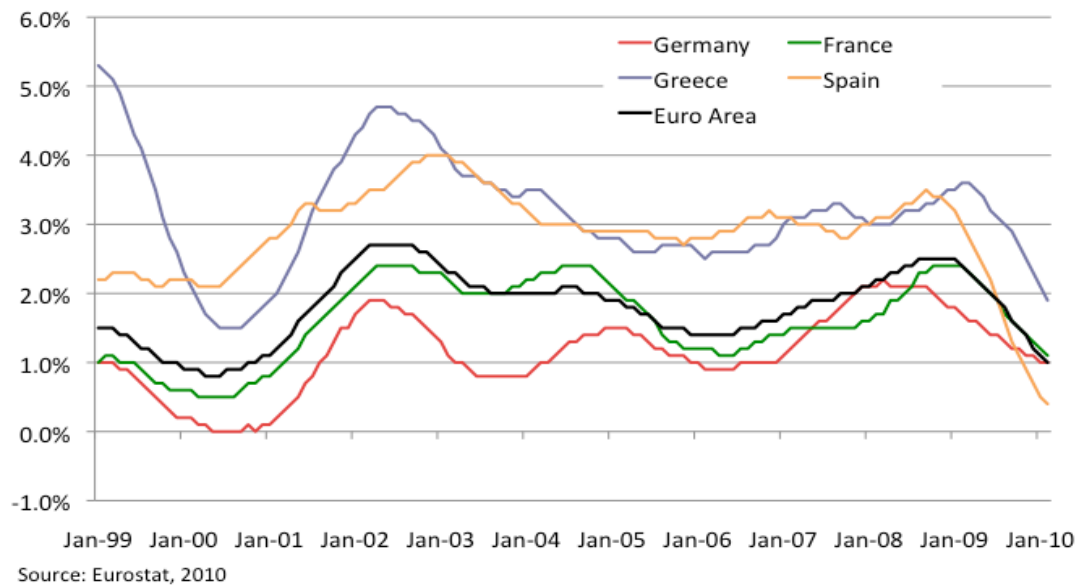
Following Badarinza and Buchmann (2009), inflation expectations have been anchored around 2.5% before the crisis struck and increased in 2008. However, taking Eurobonds as an approximation, it dropped slightly during the last year.

If the public's beliefs in the ECB's inflation target rate are bounded by the target, anchored expected inflation gives no extra room for monetary loosening in the future. A higher inflation target before the crisis would have reduced the possibility of reaching the zero lower bound of nominal interest rates and would have given more room for monetary policy to react to such a negative shock. Although it seems plausible that the EMU was not stuck in a liquidity trap in the last recession, we still believe that there was a serious threat of falling into it. Only in some years, we will be able to judge if the central bank room for maneuvering was big enough. As this was surely not the last maybe not even the biggest crisis that the EMU will ever have to face, we see as strong support for a higher inflation target.

## **2.2 Reduction of Inflation Differentials**

Although the European Central Bank has committed to keep inflation below but near to 2%, national inflation rates differ widely within the Euro Area. Graph 4 pictures exemplary the inflation rates of some countries as well as of the Euro Area as a whole. It can be seen that inflation rates have been persistently higher in Greece and Spain in the last decade until 2009 and exceeded the limits set by the Convergence Criteria most of the time.

**Graph 4 - Consumer Price Index**  
Overall index excluding energy - Annual rate



As can be seen in Graph 5, the higher inflation rates in Spain and Greece have increased the price level in these countries by more than 50% over the last ten years, compared to a less than 20% increase in Germany. It has to be asked why inflation rates within the monetary union are so different, as this fact has an impact on real exchange rates.

Angeloni and Ehrmann (2004) as well as Anderson et al. (2009) identify inflation persistence as one of the major reasons for this phenomenon. It is known that developing countries that peg their exchange rates experience real appreciations afterwards, as inflation continues for some time.<sup>3</sup> It might be argued that the same has happened in Europe. Vicious circles of rising wages and prices have not been broken by the introduction of the Euro and this has caused a loss of competitiveness for countries like Spain and Greece.

