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UNIVARIATE METHODOLOGY FOR SHORT-TERM ECONOMIC ANALYSIS

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ABSTRACT

A report on short-term economic analysis of a particular phenomenon should take as a starting point a set of quantitative results about its essential characteristics. If these results have been obtained by robust methods they can be considered of general validity and, when this is the case, they can be called the quantitative core of the analysis. The aim of this paper is to contribute to finding a way that could lead to the construction of quantitative cores.

The starting point of the methodology is the recognition that the underlying level and growth of a phenomenon very often constitute two of its essential features. Thus, the development of the methodology is based on the principle that the quantitative core of an economic report must be obtained from models describing the behaviour of the corresponding phenomenon and statistical techniques for signal extraction. The paper is focused on the use of univariate models, but the methodology is also applicable in the case where a single equation econometric model is available.

One of the first questions raised in the paper is how to estimate the underlying evolution of a time series. The discussion is concentrated on using the trend or the seasonally adjusted series. The paper defends the use of trends for economic analysis.

A second question is how to measure growth in a time series. In that respect it is asserted that a proper measure of growth should have, among others, the following properties:

- it must be related to a level signal
- it must not show irrelevant oscillations
- it must be in phase with the monthly increments of the original series
- it must exploit at maximum the last information.

In order to fulfil as much as possible the above properties this paper defines the underlying growth as the rate of growth of the mean of a sequence of twelve consecutive values of the trend, -starting in the month (t) for which one is interested in evaluating the underlying growth-, over the mean of the sequence of the twelve previous values. This implies that one needs to forecast the trend level for t+1 till t+11, and this can be done by a univariate model for the original data. The use of forecasts in calculating the current growth is no disadvantage at all, if one thinks that any current annual rate of growth, in phase with monthly increments, is using forecasts also. The growth measure advanced in the paper makes use of efficient forecasts. It must be pointed out that for quite a number of time series the above-mentioned rate of growth can be very well approximated by the corresponding rate of growth calculated on the original data and its future projections. This proposal generalizes the rate of growth suggested in Moore (1983).

The methodology is centered on the evaluation of the contemporary situation of a phenomenon and its implications for the near future. This is done by three interelated steps:

a) Comparing the values of the latest estimation of the temporal sequence of the underlying growth.

b) Comparing the latest estimation of the sequence of the underlying growth with previous estimations.

c) Comparing the contemporary underlying rate of growth with the medium term projection of growth obtained from the forecasting function of the univariate model.

The paper also makes a proposal for publication of economic data, with signals and growth rates.

Finally, in appendices A, B and C the methodology is applied to analyse the Spanish industrial production, and trade balance and the inflation in CEE, USA and Japan.

References:

Moore, G. (1983), "Business cycles, inflation and forecasting", NBER, Cambridge, Mass.

I. INTRODUCTION

Bearing in mind the present state of theoretical knowledge on economic relationships and bearing in mind the information available for economic facts, we find 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 increasing the report's guarantee of objectivity, and to making it possible, where necessary, to determine the final causes which lead two analysts of the same phenomenon to different diagnoses.

The behaviour patterns provided by Economic Theory represent and enormous abstraction of reality, as a result of which they must be imperfect and, consequently, have a conditioning effect on the objectivity of a report based on them. But, on the other hand, they provide an indispensable reference framework for developing criticism and discussion of the results of a specific analysis. Thus, with all their limitations, theoretical models are a necessary instrument for the progress of knowledge of economic aspects of the real world.

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 contrasted 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 report.

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 is applicable to situations where a single equation econometric model is available on the phenomenon under study. In fact, on occasions throughout this article the possibility is referred to of extending the core of quantitative results if an econometric model is available. Furthermore, in subsequent sections the methodology developed in the work is referred to or illustrated by phenomena for which monthly series are available; adaptation to the case of quarterly series is more or less immediate.

In different sections of the paper different concepts used in short-term analyses are defined, differentiated and interrelated, thus making the work useful for a wide rage of people interested in short-term economic reports, at both the macro and micro economic level, although the illustrations in this article are always macro economic. The rest of the paper is organized as follows: In section II the basis for the methodological proposal is presented, centred on the assessment of the underlying evolution and growth of the phenomenon in question. In section III a defence is made of the identification of underlying evolution with

the statistical concept of trend and a particular way of measuring growth in an economic phenomenon is recommended. In sections IV and V the methodological proposal is described and in VI a particular plan for the diffusion of information on economic time series is put forward. The appendices illustrate the application of the afore-mentioned methodology to different sectors of the Spanis economy and to the analysis of inflation in EEC, USA and Japan.

II. GENERAL PLAN OF PROPOSED METHODOLOGY

The proposed methodology for the building of the "quantitative core" of a short-term analysis of an economic phenomenon is built around four main points:

A) It is based on a proposal on objetives which are put forward in a short-term report.

B) These objectives require the essential aspects of an economic phenomenon.

C) The achievement of these objectives implies the use of statistical-econometric models capable of explaining the behaviour of the phenomenon studied.

D) The proposed methodology is designed to perform an evaluation, as completely as possible of the present situation of the phenomenon. This requires an adequate description of the past and, especially, an estimate of the implications which the present imposes on the future.

Regarding point a) we state that the objectives being pursued in a short-term economic analysis can be enumerated as follows:

A.1) To evaluate and quantify the present situation of an economic phénomenon.

A.2) To impinge on its essential aspects.

A.3) To project its future.

A.4) To compare the current estimate of its present evolution and its future expectations with previous apparisals (estimates) of both.

A.5) To highlight the contribution of the causal variables.

A.6) To link it to other economic phenomena with which it has a dependent relationship.

Point B) refers to the need to itemise the essential aspects of the phenomenon, since knowledge of them is, definitely, what is going to enable the above-mentioned objectives to be achieved. In principle, the essential aspects depend on the particular phenomenon being studied, but, in general we can say that the following are usually essential aspects:

B.1) Underlying evolution

B.2) Underlying growth

B.3) Seasonality

B.4) Non-expected component

B.5) Inertia (medium-term projection of the growth rate)

B.6) Others: desired values, etc.

The description of these aspects is given in the following section.

In point C) the analysis instrument, quantitative models, is introduced, which is going to enable us to approximate the essential aspects and, therefore, achieve the proposed goals. These models may be univariant models or econometric models (1), and are important in short-term analysis for:

C.1) Carrying out an immediate evaluation,
C.2) Projecting into the future,
C.3) Basing the estimating of essential aspects on them and,
C.5) Estimating the contribution of the explanatiory variables.

Finally, with point D) the importance of the time dimension is highlighted, by relating the present situation to the evolution in the past and projections into the future. Valuation of the present passes through a series of considerations, among which the following should be emphasised:

D.1) Comparison of the observed value with the expected level
D.2) Assessment of the underlying evolution of the phenomenon.
D.3) Evaluation of the different measures of growth: underlying speed and inertia.
D.4) Quantification of the influence of the explanatory variables.

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(1) We understand by univariate models those which are constructed only with information from the same variable being studied, and by econometric models those incorporating information on other economic phenomena. Normally univariate models are extended by dummy variables (intervention analysis).

In all the above it should be pointed out that when we are dealing with an aggregated phenomenon, the components of which can register sufficiently different types of behaviour, it will be advisable to perform the evaluation of the global phenomenon by using an application of methodology on a breakdown into a reduced number of components.

In Table 1 a summary is presented of this methodology for evaluating the short-term situation of an economic phenomenon.

Table 1

METHODOLOGY FOR EVALUATING THE SHORT TERM SITUATION OF AN ECONOMIC PHENOMENON

OBJECTIVE	ESSENTIAL ASPECTS OF AN ECONOMIC PHENOMENON	NEED FOR MODEL	EVALUATION OF THE PRESENT
-TO EVALUATE AND QUANTIFY THE PRESENT SITUATION OF AN ECONOMIC PHENOMENON.	-THEY DEPEND ON THE PHENOMENON. -IN GENERAL: .UNDERLYING EVOLUTION .UNDERLYING GROWTH .SEASONALITY .NON-EXPECTED GROWTH .INERTIA .OTHERS: DESIRED VALUES, ETC.	-TO PERFORM AN INMEDIATE EVALUATION	-EVALUATION OF THE LEVEL .COMPARING WITH EXPECTED VALUE
-IMPINGING ON THE ESSENTIAL ASPECTS OF THE SAME		-TO PROJECT INTO THE FUTURE	.ESTIMATING ESSENTIAL ASPECTS (eg. UNDERLYING LEVEL)
-PROJECTING INTO THE FUTURE		-TO ESTIMATE THE ESSENTIAL ASPECTS	-EVALUATION OF UNDERLYING GROWTH (A) SPEED & ACELERATION (B) INERTIA
-COMPARING IT WITH PREVIOUS ASSESSMENTS		-TO ESTIMATE THE CONTRIBUTION OF EXPLANATORY VARIABLES	
-POINTING OUT IN ALL OF IT THE CONTRIBUTION OF THE CAUSAL VARIABLES AND			-CONTRIBUTION OF EXPLANATORY VARIABLES
-LINKING IT WITH OTHER ECONOMIC PHENOMENA WITH WHICH IT HAS A DEPENDENCY RELATIONSHIP		TYPES OF MODELS -UNIVARIATE -ECONOMETRIC	[SUMMARY TABLE OF THE SHORT-TERM SITUATION]

IN AGGREGATED PHENOMENA ALL THIS MUST BE CARRIED OUT FROM THE MOST IMPORTANT COMPONENTS

III. UNDERLYING EVOLUTION AND GROWTH IN ECONOMIC TIME SERIES

III.1. Underlying evolution

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 (annual or of lesser periodicity) 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, that is to say they have a zero mean. Therefore, at the underlying level certain basic peculiarities of the phenomenon can be detected, which might be difficult to observe in the original series. Moreover, to the extent that such deviations are mainly determined by measuring errors their economic value is almost nil.

In statistical signal extraction terminology, the underlying evolution would be simply the trend of the original series, but this is a point that needs further discussion. To this end let us begin by establishing that in statistical analysis of economic series, a variable is normally broken down into three non-observable elements which we will call signals: trend, T, seasonality, S, and irregular, r.

Seasonality is a cyclical component of annual periodicity and the irregular element a component with no type of relationship with the past, as a result of which it may be preferable to call it the non-systematic component. The trend is achieved by eliminating from the

original series the two previous components (1). This leads us to identify the trend with what we have defined as underlying evolution (2).

The relationships between macroeconomic variables can be classified in two types: a relationship between robust and firm signals -permanent components, perhaps-, and another between non-systematic components. An example of the first type would be the relationship between money, nominal expenditure and prices, and an example of the second type the relationship between the changes in interest rates and the non-systematic component of the quantity of money.

Of both relationships the former is the most important, and insofar as the robust signals which intervene in it can be approximated by trends of the corresponding time series, we find that knowledge of these trends becomes the fundamental aim of users of economic information. All of this justifies the choice, in the previous section, of the underlying evolution as one of the interesting aspects of an economic series.

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(1) The definition of the trend as a component which is obtained by eliminating the oscillations of the original series merely provides us with an imprecise concept of trend, since the elimination of oscillations is not something which can be exactly defined, and, what is more, trends are usually stochastic, so that they themselves are subject to innovations, though of an order of magnitude much lower than that of the original series. Nevertheless, the concept that we have given of trend may be sufficiently intuitive for the reader to understand what we are talking about when we use this term.

(2) As a matter of fact if the series contains business cycles, them will be included in the trend and, therefore, in those cases it would be better to denote it as the trend-cycle component.

In most western countries offices of statistics and official bodies make exhaustive use of seasonally adjusted statistics and analysts very often use seasonally adjusted series as representative of the underlying path of the corresponding variables. That is to say, they eliminate from the corresponding original series only its seasonal component, thus leaving a signal which is formed by the trend and the irregular element. Therefore, a seasonally adjusted series is a contaminated series, since from it a purely random white noise element (irregular component) can be extracted, which has no information at all about the rest of the signal (trend).

From the above-mentioned we can say that at a theoretical level, the choice of a seasonally adjusted series as the robust signal of a variable is questionable, and, thus, one may wonder why such a signal is so popular in economic circles. Undoubtedly, users of adjusted series have various arguments to justify the use of such signals. The reasons most frequently put forward are discussed below.

An initial argument states that both trend and irregular element can be important, in which case both must be included in the signal as is done with the adjusted series. However, it must be borne in mind that even though the two elements may be of practical importance, they are not usually so in the same sense. Often both are necessary for different reasons, and, therefore must be treated as separate signals.

It may also be argued that even then the adjusted series is a contaminated signal, still it could be preferable to the trend because it is less imprecisedly estimated. This is the line shown in the results obtained by Maravall for Spanish monetary series (see Maravall

1987). Nevertheless, for this argument to be valid, the greater precision in the estimarion of the adjusted series with regard to the trend must compensate the greater oscillation of the former with respect to the latter (1). In general this is not the case and a practical recommendation is to use the trend.

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 new data appears, whereas on the seasonal component an estimation can be advanced before the real data are observed. In this way when a new piece of data is published any user can immediately calculate the adjusted seasonal 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 (see Pierce 1983) that such an adjustment should be done concurrently, that is, when the last piece of data which you wish to adjust is available. Thus we find that each time that a new piece of data 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.

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(1) It should be observed that the original series, as a signal of itself, is estimated with total precision, free of error, but its oscillation is enormous relative to its trend.

To sum up we have that the seasonally adjusted series is made up of a trend and an irregular element, which frequently does not make economic sense, since is often closely related to measurement errors and at other times, when it is economically interesting, it is for reasons very different to the trend. Thus, from an economic point of view there do not appear to be reasons for aggregation the trend and the irregular element. Consequently, it is usually empirical reasons that would suggest such an aggregation. Neither does this appear to be the case, since frequently, the lesser oscillation of the trend clearly compensates for a greater -often only slightly greater- imprecision in its estimation with regard to the seasonally adjusted series.

III.2. The underlying growth

In time discrete evolutions the underlying speed or growth is calculated by comparing the underlying level in t with the underlying level in t-u, and the resulting value is defined as the underlying speed in t-m, m being (u-1/2). Allocation of the previous value to the moment t-m is necessary for the evolution of underlying growth to be in phase with the monthly increments of the original series (basic growths). In general, for institutional and climatological reasons it is worthwhile to calculate the underlying growth in annual periods (u= one year).

For a growth rate to be important in a short-term analysis of an economic phenomenon, it is necessary for it:

- to be related to a level signal of the phenomenon in question,
- not to show important 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 extra growth rates,
- for its variance not to be very different between different variables on which it is convenient to carry out a joint analysis.

In order to achieve as much as possible the previous characteristics in this article we propose defining, for reasons expressed in Espasa et al. (1984) and Espasa (1988), 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. With the terminology of certain official publications (see, for example the Boletín Estadístico of the Banco de Esoaña) the denomination of this growth is that of rate T_{12}^{12}, duly centred, of the trend.

