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CYCLICAL PATTERNS OF THE SPANISH ECONOMY*

Juan J. DOLADO
Banco de España, CEMFI
Miguel SEBASTIÁN
Universidad Complutense. Banco de España
Javier VALLÉS
Banco de España

This paper provides an empirical description of some cyclical regularities of the Spanish economy, their evolution over time and implications for policy. We compare the results with those obtained for some of the major OECD economies, analysing possible changes in cyclical patterns across subsamples. In line with most of the empirical literature on business cycles, the Hodrick and Prescott filtering procedure is used to remove trends from the data.

1. Introduction

The main goal of this paper is to provide an empirical description of business cycles in Spain. This task has been possible thanks to the availability of the Spanish National Accounts on a quarterly basis, in particular of the aggregate demand components, as recently computed by the Instituto Nacional de Estadística (see INE, 1993). These quarterly data allow us to analyse first, the regularities in the movements and comovements of Spanish economic aggregates from a business cycle viewpoint; and further, to examine to what extent such regularities differ from those found in other economies. For this purpose, we compute correlations of various types among the deviations from trend of a wide array of variables, emphasising empirical regularities with respect to the following three categories: 1) real facts (output, aggregate demand components, employment and productivity); 2) nominal facts (money, prices and velocity); and, 3) open economy facts (terms of trade, nominal exchange rate and net exports). We then examine their stability over time and compare them to the regularities obtained for a representative set of OECD economies so as

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to arrive at a broader evaluation of the changes in business cycles and in their international character. In order to provide such a comparison for a similar period, seasonally adjusted quarterly data from 1970 to 1991 are used [1].

To discuss meaningfully the properties of cyclical patterns it is necessary to extract the relevant cyclical components from the data. In line with most of the recent empirical literature on business cycles, we adopt the filtering procedure proposed by Hodrick and Prescott (1980) to extract the trend component from time series data, under the traditional interpretation of real business cycle theories (henceforth, RBC) that identifies cyclical fluctuations as the stationary deviations from a balanced growth path [2]. On the basis of this analysis we seek to identify a set of «stylised facts» which can be taken to summarise the main broad regularities of Spanish cyclical patterns and their implications for policy.

The rest of the paper is organised as follows. Section 2 presents the statistical methodology that underlies the Hodrick and Prescott filtering procedure. Section 3 summarises the main characteristics of Spanish business cycles. Section 4 compares them to those obtained for some of the major OECD economies. Section 5 analyses the possible changes in cyclical patterns across subsamples. Section 6 discusses how sensitive the results are to alternative detrending procedures within the Hodrick and Prescott framework. Finally, Section 7 offers some conclusions.

2. The decomposition of time-series into trend and cyclical components

To conduct the research addressed in this paper, an operational distinction between secular and cyclical components of a time-series is needed. This is a controversial issue since, on the one hand, modern dynamic general equilibrium theory advises against making such a distinction, based upon the argument that both growth and business cycles are determined by fundamentally the same factors; and, on the other hand, because there are many methods to make such a decomposition [3].

Whilst acknowledging this, one may still have a legitimate interest in distinguishing between the lower and higher frequency movements in variables. Indeed, our approach in this paper follows the most widespread practice of removing the potential non-stationarities in aggregate time series by means of low-frequency filtering, in order to facilitate compari-

[1] To remove seasonality we adopted the X-11 method or seasonal dummy variables when the two methods did not differ significantly.

[2] See Kydland and Prescott (1982) and Long and Plosser (1983) for an excellent exposition of RBC theories stemming from the seminal work of Solow (1956).

[3] See Stock and Watson (1988), Canova (1991) and Maravall (1992) for a critical evaluation of the different methods.

sons with other studies in this type of literature. This is the procedure adopted by Hodrick and Prescott (1980) (henceforth, HP) who propose a filter whose main attractiveness lies in its flexibility, simplicity and reproducibility [4].

The HP approach faces the problem of decomposing a seasonally adjusted variable $\{y_t\}$ into a secular component $\{\tau_t\}$ and a cyclical one $\{c_t\}$. Obviously the smoother $\{\tau_t\}$, the poorer the fit to $\{y_t\}$. This trade-off underlies the minimization problem used to obtain the filtered series, and can be formalized as the following convex loss function

$$\min_{\{\tau_t\}} \sum_{3}^{T} c_t^2 + \lambda \sum_{3}^{T} (\Delta^2 \tau_t)^2 \qquad [1]$$

$$\text{s. t.} \quad c_t = y_t - \tau_t \qquad [2]$$

The first term measures the «goodness of fit» of $\{\tau_t\}$ to $\{y_t\}$ while the second indicates the degree of smoothness in $\{\tau_t\}$ measured by the second differences ($\Delta^2 = (1-L)^2$, L being the lag operator). The parameter λ is a smoothing parameter which penalises the acceleration of the trend relative to the fit.