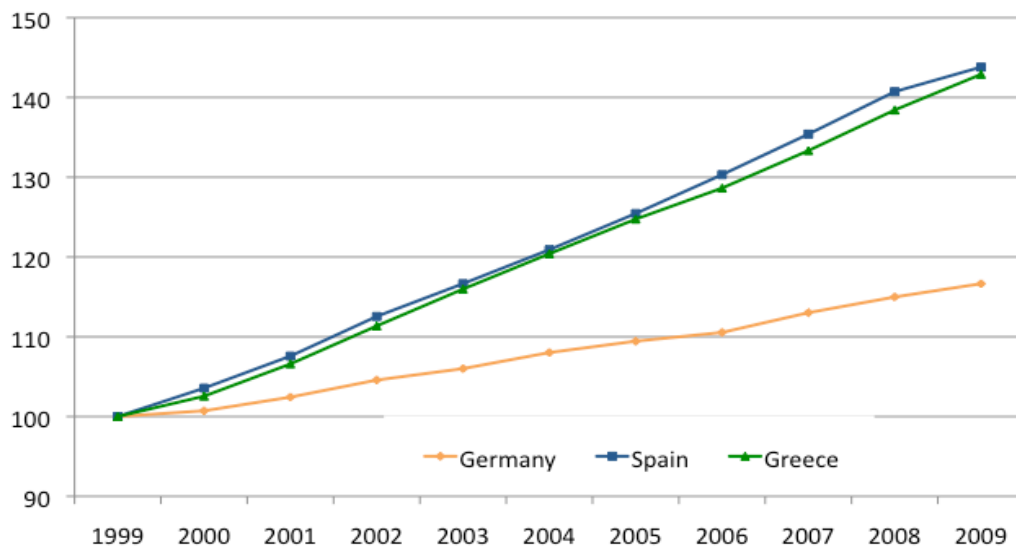
Several authors do not agree with this analysis and state that the inflation differentials are just a symptom of the real convergence that is happening in Europe.<sup>4</sup> According to their argumentation rising productivity has increased the

<sup>3</sup> See Calvo and Vegh (1999).

<sup>4</sup> See for example Palenzuela et al (2003).

**Graph 5 - Accumulated price changes**

Index 1999=100



Source: OECD, 2010

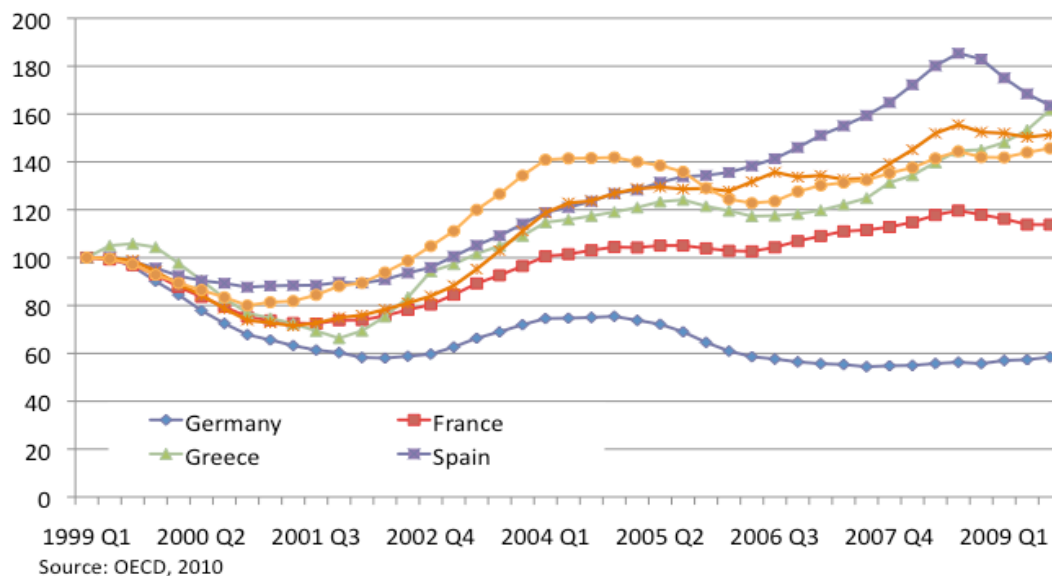
wage levels in countries like Greece or Spain. This would raise the overall price level through the Balassa-Samuelson effect.

We do not find the latter argumentation plausible when looking at macroeconomic data. Higher inflation through increased productivity does not affect competitiveness negatively. However, Graph 6 exhibits significant divergence of unit labor costs between high and low inflation countries within the EMU. Productivity measures do not show any real convergences between member countries but the opposite is true: According to the OECD (2010), Spain and Italy experienced less labor productivity growth over the last 10 years (0.7% and 0.4% annualized) than other Euro Area countries (Germany 1.4% and France 1.6%). Further evidence is given by current account statistics: As depicted in Graph 7, high current account surpluses in low inflation countries like Germany and deficits in Spain, Greece and similar member countries, give further evidence that competitiveness is diverging within the EMU.

This suggests that real causes might only be a minor factor in explaining inflation differentials, but that indeed persistent inflation differentials have hampered or even reversed convergence between EMU member countries.

