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MODEL BASED MEASURES OF CONTEMPORANEOUS ECONOMIC GROWTH

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Abstract

In short term economic reports the use of different growth rate measures is misleading. This paper studies the question of using an unique measure -underlying growth-, which should be smoothed and in phase with the monthly increments of the corresponding variable. All possible solutions require the use of forecasts at the end of the sample. The paper proposes the use of models to obtain forecasts; then the contemporaneous underlying growth is a model based measure. An evaluation of the effects of the last innovations in the underlying growth can be obtained by comparing its last estimation with previous one. An example of its application, based on inflation analysis, is presented.

Key words: Short Term Economic Analysis, Signal Extraction, Inflation, Trend, Economic Forecating.

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1. INTRODUCTION

Bearing in mind the present state of theoretical knowledge on economic relatioships and bearing in mind the information available for economic facts, one finds that a short term economic analysis always has a subjective component, of more or less importance, the guarantee of which is the professional authority of the writer of the report.

This subjective contribution must be backed as much as possible by economic theories which are sufficiently widely accepted and must also be channeled within an analysis strategy which can discipline it and force it to be consistent over time. Likewise, this strategy must restrict the development of the subjective contribution to make it be carried out on the basis of sufficiently valid basic quantitative results, which must not be ignored by the analysts. Both things, analysis strategy and the set of quantitative basic results, contribute to increase the report's guarantee of objectivity, and to make it possible, where necessary, to determine the final causes which lead two analysts of the same phenomenon to different diagnoses.

As far as basic quantitative results are concerned, we find that they are obtained from statistical-econometric models and from statistical signal extraction procedures, as a result of which these results have been scientifically tested and can, therefore, constitute the basis around which an economic report is built. Consequently, we shall call such basic quantitative results the quantitative core of the short-term economic analysis.

In this paper a methodological plan is presented to be followed when preparing the quantitative core with reference to a specific economic phenomenon. The methodology is described by basing it fundamentally on univariate models, but it is applicable to situations where a single equation econometric model is available on the phenomenon under study. Furthermore, in subsequent sections the methodology developed in this work is referred to phenomena for which monthly series are available; adaptation to the case of quarterly series is more or less immediate.

Section two reviews the main results of signal extraction applied to time series. This review points out the use and general acceptance of the canonical requisite as a normalization condition for obtaining an unique decomposition, as it is very related to the controversy of employing seasonally adjusted series or trend in applied analysis.

This controversy is the main topic of section three, where it is proposed the use of trends and the reasons for doing so are discussed. In section four a particular way of measuring underlying growth in an economic phenomenon is recommended. Section five is devoted to discuss how to assess the current situation of an economic phenomenon by using the recommended growth estimates. An emphasis is made of the importance of revisions, as they permit to evaluate the innovations' impact on what is one of the most important aspects of an economic variable: its underlying growth. The last section of the paper illustrates the application of the whole methodology to the analysis of inflation in EEC countries, USA and Japan.

2. TIME SERIES DECOMPOSITION AND SIGNAL EXTRACTION THEORY

The signal extraction problem applied to economic time series it is usually faced as one in which given an observed series X_t, the analyst wants to decompose it in three unobserved components, T_t, S_t and I_t, that are related with X_t according to the following expression:

$$X_t = T_t + S_t + I_t = SA_t + S_t . \qquad (1)$$

Component T_t must capture the long run evolution of the observed series, and it is denominated as trend; S_t is the so-called seasonal component, and reflects seasonal oscillations of X_t; and I_t is an irregular component, which is associated with local oscillations. In many applications the trend and the irregular are aggregated obtaining a series, SA_t, which is adjusted for seasonality.

During the sixties and the seventies many empirical procedures which allowed for stochastic trend and seasonal were developed. Among them, X11 (Shiskin et al., 1967) and its variant X11-ARIMA (Dagum, 1975 and 1988) are by far the most popular. These procedures estimate unobserved components by applying different symmetric filters to the original series. However, they are not yet completely satisfactory as the filters they use do not fully depend on the specific characteristics of the series being analyzed. So in the last seventies and mainly in the eighties a new type of decomposition procedures appears. Some of them are methods based on the Reduced Form model for the observed data (Burman 1980, Hillmer and Tiao 1982), others are based on structural models for the components (Nerlove et al. 1979, Harvey and Todd 1983), etc.

The differences between reduced form and structural methods are more apparent than real. Thus if the adequacy of the ARIMA model for the original series has been thoroughly checked in the application of reduced form procedures, and if when using structural methods the models for the components have been tested against the data by checking the adequacy of the implied reduced form, then both options will lead to very similar results. Therefore in what follows we shall refer only to reduced form methods. Maravall (1987) and Maravall and Pierce (1987) provide an excellent overview of them.

The reduced form method assumes that the components are orthogonal and given by unknown ARIMA models with no common factor between them. In order to obtain an unique decomposition additional assumptions are required and the so-called canonical restriction is employed. This restriction imposes the maximization of the variance of the innovation in the irregular model or, what turns to be the same, the joint minimization of the variances of the trend and seasonal innovations. This assumption ensures that the signal - trend and seasonal - will be as close to deterministic signals as possible, and no further decomposition in another signal plus an irregular component is feasible.