Writing [1] in matrix notation as

$$\min_{\{\tau\}} \quad c' c + \lambda (A\tau)' (A\tau) \qquad [3]$$

where

$$A_\tau = \begin{pmatrix} 1 & -2 & 1 & 0 & 0 & \dots & 0 & 0 & 0 \\ \cdot & \cdot & \cdot & \cdot & & \cdots & & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & & \cdots & & \cdot & \cdot \\ 0 & 0 & 0 & 0 & 0 & \dots & 1 & -2 & 1 \end{pmatrix} \begin{pmatrix} \tau_1 \\ \cdot \\ \cdot \\ \tau_T \end{pmatrix}$$

the first order condition of [3] s.t. [2] yields

$$\tau = (I + \lambda A'A)^{-1} y \qquad [4]$$

Therefore, from [4], the cyclical component $\{c_t\}$ can be computed as $c = [I - (I + \lambda A'A)^{-1}] y$ for a suitable choice of λ. As mentioned above, [3]

[4] The following quotation from Kydland and Prescott (1990, p. 8) defines the criteria to be satisfied by the filter: «The trend component of real GNP should be approximately the curve that students of business cycles and growth should draw through a time plot of this time series. The trend of a given time series should be a linear transformation of that time series, and that transformation should be the same for all series. Lengthening the sample period should not significantly alter the value of the deviations at a given date, except possibly near the end of the original sample. The scheme should be well defined, judgement free, and cheaply reproducible».

may be interpreted as finding the minimum of $F + \lambda S$, with F and S representing measures of fit (F) and smoothness (S) of $\{\tau_t\}$ respectively, where the parameter λ signals the importance attributed to F relative to S. If $\lambda \approx \infty$, the loss function is minimised for $S = 0$, i.e. $\{\tau_t\}$ is a linear trend. Conversely, if $\lambda = 0$ the minimum is achieved for $\{\tau_t\} = \{y_t\}$ and $\{c_t\} = 0$ so that a perfect fit is obtained [5].

Arbitrariness in the choice of λ is the main weakness of this method. One way of settling toward an acceptable a priori choice is to take a value of $\lambda = 1600$ which was proposed by Hodrick and Prescott as a reasonable choice for quarterly data. This is the benchmark value chosen in this paper except when otherwise mentioned. That value implies that a 5% deviation from trend per quarter is moderately large as is a one-eighth of one percent change in the growth rate in a quarter, thereby eliminating from the trend component movements in the raw data of 32 quarters or more [6].

Since there is evidence that some of the «stylised facts» derived from this decomposition, particularly those related to the nominal variables, may be highly sensitive to the choice of filter or even to the choice of λ (Blackburn and Ravn (1991), Canova and Dellas (1993) and King and Rebelo (1992)), we checked whether measures of comovements among some nominal series, such as money and prices, remain robust under more traditional filtering approaches, such as first-differencing, and also extended the choice of λ to the values (400, 6400, 500000). Figures 1 and 2 illustrate three types of trends for GDP based upon the benchmark value of λ and the two extreme values in the previous set. As noted above, $\lambda = 400$ produces a trend which fits closely to the original series whereas $\lambda \approx \infty$ implies a linear trend. We can see that at $\lambda = 1600$ the trend follows the sort of curve that one would draw «free-hand» through a plot of the series. Figure 3 presents the cyclical components in percentage terms. When the highest value of λ is used, there are basically two very long cycles. The upturn of the first cycle goes from 1971 to 1974 with the downturn reaching a trough around 1985. From 1985 to 1990 there is a second upturn with the latter year indicating the beginning of another recessive phase. For the lower values of λ, the cycles are clearly slackened, lacking much of the variation between 1974 and 1985, but the profile is very much the same, though the recession in the early nineties is clearly accentuated.

To summarise the main features of business cycle phenomena, once the cyclical components of each of the variables analysed in this paper have been obtained, we proceed by computing the statistics suggested by Kydland and

[5] This intuitive exposition of the properties of the *H-P* filter is attributable to Danthine and Girardin (1989).

[6] Danthine and Girardin (1989) point out that, since in the loss function [1], F and S appear squared, $\lambda = (F/S)^2$ which equals 1600 for $F = 5$ and $S = 1/8$, i.e. the values reported in the text. It can be also shown that, from a practical point of view, the results are similar to those from a high pass band filter eliminating all frequencies eight years or greater.

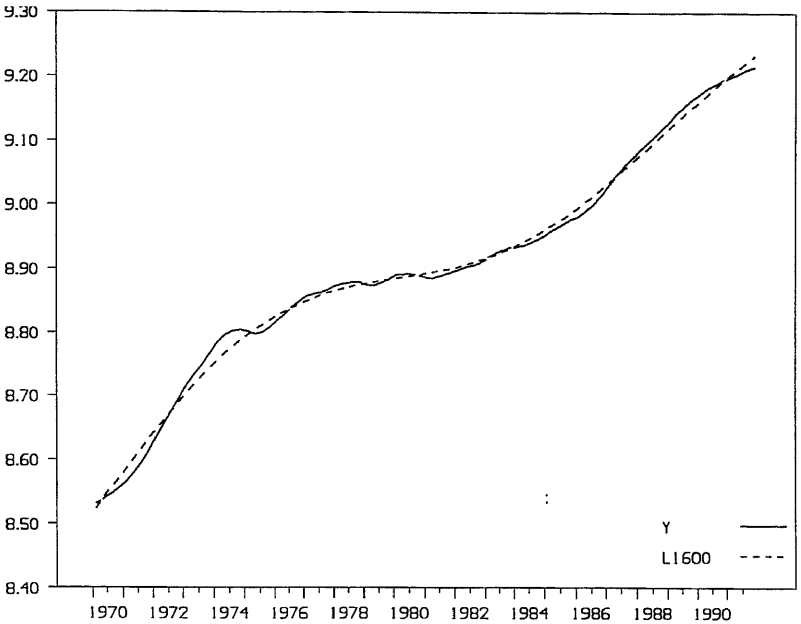

Figure 1
Actual and Trend of Spanish GDP (Logs)