**Graph 6 - Harmonized Competitiveness based on unit labor costs**

Index 1999 Q1=100



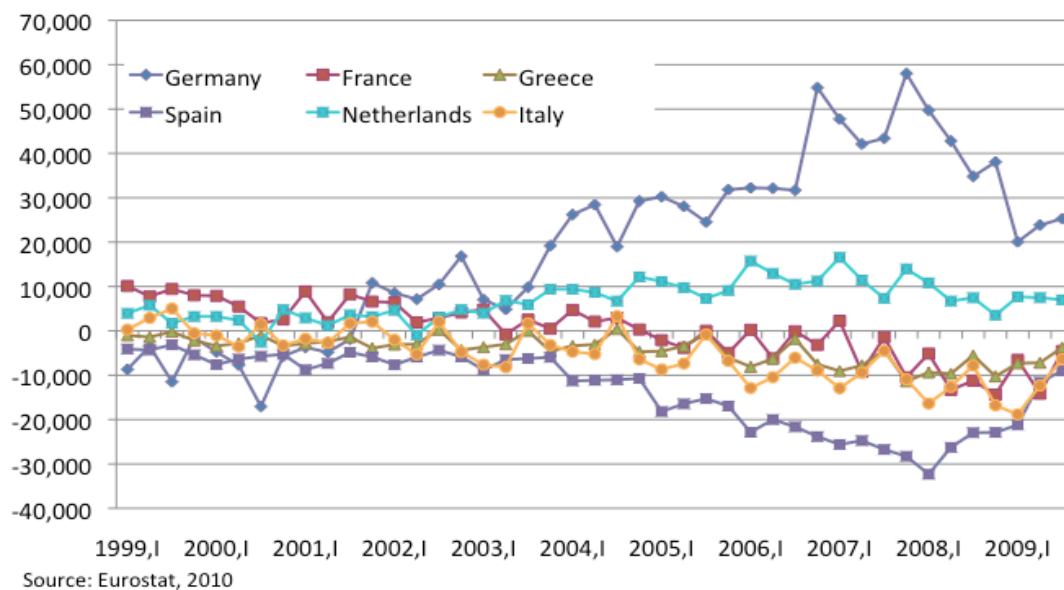
The authors of these pages do not argue that this development is anyone's fault. Although it seems that foresighted politics and a stronger willingness to adapt and to improve competitiveness could avoid built-in inflation, it must probably be accepted as an economic regularity.

It is argued here that a higher inflation rate, which is closer to the built-in inflation rate of countries like Spain and Greece, could mitigate the effect and ease convergence. It remains questionable though if such a transitory benefit of a higher inflation target is worth giving up the achievement of a credible target of 2%.

### 2.3 Inflation as Grease for the Labor Markets

Although inflation differentials are likely to decrease over time, they still have caused the need for downward wage adjustments in now less competitive countries. The current turmoil in Greece shows that this will be a painful process, as people are reluctant to accept nominal wage cuts.

**Graph 7- Current Account - Net flow**  
Millions of Euros (1st.January 1999)



While this might be a one-time adjustment, the EMU will face similar problems whenever it has to react to asymmetric shocks that require real wage cuts in some economies or sectors within the Euro Area. Since the seminal contribution by Tobin (1972) it has been argued that higher inflation eases the adjustment in light of downward wage rigidity.

Negative real shocks to a sector or an economy require real wage cuts to avoid unemployment if there is finite labor mobility between sectors or the economy as a whole is affected. These wage cuts can be obtained by decreasing the nominal wage or, holding the nominal wage constant, when the price level is increasing. The latter is the more viable option if there is downward wage rigidity.

Tobin (1972) describes an economy with different sectors among which labor mobility is constrained. He states that negative shocks to one or some of the sectors induce local unemployment if it is not possible to cut wages fast enough in the short run. With downward wage rigidity, higher inflation increases the speed of adaptation and therefore mitigates the labor market effects of a negative shock. Assuming regular shocks to parts of the economy, there is a higher aggregated unemployment rate in a country with downward wage rigidity, as there will be more sectors out of

equilibrium given a certain frequency of shocks. Tobin sees this as a theoretical explanation for a long run Philips curve. Akerlof et al. (1996) have formalized this argument.

This model can also be applied to a monetary union where the union replaces the economy as a whole and the member countries replace the different sectors. In this framework higher inflation increases not only the adaptation speed within countries, but also between countries, allowing for larger real wage cuts in the short run.

For this mechanism to work, the ECB must be able to induce a higher long run inflation rate by increasing the monetary supply. We assume that the ECB is able to do that.

The two other conditions to make this argument work are that the Euro Area is exposed to asymmetric shocks either on sector or national levels, and that there is downward wage rigidity in the European labor markets.