From a full knowledge of the ARIMA reduced form model of X_t and a complete realization of this stochastic process the components can be estimated. In practice the true ARIMA model is unknown and only a time series up to time t is available. The knowledge of the ARIMA model can be replaced by a consistent estimation of it and still we obtain consistent estimators of the components. With respect to the fact that the data is only available up to moment t, the analyst finds that he is interested in calculating the so-called concurrent estimators of the components, i.e., estimators obtained by replacing the unknown future values of X_t by forecasts from the ARIMA model. Since the forcasting errors have a non-zero variance, there is a real loss in precision when the future is not known.

It can be shown that the lack of future observations is a serious problem when estimating the values of the unobserved components corresponding to the final part of the sample period; however, as one moves backward in time it becomes a minor problem, being almost negligible if one has three or more years of observed data at each side of the time point for which one wants to estimate the components. Later on when more data arrives one can substitute forecasts by real observations and can obtain the final estimators of the components at time t.

3. THE UNDERLYING EVOLUTION OF AN ECONOMIC TIME SERIES

In order to evaluate the performance of an economic time series, its underlying evolution must be determined. By underlying evolution we understand the path along which a series advances, once we have removed from the original data every type of short term cyclical or quasi-cyclical swings and local disturbances. This path is the really important one for assessing the evolution of the phenomenon, since the original data oscillates around it in such a way that the deviations from it are compensated. Therefore, at the underlying level certain basic peculiarities of the phenomenon, which may be difficult to observe int the original series, may be detected.

As the underlying evolution turns to be an unobserved component of the original series, its empirical determination can be posed in terms of the analysis carried out on the previous section. From our point of view, it must be defined in an operative way as the trend of the series, as the seasonal captures annual cyclical oscillations and the irregular short term disturbances.

However, the underlying evolution is usually associated with the seasonally adjusted series, which occupies the central role in applied short term economic analysis. In this section we try to show that this role should usually be played by the trend.

In any case, there is a general agreement about the fact that the seasonal pattern determined mainly by institutional factors, not related to real economic decisions, and so this component should not appear in the signal to be used for short term analysis.

The discrepancy centers on the role of the irregular component: must it be considered as a part of the relevant signal or as noise to be eliminated? We support the second point of view, which implies to eliminate the irregular from the adjusted series to use only the trend. This proposal has been also supported in Moore et al. (1981), Kenny and Durbin (1981), Espasa (1984), Espasa et al (1984), Maravall and Pierce (1986) and Box et al. (1987).

There are reasons that justify the separation of trend from the irregular component. Some of them are as follows:

I. From an Economic Theory point of view.

The relationships among macroeconomic variables proposed by the economic theory involve robust and firm signals: when discussing the relationship among money, nominal expenditure and prices, for example, concepts which do not present any type of short term oscillations are used.

As the observed series also contains short term oscillations, the analyst, when he intends to estimate the basic relationship among the underlying signals, must take account of them. With an econometric model this is done by including additional variables which explain these short term disturbances: their effect and the main relationship is then jointly estimated (the pitfalls of estimating the main relationship using previously estimated signals is well known since Wallis (1974)).

However, when univariate models, which do not relate economic variables, are used, the only way of capturing the signal is by eliminating those oscillations from the original series. So if the concepts used in economic theory are more similar to the trend than to the seasonally adjusted series, there is no reason to use this last series instead of the trend as an operative definition of the underlying evolution.

For some variables, like money, the economic theory also poses relationships that involve concepts similar to the irregular component: for instance, the relationship between changes in the interest rates and the non-systematic component of money. But this does not justify the aggregation of trend - needed for the relationship of money with nominal variables - and the irregular - related with interest rates - in order to obtain a joint signal: the seasonally adjusted series of money. Just the opposite, since both components refer to very different theoretical relationships, one would like to work with each of them separately.

II. From the Statistical point of view:

II.1 The Canonical Requisite

In section 2 it was discussed the role of the canonical restriction in signal extraction procedures. This restriction could seem arbitrary but is widely accepted: " considering that the seasonal and trend components should be slowly evolving, it seems reasonable to extract as much white noise as possible from the seasonal and trend components subject to the (other) restrictions " (Hillmer and Tiao, 1982, page 66).

Thus, if there is a general agreement in the literature about the suitability of obtaining a slowly evolving trend while concentrating most of the uncertainty on the irregular, it looks strange that, once they have been estimated, the next step turns to be their aggregation in the adjusted series. On the contrary, if the adjusted series really deserves the central role it is given, then why should one use the canonical requisite to estimate the seasonal factors ?

II.2 Measurement Errors

In short term analysis the speed in obtaining results is very important, which in turn implies that each new observation must be available as soon as possible. This need of quick results can lead to use preliminary data, which contain measurement errors.

We must take advantage of the possibility of using a new observation to update our evaluation of the performance of the variable being studied, even if this observation is a preliminary one. For most series, the measurement error contained in preliminary data is of a lesser order of magnitude than the innovation of the series, so the preliminary observation improves previous forecasts.