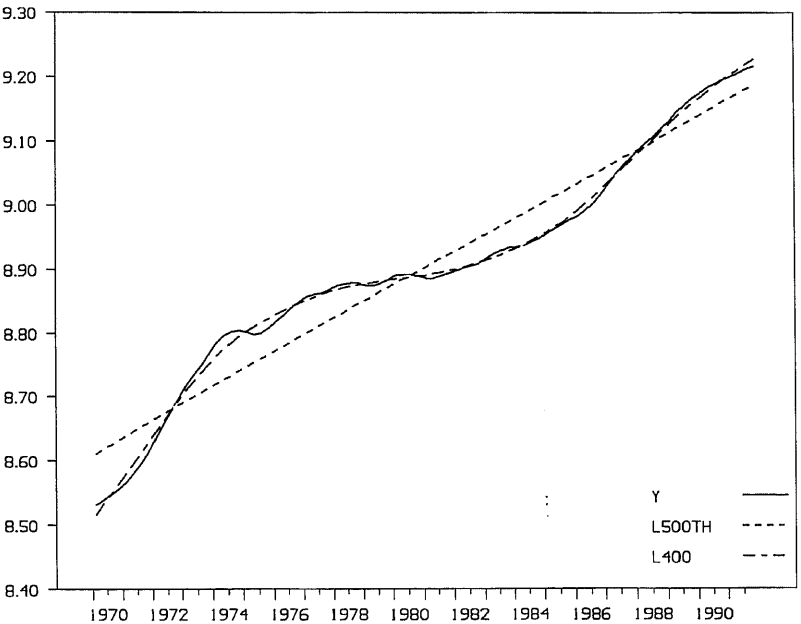

Figure 2
Log (GDP) and Trends for Different Lambdas

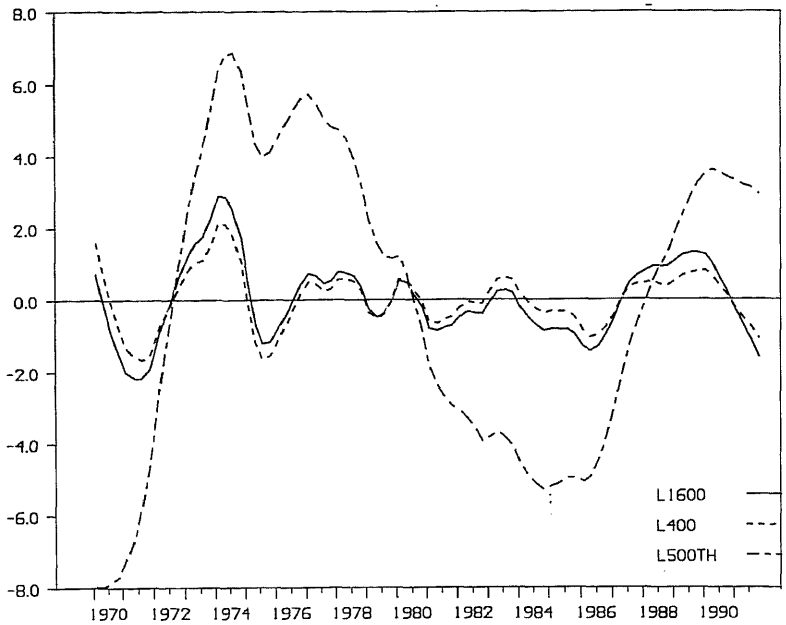

Figure 3
Log (GDP), Cyclical Components in Percentage

Prescott (1990). Henceforth, when referring to a series or variable we mean its cyclical component except when otherwise mentioned. For each series we report the following moments: *a*) the percentage standard deviation (volatility) of the series as a measure of the amplitude of its fluctuations relative to GDP's; and *b*) the cross-correlation of the series with real GDP at different leads and lags, as an indicator of the type of comovement of the series with the GDP cycle. Given their economic relevance, the correlations between money and prices, and between exchange rate, terms of trade and net exports are also recorded.

For a given variable X and GDP, the examined comovements are classified as follows. If $\rho(j)$, $j \in (0, \pm 1, ..., \pm 5)$ denotes the cross-correlation between GDP_t and X_{t-j}, we say that X is procyclical (countercyclical) if the maximum value of ρ is positive (negative) and not very close to zero. We also say that the cycle of X is leading, synchronous or lagging the cycle of GDP as $\rho(j)$ reaches a maximum for $j > 0$, $j = 0$ or $j < 0$. In particular, for $.5 \leq |\rho(j)| < 1$ we use the adverb «strongly», for $.2 \leq |\rho(j)| < .5$ we use the adverb «weakly» and, when $0 \leq |\rho(j)| < .2$ we say that the series are «acyclical». The cut-off point of 0.2 was chosen because it roughly corresponds to the null hypothesis that the correlation coefficient is zero at 5% level of significance, given our sample size [7].

[7] The standard error is approximately $T^{-1/2}$, T being the sample size (88 in our case). Thus two standard errors would be 0.21.

