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# Is there scope for inflation differentials in EMU?

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## 1. INTRODUCTION

Economic and Monetary Union (EMU) entails the de facto disappearance of bilateral exchange rates between the participating countries and the establishment of a single monetary policy managed by the European Central Bank (ECB). The independence of the ECB and its primary objective of price stability mean that the future European inflation rate can be expected to be similar to that of the countries that have historically enjoyed greater monetary stability. This, moreover, is what the nominal convergence that has taken place in recent years would suggest.

Nonetheless, the existence of a single monetary policy does not rule out the possibility of inflation differentials within EMU. EMU eliminates monetary divergences, but this would only entail a uniform rate of inflation if it is accepted that inflation is a purely monetary phenomenon. However, even with a common currency, differences will persist in the economic structure, growth rate and labour and product markets of each country. These real factors have effects on the relative prices between countries, and may generate lasting inflation differentials.

The purpose of this article is to explore the role that real factors may play and to quantify the magnitude of the potential inflation differentials between countries within EMU. It must be emphasised however, that the differentials are calculated by extrapolating past trends, so that the significant effects that monetary union may have on the workings of the national economies are not taken into account. Consequently, the estimates presented may be taken as an upper limit to the differentials that may arise in Stage Three of EMU.

The following section describes the mechanism whereby inflation differentials may arise within a monetary union, and afterwards the results of the estimation are presented. Finally, the results are briefly interpreted and evaluated for the case of Spain.

## 2. SECTORAL PRODUCTIVITY AND INFLATION DIFFERENTIALS

To explain the real components of inflation, a brief theoretical digression on the determi-

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(1) This article is a summary of the Banco de España Working Paper (no. 9823) with the same title, written jointly with Timo Tyrväinen.

nants of the real exchange rate is useful. The real exchange rate (*rer*) is defined (in logarithmic terms) as the difference between foreign prices ( $p^*$ ) and domestic prices ( $p$ ). Foreign prices are expressed in domestic currency by adding to them the logarithm of the nominal exchange rate ( $e$ ):

$$\text{rer} = (p^* + e) - p \quad [1]$$

An increase in *rer* implies a depreciation of the real exchange rate, i.e. a fall in the relative prices of domestic products. It is often assumed that, in the long run, divergences in prices between countries are exactly offset by changes in the nominal exchange rate, in such a way that the real exchange rate remains constant. Thus, the currency of a country with a systematically higher inflation rate appreciates continuously against those of countries with lower inflation. Note that this argument rules out the possibility of permanent differences in the inflation rates of the EMU countries, given the absence of the nominal exchange rate.

Nonetheless, the hypothesis that the real exchange rate is constant in the long run is usually refuted by empirical evidence (2). The assumption underlying this hypothesis is that prices are determined exclusively by monetary factors and that real factors are not relevant, except in the short run. This view is hardly plausible when we recall that countries grow at different rates, have different productive structures and that their markets do not work in exactly the same way. Without doubt monetary factors play a dominant role in the determination of prices and the nominal exchange rate, but these real differences must also affect relative prices between countries, i.e. the real exchange rate.

This notion has been used in some theoretical models of the real exchange rate to explain its long-run trends. Among these, the most well known proposition is that of Bela Balassa and Paul Samuelson, based on the idea that technological progress has different effects on sectoral productivity. In particular, their model distinguishes between two sectors: the tradables sector (T), consisting mostly of commodities and manufactures, characterised by its openness to foreign competition, and also by its capital-intensive production processes; and the non-tradables sector (NT), consisting mostly of services, which is less exposed to competition and tends to be more labour-intensive. The compensation of each factor depends on its contribution to the productive process, so that real wages are determined by the productivity

of labour (the variable *prod*). If we use  $w_T$  and  $w_{NT}$  to denote nominal wages in the two sectors, then it follows that relative prices between the sectors depend on productivity and nominal wages:

$$p_T = w_T - \text{prod}_T ; p_{NT} = w_{NT} - \text{prod}_{NT} \quad [2]$$

Given, on the assumptions of the model, that productivity increases are determined by technical progress, that technology is embedded in capital and that, as mentioned above, the tradables sector is typically more capital intensive, it is reasonable to think that productivity growth will be higher in that sector. If, moreover, labour is assumed to be mobile, nominal wages will tend to equalise between sectors in the long run. On these assumptions the above expression implies the so-called productivity hypothesis, whereby prices in the services sector will tend to grow more than in the tradables sector:

$$p_{NT} - p_T = \text{prod}_T - \text{prod}_{NT} > 0 \quad [3]$$

Chart 1 shows, in the first two graphs, sectoral productivity in two of the countries considered: Germany and Spain. It can be seen from the chart that the productivity hypothesis holds in both countries, since productivity grows more, and prices less, in the tradables sector. However, to derive more precise estimates, which enable us to make inferences on the divergences in inflation between countries, a more formal econometric analysis is required, based on the long-run statistical (cointegration) relationships between the variables. Moreover, the econometric specification is based on two further considerations: first, the theoretical model – derived in detail in the paper referred to in footnote 1 – gives rise to a formally more complex relationship between prices and productivity, which must be verified by the empirical evidence; second, as seen in Chart 1, the behaviour of wages does not seem to bear out the assumption of uniformity, so that in the long-run statistical analysis sectoral wages are also taken into consideration.

On the basis of these premises, the statistical analysis reveals a robust long-run relationship between sectoral productivities and prices for each of the countries. That said, how can this productivity hypothesis be translated into inflation differentials between countries?

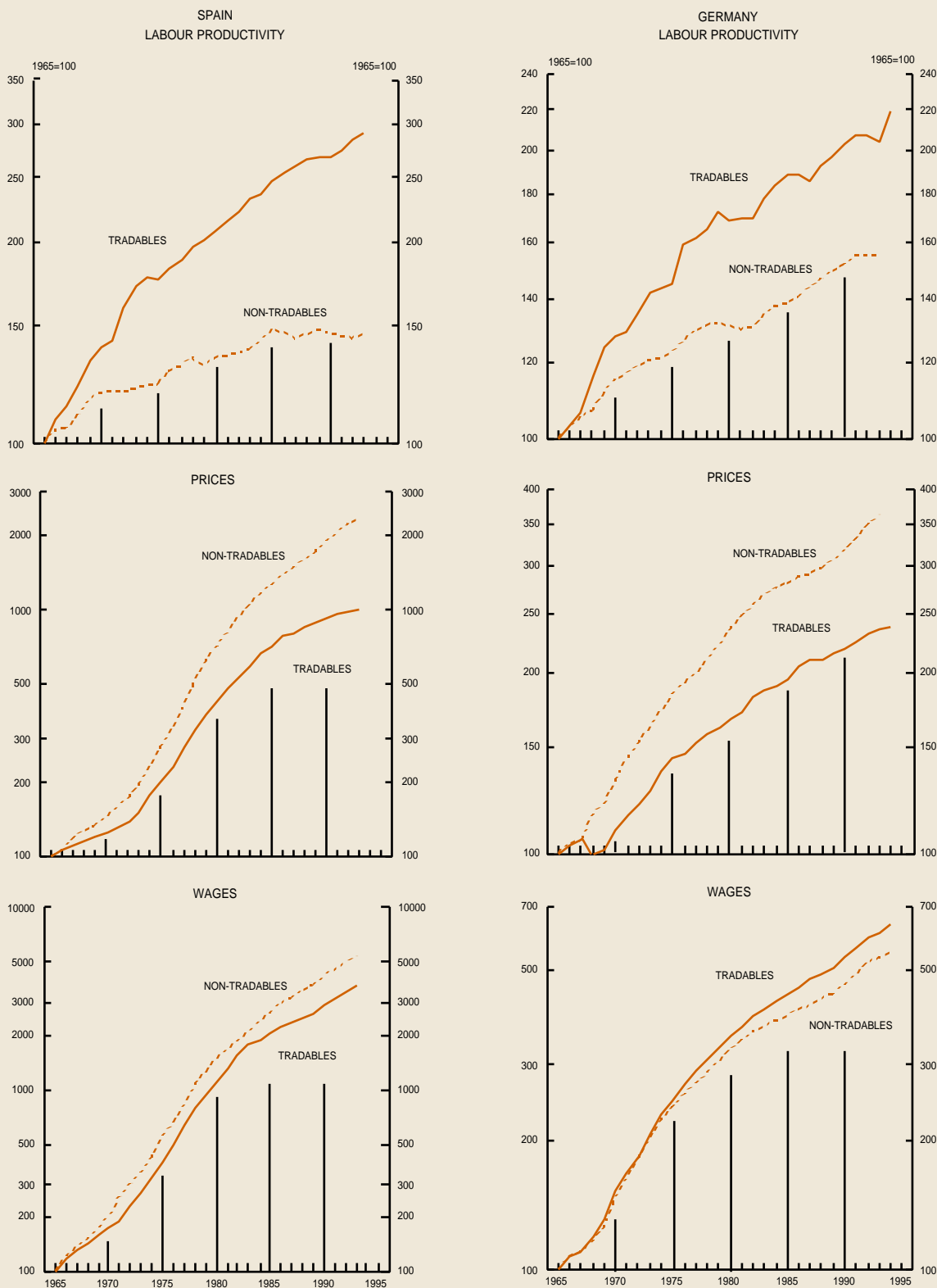
Starting from the definition of the real exchange rate and considering that each country's price index is a weighted average of the prices of tradables and non-tradables, it is simple to express the real exchange rate in terms of the sectoral prices in each country:

$$\text{rer} = [p_T^* + e - p_T] + [(p_{NT}^* - p_T^*) - (p_{NT} - p_T)] \quad [4]$$

(2) See, for example, Rogoff (1996), for a summary of the evidence and a number of qualifications to this result.

CHART 1

Sectoral productivity, prices and wages



Source: OECD.

where  $\alpha$  is the proportion of non-tradables, which is assumed to be the same in each country. Competition in the tradables sector at the international level helps ensure that the prices of these goods, expressed in a common currency, tend to be the same in each country ( $p_T = p^*_T + e$ ). Given, also, that the nominal exchange rate is irrevocably fixed in EMU, changes in the real exchange rate are equivalent to the inflation differential between countries. This differential can be written as:

$$p - p^* = \alpha [(\text{prod}_T - \text{prod}^*_T) - (\text{prod}_{NT} - \text{prod}^*_{NT})] \quad [5]$$

Note that the inflation differentials are positively related to productivity differentials in the tradables sector, and negatively to those of the non-tradables sector. The intuitive explanation of this result is as follows. Nominal wages in both sectors are determined domestically and, if they grow at similar rates, the differences in productivity between sectors will be reflected in differences in sectoral inflation (3). As seen in Chart 1, productivity growth tends to be higher in the tradables sector and, as its prices are determined abroad, these productivity gains will be reflected, basically, in nominal wages. By contrast, the non-tradables sector, with its slower productivity growth, can accommodate wage pressure by increasing its prices. It follows from all this that the inflation of non-tradables will be higher in those countries in which the productivity of tradables grows most and, given that inflation in tradables is the same in all countries, these countries will have the highest rates of inflation in EMU.

### 3. ESTIMATION OF INFLATION DIFFERENTIALS

The long-run relationship obtained in the empirical analysis enables the real component of inflation differentials to be isolated. Unlike the monetary component, the real one will not disappear as a consequence of the adoption of a common currency and monetary policy. Trends in sectoral productivity and their international differences thus constitute an indicator of the potential differences in inflation between the participating countries. By extrapolating these trends, on the assumption that the prices of tradables grow at the same rate in all countries, an approximation to the differences in inflation may persist in the euro area can easily be obtained.

(3) The divergence in wages observed in the empirical evidence is not so significant as to change these conclusions.