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 non-existent, 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 work consists of using efficient predictions, since 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. Furthermore, the proposal for measuring growth as carried out is a generalisarion 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. Besides, the proposal in this paper has the advantage of being in phase with 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 the growth of the trend in a particular month with regard to the same month of the previous year, provided that both growths are put into phase. We shall call this latter growth T_{12}^{1}. In other cases the T_{12}^{12} of the trend is approximated well by the T_{12}^{12} of the original series. Consequently, when the approximations are valid we shall substitute the T_{12}^{12} of the trend by its T_{12}^{1} or the T_{12}^{12} of the original series. Thus, for example, the underlying growth of series such us the consumer price indexes, monetary aggregates, etc., is correctly estimated by using the rate T_{12}^{12} of the corresponding 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, is synthesised in the measurement of the

proposed underlying growth. Moreover, the variances of the T_{12}^{12} growth 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 diferent macroeconomic phenomena.

IV. METHODOLOGY FOR A SHORT TERM ANALYSIS

Once the quantitative results have been obtained from models and from signal extraction procedures, we still face the task of interpreting, systemising, and presenting them in a homogeneous form. The methodological proposal for this given in this paper consists of developing the following stages:

1) Immediate evaluation of the latest observed data
2) Analysis of special events
3) Description and assessment of the underlying evolution
4) Quantification of the predictions for diferent time periods
5) Analysis of the changes in the prospects of the phenomenon being studied
6) The inertia or expectations of medium term growth
7) Comparison of underlying growth with inertia
8) Evaluation of short and medium term improvement or worsening
9) Analysis of differences obtained from different models
10) Relationship with other variables

IV.1. Immediate evaluation of the observed data item

The most correct way of doing it is to compare the recently observed item of data with the prediction interval (expectations) which had been obtained for this recently observed data item.

If the data item is outside the prediction interval an early indication will be available that the prospects of the phenomenon being studied have changed.

With this information the first analysis table will be made up, and this will collect the immediate evaluation of the observed data item.

The information contained in this table is very important on certain opccasions; for example, in the Spanish economy, in March 1988, the Consumer Price Index (CPI) showed a monthly increase of 0.7%. This figure came as a surprise in all the media, since it was considered high. Nevertheless, the model-based predictions pointed in this direction, so for the people who had that prediction available the result, independently of whether it was good or bad, came as no surprise. CPI evolution in previous months showed that this strong rise in March was latent, so that it simply materialised at the forecast moment.

On the contrary, the following April there really was a surprise, in the sense that the observed data item was markedly lower than predicted. At the same time, a simple breakdown analysis reveals that the main responsibility for the April surprise was to be found in the prices of unprocessed foods. But a statistical-econometric analysis in more detail reveals that this component has little effect on the trend, underlying evolution, of the CPI, so the euphoria following the publication of this data item in April was clearly excessive.

This example serves to remind us of the need in the analysis of an aggregated variable to be carried out on the basis of its most important components, when these do not show a similar evolution.

Later on in the report this analysis of a possible change in prospects will be done in a more complete way, by referring to which essential aspects of

the phenomenon have changed and relating -if econometric models are available- such changes to explanatory variables. Nevertheless, in this first point we already have a quick improvement in bringing out an advance as soon as we receive the observed data item.

IV.2. Analysis of special events

A distinction should be made here if the special event took place in the past or takes place in the present.

If the event took place in the past and, therefore, already had an initial estimate of its effects on the basis of the results of the intervention analysis in the corresponding model, it will be worthwhile updating this estimate with the new data item and commenting on the new results. This is particularly important if this event took place in the more recent past, since it is to be expected that the appearance of new observations of the variable in question modifies the previous estimates of its effect.

These successive modifications in the estimate must be included in the report, since they constitute important information regarding the time perception of that special event.

As an example of special events in variables of the Spanish economy we can quote the transfers between deposits and other liquid assets in public hands, the effects on CPI of implementing VAT, changes in summer seasonal behaviour in the industrial production index, etc.

If, on the other hand, these special events take place in the present, an attempt must be made to estimate their effect, and to this end, use must be made of all

available a priori information. This initial estimate has to be included in the report highlighting its nature as a provisional estimate.

IV.3 Description and assessment of the underlying evolution

For an efficient estimate of the value of the underlying evolution at a moment t, T_t, we must use the previous information, present (t) and subsequent. Now, if the latest available information refers to t later data are unknown. In that case we will substitute them by forecasts, and the estimated value of the trend will be called T^0_t. It should also be noted that by using forecasts we can manage to calculate T_{t+m} at the moment t, that is, an estimate of the trend for some future moment t+m.

The underlying evolution is described by representing on a graph the values of the trend of a series from t-n to t+n, t being the date corresponding to the latest observed item of data. This graph of the underlying evolution constitutes one of the basic graphs of the report.

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 the underlying growth described in the previous section.

With the use of forecasts for the calculation of the underlying growth in the latest data, we find that when new observations arrive the values of this growth in these points is updated. As we shall see in the following section these updatings provide highly valuable information on the phenomenon in question.

From the above mentioned, 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 assessing the momentum of the phenomenon in question. Furthermore, it will be worthwhile collecting the characteristics of both grphs in what will constitute the summary table of the short-term situation.

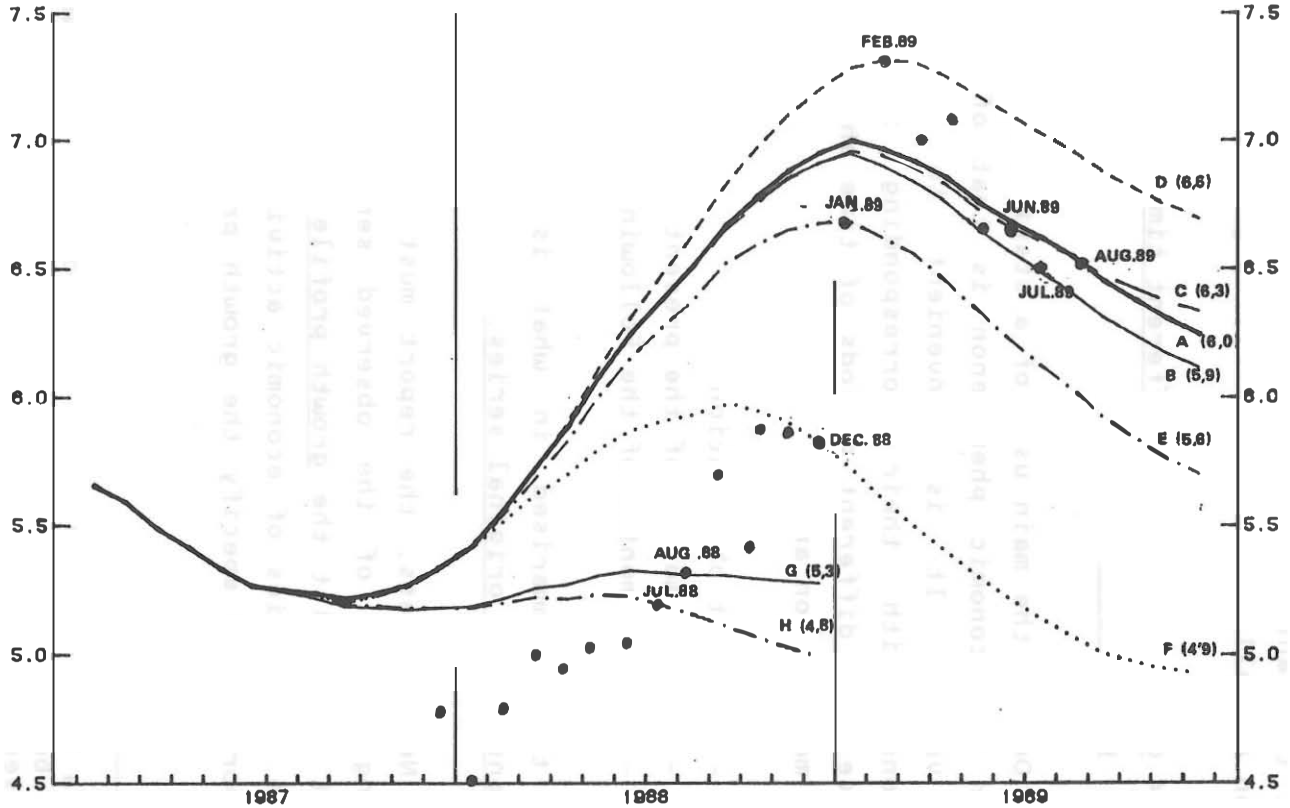
As an example, we can assess the inflation in the Spanish economy by evaluating the underlying growth in the index of consumer prices of services and proccessed goods, IPSEBENE. This index exclude for the global consumer price index the prices of energy and non-proccessed good. The underlying growth of the IPSEBENE calculated with information till August 1989 is given in the thick line of graph 1. From this line of growth we can reach to the following diagnosis, which will be inserted in the summary table mentioned above:

"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 per cent. This implies that the current growth is still greater -by approximately 1.5 percentage points- to the growth registered at the end of 1987".

It is worth insisting yet again on the two special cases that we commented on previously. On the one hand, if aggregated phenomena are being studied, the analysis must be made on a breakdown into a reduced number of series, in case there exist clashing evolutions which may partially cancel each other out and therefore, may not

UNDERLYING INFLATION IN SPAIN Graph 1.

(Consumer price index for services and proccessed goads 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

adequately reflect the effects of the components in the aggregate (1). On the other hand, if information is available on explanatory variables, it is of the maximum interest to quantify their contribution in the underlying evolution as well as in the underlying growth.

IV.4 Quantification of different time horizon predictions

One of the main uses of a statistical-econometric model on an economic phenomenon is that of predicting future values. It is convenient to specify the predictions, with their corresponding intervals of confidence, for different periods of time ahead and among them the most common are:

- the next observation
- all the months of the present year
- all the months of the following year,

all of them summarised in what is called Table of predictions on the original series.

Nevertheless, the report must not be limited to predicting values of the observed series, it is also important to predict the growth profile on the underlying evolution. In series of economic activity it is normally very important to specify the growth profile, quarter by

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(1) As a matter of fact the study on the IPSEBENE index has been carried out by distinguishing between prices of services and prices of goods, because the fomer do not show any deceleration and are maintaining rates of growth around 8 per cent, while the latter are decelerating, and their current rate of growth is around 5 per cent.

quarter or half year by half year, of the underlying evolution in the present year and in the following. These growth rates are the T_{12}^{12} of the trend corresponding to those quarters or half years. Usually, the T_{12}^{12} corresponding to the beginning of those quarters or half years are taken. With these the Annual Growth Profile Table is drawn up. It should be noted that in this way a more stable growth profile is obtained than the one obtained from quarterly of half yearly rates extended to annual rates.

Also within this point we have to talk, whenever possible, of the simulations that, as is well known, reflect the behaviour of the phenomenon being studied under diferent hypothesis on the variables explaining it. For this one must have an econometric model that records the relationships between variables, and the explanatory variables must be exogenous.

In the set of exogenous variables we can distinguish two large groups, that of those that can, more or less be controlled, in one way or another, and that of those where control of their evolution is beyond the user's reach.

For the former different behaviour hypotheses must be posed depending on the preferences of the decision maker, and its consequences on the phenomenon analysed. This exercise will be useful in deciding the most suitable evolution to impose on variables susceptible to control.

Redarding a non-controllable exogenous variables, it may be wothwhile to carry out similation exercises substituting its path of future predictions by paths that record drastic or unexpected changes.

Let us look at this with an example: let us suppose that we have available a model in reduced form for the inflation rate, where the latter is explained by monetary variables, fiscal variables and by the external inflation rate. To avoid complicating the statement, let us suppose that these variables are exogenous and that the implied monetary and fiscal variables are genuine instruments of economic policy and, as such, manageable by the authority in question, at least within a sufficiently wide margin.

The external inflation rate would be a variable beyond the control of the national economic authority so that in a simulation we could pose as a behaviour hypothesis for the same a future evolution with unexpectedly high values.

On the contrary, for monetary and fiscal variables we would introduce as a behaviour hypothesis evolution paths which could be regarded as feasible for implementation by the economic authority. Thus by observing there effects on the inflation rate one could use this information in choosing which specific implementarion of the economic policy was to be carried out.

The results of the simulations must be presented in what is called the Table of Simulations, which constitutes another of the important points of a short-term report.

IV.5. 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 phenomenon -our perspectives today- with what

we had in the past, and reach a conclusion as to whether it has improved or worsened or not changed.

With the expression "perspectives of an economic phenomenon in a moment t" we refer to the values of the underlying evolution, speed, and acceleration in this phenomenon at the present moment (t) and in the past and near future, as estimated with the information available as fas as t. In this section of the report an attempt is made to compare today's perspectives with those we had in some moment(s) in the past.

With the analysis of changes in perspectives we do not go into the question of whether the present situation (basically the evolution of underlying growth as estimated at the present moment) is favourable or unfavourable, positive or negative, (this stems from the analysis made in point 3 of this section) but only whether it is the expected one in the light of previous experience or if, on the contrary, the phenomenon is question has undergone a change, independently of whether it has been for better or worse.

In this way we will be able to contemplate whether the present perspectives of this phenomenon are worsening or improving with regard to what we had before. 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. This comparison is important, and therefore, must be included in the summary table on the short-term situation. It is also useful to present the corresponding graph on changes in perspectives. In graph 1 the underlying growth in the consumer price index of

non-energy processed goods and services -IPSEBENE- is collected as estimated with the latest available information, August, 1989, line A of the graph, and as estimated in different previous months. Line A represents the present perspectives (in August 1989) and the remaining lines the perspectives in previous months. In the graph the value of the month corresponding to each line is shown 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 graph excessively complicated. At the end of each line the medium term growth expectation (inertia) held each month for the IPSEBENE is expressed. We will come back to this expectation in the next point. From this graph 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.

In other examples collecting so many lines of previous perspectives may even make the analysis more difficult, so, in such cases, it is worth asking oneself what are the best periods of reference for making the comparisons. The general recommendation that can be given is to choose a part moment which would be especially favourable and another one which is particularly unfavourable.

Obviously, if econometric models are available the changes in perspectives must be analysed by considering the contributions of the explanatory variables.

IV.6. Inertia or medium term expectations of growth

Present growth, both of the original series and of its underlying evolution depends directly upon the past level it is being compared with. In the case of the rate T_{12}^{12} it depends on the average level of the previous year. As a consequence, results change 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 of the future trend, which we call INERTIA (1).

Inertia is the medium term expectation of growth and has the advantage of being an indicator of (future) growth that does not directly depend on specific past value.

A description of how these expectations are evolving must be included in any short-term analysis, not forgetting, if possible, to mention the contribution of the explanatory variables. This information has to be summarised in what we called the Table of Evolution of Medium Term Expectations.

Going back to he example of graph 1, where at the end of each line there is stated between brackets the expectation of the medium-term inflation rate, estimated

---

(1) In series with a quasi-linear evolution the inertia is merely the slope of the long-term prediction function.

with information till the month referred to in the corresponding line, we can see that those expectations have been worsering throughout 1988, growingh from 4.9 in December this year to 6.6 in February 1989. Since then a slight improvement has been registered, and in August 1989 the expected inflation value is 6 per cent.