As far as measurement errors are near white noise in most cases, we have that after the signal extraction procedure they will concentrate mainly on the irregular, due to the canonical requisite. Therefore, if the seasonally adjusted series is taken as the chosen signal, our evaluation will be influenced by this type of error - and it is interesting to note that measurement errors have a greater effect on the adjusted series than on the original one -. On the contrary, trend will remain almost unaffected, and as a consequence the preliminary evaluation and the final evaluation based on revised data will be almost identical.

II.3 Precision of the estimates

It can be argued that the adjusted series is better than the trend because its estimation is more accurate. This is an obvious result: as the adjusted series is a contaminated series, it is estimated with a lesser variance than a more pure signal like the trend.

But this fact by itself does not invalidate the use of the trend.

a) For this argument to be valid, the greater precision in the estimation of the adjusted series with regard to the trend must compensate the greater oscillation of the former with respect to the latter: the original series is a signal estimated with zero error but still it is not considered as an adequate one for short term analysis. There is no general answer to this trade-off between estimation variance and true component variance, and each series merits a specific consideration.

b) Maravall (1986) shows that the canonical requisite entails revision errors with maximum variance. After pointing this result, he says: " This can be interpreted as the price paid for cleaning the signal. It does not seem appropiate, however, to reduce revisions by labelling as signal what is purely white noise variation " (page 740). The same can be argued in this case.

II.4 Concurrent versus Non-Concurrent Estimates

A final argument which in some circles is still put forward in favour of using the seasonally adjusted series is that the trend has to be calculated each time a new observation appears, whereas on the seasonal component an estimation can be advanced before the real data are observed. In this way when a new observation of the original series is published, any user can immediately calculate the corresponding adjusted value.

But this adjusted value is not very reliable (see, for example, Maravall, 1987). For this reason the Commission of Experts who reported in 1981 to the Federal Reserve System on seasonal adjustment techniques, pointed out in the conclusions to their work (Pierce, 1983) that such an adjustment should be done concurrently. Thus we find that each time a new observation arrives the seasonal adjustment must be updated, as is done with the trend. Consequently, there does not appear to exist any valid reason to justify not updating signals and making economic decisions on the basis of more inexact previous estimates. All decision-making processes must attempt to be made with the greatest possible amount of information, and ignoring part of it, when the costs of obtaining it are negligible, seems absurd.

4. THE UNDERLYING GROWTH

In discrete time evolutions the underlying speed or growth is calculated by comparing the underlying level in t with the underlying level in t-h, and the resulting value is defined as the underlying speed in t-u, being u=(h-1)/2. Allocation of the previous value to the moment t - centering the rates - is necessary for the evolution of underlying growth to be in phase with the monthly increments of the original series (basic growths), which we denote by m_1 and are defined as $(X_t - X_{t-1}) / X_{t-1}$. For any non-centered rate, its peaks and troughs will not coincide in time with the main peaks and troughs of the basic growths, and this can be very misleading.

In general, for institutional and climatological reasons it is worthwhile to calculate the underlying growth in annual periods, so h will be equal to one year.

For a growth rate to be relevant in short term economic analysis, it is necessary for it:

- to be related to a level signal of the phenomenon being studied
- not to show irrelevant oscillations
- to be in phase with the basic growths
- to exploit to the maximum the latest available information
- to measure annual growths

- to make it unnecessary to complete the analysis with other growth rates
- that its variance, not to be very different among different variables on which it is convenient to carry out a joint analysis.

In order to achieve as much as possible the previous characteristics we propose defining underlying growth in monthly variables as the growth of the average of the sequence of the twelve monthly values of the trend, beginning in month t for which we wish to evaluate the underlying growth, on the average of the sequence of the twelve months immediately prior to t, i.e.

$$T_{12}^{12}(t) = \frac{T_t + T_{t+1} + T_{t+2} + \dots + T_{t+11}}{T_{t-1} + T_{t-2} + T_{t-3} + \dots + T_{t-12}} - 1$$

and we call it the centered T_{12}^{12} rate of the trend.

The proposed rate can be interpreted as the result of passing through a certain low-pass filter the first seasonal difference of the (logged) trend.

In order to clarify the above assertion we can define the T_{12}^{1} rate of growth as

$$T_{12}^{1}(t) = \frac{T_{t+6} - T_{t-6}}{T_{t-6}} - 1 \approx \Delta_{12} \ln T_{t+6}$$

and then

$$T_{12}^{12}(t) = \sum_{j=0}^{11} w_j \; T_{12}^{1}(t+j-6) \qquad (2)$$

where

$$w_j = \left(T_{t+j-12} \Big/ \sum_{h=1}^{12} T_{t-h} \right) \cdot 100$$

so it reduces the importance of short term oscillations included in $\Delta_{12} \ln T_t$.

It should be noted that if the latest available observation in a monthly series is the one corresponding to month t, the calculation of the underlying growths for t, t-1, ..., t-10 needs the use of predictions of level, which in our case is the trend, to t+11, t+10, ..., t+1, respectively. This could be considered as a serious disadvantage with respect to other alternative rates; but such a relative disadvantage is not really so, since any measurement of annual growth which is in phase with the basic growths, and which corresponds to the latest available observation, uses, in one way or another, predictions. The proposal for measuring underlying growth made in this paper consists of using efficient predictions, as they are based on the model that generates the original series.