Chart 2 shows the results of this exercise. As can be seen, inflation – calculated in annual terms – could vary between the countries significantly. Finland is the country with the smallest real component in its inflation (about one percentage point below the area average), while Spain stands out as the country with the most pronounced inflationary pressures from the real sector (1.6 % above the average for the area). Comparing with Germany, it can be seen in Chart 1 again, that productivity growth in the non-tradables sector is similar, but that productivity growth in the tradables sector is rather higher in the case of Spain. According to the model, this difference should translate into a positive potential inflation differential for Spain, as is in fact the case.

It should be underlined that the resulting ranking of the countries does not generally correspond to the historical experience in Europe. A relatively low inflation rate is estimated for countries with little tradition of price stability (such as Italy and, in particular, Finland). By contrast, the Netherlands and Belgium have relatively high inflation rates. The reason, as already pointed out, is that the exercise focuses on real factors, in particular on the relationship between productivity and sectoral prices, ignoring monetary factors, which have dominated trends in relative prices in the past.

### 4. FINAL COMMENTS

The empirical support for the productivity hypothesis implies that inflation differentials could persist after the transition to EMU, as illustrated by this exercise. Nonetheless, the normative implications are not obvious and depend on the interpretation of the results.

A first interpretation relates these differentials to real convergence. To the extent that greater growth also involves higher productivity growth it is to be expected that countries which grow faster will have higher inflation rates in EMU. This is clearly an optimistic view of inflation differentials within EMU, since they would be explained by a desirable process of real convergence (4).

However, there is a more worrying interpretation. As mentioned above, firms in the non-tradables sector can more readily pass cost increases – in particular, wage increases – through to prices, giving rise to higher sectoral inflation.

(4) Note that, in the model, the price of tradables, which may be considered a measure of competitiveness, is equalised between countries, so that higher inflation need not generate competitiveness problems.

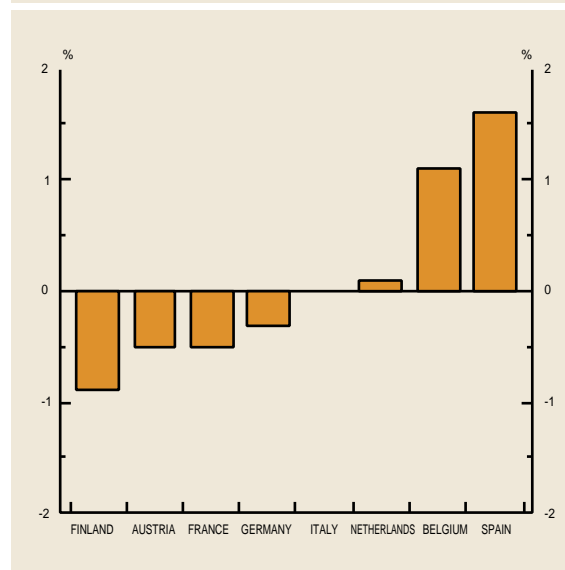
At the same time, in some countries, such as Spain, wage bargaining in each sector is not independent, so that wage pressures may be passed through to the tradables sector. In this case, the productive units of that sector would lose their external competitiveness and, in the long run, adjust their workforce, or simply shut down, thereby increasing apparent productivity, not for the positive reasons we saw above but rather owing to an inadequate functioning of markets.

In fact, recent Spanish experience leads us to suspect that a significant part of the observed productivity and inflation differentials is explained by this type of behaviour: lack of competition in the service sector and labour market rigidities. That said, EMU might be conducive to greater price flexibility in labour and product markets, since agents and regulators are aware that losses of competitiveness cannot be offset by devaluations. This fact may, if this second interpretation is correct, prompt a change in the behaviour of sectoral productivity differentials, so that they generate lower inflationary pressures than those reflected in the estimates for the inflation differential in Spain. In any event, it is clear from this analysis that further structural reforms are necessary in labour and product markets to reduce the real costs involved in the process of adjusting to the new economic environment.

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CHART 2

**Estimated inflation differentials within EMU  
Simulation exercise**



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