In those cases where the series does not show a trend growth calculation of inertia will be substituted by the expected value of the series, that is, the constant to which the prediction function tends in the long term.

IV.7. Comparison of underlying growth with inertia

It is convenient to distinguish clearly the type of information provided by the underlying growth with the inertia information.

Underlying growth in t is obtained, as we saw previously, from current perspectives. In these it becomes clear that the underlying state is evolving, that is to say, it varies over time. This implies that, for example, the values of the line A of graph 1 are not constant.

But, moreover, the perspectives and therefore the underlying growth are updated with the arrival of new data. This implies that in graph 1 not only do we have line A, but also the lines corresponding to estimates made in previous months. Let us not forget that in the calculation of perspectives unknown future values enter, and these are substituted by predictions. So, as we get to know the future the predictions are substituted by observations and the perspectives of underlying growth are revised.

Inertia, or medium-term growth expectations evolve but are not updated; with it a characterisation of the moment t is obtained -the medium-term growth expectations at this moment- which is, by definition, independent of future innovarions 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 assessmment.

Comparing present underlying growth with inertia, we can say whether 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.

In general the conclusions of this comparison are summarised in Table 2 (1).

This is information of interest which must be inclued in the summary table on the short-term situation. From graph 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.

---

(1) If the series does not present trend growth we will compare its present underlying level with the expected medium-term.

Table 2

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 slow-down	Acceleration is tending to stagnate	Margin for acceleration to continue

In any of the comparisons that we may make it is important to calculate the number of time units which be taken to achieve inertial growth or the equilibrium value, as the case may be. As an example, it is important to know what is the equilibrium level which the excess reserve rates of the banking system tend to and how many weeks it will take to reach it, without future innovations.

IV.8. Evaluation of short and medium-term improvement or worsening

From a grpah of the type shown in graph 1 the evolution of the phenomenon being studied in the short or medium-term can be evaluated.

By analysing the point estimates of the underlying growth just as they have been estimated each month (thick points of graph 1) we will be able to decide whether the evolution of the phenomenon is improving or worsening in the short-term. Graph 1 shows that underlying inflation has been rising from March 1988 to February 1989, and that in the last months it still shows values higher than those estimated for the months of 1988, so we conclude that this underlying inflation has worsened in the short-term. Specifically we can say that inflation in the IPSEBENE has risen from 5.3% in October 1987 (thick point corresponding to that month) to 6.5% in August 1989. By considering the intermediate thick points in graph 1 we shall say that inflation in the IPSEBENE was improving up to Januaryu 1988, but from February onwards it began to rise till February 1989.

By analysing inertia values (collected at the end of each line in graph 1) we may conclude whether the medium-term expectations of evolution have improved or not. In the present example these expectations have also

worsened, going from 4.7% in March 1988 to 6.0% in August 1989. In conclusion we find that this variable, IPSEBENE, has shown a transitory worsening, that is, in its monthly underlying growth values, and a more permanent worsening, that is to say, in its medium-term growth expectations.

IV. 9 Analysis of the differences obtained with different models

If different models are available, all of which are consistent for the explanation of the same economic phenomenon, and with them different predictions are obtained which are sufficiently varied, it is worthwhile analysing these differences, since they may be informative.

Let us imagine the following situation: we have avialable a univariate model for the consumer price index and a leading indicator model for that same variable, where the indicator is an index of wholesale prices.

If the predictions with the univariate model are, for a period, systematically better than those of the model with the indicator, one may well conclude that probably the commercial margin is changing.

If, on the contrary, the univariate model generates noticeably worse predictions we may conclude that the recent innovations to the system do not agree with the past innovations contained in the history of the series. That is to say, it seems that in recent periods some type of factor is impinging and affecting the prices in the system, and it is not built into the previous CPI behaviour, but has already been assimilated by the indicator, wholesale prices.

IV. 10 Relationshisp with other variables

Once the analysis of a particular economic phenomenon has been made it is worthwile relating it to the evolution of other phenomena, even when a quantitative short-term analysis of the latter has not been made.

For example, when inflation has been analysed it may well be interesting to study its effects on the evolution of other variables, such as the inflation differential with other countries, the drift of nominal interest rates, the determination of real interest rates or the foreseeable evolution of monetary objectives.

V. MAIN TALBES AND GRAPHS OF BASIC QUANTITATIVE RESULTS FOR MAKING A SHORT-TERM REPORT

1) Table of immediate evaluation of the observed data item

It compares the latest observed item of dat with the prediction interval available for the same

2) Graph of underlying evolution (trend)

It represents the firm line of evolution -free of oscillations with a zero mean- of the phenomenon.

3) Graph of underlying growth

It represents the growth (at an annual rate) of the underlying evolution.

4) Table of predictions on the original series

It gives the predictions of the original series for the year in progress and the following one. Such predictions refer to the level and/or annual growth of this series.

5) Table of growth profile

It gives the predictions of the underlying growth for each quarter of the year in progress and the following.

6) Table of simulations

It is produced when an econometric model with exogenous explanatory variables is available. This table

reflects the behaviour of the phenomenon being studied by assuming different hypotheses in the evolution of (a) certain exogenous variable (s).

7) Graph of change in perspectives

It reflects the estimate of the underlying growth as was done in moments just prior to the present. This graph can be presented along with that of point 3.

8) Table of evolution of medium-term expectations (inertia)

It gives the medium-term expected rates of growth which has been estimated each month.

9) Table of estimates of the short and medium-term improvement of worsening

From the comparison of the present underlying growth (graph of point 3) with estimates made in previous months (graph of point 7) a conclusion can be drawn as to whether perspectives are improving or not in the short-term.

From a comparison of the inertia value at the present moment with its values in previous months (table of point 8) a conclusion can be drawn as to whether the perspectives are improving or not in the long-term.

10) Summary table of the short-term situation

It may contain the following points:

a) It describes whether the phenomenon is in a constant growth situation, accelerating or slowing down. (It is made by analysing the underlying growth recorded in the graph of point 3).

b) It show whether the present perspectives described in a) mean in the short-term an improvement of worsening with regard to previous perspectives. (It is made by comparing the graph of point 3 with those of point 7).

c) It indicates the value of the underlying growth at the present moment and, if deemed necessary, the quarterly growth profile for the present year. (The former is taken from the graph of point 3 and the latter from the table of point 5).

d) It gives the value of the medium-term growth expectations (it is taken from the table of point 8), and by comparing it with the underlying growth (represented in the graph of point 3) a conclusion can be drawn (following the indications shown in table 2) as to whether the present growth situation described in a) is likely to change or not in the near future.

e) It shows whether the medium-term expectations of the phenomenon in question are improving or not. (It is made by comparing the values of the table of point 8).

VI. PROPOSAL FOR THE PUBLICATION OF AN ECONOMIC INDICATOR

The official agencies who draw up and/or distribute information on macroeconomic variables, or on variables which approximate to them- short-term Indicators- have to decide what type of information they present besides the original data of the corresponding variables.

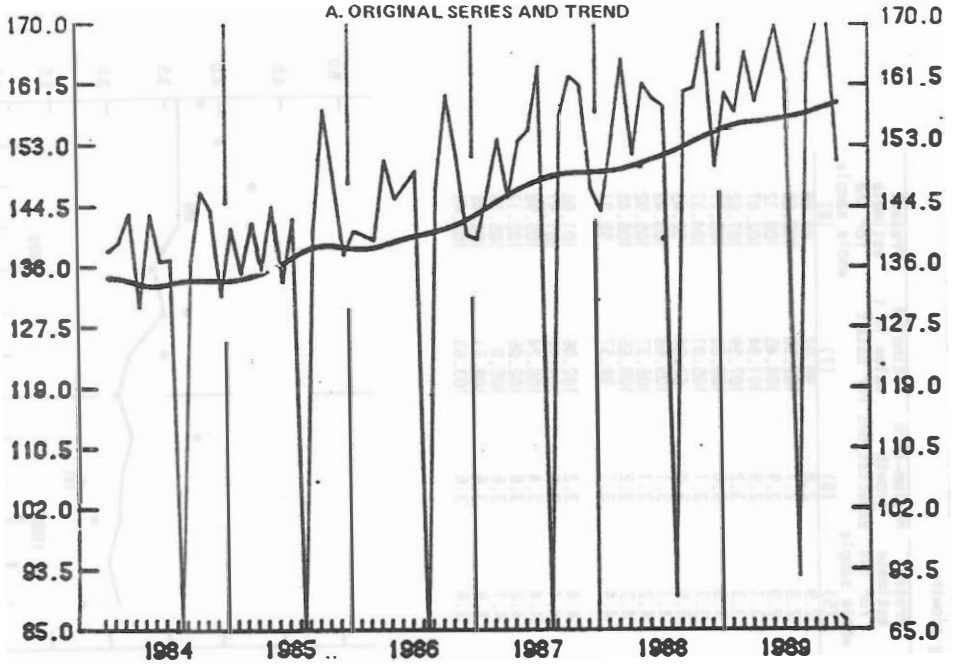
The problem arises because the original data contain excessive oscillations, see graph 2, so that they disguise a possible firm evolution path for the variable in question. As can be gathered from what has been said before, many users can be equally or even more interested in that pah than in the original values, so there exists a demand for agencies also to publish adjusted series, or signals, of the original values, which may help to estimate the underlying path of the variable in question.

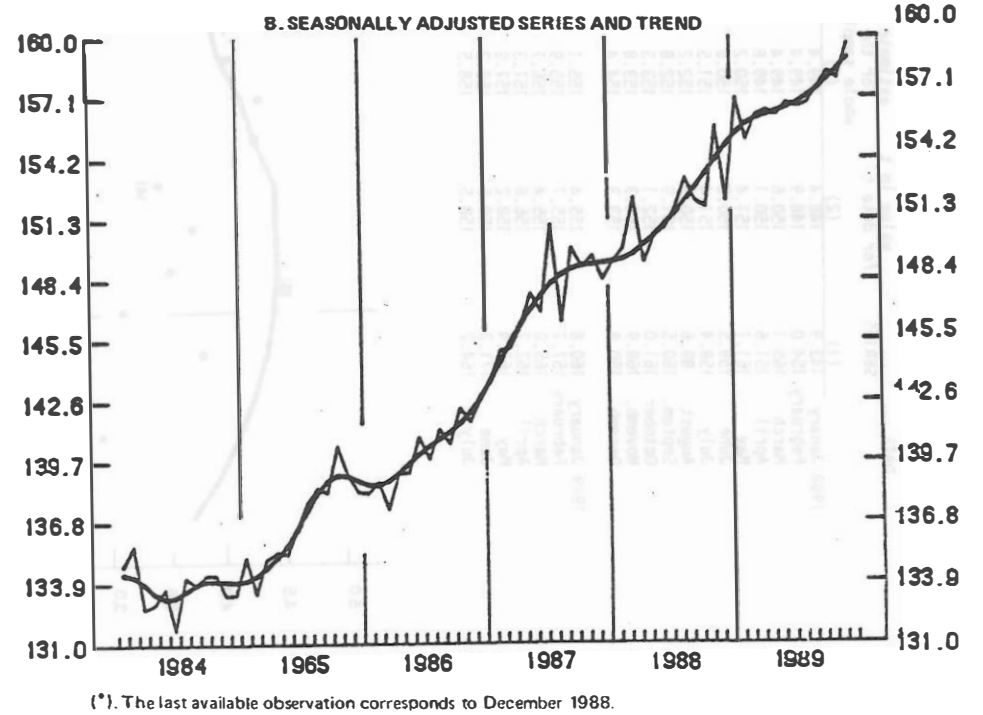
Historically, it has been quite usual to estimate this underlying evolution through the seasonally adjusted series, but it has been discussed in section III that, in general, is advisable to use the trend and the methodology expressed in preceding sections has been based on the trend and its annual growth. A proposal about the publication of such signals is given in table 3, which in line with previous methodology, records the infromation necessary for producing the summary table of the short-term situation, described in point 10 of section IV.

Efficient estimation of any of the above mentioned signals implies, as we have seen in section III, using past, present and future data in calculating the value of the signal in a particular moment t. Thus, the updating of the signals is a real, inevitable fact, so

INDEX OF INDUSTRIAL PRODUCTION, TREND AND THE SEASONALLY ADJUSTED SERIES

Graph 2.





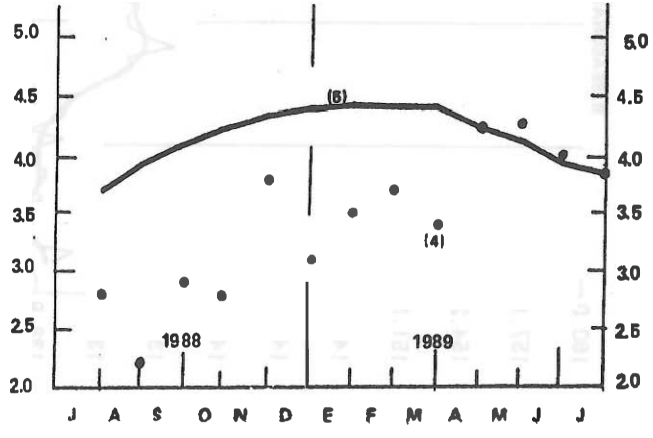
(*). The last available observation corresponds to December 1988.

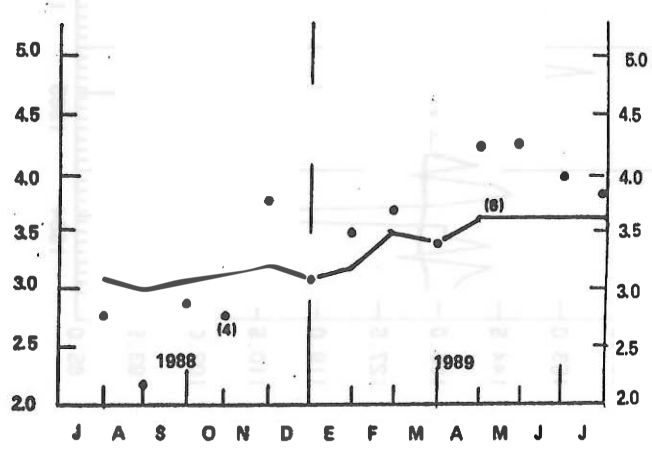
TABLE 3

INDEX OF INDUSTRIAL PRODUCTION

Latest observation july 1989

DATE	ORIGINAL SERIES	TREND Underlying growth				INERTIA	SEASONAL FACTOR	
		Estimated value in t for date t	Present estimate for the whole sample	Estimated value in t for date t	Present estimate for the whole sample	Medium-term growth expectations	Estimated value in t for date t	Present estimate for the whole sample
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1988 Janary	143.9	148.4	149.4	2.1	2.9	2.8	98.07	98.84
February	154.0	148.9	149.4	2.2	2.8	2.7	102.58	102.60
March	165.1	150.6	149.4	2.9	2.9	2.9	108.45	108.12
April	151.6	150.1	149.8	2.3	3.1	2.9	101.94	102.07
May	161.7	151.4	150.2	2.8	3.3	3.2	107.59	107.82
June	159.5	150.3	150.8	2.3	3.5	3.0	105.66	105.77
July	158.4	151.4	151.5	2.8	3.7	3.1	105.01	104.37
August	89.6	150.3	152.2	2.2	3.9	3.0	57.84	58.45
Septem.	160.5	151.9	152.8	2.9	4.1	3.1	105.68	105.43
October	161.0	152.1	153.3	2.8	4.2	3.1	106.37	105.92
Novemb.	168.9	154.3	153.8	3.8	4.3	3.2	108.65	108.48
Decemb.	160.8	153.3	154.4	3.1	4.4	3.1	98.57	98.21
1989 January	160.8	155.4	155.1	3.5	4.4	3.2	102.06	101.86
February	157.7	155.7	155.9	3.7	4.4	3.5	101.72	101.57
March	165.0	155.4	156.7	3.4	4.4	3.4	106.24	105.98
April	162,7	156.8	157.3	4.2	4.2	3.6	102.05	102.17
May	167.4	158.2	157.9	4.3	4.1	3.6	105,8	105.70
June	171.2	158.5	158.2	4.0	3.9	3.6	108.71	108.48
July	164.2	158.5	158.5	3.8	3.8	3.6	103.63	103.63





that when official information statistics agencies consider not publishing updates of the signals they are not tackling the elimination of a problem (the existence of revised estimates), since eliminating them is impossible, but are questioning whether to hide their revisions from users.