While theoretical economists have a hard time reasoning the existence of downward wage rigidity, empirical evidence consistently points out its existence. Dessy (2002) presents evidence for it in 12 European countries. Although wage cuts seem to happen on the individual level, they are rare. Like other authors he identifies the significant share of workers that report zero wage changes as a sign of wage rigidity. He also finds considerable differences in wage flexibility across European countries, which highlights the likely influence of labor market institutions and somewhat weakens the case for a higher inflation rate as improving institutions might be a better lever.

Moreover, Chechetti and Groshen (2000) summarize evidence for downward wage rigidity in the US and conclude that “while each individual micro or macro test may not be fully convincing on its own, taken together the tests provide diverse and fairly consistent evidence that wages are rigid downward.”

Holden and Wulfsberg (2007) cannot reject the existence of downward nominal wage rigidity in 19 OECD countries at industry level. Evidence for Germany is given by Knoppik and Beissinger (2003).

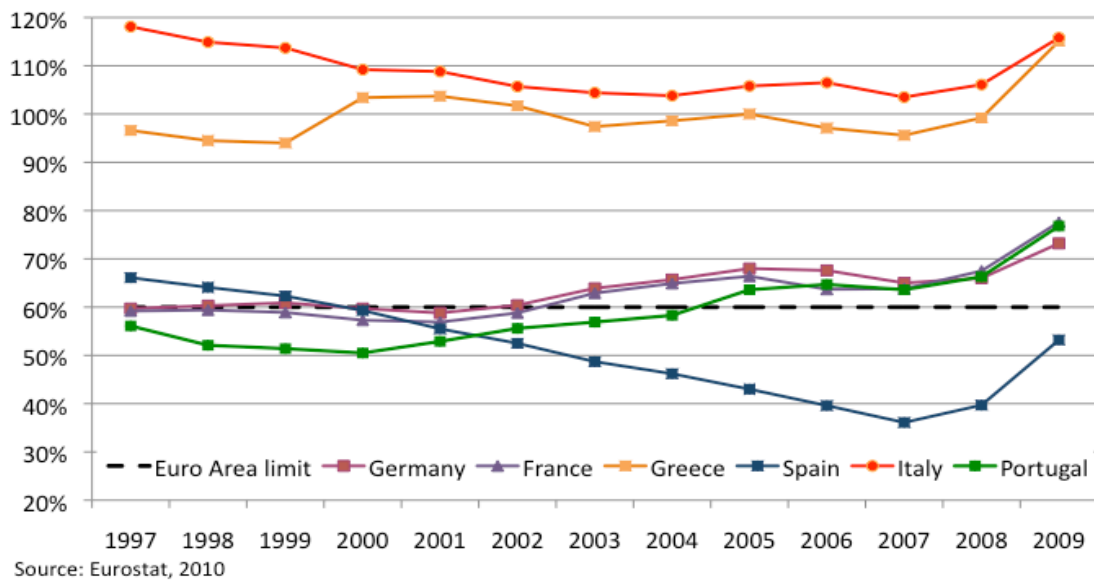
The existence of downward wage rigidity and the heterogeneity across Euro countries and their exposure to real shocks suggests that the Tobin labor market grease might not only be a theoretical bauble, but could have serious policy implications.

As we are not the first to assess this argument, there is already a strand of literature with a wide range of results. Wyplosz (2001) finds that higher inflation would significantly increase labor market flexibility and recommends therefore an inflation target of at least 4% in the EMU. Akerlof et al. (1996) calculate optimal inflation in the range of 2-3% in the US based on this argument, while Knoppik and Beissinger (2003) regard a target higher than 3% as optimal for Germany. Nickell and Quintini (2003) state though that an increase of the long-run inflation rate from 2.5 % to 5.5% in the UK, would reduce equilibrium unemployment by only 0.13%.

To get a better grasp of the quantitative impact of the identified mechanism we make a rough calculation: Assuming completely inelastic nominal wages and no productivity changes, a 25% difference in unit labor costs takes 10 years to vanish with 2% percent of inflation and only 5 years with 4%. Increasing the target even more makes convergence quicker, but the marginal benefits decrease rapidly.

Given this and the above results, we believe Tobin's argument to be even stronger in a monetary union, as higher inflation increases not only the speed of wage adjustments between sectors, but also countries. The enormous differences in unit labor costs seen in Graph 6 show that the European labor market lacks flexibility and might very well suffer from downward wage rigidity. As seen above there are studies suggesting an optimal inflation rate for the US of 2% to 3%. As Europe appears to be more heterogeneous and national and language borders still limit labor mobility, we

**Graph 8 - General Government Debt**  
Share of GDP



see this as an argument for an inflation rate of at least 3% to 4% in the EMU. This figure is also suggested by the above mentioned studies that concern the Euro Area.