3. Spanish business cycle facts

We have computed the set of statistics described in Section 2 for the filtered data during the period 1970-1991. With those statistics we try to characterise the business cycle patterns describing the volatility of the real and nominal variables, their intensity and their comovements with output and prices. All variables are measured in natural logarithms except inventory investment and net exports which are expressed as a percentage of GDP[8].

Table 1 records the Spanish real facts whose main characteristics may be summarised as follows.

Consumption is more volatile than output (1.1 times), is strongly procyclical and leads output by one quarter. This result, which seemingly contradicts the consumption smoothness predicted by the Permanent Income/Life Cycle hypothesis, could simply reflect the fact that consumption has not been purged of consumer durable purchases. Unfortunately, such a decomposition is not available on a quarterly basis. However, it is available with annual data (see Estrada and Sebastian (1993)). We therefore looked at the yearly data for a similar period, using $\lambda = 400$, and found that although purchases of durables are much more volatile that purchases of non-durables (the relative volatilities with respect to GDP are 3.0 and 1.1, respectively), the latter are still more volatile than GDP. Moreover, it is important to note that the consumption data pertaining to the OECD economies we compare with in Section 4, also correspond to total consumption, and almost everywhere we observe that consumption has lower volatility[9]. Two possible explanations of this striking feature come to mind. According to the RBC theories, the fact that Spanish consumption is more volatile than output may indicate a large elasticity of intertemporal substitution together with strong wealth effects. Indeed, in response to a positive technology shock (that tends to raise real interest rates) the intertemporal substitution effect calls for less consumption while both the wealth and intratemporal (consumption-leisure) substitution effects call for higher consumption (see, e.g., King, Plosser and Rebelo (1988)). Alternatively, a more Keynesian oriented interpretation would point out to the effects of liquidity constraints (credit crunches) and of frequent changes in tax and transfer schemes. Given that credit controls have not been imposed in Spain as frequently as in other countries (France, United Kingdom) we consider the second argument as the most likely to have had a large impact on consumption via changes in disposable income (see Estrada and Roldán (1992) where favourable evidence to this conjecture is presented).

[8] The reason for taking logarithms is that we are interested in the percentage (rather than the absolute) deviations from trend. In some cases (when a series takes negative values), we take the ratios of variables to GDP.

[9] Two other qualifications are, first, that one should focus on disposable income rather than GDP; and, second, that consumption variability may be large due to the presence of unit roots in income. This last point must be qualified, however, since the data has been filtered. For instance, in Table 6 there is no evidence of a unit root in HP levels when $\lambda = 1600$ is used.

TABLE 1
Real facts for Spain

Variable X	Relative Volatility	Cross correlation of GDP with										
		$X(t-5)$	$X(t-4)$	$X(t-3)$	$X(t-2)$	$X(t-1)$	$X(t)$	$X(t+1)$	$X(t+2)$	$X(t+3)$	$X(t+4)$	$X(t+5)$
Real GDP	1.00	0.05	0.24	0.47	0.71	0.90	1.00					
Consumption	1.13	0.25	0.40	0.55	0.68	0.74	0.69	0.56	0.39	0.19	0.17	−0.09
Government consumption	0.96	−0.29	−0.18	−0.02	0.15	0.29	0.36	0.35	0.29	0.23	0.22	0.26
Investment	4.56	−0.03	0.23	0.43	0.58	0.69	0.72	0.65	0.51	0.34	0.19	0.08
Fixed Investment	3.79	0.08	0.32	0.53	0.69	0.78	0.80	0.74	0.60	0.41	0.24	0.08
Inventory Investment	0.60	−0.10	−0.08	−0.02	0.03	0.09	0.13	0.13	0.09	0.06	0.03	0.05
Exports	3.05	0.29	0.33	0.34	0.34	0.31	0.24	0.15	0.05	−0.04	−0.15	−0.26
Imports	4.61	0.19	0.39	0.56	0.62	0.69	0.61	0.45	0.25	0.06	−0.05	−0.08
Net Exports	0.97	−0.02	−0.16	−0.28	−0.37	−0.40	−0.37	−0.28	−0.17	−0.08	−0.04	−0.07
Employment (total)	1.01	0.07	0.25	0.41	0.54	0.64	0.70	0.71	0.66	0.55	0.42	0.25
Employment (wage earners)	1.28	0.33	0.42	0.47	0.51	0.51	0.50	0.44	0.39	0.30	0.22	0.12
Labour productivity (total)	0.76	0.04	0.13	0.24	0.34	0.41	0.37	0.24	0.05	−0.11	−0.28	−0.34
Labour productivity (wage earners)	1.16	−0.26	−0.16	−0.01	0.12	0.26	0.30	0.29	0.18	0.07	−0.06	−0.14

Output volatility is 1.06.
Volatility figures are in % standard deviation.
For those variables expressed in output ratios (inventory investment and net exports) we report absolute, not relative, volatility.

As regards investment behaviour, fixed investment is about four times more volatile than output, strongly procyclical and tends to move contemporaneously with the cycle, while inventory investment is basically acyclical with almost no correlation at any lead or lag. Total investment is more volatile than fixed investment, due to the strong comovement of its components. In this respect, RBC theories explain the lower volatility of consumption relative to investment through the intertemporal effects that technology shocks have on the joint consumption-leisure decision and their implications on savings via changes in interest rates.