As a general attitude it may be convenient to facilitate the maximum of information and, therefore, publish revisions. Moreover, in points IV. 5 and IV. 8 we have seen the economic content from a short-term point of view which exists in such revisions. Thus in the proposal for publishing indicators shown in Table 3, in the column (2) the monthly trend values are given as estimated for each month and in column (3) the estimate of this trend using all avialable information (and necessary predictions) up to the moment the table is drawn up.

Also in column (4) of table 3 the underlying growth is shown as estimated with information up to each month in question, and in column (5) the estimate made with information available up to the moment of drawing up the table. Woth estimates are recorded also in the form of a graph, and by comparing them the effect of the innovations of the new observations on the underlying growth of the phenomenon represented can be deduced, and as we have already metioned, this is one the most important effects that a user wishes to know.

The assessment of the underlying growth in a particular month is completed by comparing it with medium-term growth expectations -INERTIA- avialabe at that moment. To make such a comparison possible the inertia is recorded in column 6 of table 3. It is also shown on a

graph to make it easier to assess the medium-term impovement of worsening of the economic phenomenon. In the same graph panel the values of column 4 are once more included and these, as we have already said, allow an assessment of the improvement or worsening in the short term.

Finally the seasonal coefficients indicate (by subtracting a hundred from the seasonal coefficient), the percentage by which in a particular month the increase or decrease deviates from the trend level. In table 3 the concurrent estimate of each month's coefficient is recorded in column 7 and in column 8 the estimate with all available information. It should be noted that, unlike the seasonally adjusted series which is a contaminated series, seasonal coefficients constitute a pure signal which, moreover, is estimated very accurately in comparison with other signals.

A P P E N D I X A

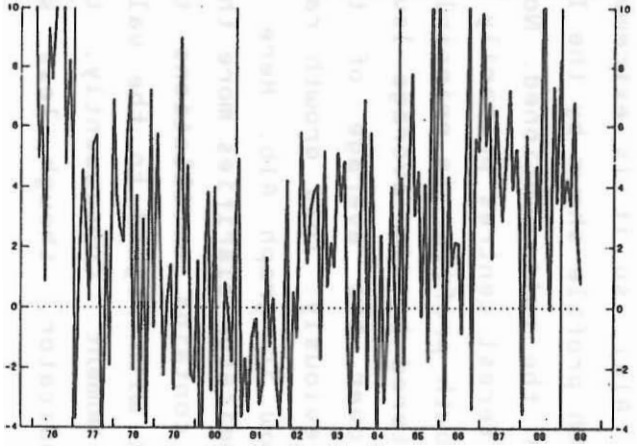
APPLICATION OF THE PREVIOUS METHODOLOGY: SPANISH INDUSTRIAL ACTIVITY IN 1988 AND THE FIRST HALF YEAR OF 1989

To find out the evolution registered by Spanish industrial activity in the last year and in general in any year, it is important to estimate the growth profile, even on a quarterly basis, shown by the index of industrial production, IPI. This growth indicator, representative in annual terms, with the limitations inherent in the IPI, of industrial real activity, along with others referring to the service, building and agricultural sectors, enables, by the use of solid measurements of inflation (see appendix B), the consistency of monetary policy with real activity to be evaluated.

Annual growth rates, growth registered in a month over the same month in the previous year, T^1_{12} of the IPI oscillated in 1987 and 1988 by more than eight points throughout the year (see graph A1a), so it is extremely difficult to establish the growth profile shown by the IPI in those years on the basis of the rate mentioned. Now, if, as has been pointed out, interest centres primarily in having available a quarterly growth profile, in principle, one could use the growth registered by the average level of three consecutive months over the average of the corresponding months a year previously. This growth rate can be called T^3_{12} and is show in graph A1b. Here it can be seen that this growth indicator clarifies more than the previous one, but still contains oscillations the magnitude of which is important with regard to the value of the growth rate at each moment. Consequently, the T^3_{12} is, also a confusing indicator, though less so,

GRAPH A.1.a.

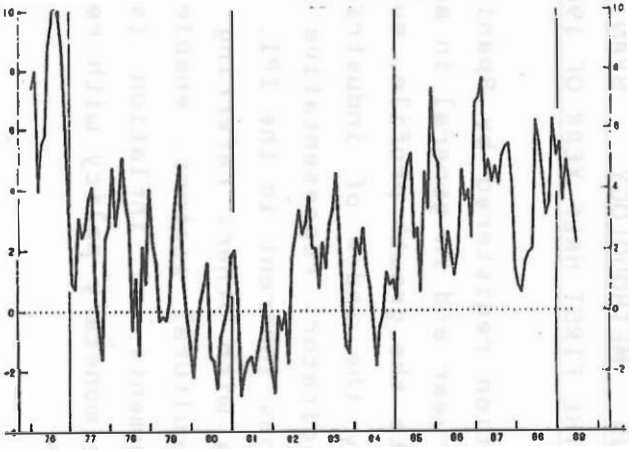
T 1,12 RATE OF INDUSTRIAL PRODUCTION INDEX (JUNE 1989)



T 1,12: Rate of grouth in the level of a month over the level of the same month in the previous year.

GRAPH A.1.b

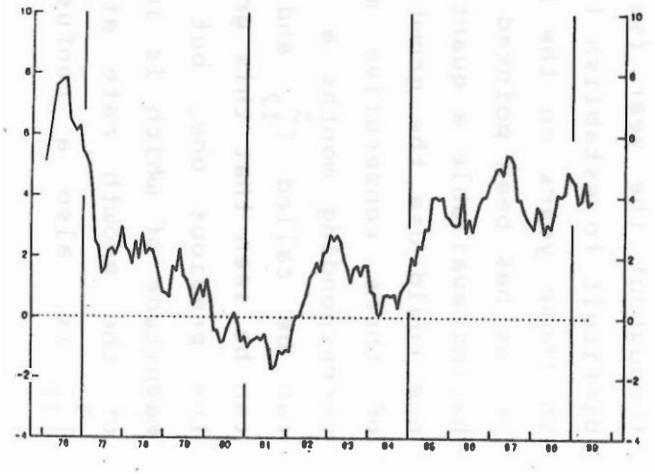
T 3,12 RATE OF INDUSTRIAL PRODUCTION INDEX (JUNE 1989)



T 3,12: Rate of grouth in the mean level of three consecutive months over the mean level of the same three months in the previous year.

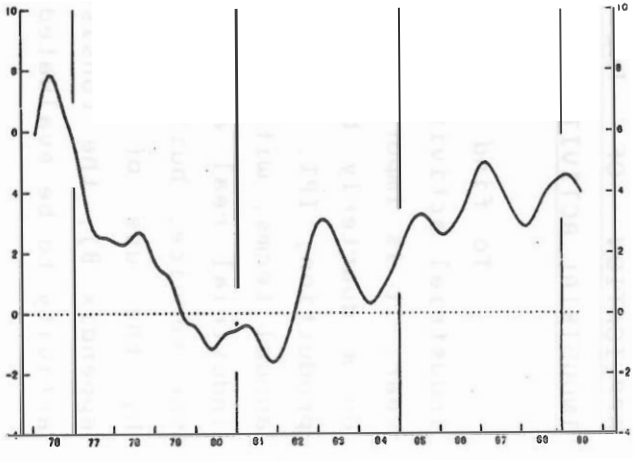
GRAPH A.1.c.

T 12,12 RATE OF INDUSTRIAL PRODUCTION INDEX (JUNE 1989)



GRAPH A.1.d.

T 12,12 RATE OF TOTAL IPI TREND JUNE 1989



and harly practical for basing on it the growth in industrial production.

The Annual National Accounts register growths in average values of macroeconomic variables throughout the year compared to the corresponding average values of the previous one. When a macromagnitude is measured monthly, as is the case with industrial production, this growth is obtained by averaging the level of the twelve months and comparing it with the corresponding level of the twelve months of the previous year. The resulting rate can be called T_{12}^{12} and its values for the IPI are shown in the graph A1c. With this graph a much more illustrative description of industrial growth is obtained than in the previous ones, even if it contains certain oscillations which it would be desriable to get rid of.

So far we have been concentrating on the industrial growth profile, but it is also interesting to have available a level indicator on production, since, for example, the long-term paths for money, prices and real activity are determined on the levels of these variables. The level obtained with the original IPI data have strong oscillastions (see graph 2), so that it is convenient to take as an indicator a series from which such oscillations have been removed. Such a level indicator may be the seasonally adjusted series or the trend. Both are shown in graph 2, where one can easily see the usefulness of using the trend and discarding the seasonally adjusted series.

If we have a level indicator with no seasonal and irregular oscillations, we can base the growth profile we are looking for on it. Thus, in graph A1d the rate T_{12}^{12} of the IPI trend is shown, and this is the

industrial growth indicator proposed in this appendix. This growth indicator has the characteristics of showing a scarcely oscillating evolution compared to other alternative indicators and is directly obtained from a level indicator, the trend.

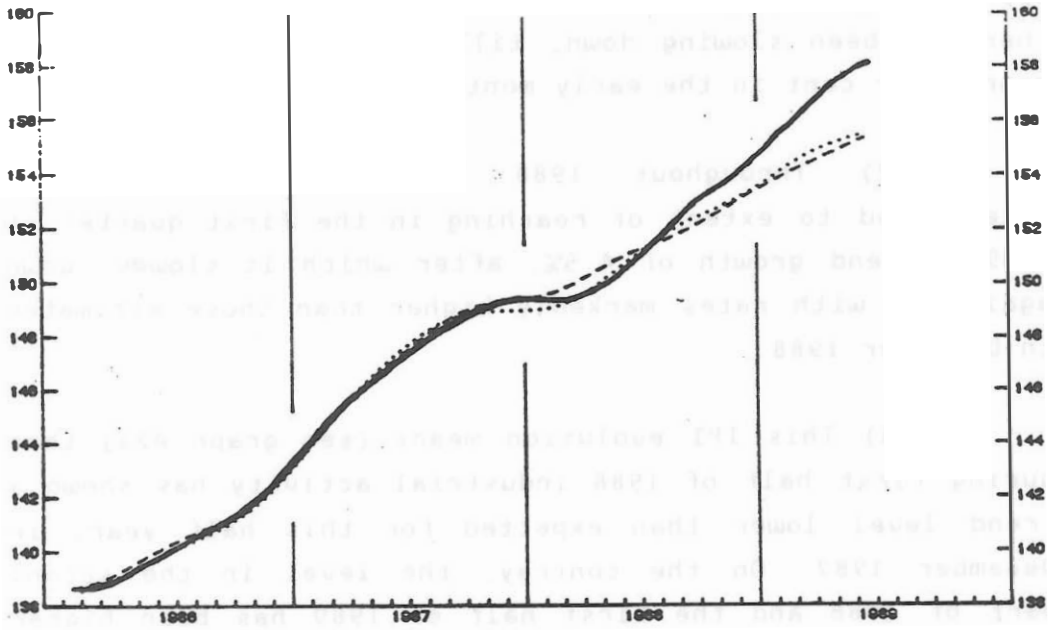
Before using the T_{12}^{12} of the IPI trend to analyse the Spanish industrial production in 1988 and the first half of 1989, certain points related to it must be clariefied. The IPI ofers a monthly measurement of industrial production and thus enables the possible changes that this production may undergo to be promptly known. Thus, as a indicator of industrial activity it can be used for assessing whether the economic policy measures adopted are producing the expected results, or whether it is worthwhile beginning to think of a readjustment or new design in them. Therefore, it is desirable to have available a monthly indicator of industrial activity.

To calculate the rate T_{12}^{12} centred on the moment referred to on the latest available observation, predictions must be made of the corresponding level series for the next eleven months. This can be done with a purpose-built univariate model. With such a model the standard error deviation in the prediction made twelve months in advance is 2.47%.

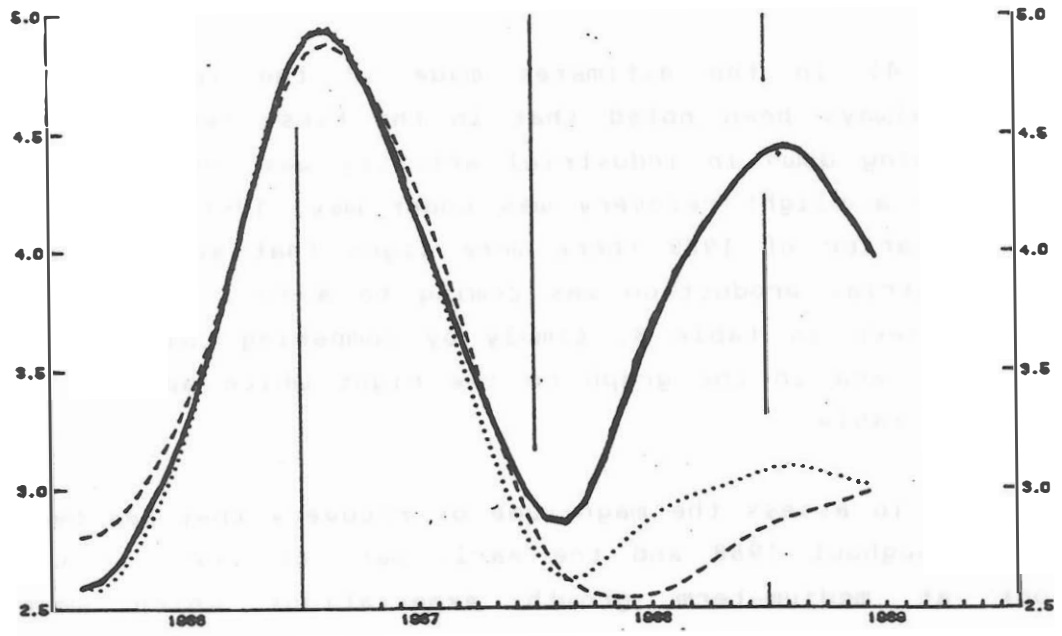
Th thick line of graph A2a records, for the period between January 1986 and June 1989, the IPI trend, as estimated with information up to 1989. Moreover, the estimate of the trend made in December 1987 and December 1988 is also included. Graph A2b show the annual T_{12}^{12} growth corresponding to previous trends.

