
Persistent inflation differentials in Europe

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1. INTRODUCTION

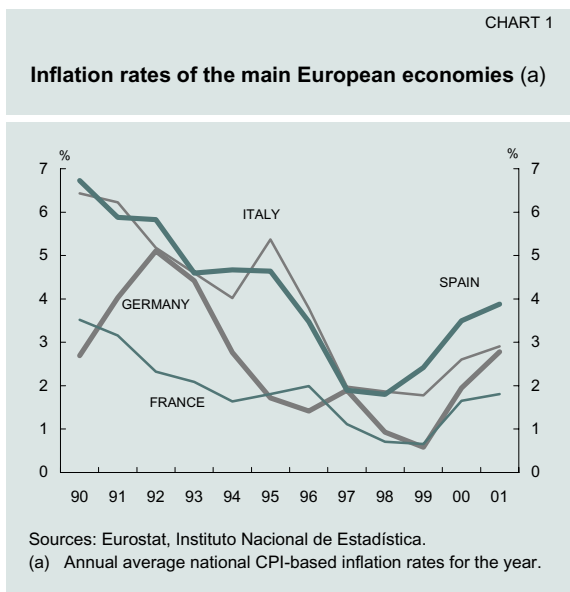
In recent years there has been a widespread decline in inflation rates in the euro area countries, accompanied by the progressive convergence of such rates. However, the differences between these inflation rates have not only not disappeared but have in fact held stable since the start-up of Economic and Monetary Union (EMU). Chart 1 highlights the persistence of these differentials between the main euro area economies during the past decade.

Numerous studies in recent years have addressed the inflation differentials between countries. According to the Balassa-Samuelson (B-S) hypothesis, inflation differentials are directly linked to developments in each economy in respect of relative prices in their sheltered or non-tradeable sectors as opposed to their tradeable sectors. These relative prices, in turn, are linked to differences in productivity across the various sectors. As a result, inflation differentials do not necessarily entail changes in the relative competitiveness of economies, as it is the most inflationary countries which see the highest growth in relative productivity.

This article reviews the empirical evidence over the past two decades for Spain, Germany, Italy and France, breaking down changes in relative prices between tradeables and non-tradeables into relative changes in markups, labour costs and labour productivity. The analysis focuses on studying whether there are persistent differences – and their source – in the long-term growth of relative prices between the main European economies and, in particular, whether the effect of changes in relative productivity is, as the B-S hypothesis indicates, predominant. Were this not the case, inflation differentials might be reflecting changes in the relative competitiveness of European economies. Section 2 presents the analytical framework used and the data employed. Section 3 describes the results obtained from exploring the data, and section 4 draws some conclusions.

2. ANALYTICAL FRAMEWORK AND DATA USED

Under the B-S effect, different tendencies in relative prices between two countries translate into changes in the real exchange rate or, in the case of a monetary union, into inflation differentials. The real exchange rate can be expressed, in logarithms, as $p_t - p_t^* - e_t$, where p_t y p_t^* re-



spectively represent the general levels of domestic and foreign prices and e_t is the nominal bilateral exchange rate. Using the breakdown of the general level of prices into prices in the tradeable (T) and non-tradeable (NT) sectors, $p_t = \gamma_t p_t^{NT} + (1-\gamma_t) p_t^T$, where γ_t is the proportion of non-tradeables in total nominal value added, the real exchange rate can be rewritten as:

$$p_t - p_t^* - e_t = (p_t^T - p_t^{*T} - e_t) + \gamma_t (p_t^{NT} - p_t^T) - \gamma_t^* (p_t^{*NT} - p_t^{*T}) \quad [1]$$

The pass-through of persistent differences in the growth of two countries' relative prices to persistent changes in their real exchange rates, or to persistent inflation differences under monetary union, therefore resides on a significant assumption: namely, that in the long run, purchasing power parity (PPP) holds in the tradeable sector. In statistical terms, this means that the first addend in equation [1] is stationary. The fulfilment of this assumption is in itself an important matter which is not addressed in this work (1).

Under the assumption of imperfect competition in the goods markets, the price of each sector is determined as a markup (μ_t) on the marginal cost, i.e. on the ratio of the nominal unit wage (w_t) to marginal labour productivity (mpl_t). Expressed in logarithms, we obtain the following expression for the setting of sectoral prices: $p_t = \mu_t + w_t - mpl_t$.