## 2.4 Reducing the Debt Burden

In order to be part of the EMU, the Convergence Criteria establish that government debt and deficit as a share of GDP should not be higher than 60% and 3%, respectively. However, countries like Greece or Italy were far away from what the criteria state in terms of public finances at the time they were incorporated into the area. As Graph 8 shows, debt as a share of GDP was 113% when Italy joined the area and 103% when Greece did. These high levels of debt were sustained through the years. Moreover, the recent crisis put pressure to these and to all EMU countries. In order to stimulate the economy, fiscal plans and automatic stabilizers were set in action and debt as a share of GDP increased around 10 percentage points in 2009 with respect to the previous year in every EMU country. We acknowledge a similar story when analyzing budget deficits. Given the high levels of debt in the region and the turmoil produced by financial markets, the following section discusses the effects of inflation on debt dynamics and concludes with a warning on moral hazard.



It is a well known fact that inflation reduces the debt burden. Following Fischer and Easterly (1990), the growth in the deficit is the excess of the primary deficit over seigniorage revenues plus the net interest expense on the old debt. Thus we can see that increasing Euro Area inflation will reduce national deficit growth via two avenues. First, an increase in seigniorage reduces the primary deficit. Second, higher inflation reduces the real value of Euro-denominated debt. The implication for the EMU is that higher inflation will aid the efforts of countries, such as Greece, to bring their primary deficits under control. Convincing the markets of debt sustainability is a key part of ending the current European debt crisis.

On a European level, the high level of debt of countries like Greece or Italy brings into question the ability of the ECB to enforce targets. At the national level, this high debt to GDP ratio increases borrowing costs and hampers ability to repay debt. While it is possible to generate a certain amount of seigniorage without creating inflation, a higher inflation necessarily brings about higher seigniorage revenue. Thus the seigniorage revenues generated by our proposal will lower debt to GDP ratios across Europe and will therefore lower borrowing costs, easing the servicing of existing debt.

The second and more important avenue through which inflation lightens the debt burden is through its effect on the real value of promised interest payments on debt. This reduction in value, however, is only a transitory effect and will last until the existing debt is rolled over. This is because nominal interest rates will rise. Until these rollovers are complete, our proposal will ease the servicing of European debt by “inflating away” a portion of the payments.

Although these results show inflation in a positive light, there are two serious dangers. First, using inflation to generate seigniorage is much like Wile E. Coyote chasing the Road Runner running off a cliff. Everything is going according to plan until suddenly the ground disappears from beneath Coyote’s feet. Financing a deficit through seigniorage is a tricky task that runs the risk of falling into hyperinflation, or a high inflation – low seigniorage equilibrium, as described in Cagan (1956).

However, given the rates of inflation being discussed, this is a tail concern. The second, more immediate issue is that of moral hazard as it relates to the default via inflation. If it is used once as a tool for fiscal relief, the expectation will be that higher inflation will follow every European fiscal crisis. Of course, cheating on debt payments is not a long term strategy. Creditors will begin to price an “inflation premium” into future European debt issuances to hedge against a similar response in the future.

The purpose of the European inflation target is not to be a “pressure release valve” in the event of a crisis in one member country and our proposal does not intend for it to become one. The higher inflation target cannot be seen as an attempt to alleviate the current debt crisis. Otherwise the ECB will lose credibility and the public’s expectations for inflation will deviate from the ECB’s announcement, opening the door for a whole host of new issues. Reliance on inflation as part of the solution to fiscal difficulties creates a moral hazard for national budget planners. Therefore, if its risks are properly managed, the debt reducing effects of our proposal are indeed beneficial, but ultimately not desired.

### **3. Costs of Augmenting the Target**

#### **3.1 The Danger of a Loss in Credibility**

After the publication of the “Rethinking Macroeconomic Policy” report European central bankers highlighted the dangers of a higher inflation target. Weber (2010) stated that “the IMF is playing with fire.” We are aware of the fact that raising the ECB inflation target could endanger the credibility of the bank since the 2% target was always communicated as being untouchable. However, we believe that this would not be the case if the new target was properly announced and well reasoned.

We believe that in order to set a credible inflation target, there has to be transparency about the transition process. The Central Bank should explain why,

when and how the new target will be implemented in order to increase inflation expectations up to the new target, avoiding variability and false expectations.