From these graphs one can deduce:

TREND IN THE SPANISH INDUSTRIAL PRODUCTION INDEX Graph. A2*a*



GROWTH RATE IN THE SPANISH INDUSTRIAL PRODUCTION INDEX Graph. A2b



(1): ——— Jul 89
(2): Dcbre.88
(3): – – – Dcbre.87

1) Industrial production showed growth rates approaching 5 per cent the beginning of 1987 and since then has been slowing down, till it reached growth rates near 3 per cent in the early months of 1988.

2) Throughout 1988 industrial activity has accelerated to extent of reaching in the first quarter of 1989 a trend growth of 4.5%, after which it slowed down again but with rates markedly higher than those estimated in December 1988.

3) This IPI evolution means (see graph A2a) that during first half of 1988 industrial activity has shown a trend level lower than expected for this half year, in December 1987. On the contray, the level in the second part of 1988 and the first half of 1989 has been higher than these expectations.

4) In the estimates made in the intermediate months always been noted that in the first term of 1988 the slowing down in industrial activity was coming to an end, and a slight recovery was under way, just as in the first quarter of 1989 there were signs that accelaration in industrial production was coming to a full stop. This can be seen in table 3, simply by comparing columns (4) and (6), and in the graph on the right which appears in the same table.

To assess the magnitude of recovery that has been put throughout 1988 and the early part of 1989, we can look at medium-term growth expectations which were estimated each month. These expectations are also recorded in table 3. From these values it can be deduced that expectations have been fairly stable in their evolution,

but systematically showing a slight recovery since the beginning of 1988. Thus, a medium-term growth expectation of 2.85 in January 1988 has risen to 3.6% in June 1989.

In the graph panel on the right of table 3, by means of points the trend growth that was estimated for each month at the corresponding moment is specified. By comparing the sequence of points with the line of medium-term growth expectations, we see that the message of recovery has always been there, throghout 1988, in the data, since contemporary trend growth is below future growth expectations. The graph finally shows that in the last months of the year contemporary growth rates have ceased to be systematiclly below expectations, and were even above them in the first half of 1989. This leads us to the conclusion that the indutrial growth will show a slight drop in the second half of the present year.

A P P E N D I X B

EXAMPLE OF A SHORT-TERM QUANTITATIVE REPORT: SPANISH EXTERNAL TRADE WITH INFORMATION UP TO SEPTEMBER 1987 (*).

The information provided by the National Customs Authority allows us to make a short-term analysis of Spanish external trade corresponding to that data.

IMPORTS.

Underlying evolution

The underlying evolution, after a stage of very fast growth following the entry of Spain in the EEC till the beginning of 1987, shows, according to the information available up to September 1987, a slight slowdown in growth, with a rate of growth around 18% in this month (graph B1).

Change of perspectives

The present perspectives are more expansive those estimated with information available up to June and August 1987 (see graph B1).

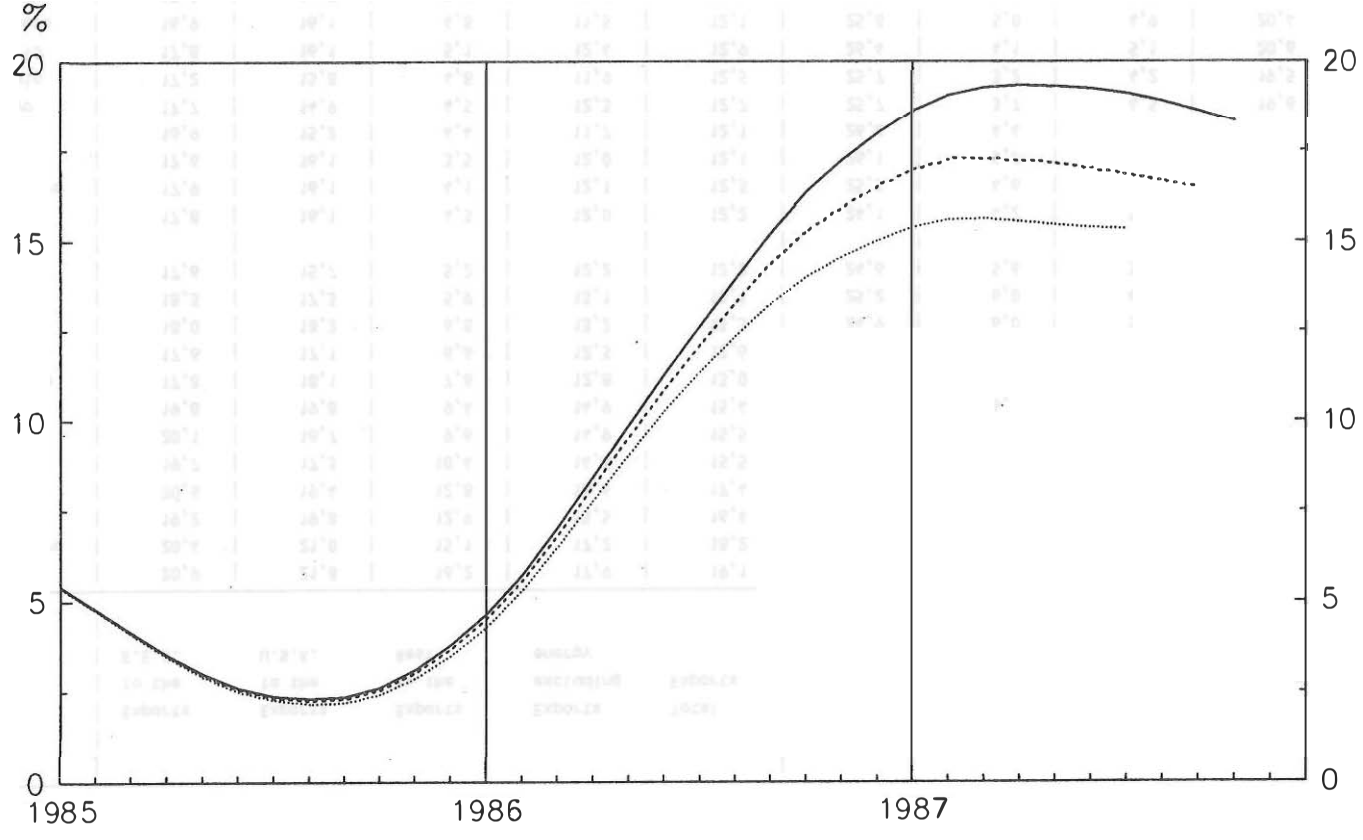
Inertia or medium-term growth expectations

Medium-term growth expectations (inertia) are estimated at 16.7%, one of the highest rates since the beginning of 1986 (it can be seen in table B.1). However, given that the speed of the present advance is two percentage points higher than inertia, there is sufficient margin for the present situation of a slowdown in growth to be maintained (see table B.2 and graph B.1).

(*) This example has been constructed using the models and strategy proposed in Delrieu and Espasa (1988).

TOTAL IMPORTS
Underlying Growth Perspectives

Graph B.1.



MEDIUM TERM GROWTH EXPECTATION

Table B.1.

DATA	Medium Term Growth Expectation for :					Medium Term Growth Expectation for :				
	Exports to the E.E.C.	Exports to the U.S.A.	Exports to the Rest	Exports excluding energy	Total Exports	Imports from the E.E.C.	Imports from the U.S.A.	Imports from the Rest	Imports excluding energy	Total Imports
8601 Enero	20,9	21,8	16,2	17,9	19,1	17,6	9,6	13,2	14,7	14,6
8602 Febrero	20,4	21,0	15,1	17,2	18,2	17,5	10,8	11,4	15,1	14,0
8603 Marzo	19,2	19,8	12,9	15,5	16,4	18,0	9,8	9,6	14,7	14,1
8604 Abril	20,6	19,4	12,8	16,6	17,4	18,8	8,7	9,2	15,2	13,7
8605 Mayo	19,7	17,3	10,4	14,8	15,5	18,9	6,9	7,7	14,8	13,5
8606 Junio	20,1	18,7	9,6	14,9	15,5	20,8	7,0	7,7	16,1	13,9
8607 Julio	19,8	19,8	9,4	14,9	15,4	21,9	6,2	7,5	17,2	14,7
8608 Agosto	17,8	18,1	7,6	12,8	13,0	20,9	4,4	6,1	16,0	12,9
8609 Septb.	17,6	17,1	6,6	12,3	12,6	22,0	4,2	5,8	16,8	14,0
8610 Octb.	18,0	18,2	6,8	13,2	13,3	24,9	6,0	5,5	19,7	16,1
8611 Novb.	18,3	17,3	5,9	13,1	13,1	25,2	6,0	4,8	20,2	16,1
8612 Dicb.	17,6	15,7	5,2	12,2	12,2	24,6	5,6	3,7	19,2	15,3
8701 Enero	17,8	16,1	4,3	12,0	12,2	24,1	4,2	3,0	18,3	14,7
8702 Febrero	17,9	16,1	4,1	12,1	12,3	25,5	4,6	3,4	19,5	15,6
8703 Marzo	17,6	16,1	3,5	12,0	12,1	26,1	5,7	3,5	20,4	16,9
8704 Abril	16,9	15,2	4,4	11,7	12,1	26,6	4,4	3,8	20,3	16,8
8075 Mayo	17,7	14,9	4,5	12,3	12,7	25,7	3,7	4,5	19,6	15,5
8706 Junio	17,2	15,8	4,8	11,9	12,5	25,7	3,2	4,2	19,5	16,1
8707 Julio	17,8	16,1	5,1	12,4	12,9	26,4	4,1	5,1	20,6	16,5
8708 Agosto	16,9	16,1	4,8	11,5	12,1	25,8	5,0	4,9	20,4	15,2
8709 Septb.	18,1	16,7	5,2	12,7	13,2	26,6	5,7	5,7	21,5	16,7

Table B.2.

ANALYSIS OF THE SITUATION OF SPANISH IMPORTS WITH INFORMATION AVAILABLE UP TO SEPTEMBER 1987

COMPONENT	UNDERLYING IMPORT SITUATION	Underlying growth	MEDIUM-TERM GROWTH EXPECTATIONS (Inertia)	COMPONENT TRENDS AS A PERCENTAGE OF THE TOTAL		
				January 86	Present	Forecast medium term
TOTALS FROM EEC	SLOWDOWN IN GROWTH (more expensive situation than that of June & August)	28.2%	26.6%.The slowdown may continue. In any case expectations have been the highest of 1986 & 1987	36.0%	55.4%	59.9%
TOTALS FROM USA	END OF A STAGE OF ACCELERATED GROWTH (more expensive situation than that of June & August)	8.0%	5.7%.It's estimated that this growth situation will slow down.Expectations have been the highest since mid 1986	11.1%	8.1%	7.3%
TOTALS FROM THE REST OF THE WORLD (*)	SLIGHT SLOWDOWN IN GROWTH (more expansive situation than that of June & August)	7,7%	5.7%.The slowdown is tending to stagnate.Expectations are higher than the ones estimated during the last months	52.9%	36.5%	32.8%
NON-ENERGY TOTALS	SLOWDOWN IN GROWTH (more expansive situation than that of June & August)	24.3%	21.5%.A situation of slowdown in growth is expected, even though growth expectations have been the highest of 1987	63.9%	84.4%	87.7%
TOTALS (**)	STEADY GROWTH (more expansive situation than the one estimated in June & August)	18.7%	17.5%.There's a margin for a certain slowdown to be produced.Expectations have been among the highest since Spain joined the EEC			

(*) The rest of the world includes all countries except the EEC and United States.
(**) Inertia calculated for the total is obtained by weighting those corresponding to the different economic series.

Growth profile

The underlying growth rate during 1986 went from 4.6% in the first quarter to 16.6% in the last. By quarters 1987, the estimate of that growth is: 18.8%, 19.5%, 19.2% and 18.4%, respectively (see graph B.2).

Breakdown by regional areas

A breakdown by regional areas reveals that the share quota of the total of imports coming from the EEC (54.8%) is increasing annually at the expense of imports from the rest of the world and especially, the United States, the percentage of which is estimated at 8%.

Summary

In Table B.2. the short-term situaton of Spanish imports is summarised.

EXPORTS

Underlying evolution

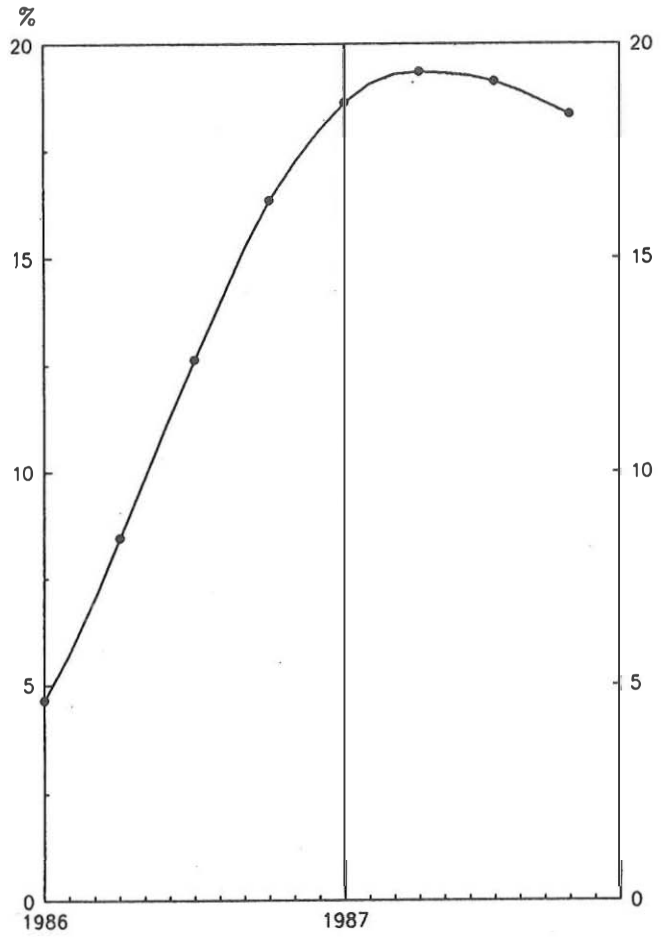
With entry into the Community the slowdown in growth reflected by this variable during 1985 reached its nadir, and from then onwards a speed up in growth was noted until mid-1987. At present the underlying situation is of steady growth around 15.0% (see table B.3).