Thus we find that the use of predictions in the calculation of the underlying growth in recent months, far from being a disadvantage, is an efficient way of exploiting to the maximum the latest information on the phenomenon, in order to calculate measurement of contemporary annual growth rate.

Moreover, the proposal of measuring growth as carried out is a generalisation of Moore's measure (1983), consisting of measuring growth by comparing the value observed in t with the average of the twelve immediately prior months, i.e.

$$T_t \,/\, \left(\sum_{j=1}^{12} T_{t-j} \,/\, 12 \right)$$

Note that Moore's rate is not centered, so it is not in phase with the basic growths.

Finally it must be pointed out that in certain cases the growth rate T_{12}^{12} of the trend can be approximated by other rates, provided they are put into phase. The more usual approximations are:

1) the centered rate T_{12}^{1} of the trend, defined for month t as $(T_{t+6} / T_{t-6}) - 1$ as we have seen above. Its use implicitly assumes that the weighted average (2) is not necessary to get a smoother line.

2) the centered rate T_{12}^{12} of the original series.

Apart from possible advantages which both from an economic and statistical point of view the underlying growth possesses, with it the important growth in economic series is unified. In this manner, if such a growth is used there is no need to analyse a series by concentrating on different annualised monthly or quarterly growth rates. The different advantages which each one of them may possess: maximum influence of the present, stability, etc. are synthesised in the measurement of the proposed underlying growth.

Moreover the variances of the T_{12}^{12} groth rates of the trends of the macroeconomic series are much closer to each other than the variances of annual growth rates on the original series. This approximation of variances is necessary to be able to claim that a relatively homogeneous growth measurement is being used on different macroeconomic phenomena.

It must be stressed that even if in published reports only a single growth measure appears, all the rates of growth used corresponding to different phenomena would be random variables. So they have a certain variance, greater or smaller depending on the series to which they are applied and on the specific function that defines the rate. The use of the centered T_{12}^{12} rate of the trend contributes to get comparable measures of growth when comparing diffrent variables because:

- the trend has a much smaller variance than the original series, and
- The T_{12}^{12} rate entails a weighted average of the rates T_{12}^{1}.

5. ASSESSING THE PRESENT SITUATION OF AN ECONOMIC VARIABLE BY MEANS OF UNDERLYING MEASURES

Once the quantitative results have been obtained from models and from signal extraction procedures, we still face the task of interpreting and presenting them in an homogeneous form. To do so, the analysis must focus on four main points:

1) Description and Assessment of the Underlying Evolution and Growth

The underlying evolution is described by presenting on a graph the values of the trend of the series from t-n to t+m, t being the date corresponding to the last observation of the original series. When estimating the trend values, unknown future values of the observed series are sustituted by forecasts.

As far as assessment is concerned in this underlying evolution, we can obtain it by analysing its speed of advance, which is no more than its underlying growth.

So we find that in a short term report it will be worthwhile including the graph of the underlying growth, which combined with the graph of the underlying evolution will give us, in a very clear form, the necessary information for evaluating the momentum of the series being analyzed.

As an example, we can assess the inflation in the Spanish economy by evaluating the underlying growth in the index of consumer prices of services and proccessed goods, IPSEBENE. This index excludes from the global consumer price index the prices of energy and non-proccessed goods. The underlying growth of the IPSEBENE calculated with information up to August 1989 is given in the thick line of figure 1. From this line of growth we can reach to the following diagnosis: " the IPSEBENE index registered a strong accelerated growth in 1988 which lasted till the beginning of 1989. Since them this index has been in a decelerated movement and by now (August 1989) it is experiencing an underlying rate of growth of 6.5%. This implies that the current growth is still greater - by approximately 1.5% - to the growth registered at the end of 1987 ".

The other lines in figure 1 represent the estimations of this underlying growth when considering only information up to different months before August 1989.