Government consumption has a similar volatility to GDP's and is weakly procyclical. This result may seem surprising, since discretionary fiscal policy as a whole is traditionally viewed as countercyclical. However, there are large components of government spending (transfers, subsidies), excluded from the definition of government consumption, that should move strongly against the cycle. One could imagine that expenditures on goods and services are then adjusted to compensate for those movements, implying that government consumption behaves procyclically.

Net exports, as a percentage of GDP, have a similar volatility to that of output, are weakly countercyclical and tend to move with a one period lead. By component, both exports and imports are highly volatile. While exports are weakly procyclical and lead output by two or three periods, imports are strongly procyclical and lead output by just one period. The fact that imports and investment have similar relative volatilities may be taken as an indication of the important role that investment decisions play on the propensity to import. Keynesian models explain the countercyclical trade balance fluctuations by domestic demand shocks that increase imported goods, leaving the real exchange rate unaltered. However, the countercyclicality of net exports seems to contradict simple RBC theories which would predict a procyclical behaviour in response to a positive technology shock. Suggestions to reconcile the theory with the stylised facts, within a RBC framework, are the introduction of large international spillover effects in output (see, e.g. Backus et al (1992)) and the inclusion of non traded goods (Backus and Kehoe (1989)). Indeed, in RBC models driven only by government shocks, net exports would be countercyclical.

Total employment is strongly procyclical, lags the cycle by one period and is as volatile as output. Average labour productivity is less volatile than output, only weakly procyclical and moves with a one period lead [10]. When employment is defined in terms of wage earners, labour and productivity are more volatile and their comovements with the cycle are weaker. Existing economic theories predict both a strong procyclical and coun-

[10] Since the cross-country study we compare with (Blackburn and Ravn (1991)) does not contain variables such as hours per worker and real wages, we have omitted them in our study. Also, data on other production inputs, such as capital stock, were unfortunately unavailable.

tercyclical behaviour of average labour productivity. On the one hand, procyclicality follows from RBC theories whereby a positive technology shock shifts the physical marginal product of labour; it is also predicted by labour hoarding theories whereby firms adjust their labour utilization ratio over the cycle. On the other hand, a more traditional demand-determined Keynesian model would predict countercyclical productivity under a concave production function. Interestingly, if one incorporates government shocks in a RBC model (see e.g. Christiano and Eichenbaum (1992)), labour productivitity becomes less procyclical, so it is tempting to say that the facts about net exports and productivity may be explained by the role played by government shocks in Spain. Further evidence on this conjecture would be drawn below, in Section 5, when analysing the cyclical patterns across subsamples.

Consequently, the high volatility of consumption, the procyclical behaviour of government consumption, the countercyclical behaviour of net exports and the weak procyclical behaviour of labor productivity are the most salient features on the real side of the Spanish economy.

Table 2 presents the nominal facts summarised by the behaviour of money, prices and velocity. We include two definitions of money: the broad monetary aggregate (M4 or ALP) used as the intermediate target in the Spanish economy and a narrower definition (M1), more appropriate for international comparisons[11]. Since there is some evidence (see e.g. Blackburn and Ravn (1991) and Fiorito and Kollintzas (1992)) that the correlations between money, prices and output depend crucially on whether one looks at HP levels or growth rates (unfiltered), we report results for both sets of fluctuations.

With regard to the behaviour of the monetary aggregates, we find that M4 is less volatile than output and moves in a procyclical way, being more correlated with output in HP levels than in growth rates. It also seems to be synchronous with GDP. The low volatility of M4 is hardly surprising since it is a broad aggregate which internalises most of the flows in and out of the narrower aggregates, as a result of financial deregulation. In contrast, M1 is between three and four times more volatile than output, but its covariation with output is similar to that of M4. At this stage, it is important to notice that the presumption that money leads output is not confirmed, as opposed to what happens in most western economies. Money not leading real GDP might challenge the monetarist view that shocks in the money supply are an important source of business cycle fluctuations and tends to favour the neutrality of money claimed by RBC models (see for example Kydland (1989))[12].

[11] The cross-country study we compare with (Blackburn and Ravn (1991)) only reports M1.

[12] However, when we computed the comovements of the HP filtered series of M2 with output and prices, we found a leading shift of 2 to 5 periods, suggesting that M2 may play a role as a leading indicator of the cycle (see Cabrero, *et al.* (1992)).

TABLE 2
Nominal facts for Spain - Hodrick-Prescott Filtered series

Variable X	Volatility	Cross correlation of GDP with										
		$X(t-5)$	$X(t-4)$	$X(t-3)$	$X(t-2)$	$X(t-1)$	$X(t)$	$X(t+1)$	$X(t+2)$	$X(t+3)$	$X(t+4)$	$X(t+5)$
Money:												
M4	0.94	−0.21	0.08	0.28	0.40	0.47	0.49	0.47	0.42	0.35	0.27	0.15
M1	3.22	−0.01	0.25	0.43	0.43	0.45	0.46	0.41	0.29	0.22	0.19	0.11
Money velocity:												
M4	1.78	−0.28	−0.28	−0.22	−0.13	−0.03	0.06	0.13	0.15	0.11	0.04	−0.04
M1	3.03	−0.21	−0.40	−0.48	−0.40	−0.35	−0.30	−0.22	0.06	−0.03	−0.08	−0.09
Prices	1.64	−0.47	−0.46	−0.44	−0.42	−0.37	−0.29	−0.18	−0.06	0.01	0.04	0.02