There are two examples of economies setting a higher inflation target. The Czech Republic increased the upper bound of the range in which inflation was supposed to be in the year 2000.<sup>5</sup> The experience was successful, inflation expectations and the level of prices went up in the period without accelerating afterwards. Also, Brazil increased their inflation target in 2004 successfully.<sup>6</sup>

Since its creation the European Central Bank has enjoyed the trust of the business community. Even though inflation had been slightly higher than 2% from 2000 until 2008, inflation expectations always stayed close to the target. This fact gives rise to two possible scenarios. First, people could withdraw all their trust from the ECB if the target is changed. Another interpretation will be that given that the ECB has earned so much trust from the people, it would be able to credibly commit to a new target.

Given the vast credibility of the European Central Bank, and the fact that two emerging countries' central banks were able to do it without major disruptions, we are positive that if the policy is implemented transparently, the ECB's credibility would not be damaged.

### **3.2 Adjustment Costs**

One of the issues that must be addressed when considering an adjustment of the European inflation target is the existence of price stickiness. Under perfect flexibility, all prices in the economy adjust continuously, while in reality price changes are costly and are therefore made discreetly. This section will first examine the direct cost of bringing nominal prices in line with optimal prices in an inflationary

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<sup>5</sup> See Czech National Bank (2001, 2010).

<sup>6</sup> Banco Central do Brasil (2004).

environment. Second, it will discuss the implications of having asynchronous price adjustments in the economy.

Price rigidities are a known property of market dynamics and are one of the underpinnings of Keynesian economics. However, there had been no quantification of direct adjustment costs until Levy et al. (1997). The authors examine the price changing procedures of five different American supermarket chains and find that each store in each chain must incur costs of 0.7% of annual gross revenues simply to update its pricing. More importantly for the advancement of our argument, Levy et al establish a direct link between the magnitude of menu costs and nominal price rigidities. They find support for this conclusion both within stores, where products subject to different adjustment costs are re-priced at different frequencies, and across stores, where stores that face higher overall adjustment costs re-price at lower frequencies than other stores – implying a greater divergence of prices from their optimal level.

Mankiw (1985) describes how the presence of this cost can have a butterfly effect on the business cycle. A monopolistic firm sets its price in anticipation of a certain level of demand from its customers. If there is uncertainty surrounding the inflation rate and demand projections are not met, the producer will be pressured to revise prices. The firm will only make this correction if the private benefit exceeds the menu cost. However, Mankiw shows that the social gains to the adjustment far exceed private gains.<sup>7</sup> In fact, assuming a demand shock of 1 percent and a price elasticity of ten, the ratio of social to private gains is twenty-three; reducing the elasticity of price to two increases the ratio to over two hundred. The smaller the demand shock, the less incentive a producer has to update pricing and the greater the risk of incurring these large social losses.

Mankiw's theoretical findings are a warning. While a higher level of inflation alone will not trigger these social losses, uncertainty or mistrust of the new target will. In

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<sup>7</sup> Barro and Rush (1980) find that the demand shocks in post-war America average 1.4 percent, making this a plausible number.

order to quarantine the adjustment cost, the ECB will need to keep producers and consumers informed about what inflation rate to expect. Following Mankiw's work, as long as our proposal does not raise inflation uncertainty, the effects of adjustment costs will be microeconomic and confined to the order of magnitude found by Levy et al.

Having discussed the direct effects of adjustment costs, we now turn to the costs of having asynchronous price adjustment. A well functioning price system is necessary for efficient resource allocation. If economic agents suspend necessary price adjustments, price signals are transmitted with noise, thereby distorting economic decisions. As an example, idiosyncratic and uncoordinated price changes make it difficult to distinguish between price changes caused by real shocks and price changes simply due to price updating. Cecchetti and Groshen (2000) state that this confusion leads to resource misallocation, which in turn causes firms to hedge against unpredictable profit streams by taking fewer business risks. The authors use the example of a firm building a smaller factory to minimize variations in profitability. Producers lose because they are not producing at profit maximizing levels; consumers lose because they consume less.

Danziger (2001) uses a monopolistic competition framework of symmetric firms to identify the time-weighting effects of NPV calculations as the culprit for welfare losses due to inflation. He starts by stating that when prices are sticky, but output is not, the nominal prices of a period are actually set lower than the profit-maximizing amount. This is because NPV calculations incentivize the producer to set a lower nominal price to capture higher profits in the beginning of the period, at the expense of profits later, and therefore output/consumption is higher than otherwise.

Danziger's contribution to the literature is to add sticky output levels. Now, output is also fixed over a period of time. He describes how NPV calculations cause producers to set their periodic output choices below output levels under stable prices. Harm is caused both because of lower output and also because there are alternating instances where a firm has excess inventory and where it needs to ration its product.

Danziger estimates welfare losses from a change in inflation from 2% to 5% to be on the order of 0.5% of GDP.