Change of perspectives

The analysis for September 1987 reflects more expansive behaviour than what has been estimated according to information availabe for June and August (see graph B.3).

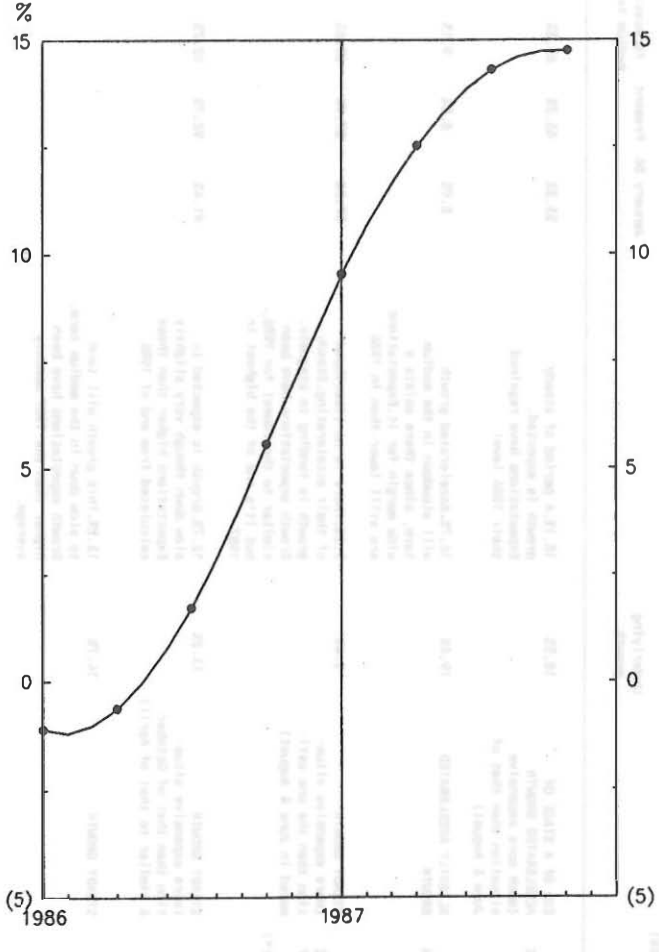
Graph B.2.

GROWTH PROFILE OF TOTAL IMPORTS



The last observation available is september 1987

GROWTH PROFILE OF TOTAL EXPORTS



. The last observation available is september 1987

Table 8.3.

ANALYSIS OF THE SITUATION OF SPANISH EXPORTS WITH INFORMATION AVAILABLE UP TO SEPTEMBER 1987

COMPONENT	UNDERLYING EXPORT SITUATION		MEDIUM-TERM GROWTH EXPECTATIONS (Inertia)	COMPONENT TRENDS AS A PERCENTAGE OF THE TOTAL		
		Underlying growth		January 86	Present	Forecast medium term
TOTALS FOR EEC	END OF A STAGE OF ACCELERATED GROWTH (much more expansive situation than that of June & August)	18.5%	18.1%.A period of steady growth is expected. Expectations have regained their 1986 level	53.3%	63.2%	65.3%
TOTALS FOR USA	SLIGHTLY ACCELERATED GROWTH	19.4%	16.7%.Accelerated growth will slowdown in the medium term, since there exists a wide margin for it.Expectations are still lower than in 1986	8.9%	8.8%	9.1%
TOTALS FOR THE REST OF THE WORLD (*)	STEADY GROWTH (more expansive situation than the one estimated in June & August)	5.4%	5.2%.There is no likelihood of their accelerating.Steady growth is tending to stagnate. Growth expectations have been similar to the lowest for 1986, but it's one of the highest in 1987	37.5%	27.9%	25.6%
NON-ENERGY TOTALS	STEADY GROWTH (more expansive situation than that of October & similar to that of April)	13.2%	12.7%.Growth is expected to slow down though very slightly Expectations higher than those calculated from end of 1986	91.4%	92.7%	92.7%
TOTALS (**)	STEADY GROWTH	14.7%	13.2%.This growth will tend to slow down in the medium term. Growth expectations have been higher than the 1987 monthly average.			

(*) The rest of the world includes all countries except the EEC and United States.
(**) Inertia calculated for the total is obtained on its own model.

Inertia or medium-term growth expectations

The medium-term growth expectations (inertia) will oscillate around 13%, and even though they are higher than those estimated during the rest of the year (see Table B.2), they are still below those which were estimated during the first quarter of 1986.

Given that the present speed of advance, 14.7%, is higher than inertia, it is likey that the present situation of steady growth will be replaced by a situation of slowdown in growth (see Table B.3 and graph B.3).

Growth profile

Underlying growth rates during 1986 oscilated between -1.1% at the beginning of the first quarter and 5.65 in the last. In this recovery phase, growth rates at the beginning of the quarter which have been estimated for 1987 were 9.5%, 12.5%, 14.3% and 14.7% (see graph B.2).

Breakdown by regional areas

The annual share quota is growing for exports to the EEC and falling for exports to the rest of the world and the United States.

CONCLUSION: ANALYSIS OF TRADE BALANCE

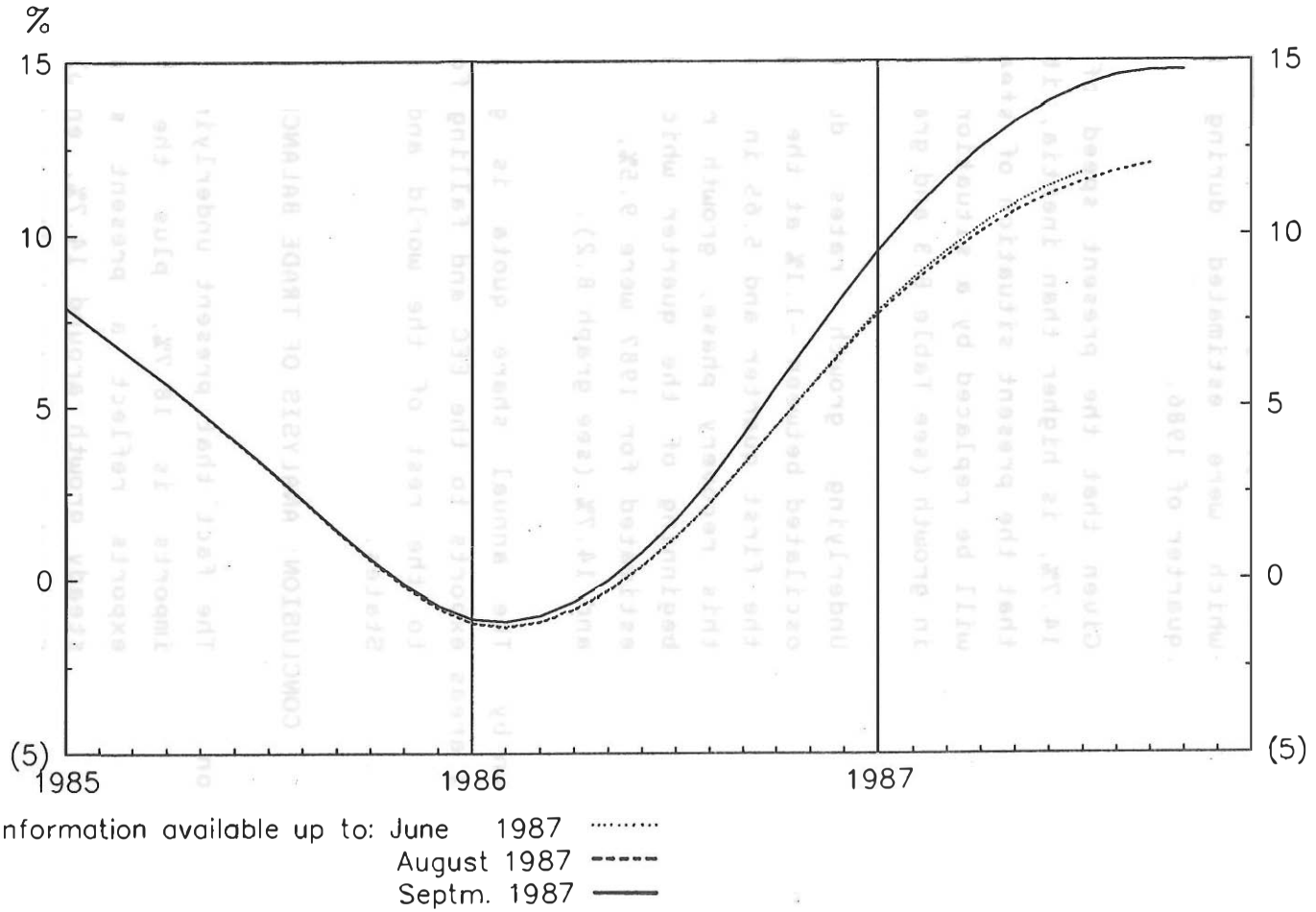
Situation

The fact that present underlying growth of imports is 18.7%, plus the fact that exports reflect a present situation of steady growth around 14.7%, enables us to forecast a worsening in the trade balance.

TOTAL EXPORTS

Underlying Growth Perspectives

Graph B.3.



Prediction

According to this, we find that the trade deficit will continue growing (see graph B.4). The forecast deficit for 1987 is 1.80 billion pesetas (14.800 million dollars), which means an annual growth of 62.3% when measured in pesetas and 90.7% in dollars (see Tables B.4 and 5).

Energy and non-energy products

However, this growth is mitigated by the behaviour of energy products, since for the non-energy sector the prediction of the deficit growth is 171.2% measured in pesetas (212.9% in dollars).

Regional areas

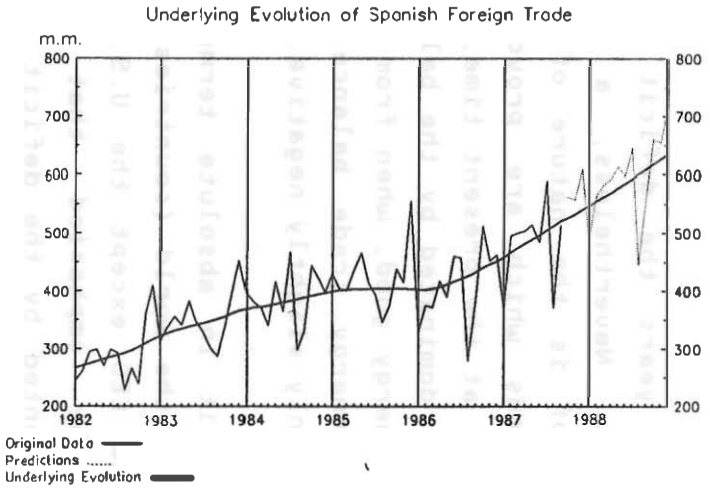
At the end of the year, the percentage which the trade deficit by areas will represent will be 35.2% for the EEC, 6.5% for the U.S.A. and 58.2% for the rest.

Conclusion

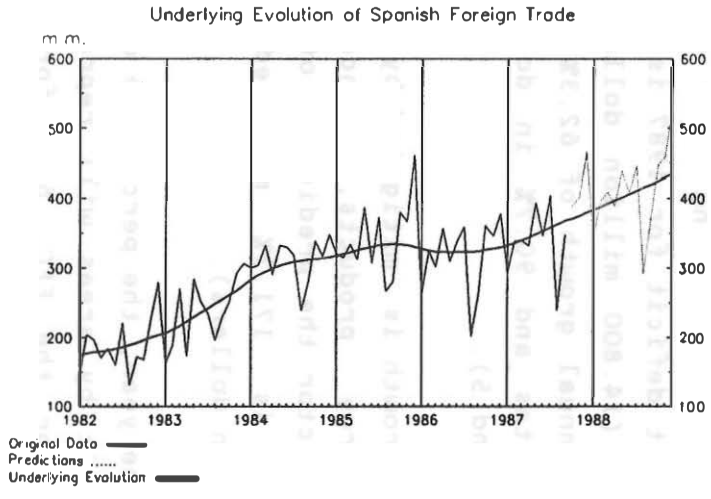
In the next few years the deficit will continue to grow. Nevertheless, a more worrying aspect of is the nature of the commercialised goods which are provoking the deficit. Thus, at the present time, the deficit is totally dominated by the balance in trade in non-energy good, when from 1982 to 1986 the non-energy trade balance had been positive or only slightly negative.

The highest deficit in absolute terms is with the rest of the world (countries not belonging to the EEC except the U.S.A.). but it must be emphasied that the percentage represented by the deficit with

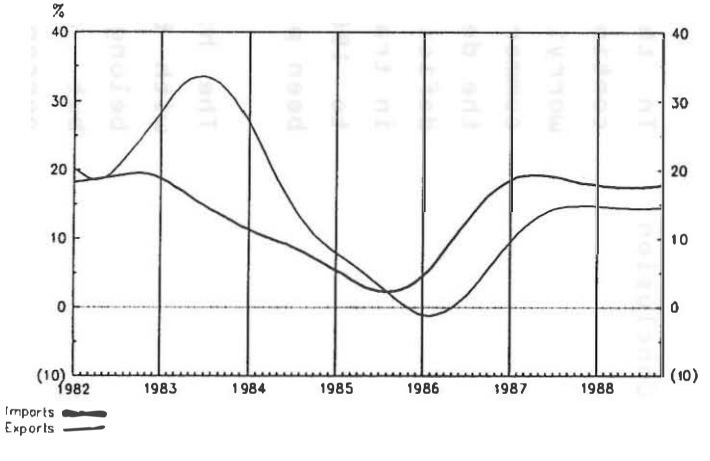
TOTAL IMPORTS



TOTAL EXPORTS



UNDERLYING GROWTH OF SPANISH FOREIGN TRADE



TRADE BALANCE

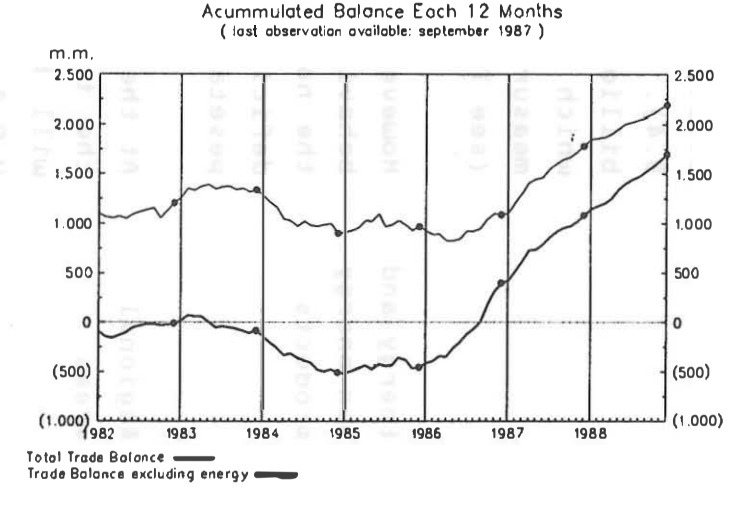


Table 8.4.