Variable X	Cross correlation of PRICES with									
	$X(t-5)$	$X(t-4)$	$X(t-3)$	$X(t-2)$	$X(t-1)$	$X(t)$	$X(t+1)$	$X(t+2)$	$X(t+3)$	$X(t+4)$	$X(t+5)$
Money:											
M4	0.01	−0.04	−0.09	−0.14	−0.15	−0.15	−0.14	−0.14	−0.16	−0.16	−0.15
M1	0.19	0.16	0.12	0.14	0.11	0.07	0.04	0.05	−0.01	−0.07	−0.08

TABLE 2 (Cont.)
Nominal facts for Spain - Growth Rates

Variable X	Volatility	Cross correlation of GDP with										
		$X(t-5)$	$X(t-4)$	$X(t-3)$	$X(t-2)$	$X(t-1)$	$X(t)$	$X(t+1)$	$X(t+2)$	$X(t+3)$	$X(t+4)$	$X(t+5)$
Money:												
M4	0.85	0.18	0.19	0.22	0.21	0.23	0.24	0.23	0.22	0.18	0.11	−0.01
M1	3.75	0.20	0.23	0.22	0.20	0.21	0.23	0.19	0.15	0.19	0.19	0.07
Money velocity:												
M4	0.94	0.01	0.02	0.03	−0.02	−0.01	−0.07	−0.17	−0.28	−0.35	−0.36	−0.29
M1	3.68	−0.15	−0.18	−0.15	−0.14	−0.16	−0.20	−0.18	−0.18	−0.24	−0.26	−0.16
Prices	1.19	−0.07	−0.09	−0.14	−0.23	−0.33	−0.43	−0.47	−0.49	−0.49	−0.47	−0.46

Variable X	Cross correlation of PRICES with										
	$X(t-5)$	$X(t-4)$	$X(t-3)$	$X(t-2)$	$X(t-1)$	$X(t)$	$X(t+1)$	$X(t+2)$	$X(t+3)$	$X(t+4)$	$X(t+5)$
Money:											
M4	0.24	0.24	0.25	0.30	0.33	0.32	0.31	0.36	0.39	0.40	0.46
M1	−0.09	−0.11	−0.07	−0.00	0.02	0.00	0.03	0.10	0.08	0.07	0.14

Money velocity presents higher volatility than output, and is countercyclical for both the M4 and M1 definitions. This latter result may indicate that the money income elasticity is larger than unity, a result which has been found in recent studies of money demand (see Cabrero, Escrivá and Sastre 1992)). Prices are countercyclical both for detrended series and growth rates. As long as monetary policy is not accommodative, this feature can be accounted for by RBC theories, since technology shocks work through aggregate supply curve shifts (see e.g. Cooley and Ohanina (1991) and Chadha and Prasad (1992)). The GDP deflator moves with four or five quarters of leading shift with respect to the cycle when we consider HP levels and with two to three quarters of lagging shift in terms of growth rates. Prices leading GDP could be evidence in favour of the main source of shocks lying on the supply side (e.g. oil and wage shocks) as they imply a faster transmission to prices than to output.

The signs of the comovements between prices and money (lower panel of Table 2) depend again on the monetary definition and on the filtering procedure. For M4, money is negatively correlated with prices in HP levels and positively correlated in growth rates. For M1, the money-price correlations are almost negligible. The positive correlation between current inflation and future money growth could be an indication that anticipated future money disturbances have a contemporaneous inflationary effect. It could also be reflecting that money has been accommodating nominal demand shocks and counteracting supply disturbances, in agreement with the RBC interpretation of the countercyclical behaviour of prices. There is also slight evidence in favour of money lagging prices, as a money demand interpretation would predict.

Table 3 includes some of the open economy facts. Terms of trade (TT), defined as the ratio between the implicit deflators of exports and imports, is highly volatile. However, when a definition excluding energy goods (TT^{ne}) is used, the volatility and persistence of the series decreases, reflecting the large swings in energy prices. The first definition is procyclical and leads output, while the second definition is weakly countercyclical. Moreover, they tend to lag net exports by four to five quarters, an indication of price flexibility to current account imbalances.

Unsurprisingly, the exchange rate, measured in US $/peseta, is highly volatile, as in most of the comparative studies, being dominated by the fluctuations of the US$ vis-à-vis the rest of the OECD currencies. It is weakly procyclical, not clearly leading or lagging output. It is interesting to note that, as expected, it is negatively correlated with net exports while leading them.

4. International comparison

One of the interesting features of business cycles research is to study whether there are common patterns guiding interdependent economies.