(1) Notably, however, Canzoneri et al. (1999) find that this stationarity hypothesis cannot be rejected for the main European economies vis-à-vis the Deutschmark but that it is nonetheless clearly rejected when the exchange rate is used against the US dollar, in keeping with the results found in many other papers.

Relative prices in the non-tradeable as opposed to the tradeable sector will, therefore, be determined as follows:

$$p_t^{NT} - p_t^T = (\mu_t^{NT} - \mu_t^T) + (w_t^{NT} - w_t^T) + (mpl_t^T - mpl_t^{NT}) \quad [2]$$

Long-term developments in these three components will determine the course of relative prices. Thus, persistent differentials in their long-term growth across countries will give rise to different relative price tendencies. So as to understand how important these factors can be in the generation of persistent inflation differentials in the euro area, recent developments in these factors should be analysed.

The data used are drawn from the OECD sectoral annual database STAN for Germany, France, Italy and Spain (2). The sample period available ends in 1999 for France and in 2000 for Germany, Italy and Spain. The tradeables sector includes agriculture and manufacturing, and the non-tradeable sector private market and non-market services. For each sector and country, the price is proxied with the value-added deflator and the nominal unit wage with the total compensation of wage-earners divided by the number of wage-earners.

Assuming Cobb-Douglas production functions, marginal labour productivity in each sector is proportionate to its average productivity, $mpl_t = \alpha + y_t - l_t$, where α is the logarithm of the proportion of labour in output, y_t is the logarithm of output and l_t is the logarithm of labour. Output is proxied using gross value added, and labour using the number of employees.

The sectoral markup is not observable and is calculated as a residual of the other variables, i.e. $\mu_t = p_t - [w_t - (\alpha + y_t - l_t)]$. It is often assumed that α is equal in all sectors, whereby it is not necessary to calculate them to study relative productivities. However, for all the countries analysed, α differs greatly from the tradeables to the non-tradeables sectors, although it is relatively stable over time in all of them. Since what is at issue here are medium- and long-term trends in prices, markups and sectoral and relative productivities, we can obviate calculation of the sectoral α by expressing all the variables as a percentage change on the first sample figure.

(2) This database is an update of the OECD's former ISDB sectoral database, using all the recent methodological changes, such as the conversion to ESA 95. The Spanish data have not yet been updated in STAN. The most extensive sample available for Spain begins in 1986 and is drawn from ISDB, and has been extended from 1995 with the growth rates of equivalent variables from Eurostat (ESA 95).

3. RESULTS

On the basis of expression [2], the changes in relative prices in a country's non-tradeable sector can be broken down into changes in markups, relative wages and relative marginal productivities, as follows:

$$\begin{aligned} \Delta (p_t^{NT} - p_t^T) &= \Delta (\mu_t^{NT} - \mu_t^T) + \\ &+ \Delta (w_t^{NT} - w_t^T) + \Delta (mpl_t^T - mpl_t^{NT}) \end{aligned} \quad [3]$$

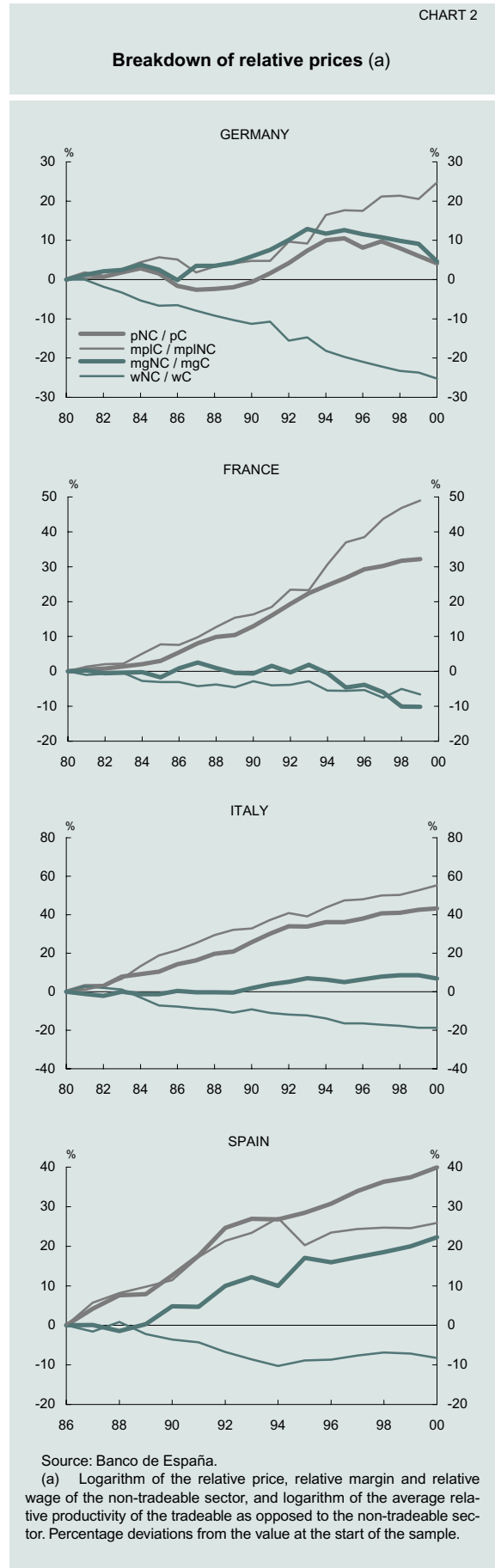
Recall that, under the assumptions of Cobb-Douglas production functions and constant sectoral α , marginal labour productivity is proportionate to average labour productivity and, therefore, the last term of the preceding expression is equivalent to the change in relative average productivity.