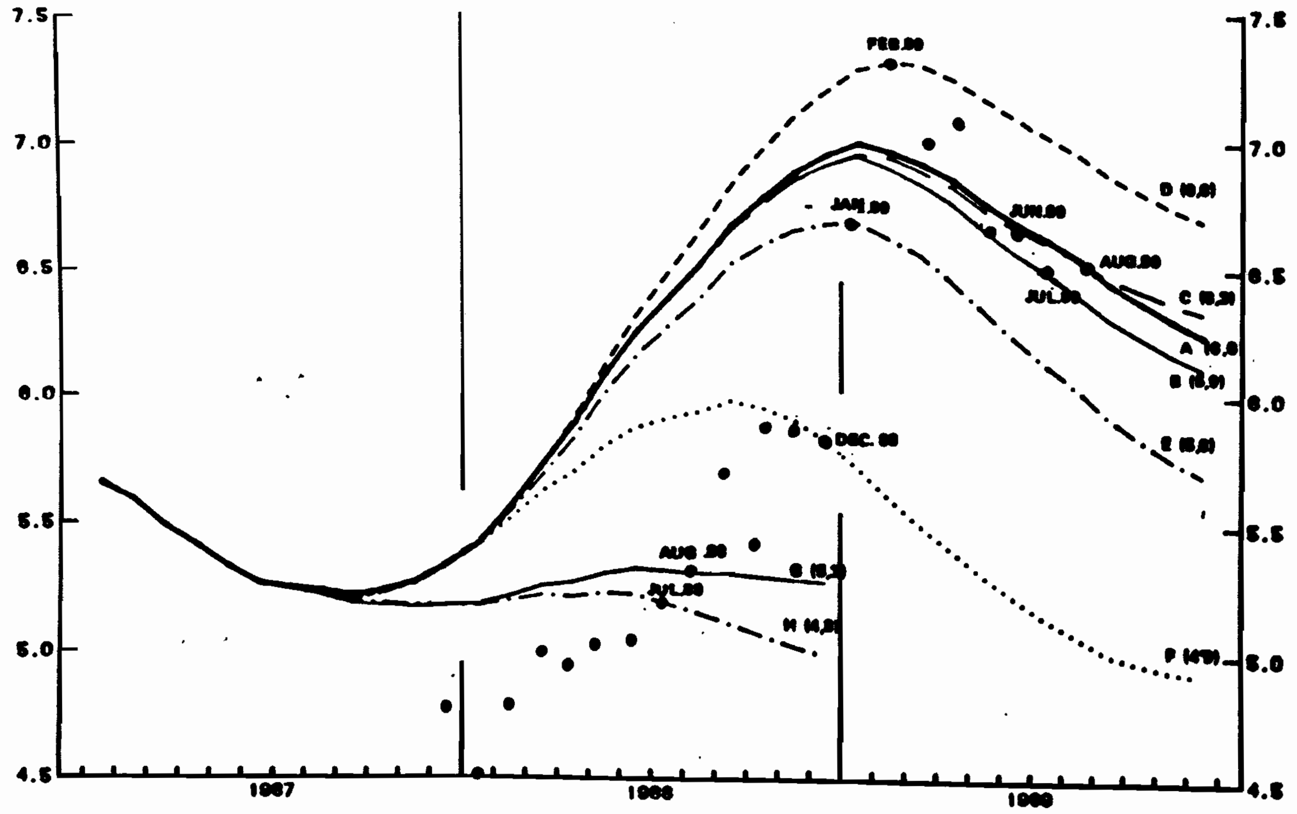
2) Inertia or Medium Term Expectations of Growth.

Contemporaneous growth, both of the original series and of its underlying evolution, depends directly upon the past level it is being compared with. As a consequence, results change

FIGURE 1.

UNDERLYING INFLATION IN SPAIN

(Consumer price index for services and proccessed goods excluding energy)



A: Estimate made in August 1989
B: Estimate made in July 1989
C: Estimate made in June 1989
D: Estimate made in February 1989
E: Estimate made in January 1989
F: Estimate made in Decemb. 1988
G: Estimate made in August 1988
H: Estimate made in July 1988

according to whether the moment of reference has been good or bad.

Therefore, a growth measurement is desirable which does not depend so much upon the moment in the past which we are comparing with the present. This measurement is the growth rate in the long run of the future trend, which we call inertia. It is linked with the prediction function of the observed series: for instance, in a series with a quasi-linear evolution the inertia is merely the slope of its long term prediction function.

From this definition, it follows that inertia is a medium term expectation of growth which does not directly depend on a specific past value. A description of how these expectations are evolving must be included in any short term analysis.

Going back to the example of figure 1, where at the end of each line there is stated between brackets the inertia of the inflation rate estimated with information till the month referred to in the corresponding line, we can see that in August 1989 the expected medium term inflation rate is 6.0%.

3) Comparison of Underlying Growth with Inertia

It is convenient to distinguish clearly the type of information provided by the underlying growth from the inertia information. Underlying growth in t is obtained, as we saw previously, from current perspectives. In these it becomes clear that the underlying growth is evolving, that is to say, it varies over time.

But, moreover, underlying growth is updated with the arrival of new data. As unknown future values enter in its calculation, predictions are used instead; so, as we get to know the future the predictions are sustituted by observations, and the perspectives of underlying growth are revised.

Inertia, or the medium term growth expectation, evolves but is not updated; with it a characterisation of moment t is obtained - the medium term growth expectations at this moment - which is, by definition, independent of future innovations and therefore is not updated.

In consequence, and since the information contained in the underlying growth differs from the information provided by inertia, it may be interesting to proceed to its joint assessment. Comparing present underlying growth with inertia, we can say if the present growth situation is expected to change or not: if, for example, present underlying growth is above medium-term growth expectations it seems logical to expect the former will slow down till it reaches the latter.

Thus in the situation described in figure 1 it can be deduced that underlying inflation in the IPSEBENE was falling in August 1989, and given that its value in that month - 6.5% - was higher than inertia - 6.0% -, it was expected that this slowing down would continue.

In general the conclusions of this comparison are summarized in Table 1.

4) Analysis of the Changes in the Perspectives of the Phenomenon under Study

In the report we can compare the view we have today of the variable - our perspectives today - with what we had in the past, and reach a conclusion as to whether it has improved, worsened or not changed.