TABLE 3
Open economy facts for Spain

Variable X	Volatility	Cross correlation of GDP with										
		$X(t-5)$	$X(t-4)$	$X(t-3)$	$X(t-2)$	$X(t-1)$	$X(t)$	$X(t+1)$	$X(t+2)$	$X(t+3)$	$X(t+4)$	$X(t+5)$
Terms of Trade (total)	4.96	0.51	0.49	0.42	0.29	0.12	−0.04	−0.19	−0.29	−0.32	−0.31	−0.27
Terms of Trade (non-energy)	2.63	0.17	0.23	0.18	0.07	−0.04	−0.12	−0.23	−0.26	−0.21	−0.09	0.02
Exchange rate (US$/Pta.)	9.24	0.21	0.21	0.19	0.17	0.16	0.17	0.19	0.20	0.18	0.15	0.11

Variable X	Cross correlation of NET EXPORTS with										
	$X(t-5)$	$X(t-4)$	$X(t-3)$	$X(t-2)$	$X(t-1)$	$X(t)$	$X(t+1)$	$X(t+2)$	$X(t+3)$	$X(t+4)$	$X(t+5)$
Terms of Trade (total)	−0.30	−0.34	−0.33	−0.27	−0.10	−0.01	−0.18	0.36	0.49	0.57	0.59
Terms of Trade (non-energy)	−0.37	−0.45	−0.46	−0.39	−0.25	−0.04	0.17	0.37	0.50	0.55	0.51
Exchange rate (US$/Pta.)	−0.58	−0.67	−0.70	−0.69	−0.64	−0.57	−0.47	−0.33	−0.16	0.03	0.21

International comparisons are useful only when homogeneous data sets and identical methodological procedures are employed. This is the case between our work and the one carried out by Backus and Kehoe (1989), Blackburn and Ravn (1991), Danthine and Giradin (1989), Fiorito and Kollinzas (1992) and Kydland and Prescott (1990) who use the HP filter with $\lambda = 1600$.

TABLE 4
International comparison (volatility)

	SP	UK	GE	FR	IT	US
Real Facts						
Gross Domestic Product	1.06	1.63	1.51	0.91	1.69	1.51
Consumption	1.13	1.16	0.94	0.84	0.78	0.74
Government consumption	0.96	0.76	0.88	0.61	0.41	0.78
Investment	4.56	4.44	3.97	5.08	4.14	4.82
Exports	3.05	2.04	2.19	3.14	2.26	2.87
Imports	4.61	2.65	2.20	4.33	2.93	2.94
Net exports	0.97	1.03	1.05	0.75	1.19	0.75
Total employment	1.01	0.69	0.67	0.70	0.68	0.60
Labour productivity	0.76	0.88	0.78	0.82	1.06	0.55
Nominal Facts						
Money (M1):						
in HP levels	3.22	3.38	2.61	3.04	1.73	2.02
in growth rates	3.75	1.89	1.78	2.70	1.29	1.16
Velocity:						
in HP levels	3.68	3.79	2.96	3.42	2.82	1.75
in growth rates	3.03	2.77	2.09	2.77	1.75	0.53
Prices:						
in HP levels	1.64	2.69	0.71	1.33	2.19	1.12
in growth rates	1.19	1.48	0.71	0.91	1.47	0.65
International Facts						
Terms of Trade (total)	4.96	3.22	2.70	2.86	3.51	3.80
Nominal Exchange Rate	9.24	8.94	8.94	9.55	9.03	–

SP, Spain; UK, United Kingdom; GE, West Germany; FR, France; IT, Italy; US, United States of America.
The volatility of real variables is in relative terms except for net exports and GDP.

In Table 4 we compare our results with those of four other European countries (France, Italy, United Kingdom and West Germany) and the United States, as taken from Blackburn and Ravn (1991) for an identical sample period [13].

[13] Raymond (1992) makes a similar comparison among EC, US and Spain's GDP cycles, finding strong correlations. However, his results have to be viewed with caution given that the filtering procedure is a linear trend (see Section 6).

TABLE 4 (Cont.)
International Comparison (Comovements)

	SP	UK	GE	FR	IT	US
Real Facts						
Consumption	0.74	0.75	0.64	0.69	0.82	0.86
	leads	syn	syn	–	syn	–
Investment	0.72	0.70	0.81	0.80	0.91	0.92
	syn	–	–	–	–	–
Government consumption	0.36	0.07	0.39	−0.24	0.38	0.43
	syn	lags	lags	lags	leads	lags
Exports	0.34	0.31	0.45	0.62	−0.38	−0.62
	leads	lags	syn	syn	lags	–
Imports	0.66	0.56	0.71	0.79	0.79	0.80
	leads	–	syn	syn	–	syn
Net exports	−0.40	−0.38	−0.54	−0.31	−0.61	−0.67
	leads	lags	–	syn	–	–
Total employment	0.71	0.65	0.72	0.73	0.63	0.92
	lags	–	–	–	–	–
Labour productivity	0.41	0.74	0.74	0.57	0.80	0.85
	leads	syn	syn	–	–	syn
Nominal Facts						
Money (M1):						
in HP levels	0.46	0.61	0.66	0.28	0.50	0.36
	syn	leads	leads	leads	leads	leads
in growth rates	0.23	0.29	0.32	0.20	0.33	0.30
	syn	leads	leads	leads	leads	leads
Velocity: in growth rates	−0.27	0.36	0.55	0.31	−0.51	0.40
	lags	syn	syn	syn	leads	syn
Prices:						
in HP levels	−0.47	−0.61	−0.63	−0.72	−0.65	−0.76
	leads	syn	–	–	–	–
in growth rates	−0.49	−0.29	−0.17	−0.30	−0.30	−0.33
	lags	syn	syn	leads	leads	leads
International Facts						
Terms of Trade (total)	0.51	0.28	0.53	0.40	0.61	−0.63
	leads	–	–	–	–	lags
Nominal Exchange rate	0.21	0.44	−0.33	0.28	0.39	*
	leads	lags	lags	lags	–	
Other Comovements						
Prices and Money:						
in HP levels	0.19	−0.37	−0.53	−0.34	−0.17	−0.50
	leads	–	–	–	lags	lags
in growth rates	0.08	−0.31	0.26	0.29	0.52	−0.17
	lags	leads	syn	–	leads	syn
Net exports and Terms of Trade	0.59	−0.20	−0.64	−0.48	0.57	−0.64
	lags	leads	leads	leads	–	syn

In each country's column we write «leads», «syn» or «lags» when there is a discrepency with Spanish comovements; elsewhere we leave it blank.