The B-S effect predicts that, in the long run, the growth of relative prices is due to the growth of relative labour productivity. This result is obtained if both perfect competition in the markets for goods ($\mu_t = 0$) and equal wages across sectors ($w_t^{NT} = w_t^T$) are assumed. Likewise, this would be derived with the less strict assumption that both relative markups and relative wages, or both in conjunction, are stationary.

For a panel of OECD countries, Canzoneri et al. (1999) show that both relative prices in the non-tradeable sector and relative average labour productivity in the tradeable sector are non-stationary in the long run. They further find evidence of cointegration between relative prices and productivities (3). This result entails accepting the B-S hypothesis that the long-term trend of relative prices is attributable to the long-run trend behaviour of relative productivities. But it differs from the usual interpretation in that the long-term growth of average relative productivity, unlike the total relative productivity of the factors to which the B-S model refers, includes both relative productivity gains in the tradeable sector and changes in relative sectoral demand, i.e. not only a build-up of relative supply shocks but also of relative demand shocks.

The foregoing aggregate result may, however, mask differing behaviour from country to country. Chart 2 depicts the relative prices of non-tradeables (p^{NT}/p^T) along with relative productivities (mpl^T/mpl^{NT}), relative markups (mk^{NT}/mk^T) and relative wages (w^{NT}/w^T), for

(3) According to the Balassa-Samuelsom effect, the expected cointegration coefficient would be strictly unitary. Canzoneri et al. (1999) find a coefficient close to but less than unity for most countries, reflecting the fact common to many economies that relative productivity shows much swifter growth than relative prices.



Germany, France, Italy and Spain. Over the past two decades, and for most of the countries analysed, relative prices and productivities alike appear to be on a rising trend. However, this chart also indicates that the evidence in favour of the B-S hypothesis is far from conclusive. Relative prices show considerable and persistent deviations from relative productivities.

According to expression [3], these persistent deviations would be due to one or both of the following reasons: a) markups trending differently in the non-tradeables as opposed to the tradeables sector, i.e. $\Delta (\mu_t^{NT} - \mu_t^T) \neq 0$, and b) the different trend of sectoral wages, i.e. $\Delta (w_t^{NT} - w_t^T) \neq 0$, in each country. The first instance would contravene the assumption underlying the B-S hypothesis of perfect competition, and the second that of sectoral wage equalisation.

Moreover, these deviations, insofar as they persist and their intensity differs from country to country, will be generating cross-country differentials in the trend of relative prices and might therefore cause changes in the relative competitiveness of the various countries. Further, if the deviations remain in place under EMU, they might cause persistent inflation differentials. In this case, they would not be in response to equilibrium adjustments but would rather be reflecting rigidities in the goods or labour markets.

Until the mid-nineties, the trend of relative prices in Germany, France and Spain seems similar, in the medium and long run, to that of relative productivities, in keeping with the B-S hypothesis. In France, moreover, this is so, as the B-S model predicts, because both relative wages and markups show no trend but are stationary. In Germany and Spain these variables are clearly not stationary, but the rising trend of relative markups largely offsets the ongoing decline in relative wages.