While this result shows how our proposal can cause inefficiencies, it is not quite complete. One material component of his paper is the implicit assumption that wages are fully elastic. Fully elastic wages are what give Danziger the falling real prices he needs to complete his analysis, but we do not know of any firm which calculates an inflation adjustment every pay period. Thus the next evolution of this strand of literature must be a similarly thorough treatment of sticky wages. At best, wages are adjusted for inflation annually. So while wages change yearly, firms change prices according to a given product's adjustment cost function. This disconnection between wages and prices are a serious source of confusion for economic agents.

The two channels identified by Cecchetti and Groshen and Danziger are just two examples of higher inefficiency caused by higher inflation. Additionally, it becomes harder for monetary authorities to measure the progress of inflation itself when nominal prices deviate from optimal prices on a firm-by-firm basis. This harkens back to the conclusions of Mankiw (1985) - an untrustworthy measure of inflation can trigger relatively large aggregate surplus losses since it increases inflation uncertainty.

The take-away from this section is that higher inflation might increase noise of price signals and thereby induces serious inefficiencies. Reducing inflation uncertainty can mitigate these inefficiencies. If the ECB will be able to credibly commit to a higher target will be discussed in the next section.

### **3.3 The Inflation Rate and its Volatility**

In the last section we discussed the impact of inflation uncertainty. It has been argued that the inflation rate might become more volatile and less predictable at

higher levels, a suggestion that goes back to Friedman (1977). He claimed that the people's uncertainty about the inflation regime in times of high inflation would induce a volatile inflation rate.

It seems questionable to us if this argument applies to the case of the ECB raising the inflation target to a higher but still single digit number. Nevertheless it is likely that expectations of economic agents would not adapt instantaneously with the regime change, but that there would be a transition period in which wrong expectations of price dynamics would cause inefficient allocations. Evans and Wachtel (1993) find strong evidence for this in US data.

After this transition period it is improbable that the higher rate of inflation would still increase its uncertainty. Several studies have tried to measure the link empirically. Kontonikas and Caporale (2009) find that correlation between the inflation rate and its uncertainty has become smaller over the last decades and has even become negative in several countries since the introduction of the Euro. Hartmann et al. (2009) find supporting evidence for the claim that the introduction of the Euro has reduced inflation uncertainty in member countries.

As the literature cannot establish the strong link that was suggested by Friedman, we conclude that the higher target would not impede planning further through increased uncertainty in the long run. The regime shift might though generate inefficiencies in the short run. If any inflation regime shift should be done at all, we recommend therefore a smooth and clearly communicated increase of the inflation over a prolonged period of time.

### **3.4 Inflation as a Distortionary Tax**

Changes in inflation redistribute wealth between creditors and debtors whenever repayments are not inflation-indexed. Although we assume the nominal interest rate to adjust in the medium term to a new target, those contracts or bond purchases

that were made before the announcement will be mispriced ex-post and harm creditors.

We discussed already the effects on government debt and mentioned two opposed effects: On the one hand the reduction of sovereign debt, which we believe to be beneficial, even when taking into accounts the losses of creditors. On the other hand the problem of “moral hazard,” which we see as serious threat.

In the private economy the “moral hazard” issue seems to be smaller, although the raised inflation target might signal that collapses after credit booms will always be mitigated by higher inflation, thereby reducing the downside for debtors. More important though, there is no obvious benefit in redistributing money from creditors to debtors, as opposed to a sovereign debt reduction. It acts here only as a distributional tax that distorts market allocations.

As Issing (2001) points out, increased inflation might have real effects whenever creditors and debtors are inherently different. A redistribution of wealth from less to more risk-averse individuals will for example change the aggregate investment pattern of the economy.

Although we regard this distribution as a negative side-effect of an increase in the inflation target, they remain temporary: As soon as the new stable level of inflation has been reached, nominal interest rates will adjust to it and from then on contracts will take the new inflation expectations into account. This argument relies again on the assumption that inflation uncertainty will not rise with a higher target.

Inflation also acts as a tax on direct money holdings. People will therefore try to hold less money, which induces the so called “shoe-leather costs”, referring metaphorically to the fact that people wear off their shoes as they have to go more frequently to the bank to withdraw money. More important in this context is of course the time this takes and the transaction costs it causes. This effect is not temporary and will obviously worsen with a higher inflation target. Most empirical



research suggests though that these costs will be insignificant for rates of inflation below 5%.<sup>8</sup>

### **3.5 Distortions in the Tax System through Inflation**

Inflation has also distorting effects in the tax system. We shall discuss here the two most important channels through which this works: The tax income bracket effect and the distorted taxation of nominal capital gains.