TABLE 1. - COMPARISON OF UNDERLYING GROWTH WITH INERTIA

Inertia / Present Situation of Growth	The inertia value is lower than that of present underlying growth	The inertia value is the same as that of present underlying growth	The inertia value is higher than that of present underlying growth
Situation of growth slowdown	There is a margin for the slowdown to continue	The slowdown is tending to stagnate	Possibility of a turning point in the growth slowdown
Situation of constant growth	Possibility that steady growth may slow down	Steady growth is expected to continue	Possibility that steady growth speed up
Situation of accelerated growth	Possibility that accelerated growth may slowdown	Acceleration is tending to stagnate	Margin for acceleration to continue

With the expression " perspectives of an economic phenomenon in moment t " we refer to the underlying growth path of this phenomenon as estimated; it is important to remark that even if the perspectives in t refer to the interval (t-n, t+m) for some adequate values of n and m, they are calculated using observed values up to t.

For instance, let us suppose that we are evaluating the performance of the Industrial Production Index in a particular country (IPI). With information up to January 1991, we can estimate the underlying evolution, its speed and its acceleration for the whole period 1990-1992: these are the perspectives we have for the IPI in January 1991. One month later the value of February is also known: if we reestimate the signals and their growth for 1990-1992 adding this new value to the set of information, we would obtain the perspectives in February 1991, and so on.

With the analysis of change in the perspectives we do not go into the question of whether the present situation is favourable or unfavourable, positive or negative, but only whether it is the expected one in the light of previous experience or if, on the contrary, the phenomenon in question has undergone a change, independently of whether it has been for better or worse.

Put another way, with this comparison of perspectives we are evaluating the impact of the recent innovations incorporated into the economic phenomenon in one of its fundamental characteristics: the underlying growth. Frequently this is the innovation impact of greatest interest.

Returning back to our analysis of inflation in figure 1, we have the underlying growth as estimated in different months. Line A represents the present perspectives (in August 1989) and the remaining lines the perspectives in previous months. In the figure the value of the month corresponding to each line is represented with thick points, showing specifically the points for all months since October 1987 even if its corresponding perspective line is not included in order not to make the figure excessively complicated. From this figure it is deduced that inflation perspectives have been deteriorating since February 1988 till February 1989, but since March this year there has been a slight but sistematic improvement in the inflation perspectives.

5) Comparison of the Inertia Values Along Time

By the analysis described in point 4, one gets an assessment about if in the short run the evolution of the phenomenum in question has improved, worsened or not changed. But if at time t we compare the inertia value at this point with previous ones, an assessment can be made about if in the medium term the phenomenum is improving or not.

Returning back to the values between brackets in figure 1, inertia has been deteriorating since December 1988 till February 1989; then it has shown a slight improvement up to our last observation (August 1989).

6. AN EXAMPLE: UNDERLYING INFLATION AND INFLATION DIFFERENTIAL ANALYSIS

Inflation has been one of the main problems in western economies from the seventies onwards. A majority of economic policies in recent years have had as their number one aim reducing inflation and, bearing in mind the interrelationships of modern economies, the inflation diferential constitutes an important aspect for consideration in the necessary coordination of economic policies.

In this context the correct quantification of the inflation acquires special interest. This must be calculated on the corresponding underlying inflations: seasonal oscillations - which cancel each other out of the year - or short term oscillations are not important for calculating the differential, as they contain no information about the basic equilibria.

The price index that we shall use is the Consumer Price Index (CPI), as national accounting data are known with delay and in some countries - like Spain - only annual values are available. So from now we will refer to the trend of the CPI of country i as the underlying price evolution for i; underlying growth or underlying inflation for country i is then defined as the T_{12}^{12} rate of the corresponding CPI trend. However, it can be shown that for the price series we are considering the T_{12}^{12} rate of the trend and the same rate of the original series are very similar (see Espasa et al., 1987, for a thorough discussion for the Spanish case). Consequently all the results for underlying inflation to be presented are calculated directly from original data.

The EEC CPI, excluding Spain, is obtained as the geometric mean of each of the member countries. The weights used correspond to the percentage share of these countries within Spain's foreign trade during 1985. Portugal has been included for the whole sample period.

In Table 2 the situation of the Community CPIs is analysed with information up to August 1989 and in figure 2 the underlying growths are shown. We have also included USA and Japan to complete the international panorama.