In the case of Italy, however, the trend of relative prices and productivities appears to be equal throughout the period, except in the mid-eighties, when relative prices grew less than productivities due to a heavy fall in relative wages unabsorbed by growing relative markups. Thereafter, the continuous but milder decline in relative wages was actually reflected in bigger relative markups, resulting in the B-S hypothesis holding sustainedly.

From the mid-nineties, relative prices and productivities diverge in Germany, France and Spain. It is further worth noting how these deviations are persistent and of a different intensity and indeed sign from country to country.

In the case of Germany, the trend of relative prices changes radically after reunification, with that of relative productivities or that of relative wages scarcely shifting. In the immediate post-reunification years the growth of non-tradeables' relative markup quickens, owing to the fact that the markup of the sector exposed to foreign competition declines sharply. It should not be forgotten, however, that markups are estimated residually; consequently, other factors not explicitly envisaged in the derivation of equation [3] might be being captured. The relative markups of non-tradeables grew as markups in the sector exposed to foreign competition declined, probably to offset, in part, the appreciation of the Deutschmark in 1991. As German competitiveness improved, the relative markups on its non-tradeables progressively fell, correcting the previous increase. This turnaround in relative markups compounded the persistent negative trend of relative wages, giving rise to the trend witnessed in relative prices.

In France, the deviation in trends arose further to an acceleration in labour productivity in the tradeables sector. The greater growth in relative productivity in tradeables from the mid-nineties was not offset by a readjustment of relative wages but fed through rather and mainly to a fall in relative markups in the non-tradeables sector. This persistent fall in the relative markups of non-tradeables explains how the change in relative productivities did not translate in full into a greater relative price of non-tradeables. The resulting persistent deviation in respect of the B-S hypothesis might explain, in part, France's lower inflation rate compared with the other countries during this period.

The case of the Spanish economy is virtually the opposite of that of France. As from the last recession, which began in 1993, the productivity in tradeables has fallen persistently, leading to the observed decline in the relative productivity of this sector compared with non-tradeables. As wages have responded in but a very limited fashion to this turnaround in the productivity of the tradeables sector, the associated relative unit labour costs – measured as the ratio of wages to productivity – have grown substantially. However, this increase in unit costs in the sector exposed to foreign competition has been offset by a persistent shrinkage of markups in this sector, whereby we have observed a significant increase in the relative markups in non-tradeables as opposed to tradeables.

Consequently, the decline in relative productivity in Spain in the recent period is not reflected in a change in the trend of relative prices. The sustained growth of relative markups in the non-tradeables sector, principally, along with

the disappearance of the decline in relative wages, accounts for the persistent deviation from the B-S prediction during the years prior to EMU. Unlike in France, this deviation might, in part, be the cause of the higher inflation rate in Spain compared with the other countries analysed.

4. CONCLUSIONS

Following the start-up of EMU, inflation differentials between the Member States have continued to be observed. The Balassa-Samuelson hypothesis associates, under certain assumptions, durable changes in the real exchange rate, which would be reflected in persistent inflation differentials under monetary union, with differing trends from one country to another in the prices of the sector sheltered from foreign competition as opposed to those in that exposed to such competition. The B-S hypothesis further sustains that these different trends are due, in the long run, to the fact that productivity in the tradeable as compared with the non-tradeable sector grows more quickly in one country than in another.

This article shows that, in the long run, relative prices trend similarly to relative productivities in the main European economies. However, it also shows how these economies have, in the years prior to the start-up of the single monetary policy, experienced persistent divergences from the Balassa-Samuelson hypothesis. Rela-

tive prices in the tradeable as compared with the non-tradeable sector have evidenced a markedly different trend from that of relative productivities in the tradeable sector. These divergences have been due, in certain countries, to persistent changes in relative wages, as in the case of Italy during the eighties, while in others they have been attributable to persistent changes in relative markups, arising further to a change in the trend of relative productivities, as in Spain and France in the second half of the nineties, or in Germany since reunification.

Insofar as these persistent changes in relative wages or in relative markups differ in intensity and are even of differing signs from one country to another, and inasmuch as such differences are maintained, they might be generating inflation differentials under monetary union. These differentials not only respond to possible equilibrium adjustments but also reflect rigidities in goods or labour markets that might affect the relative competitiveness of each economy and, therefore, their growth potential.

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