Modern tax systems are known to distort market prices even without inflation, as only lump-sum taxes would be non-distorting, but fairness arguments imply that taxation should be progressive. Most modern tax systems exhibit nominal income ranges in which certain marginal taxation schedules apply. Marginal taxation tends to become higher the higher the income range lies. When these tax income brackets are not adjusted constantly, inflation will reduce the real value of the taxation thresholds, implying that ever lower real incomes will be exposed to higher marginal taxation. If the adjustment frequency of the tax income brackets will not rise with a higher inflation target, this “cold progression” will become worse. We see though no reason for not adjusting nominal brackets regularly and conclude that this effect is politically desirable.

The other distorting effect of inflation, which is the more prominent one, is the fact that inflation reduces the real net-of-tax returns on savings. As income taxes apply to the nominal interest rate, inflation increases tax payments since they are also levied on the inflation part of the nominal interest rate.<sup>9</sup>

Empirical research suggests that the distortions which inflation causes in the tax system are significant and harmful. Feldstein (1997) estimates for the US that a reduction of the inflation rate from 2% to 0% would increase welfare by 1% of GDP.

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<sup>8</sup> See for example Lucas (2000), Sinn (1999) and Chadha et al. (1998).

<sup>9</sup> Feldstein (1999) gives a survey of the literature on this effect.

For the Euro Area, the IMF (2002) states, that a reduction of the target from 2% to 1% could increase welfare by 1%. Palenzuela et al. (2003) survey further evidence that points in a similar direction.<sup>10</sup>

Accepting the surprisingly high level of the estimated welfare losses, we see the distorting effects of inflation in the tax systems as an argument to oppose a higher inflation target.

#### **4. Conclusions and Policy Recommendation**

In the preceding chapters we have presented both the grease and sand effects of an increase in the inflation target. We found that a higher rate of inflation can increase the room for monetary maneuvering by mitigating the threat of falling into a liquidity trap when facing a negative real shock. Despite concluding the EMU was not in a liquidity trap during the recent crisis, we still observed that nominal interest rates dropped close to zero, suggesting that the ECB reached the limits of its maneuvering space. A higher inflation target will increase the strength of this monetary buffer for the next crisis.

The current crisis has also brought to light the heterogeneity within this currency union. We find that persistent inflation differentials are a major cause of real exchange rate movements that have distorted competitiveness among member countries. We argue that a target of 3% to 4% will ease the convergence process, as it is closer to the built-in inflation rate of countries like Greece and Spain. This will be though only a transitory benefit.

More importantly, we suggest that a higher target will permanently improve the flexibility of European labor markets in the face of negative real shocks. It does this by facilitating real wage cuts in the presence of nominal downward wage rigidity. Empirical studies that take this argument into account suggest that an inflation rate

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<sup>10</sup> All estimates are though based on the same empirical framework developed by Feldstein (1997).

of at least 3% to 4% would be optimal in the Euro Area. Our own rough calculations support this result.

Lastly, some politicians may see another benefit of higher inflation for its effects on debt levels and dynamics. Most importantly, higher inflation will reduce the real value of the outstanding debt. Additionally, it lowers the primary deficit via additional seigniorage revenues. These benefits are a double-edged sword, as their presence creates moral hazard.

Although these arguments make a clear case for raising the target, we have also identified several costs that give us pause. Firstly, the change itself may harm the ECB's credibility that has been successfully established since the introduction of the Euro. We believe though that this will not be the case if the new target is rolled out with clarity and transparency.

As a more serious threat, higher inflation will increase the frequency with which nominal prices will need to be updated. This will not only impose additional costly price adjustments on producers, but the fact that these adjustments are asynchronous distorts market signals and cause inefficient resource allocation. We argue though that the noise in price signals will not increase with inflation, as there will be a corresponding increase in frequency of price adjustments.

It has been argued that a higher inflation rate increases its volatility. This is harmful as increased uncertainty causes consumer surplus losses and makes planning more difficult. We show that empirical evidence cannot establish a conclusive link between the inflation rate and its volatility. However, during the transition period after the regime change, expectations of economic agents will not adapt instantaneously and thereby uncertainty will arise. Therefore, we argue for a smooth and clearly communicated increase in the inflation rate over a prolonged period of time.

A change in inflation has two further distortionary effects, namely the redistribution of wealth between debtors and creditors and its impact on the tax system. The first one only occurs until all old debt is repaid, while the second is lasting whenever tax income brackets are not adjusted regularly and capital taxation is not changed. We see no reason why these adjustments should not occur.

Having analyzed the grease and sand effects of an increase in the inflation target, we conclude that the ECB should raise the inflation target to 3% to 4%. Beyond this level, the marginal benefits decrease and the sand effects outweigh the grease effects.

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