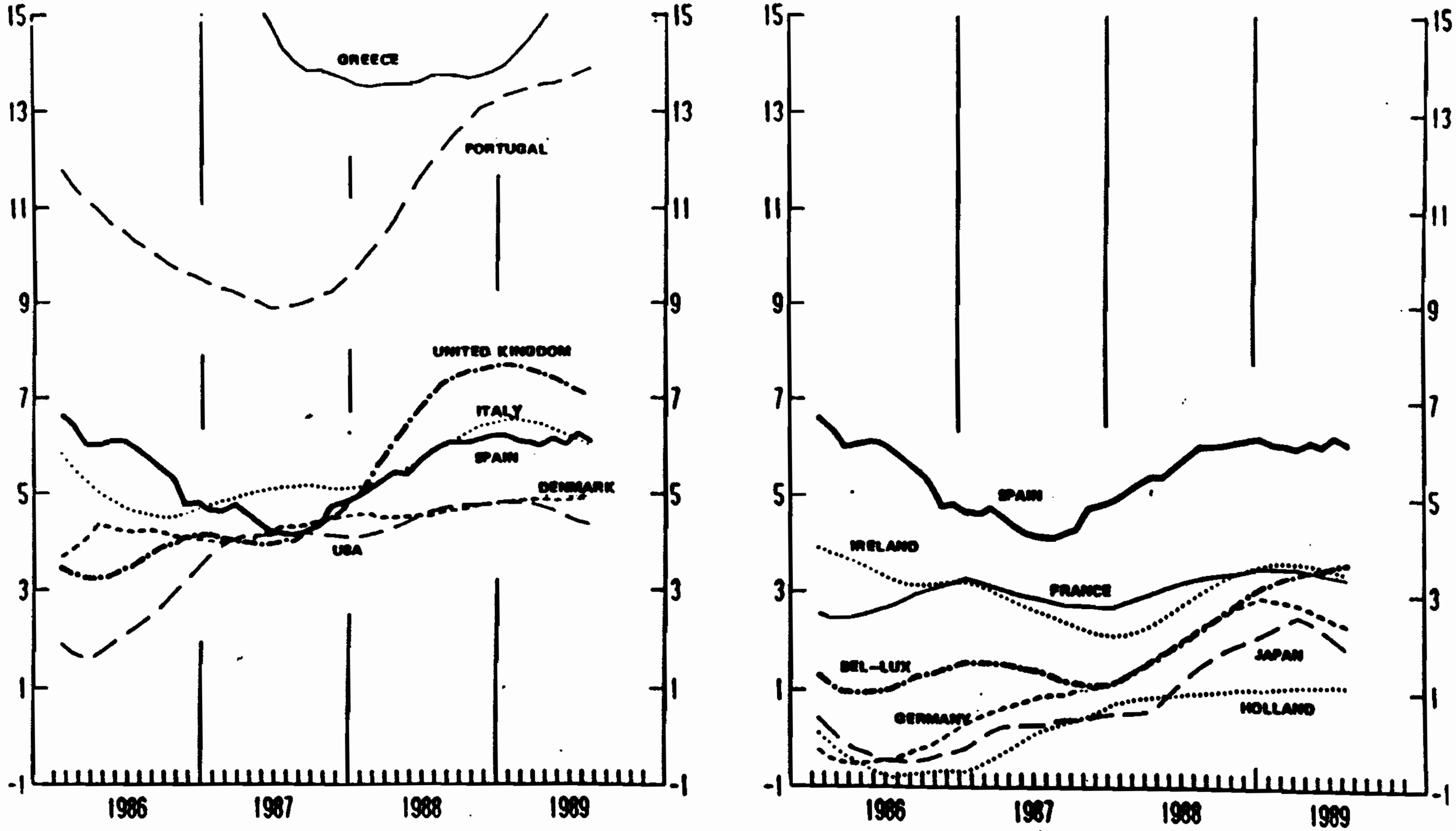
Most EEC countries showed at that time a slowdown in growth. Nevertheless, exceptions are - with accelerated growth - Belgium/Luxembourg, Greece and Portugal, and - with steady growth - Holland. USA and Japan also presented a slowdown in growth. Table 3 provides a brief summary of the main results from the Spanish point of view.

Table 4 records how inflation perspectives have evolved in various countries from April to August. It can be seen how a fairly general improvement in the inflationary situation could be detected in the third quarter of 1989.

Finally, Table 5 shows the evolution of Spain's inflation differential with the other EEC countries, the EEC - excluding Spain - as a whole, Japan and USA. From it, it can be seen that the inflation differential between Spain and the EEC, for august 1989 and estimated with data up to august, is 1.8%. By comparing this value with the perspectives we had in July for August - not shown -, it means a half-point worsening. A similar result holds for the Spanish inflation differential with USA and Japan.

FIGURE 2.

UNDERLYING INFLATION



Note: The origin of the prediction is August 1989.