STATEMENT OF THE PRESENT TRADE BALANCE AND FORECAST FOR 1987 (in million pesetas)
According to information available up to september 1987

Column	Accumulated up to the present period in 1987(a) 1	Produced in 1986(a) 2	Forecast for 1987(a) 3	Variation rate between (2) & (3)
By areas				
Total EEC	444.215'0 (33.5%)	162.789'0 (15.0%)	634.579'0 (35.2%)	289.8%
Total USA	94.437'0 (7.1%)	131.672'0 (12.1%)	118.298'0 (6.5%)	-10.57%
Total RW	787.074'0 (59.4%)	796.802'0 (73.0%)	1.049.324'0 (58.2%)	31.8%
By products				
Non energy	753.489'0 (56.8%)	399.448'0 (36.6%)	1.083.210'0 (60.1%)	171.2%
Total	1.325.726'0	1.090.542'0	1.802.201'0	62.3%

(a) In brackets percentage of total deficit.

Table B.5.

STATEMENT OF THE PRESENT TRADE BALANCE AND FORECAST FOR 1987 (in million dollars)
According to information available up to september 1987

Column	Accumulated up to the present period in 1987(*) 1	Produced in 1986(**) 2	Forecast for 1987 (***) 3	Variation rate between (2) & (3)
By areas				
Total EEC	3.509'4	1.162'4	5.228'5	349.8%
Total USA	746'07	940'19	874'69	3.7%
Total RW	6.218'0	5.684'3	8.645'7	52.1%
By products				
Non energy	5.952'7	2.852'2	8.924'9	212.9%
Total	10.473'0	7.786'9	14.849'0	90.7%

(*) Average ×/$ exchange rate to present time (126.58)
(**) Average exchange rate during 1986 (140.0)
(***) Assuming that the average of the ×/$ exchange rate for the remaining months of 1987 will be the same as the latest available data item (121.37)

this geographical area, compared to the total deficit is falling, going from 73.0% in 1986 to 58.2% forecast for 1987, while, on the other hand, the deficit with the EEC is becoming an ever-growing share of the total going from 15.0% in 1986 to 35.2% forecast for 1987.

A P P E N D I X C

UNDERLYING INFLATION IN THE EEC. U.S.A. AND JAPAN AND THE INFLATION DIFFERENTIAL WITH SPAIN, IN AUGUST 1987.(*)

Underlying inflation

The underlying evolution in a time series is a signal that thoughout this work we have been indentifying with the statistical concept of trend.

In the specific case of a price index it is worthwhile distinguishing between the original series, which represents a price level, and the inflation series, which is here defined as the annual growth of this index. Consequently, the underlying evolution of a price index will be its trend and the underlying inflation will be calculated by means of the annual growth rate of the trend of this index.

If must be noted that the underlying evolution and, therefore, its growth can be obtained for any price index. Therefore, given a price index, P, if the annual growth of its trend is calculated one will have the underlying inflation for this index. In the layout below a summary of these concepts is give.

Price Index	→	UNDERLYING EVOLUTION of the price index = Price index trend	→	UNDERLYING INFLATION in the price index P = annual groth of trend of P.

An important measurement of inflation for the economy as a whole must be obtained from a general price

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(*) This appendix has been drawn up from a previous work by M. Ll. Matea and M.L. Rojo.

index, such as the one represented by the gross domestic product deflactor. However, national accounting data are know with delay and it is usual to calculate inflation on a monthly consumer price index (CPI), obtained from a wide price survey, and the prices weithted according to an estimated outline of family expenditure. Thus, when talking about inflation or underlying inflation without reference to a specific price index, we are referring to the one derived from the CPI.

For the consumer price indexes it can be seen that their annual trend growth rate shows a similar evolution to that of the T_{12}^{12} rate (growth for the average of twelve observations on the average of the twelve immediately preceding observations) of their corresponding original series. Therefore, the T_{12}^{12} rate of a price index is an acceptable indicator of its underlying inflation.

Methodology for the analysis of the inflation differential

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 differential 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,

since seasonal oscillations, which cancel each other out over the year, or short-term oscillations, are not important for calculating the differential, since they give no information on its repercussion in the basic equilibria of the economy.

Underlying evolution and medium-term expectations for the inflationary process in the European Economic Community Countries, United States and Japan

The Community CPI, excluding Spain, is obtained as the geometric mean of each of the member countries. The weithtings used correspond to the percentage share of these countries within Spain's foreign trade during 1985. The series which is show here for the EEC, excluding Spain, includes Portugal from the beginning.

In Table C1 the situation of Community consumer price indexes is analysed and in graph C1 the underlying growths are show. In Table C1 as well as studying the improvement or worsening of the inflationary situation throghtout 1989, medium-term expectations are shown estimated with information up to August.

The Community CPI, excluding Spain, shows from the beginning of 1989 a slowdown in growth, with its present underlying inflation at 4.3%, wich means an improvement compared to the situation of the previous month. The figures for medium-term expectations are around 4.7%, so the present slowdown is not expected to be maintained in the medium term.

Most Community countries show a slowdown in growth. Nevertheless, as exceptions we have

Table C.1.

ANALYSIS OF THE SITUATION OF EEC CPI'S WITH INFORMATION UP TO AUGUST 1989

COUNTRY	PRESENT UNDERLYING SITUATION		INFLATION EXPECTATIONS (INERTIA)
	Price level	Inflation	
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 slowdow in growth to continue. Expectation have improved.
FRANCE	SLOWDOWN IN GROWTH Situation worse than that in June	3.3%	2.8%. Slowdown in growth expected to continue. Expectation have improved.
UNITED KINGDOM	SLOWDOWN IN GROWTH Improvement compared to July situation	7.0%	8.2%. Chance that slowdown in growth may speed up. Expectation have improved.
BELGIUM-LUXEMBURG	ACCELERATED GROWTH Situation similar to that in July	3.7%	3.8%. There is no margin for accelerated growth to continue. Expectation 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. Expectation have improved.
HOLLAND	STEADY GROWTH Situation worse than that in July	1.1%	1.0%. Steady growth is expected to continue. Expectation 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 grpwth 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.

(*) The Irish series is quarterly, therefore, the analysis of its situation is updated at the end of each quarter.

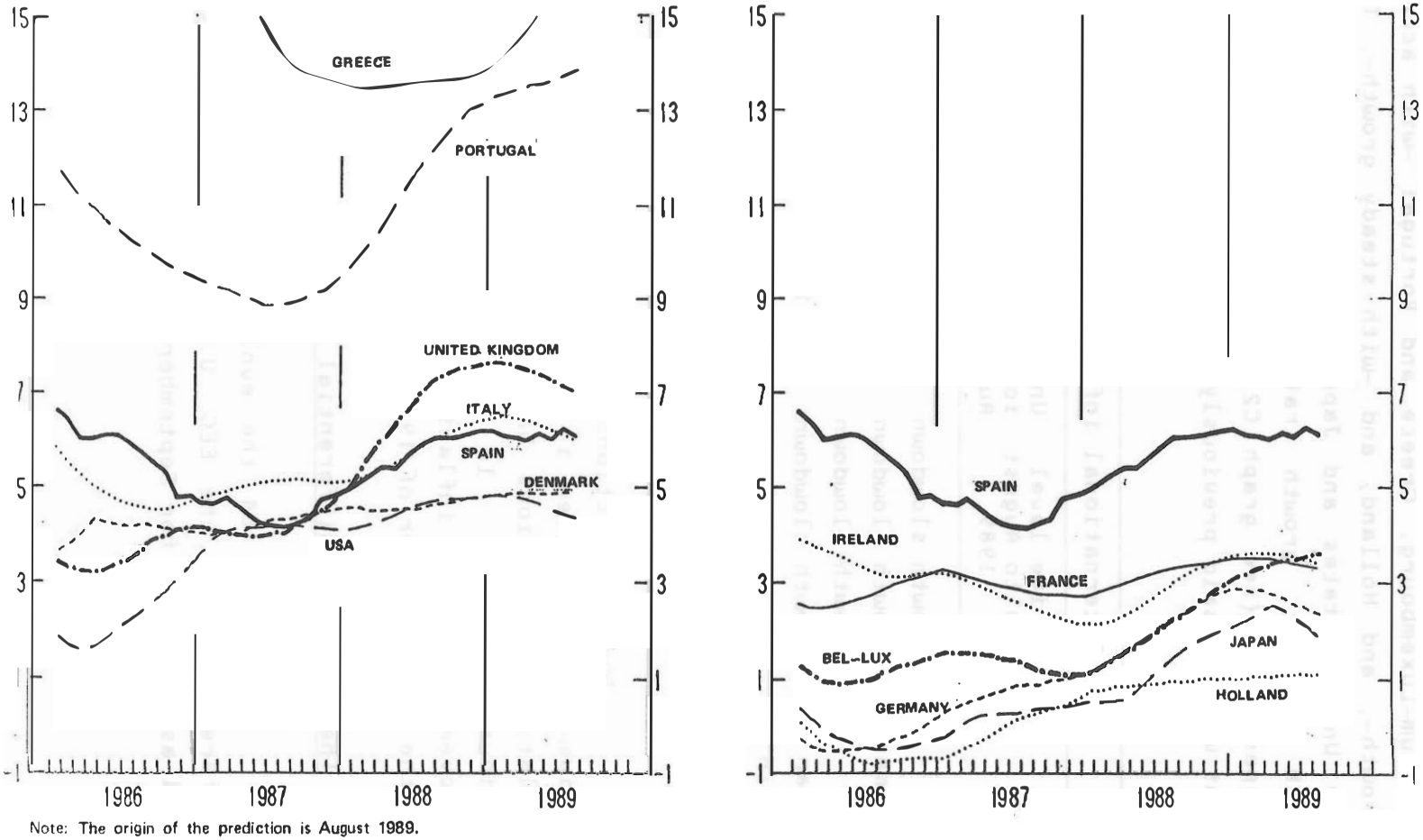
Table C.1 (Cont.)

ANALYSIS OF THE SITUATION OF USA AND JAPAN IPC'S WITH INFORMATION UP TO AUGUST 1989

COUNTRY	PRESENT UNDERLYING SITUATION		INFLATION EXPECTATIONS (INERTIA)
	Price level	Inflation	
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.

Graph C.1.

UNDERLYING INFLATION



Note: The origin of the prediction is August 1989.

Belgium-Luxembourg, Greece and Portugal -with accelarated growth-, and Holland, and -with steady growth-. In turn, the United States and Japan show a slowdown in growth, with present growth rates around 4.4% and 1.9%, respectively (see graph C2, and Table C1). A summary of what we have said previously is given below:

International inflationary situation			
	Price level up to August 1989	Underlying inflation in 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

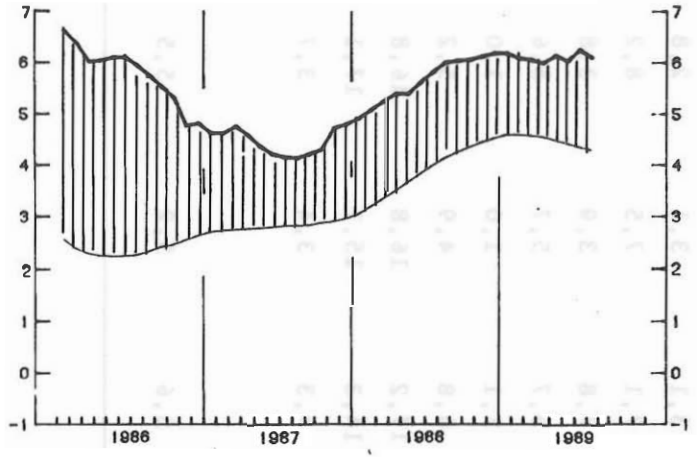
The predictions for 1989, 1990 and the medium-term are given in Table C2. Table C3 records how inflation expectations have evolved in recent months in various countries. In the Table a fairly general impovement in the inflationary situation can be detected in the third quarter of 1989.

The inflation differential between Sapin and the EEC

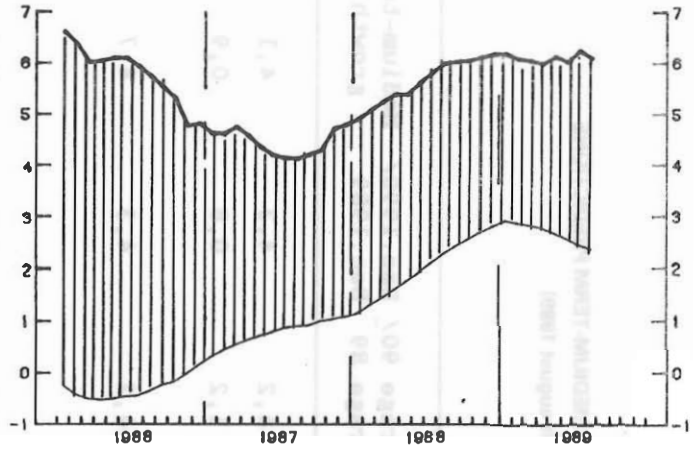
In Table C4 the evolution of Spain's inflation differential with the EEC, U.S.A. and Japan is shown as well as forecasts for September 1988.

Graph C.2.

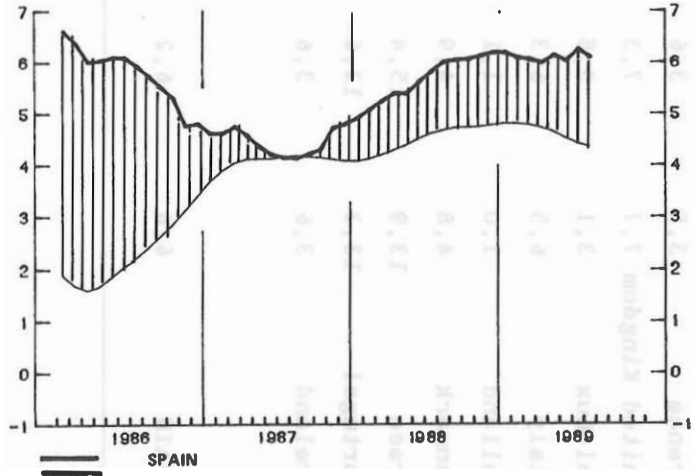
SPAIN'S INFLATION DIFFERENTIAL WITH THE EEC



SPAIN'S INFLATION DIFFERENTIAL WITH GERMANY



SPAIN'S INFLATION DIFFERENTIAL WITH USA



SPAIN'S INFLATION DIFFERENTIAL WITH JAPAN

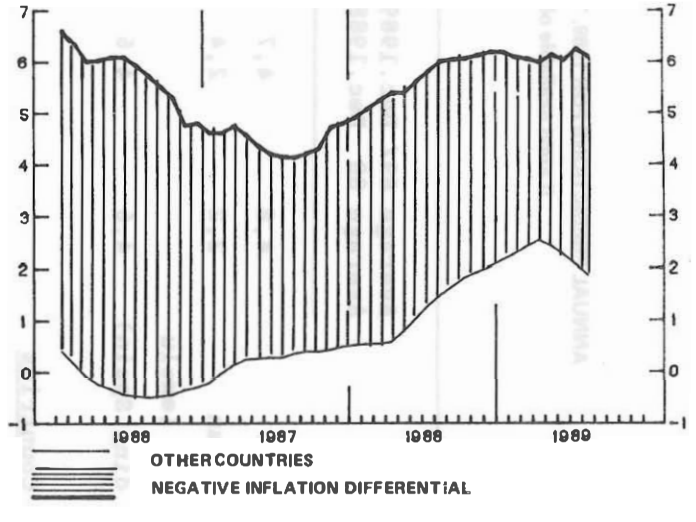


Table C2

ANNUAL PREDICTIONS FOR 1989, 1990 AND MEDIUM-TERM PREDICTIONS
(Latest available observation august 1989)

	Average 89/ Average 88	Dec.1989/ Dec.1988	Average 90/ Average 89	Dec.1990/ Dec.1989	Medium-term growth
USA	4,8	4,7	4,2	4,3	4,1
Japan	2,2	2,4	1,2	0,8	0,9
EEC (excluding Spain)	4,6	4,6	4,2	4,3	4,7
Countries					
Germany	2,9	2,9	2,1	2,3	2,2
France	3,5	3,6	3,1	3,1	2,8
United Kingdom	7,7	7,3	7,1	7,5	8,2
Bel-Lux	3,1	3,8	3,8	3,9	3,8
Italy	6,5	6,3	5,7	5,7	5,6
Holland	1,0	1,1	1,1	1,0	1,0
Denmark	4,8	4,9	4,8	4,9	5,2
Grece	13,9	15,4	17,2	16,8	16,8
Portugal	13,3	13,6	14,3	15,1	17,1
Ireland	3,6	3,6	3,3	3,4	3,7
SPAIN	6,6	6,2	5,6	5,2	5,5

Table C3

EVOLUTION OF MEDIUM-TERM INFLATION EXPECTATION IN THE EEC, USA AND JAPAN (1)

	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 excluding Spain	6,8	6,3	6,0	5,6	4,7
Countries					
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
Grece (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) The time series data for Ireland is quarterly, therefore the medium term expectation is revised only at the end of each quarter.

(*) The CPI series for Ireland is quarterly, so inertia is revised at the end of each quarter.

2.10.89

SPAIN'S INFLATION DIFFERENTIAL WITH THE EEC

Table C.4

Latest observation
1989-8

Date		E.E.C. except Spain	Germany	France	United Kingdom	Bel-Lux	Italy	Holland	Denmark	Greece	Portugal	Ireland
1986	1	4.1	6.9	4.1	3.2	5.3	.8	6.5	2.9	-16.4	-5.2	2.7
	2	4.0	6.8	3.9	3.1	5.3	.9	6.5	2.5	-15.8	-5.0	2.6
	3	3.7	6.5	3.6	2.8	5.1	.8	6.3	1.9	-15.5	-5.1	2.3
	4	3.8	6.6	3.6	2.8	5.1	1.0	6.5	1.7	-14.8	-4.9	2.4
	5	3.9	6.6	3.5	2.8	5.2	1.2	6.7	1.8	-14.1	-4.5	2.6
	6	3.9	6.6	3.5	2.7	5.1	1.4	6.8	1.9	-13.8	-4.4	2.7
	7	3.7	6.4	3.2	2.4	4.9	1.3	6.7	1.7	-13.2	-4.3	2.7
	8	3.4	6.1	2.9	2.0	4.8	1.2	6.5	1.5	-12.9	-4.4	2.6
	9	3.1	5.8	2.6	1.7	4.3	1.0	6.3	1.3	-12.5	-4.4	2.4
	10	2.9	5.5	2.3	1.4	4.0	.8	6.0	1.2	-12.0	-4.4	2.2
	11	2.2	4.8	1.7	.7	3.4	.2	5.4	.7	-12.1	-4.9	1.6
1986	12	2.2	4.7	1.8	.7	3.3	.2	5.5	.8	-11.7	-4.7	1.6
1987	1	1.9	4.3	1.4	.5	3.1	-.1	5.3	.6	-11.8	-4.8	1.4
	2	1.9	4.2	1.4	.5	3.1	-.2	5.2	.6	-11.8	-4.7	1.5
	3	2.0	4.2	1.6	.7	3.2	-.1	5.2	.7	-11.2	-4.5	1.7
	4	1.8	3.9	1.5	.6	3.1	-.4	4.9	.6	-11.1	-4.5	1.7
	5	1.6	3.7	1.4	.4	2.9	-.7	4.5	.3	-10.9	-4.6	1.6
	6	1.4	3.4	1.3	.2	2.8	-.9	4.2	.0	-10.8	-4.6	1.5
	7	1.3	3.3	1.3	.2	2.8	-1.0	4.0	-.1	-10.1	-4.7	1.6
	8	1.3	3.2	1.3	.1	2.9	-1.0	3.9	-.2	-9.9	-4.8	1.6
	9	1.4	3.3	1.5	.1	3.1	-.9	3.9	-.1	-9.6	-4.8	1.8
	10	1.4	3.3	1.6	.0	3.2	-.8	3.9	-.1	-9.5	-4.8	2.0
	11	1.8	3.7	2.0	.3	3.6	-.3	4.3	.3	-9.0	-4.5	2.5
1987	12	1.8	3.7	2.1	.1	3.7	-.3	4.2	.3	-8.9	-4.6	2.7
1988	1	1.9	3.8	2.2	.0	3.8	-.2	4.2	.4	-8.6	-4.6	2.8
	2	1.9	3.8	2.3	-.2	3.8	-.1	4.3	.5	-8.4	-4.9	2.9
	3	1.9	3.8	2.4	-.4	3.8	.0	4.4	.8	-8.3	-5.1	3.0
	4	1.9	3.8	2.4	-.6	3.8	.1	4.5	.9	-8.1	-5.3	3.1
	5	1.7	3.6	2.3	-1.0	3.7	-.1	4.5	.9	-8.2	-5.7	2.9
	6	1.8	3.7	2.5	-1.1	3.7	.0	4.7	1.1	-8.0	-5.9	3.0
	7	1.8	3.7	2.6	-1.2	3.8	.0	4.9	1.3	-7.9	-6.1	3.0
	8	1.9	3.7	2.7	-1.3	3.8	.1	5.1	1.4	-7.7	-6.2	3.0
	9	1.8	3.6	2.7	-1.4	3.6	.0	5.1	1.4	-7.7	-6.5	2.9
	10	1.7	3.5	2.7	-1.5	3.5	-.2	5.1	1.4	-7.6	-6.7	2.8
	11	1.7	3.4	2.7	-1.4	3.4	-.2	5.1	1.4	-7.6	-6.9	2.7
1988	12	1.7	3.4	2.7	-1.4	3.2	-.2	5.2	1.4	-7.8	-7.0	2.7
1989	1	1.8	3.3	2.7	-1.5	3.1	-.3	5.2	1.4	-7.8	-7.1	2.6
	2	1.5	3.2	2.6	-1.6	2.9	-.4	5.0	1.3	-8.1	-7.3	2.5
	3	1.5	3.2	2.5	-1.5	2.7	-.4	5.0	1.2	-8.4	-7.4	2.4
	4	1.4	3.2	2.5	-1.5	2.6	-.4	4.9	1.1	-8.8	-7.8	2.4
	5	1.6	3.5	2.7	-1.3	2.7	-.2	5.0	1.3	-9.0	-7.4	2.5
	6	1.8	3.5	2.6	-1.2	2.5	-.2	4.9	1.2	-9.5	-7.6	2.5
	7	1.9	3.8	2.9	-.9	2.7	.1	5.1	1.4	-9.7	-7.5	2.8
	8	1.8	3.7	2.8	-.9	2.5	.1	5.0	1.2	-10.2	-7.8	2.7
	9	1.7	3.7	2.7	-1.0	2.3	.1	4.9	1.1	-10.5	-7.9	2.6

Note: The weightings have been calculated according to each country's percentage share of Spain's Foreign Trade during 1986.

SPAIN'S INFLATION DIFFERENTIAL

Table C.4
(Cont.)

2.10.89

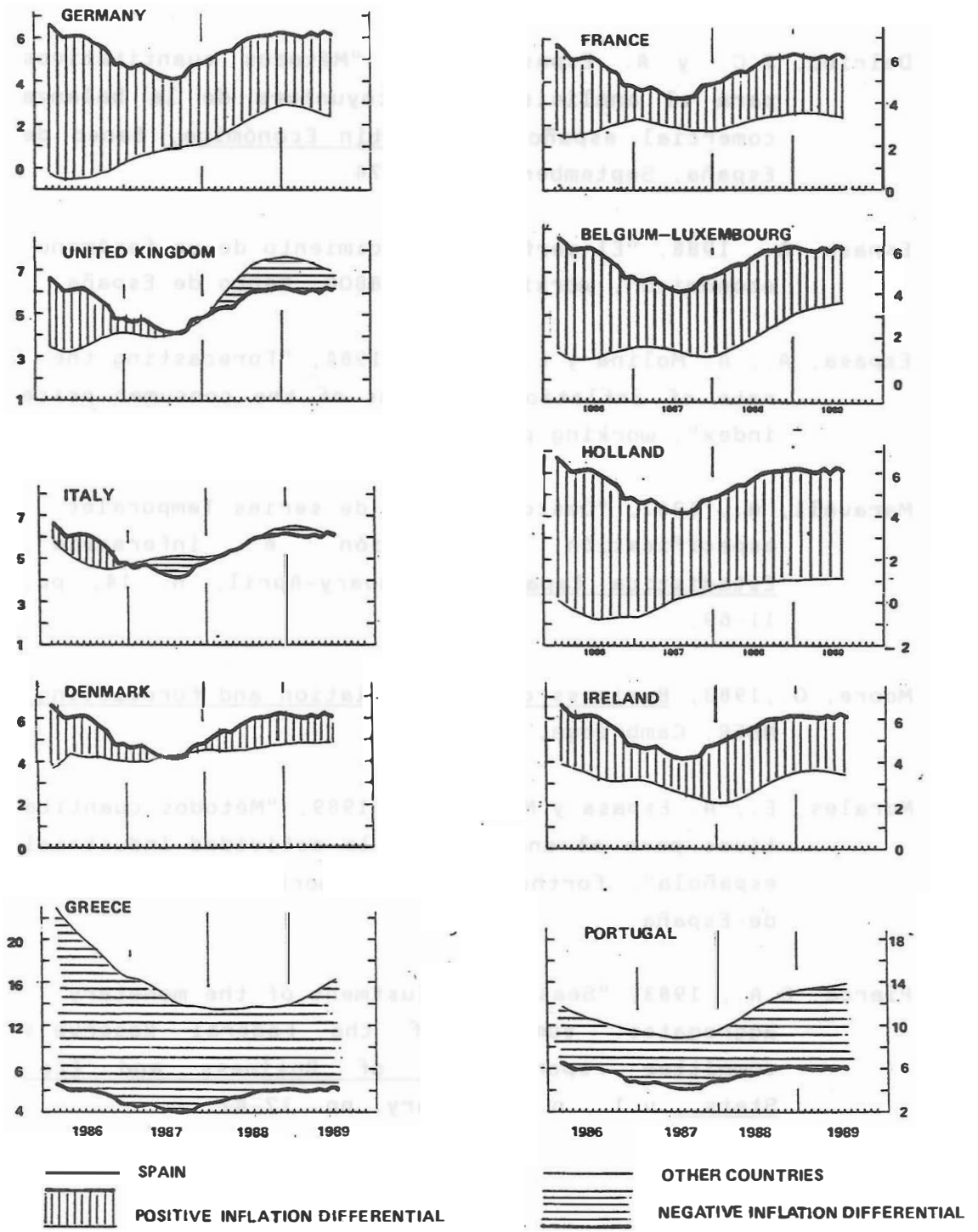
Latest observation
1989-8

Date	U.S.A.	Japan	Date	U.S.A.	Japan	Date	U.S.A.	Japan
1985 1	4.8	8.3	1987 1	1.0	4.8	1989 1	1.4	4.0
2	4.7	6.4	2	.7	4.8	2	1.3	3.8
3	4.8	6.2	3	.7	4.6	3	1.3	3.6
4	4.3	5.9	4	.5	4.3	4	1.3	3.5
5	4.2	5.7	5	.2	4.1	5	1.5	3.7
6	4.2	5.6	6	.1	3.9	6	1.5	3.8
7	4.3	5.7	7	.0	3.9	7	1.8	4.2
8	4.4	5.9	8	.0	3.8	8	1.7	4.2
9	4.6	6.2	9	.1	3.8	9	1.7	4.3
10	4.7	6.3	10	.2	3.9			
11	4.8	6.4	11	.6	4.3			
1985 12	4.7	8.2	1987 12	.7	4.3			
1986 1	4.7	6.2	1988 1	.8	4.4			
2	4.7	8.2	2	1.0	4.5			
3	4.4	6.1	3	1.1	4.7			
4	4.4	6.3	4	1.1	4.8			
5	4.2	6.4	5	1.0	4.6			
6	4.0	6.5	6	1.1	4.6			
7	3.7	6.4	7	1.2	4.6			
8	3.3	6.2	8	1.3	4.5			
9	2.9	6.0	9	1.3	4.4			
10	2.5	5.7	10	1.3	4.2			
11	1.7	5.1	11	1.4	4.2			
1986 12	1.4	5.1	1988 12	1.4	4.2			

From the values observed in August, the inflation differentail between Sapin and the EEC is 1.8%, which means a half-point worsening in the inflation differential estimated for August with information up to July. Also with the United States and Japan, there has been an increase in our inflation differential, which at the moment stands at 1.7% and 4.2% (see graphs C2 and C3).

Graph. C.3.

INFLATION DIFFERENTIAL (*)



(*). Greece and Portugal are on half scale. The base period for forecasts is August 1989.

BIBLIOGRAPHY

Delrieu, J.C. y A. Espasa, 1988, "Métodos cuantitativos para el análisis de la coyuntura de la balanza comercial española", Boletín Económico, Banco de España, September, pp. 53-74.

Espasa, A., 1988, "El perfil de crecimiento de un fenómeno económico", working paper 8806, Banco de España.

Espasa, A., A. Molina y E. Ortega, 1984, "Forecasting the rate of inflation by means of the consumer price index", working paper 8416, Banco de España.

Maravall, A., 1987, "Descomposición de series Temporales: especificación, estimación e inferencia", Estadística Española, January-April, n. 14, pp. 11-69.

Moore, G.,1983, Business cycles, inflation and forecasting, NBER, Cambridge, Mss.

Morales, E., A. Espasa y M.L. Rojo, 1989, "Métodos cuantitativos para el análisis de la actividad industrial española", forthcoming as a working paper, Banco de España.

Pierce, D.A., 1983, "Seasonal adjustment of the monetary aggregates: summary of the Federal Reserve's committee report", J. of Business and Eco. Stats., v.1., n 1, January, pp. 37-42.

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