TABLE 2.- ANALYSIS OF THE SITUATION OF THE CPI'S WITH INFORMATION UP TO AUGUST 1989

COUNTRY	PRESENT UNDERLYING SITUATION: Price Level	PRESENT UNDERLYING SITUATION: Inflation	INFLATION EXPECTATIONS (INERTIA)
EEC excluding Spain	SLOWDOWN IN GROWTH Situation better than that in July	4.3%	4.7%: Chance that slowdown in growth will speed up. Expectations have improved.
GERMANY	SLOWDOWN IN GROWTH Situation better than that in July	2.4%	2.2%: Margin for slowdown in growth to continue. Expectations have improved.
FRANCE	SLOWDOWN IN GROWTH Situation worse than that in June	3.3%	2.8%: Slowdown in growth expected to continue. Expectations have improved.
UNITED KINGDOM	SLOWDOWN IN GROWTH Improvement compared to July	7.0%	8.2%: Chance that slowdown in growth may speed up. Expectations have improved.
BELGIUM - LUXEMBOURG	ACCELERATED GROWTH Situation similar to that in July	3.7%	3.8%: There is no margin for accelerated growth to continue. Expectations remain at July level.
ITALY	SLOWDOWN IN GROWTH Situation better than that in July	6.0%	5.6%: There are possibilities that slowdown in growth may continue. Expectations have improved.
HOLLAND	STEADY GROWTH Situation worse than that in July	1.1%	1.0%: Steady growth is expected to continue. Expectations remain at July level.
DENMARK	STEADY GROWTH Situation worse than that in July	4.9%	5.2%: Margin for steady growth to speed up. Expectations have worsened.
GREECE	ACCELERATED GROWTH Situation worse than that in July	16.3%	16.8%: Margin for accelerated growth to continue. Expectations have worsened.
PORTUGAL	ACCELERATED GROWTH Situation worse than that in July	13.9%	17.1%: Margin for accelerated growth to continue. Expectations have worsened.
IRELAND (*)	SLOWDOWN IN GROWTH Situation very similar to that of the previous quarter	3.4%	3.7%: There is no margin for slowdown in growth to continue. Worsening of expectations.
SPAIN	SLOWDOWN IN GROWTH Situation worse than that in June	6.1%	5.5%: Margin for slowdown in growth to continue. Expectations have improved.
USA	SLOWDOWN IN GROWTH Situation better than that in July	4.4%	4.1%: It is expected that the slowdown in growth will continue. Expectations are improving.
JAPAN	SLOWDOWN IN GROWTH Same situation as in June	1.9%	0.9%: Margin for slowdown in growth to continue. Expectations remain at July level.

(*) As the irish series is quarterly the analysis of its situation is updated at the end of each quarter.

TABLE 3.- INTERNATIONAL INFLATIONARY SITUATION

	Price level up to August 1989	Underlying inflation CPI in August 1989	Medium term inflation Expectations
EEC	Growth Slowdown	4.3%	4.7%
GERMANY	Growth Slowdown	2.4%	2.2%
USA	Growth Slowdown	4.4%	4.1%
JAPAN	Growth Slowdown	1.9%	0.9%
SPAIN	Growth Slowdown	6.1%	5.5%

TABLE 4.- EVOLUTION OF MEDIUM-TERM INFLATION EXPECTATIONS IN THE EEC, USA AND JAPAN (1) (2)

	1989 April	May	June	July	August
USA	6.0	6.3	6.2	4.7	4.1
JAPAN	0.5	0.6	0.9	1.0	0.9
EEC (exclud. Spain)	6.8	6.3	6.0	5.6	4.7
Germany (23.2%)	3.5	2.8	3.0	2.4	2.2
France (27.6%)	4.1	3.3	2.4	3.1	2.8
United Kingdom (17.0%)	11.6	12.3	11.6	11.0	8.2
Bel.-Lux. (4.7%)	4.0	3.6	3.6	3.8	3.8
Italy (13.0%)	8.6	7.3	7.4	6.2	5.6
Holland (8.3%)	0.9	0.8	0.8	1.0	1.0
Denmark (1.3%)	5.7	5.0	4.1	4.8	4.9
Greece (0.7%)	16.5	16.3	16.4	16.6	16.8
Portugal (3.3%)	15.2	12.3	14.2	14.0	17.1
Ireland (1.0%)	3.6	3.6	3.7	3.7	3.7

(1) Ireland CPI series is quarterly, so expectations and inertia are updated at the end of each quarter.
(2) The figures between parenthesis are the weights of each country in the EEC excluding Spain index.

TABLE 5.- SPAIN'S INFLATION DIFFERENTIAL IN 1989, WITH INFORMATION UP TO AUGUST 1989

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
EEC (Exc. Spain)	1.6	1.5	1.5	1.4	1.6	1.6	1.9	1.8	1.7
GERMANY	3.3	3.2	3.2	3.2	3.5	3.5	3.8	3.7	3.7
FRANCE	2.7	2.6	2.5	2.5	2.7	2.6	2.9	2.8	2.7
UNITED KINGDOM	-1.5	-1.6	-1.5	-1.5	-1.3	-1.2	-0.9	-0.9	-1.0
BEL.-LUX.	3.1	2.9	2.7	2.6	2.7	2.5	2.7	2.5	2.3
ITALY	-0.3	-0.4	-0.4	-0.4	-0.2	-0.2	0.1	0.1	0.1
HOLLAND	5.2	5.0	5.0	4.9	5.0	4.9	5.1	5.0	4.9
DENMARK	1.4	1.3	1.2	1.1	1.3	1.2	1.4	1.2	1.1
GREECE	-7.8	-8.1	-8.4	-8.8	-9.0	-9.5	-9.7	-10.2	-10.5
PORTUGAL	-7.1	-7.3	-7.4	-7.6	-7.4	-7.6	-7.5	-7.8	-7.9
IRELAND	2.6	2.5	2.4	2.4	2.5	2.5	2.8	2.7	2.6
USA	1.4	1.3	1.3	1.3	1.5	1.5	1.8	1.7	1.7
JAPAN	4.0	3.8	3.6	3.5	3.7	3.8	4.2	4.2	4.3

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