4.1. Volatility

Table 4 (first panel) offers the main facts regarding volatility. The first remarkable feature is the low volatility of the Spanish real activity. Output volatility is 1.06, only above France's 0.91, while the standard deviations for the rest of the economies are always above 1.50. At first glance, the high degree of intervention and regulation in these two economies in counteracting shocks may explain those low figures. Second, as mentioned above, it is remarkable that private consumption in Spain is more volatile than output, a feature that only the UK economy shares. As explained, this could be due to the government's erratic redistributive policies and sporadic credit controls imposed on private consumers. The rest of the OECD economies considered here display a consumption smoothing pattern, especially the United States and Italy. Relative cyclical variation in total investment, however, is in the middle of the range of values. The third most remarkable finding is that government consumption has a similar volatility to that of output, Spain being the only country where this fact occurs. The external sector also provides interesting information. A common feature in all countries is that export and import volatilities are higher than that of output, but the relative sizes tend to be higher in Spain. This could be explained as a consequence of the progressive opening of the Spanish economy, whereby an increase in the volume of trade also increases its volatility. In spite of the higher volatility of exports and imports separatedly, the Spanish net exports ratio volatility is close to unity, as in most countries. Finally, relative volatility in employment is highest in Spain, 1.01, while it is in the range 0.6-0.7 for the rest of the countries. On the contrary, productivity variability is in the middle of the range between the highest (1.06 in Italy) and the lowest (0.55 in the US).

Regarding nominal facts, we first report money volatility compared with other countries, both in HP levels and growth rates. To afford homogeneous comparisons with the results for other countries, we report results for the narrower definition of money (M1). Money supply and velocity appear to be more volatile than in most countries, suggesting that the switching in and out of M1, as a result of financial deregulation and fiscal opacity, has been relatively stronger in Spain. Price volatility is, as in France, in between the higher values (Italy and the UK) and the lower values (Germany and the US), both in terms of HP levels and growth rates.

Terms of trade are highly volatile, again well above the rest of the countries, another consequence of the opening-up process, while nominal exchange rate variability is quite similar, an indication that the different currencies have been dominated by the $US swings.

4.2. Comovements

Table 4 (second panel) summarises the cross-country results on the comovements of real and nominal variables with output. The reported

figures indicate the highest correlation detected. In each country's column we write «lead», «synchronous» or «lag» only when there is a discrepancy with the Spanish comovements; otherwise we leave it blank.

Consumption and investment are procyclical everywhere. In Spain, consumption leads output by one quarter, like in the US and France. Investment moves in phase with the cycle, a fact that is common to all countries. Government spending is weakly procyclical and moves contemporaneously, while in US and Germany it lags the cycle. In Italy it was found to lead the cycle; in France, to be countercyclical and in the UK no cyclical pattern was detected. These differences suggest that any cross-country regularities in business cycle fluctuations are certainly not due to cross-country similarities in government expenditure policies.

Spanish exports are found to be procyclical, as in most countries (except US and Italy). The main difference with the remaining countries is that they lead the cycle. Imports are strongly procyclical as everywhere, leading output as in the UK and Italy. Net exports are countercyclical, again as everywhere, leading the cycle as in Germany, Italy and the US. This suggests that net export comovements are dominated by the behaviour of imports.

Employment and labour productivity are procyclical everywhere, the former lagging the cycle and the latter leading output as in France and Italy. The only significant discrepancy detected is the low correlation between productivity and output in Spain. It is also noticeable that productivity leads the cycle in France and Italy. This has been pointed out as a fact in favour of the RBC interpretation of economic fluctuations for those countries.

Regarding phase shifts of nominal variables, money is clearly procyclical everywhere. For the Spanish economy, M1 seems to move in phase with output, while an empirical regularity is that it leads the cycle for all other countries. However, Spain is no exception to the empirical regularity of prices being countercyclical, both is HP levels and in growth rates. Nevertheless, there are some phase-shift discrepancies, as they seem to lag the cycle in growth rates. In most countries prices lead the cycle, as is the case with Spanish HP filtered series. This fact, combined with countercyclicality, may be a sign of the severe supply shocks of the oil price jumps of the 70's. Velocity is countercyclical as in Italy, but it lags the cycle. In the rest of the countries it seems to be procyclical, moving in phase with output. The correlation between money and prices is positive in HP levels, whereas a negative correlation seems to abound in the remaining economies. However, it is positive in terms of growth rates as in the European countries excluding the UK.

The open economy facts are quite similar to those in other countries. Terms of trade are procyclical everywhere except in the US and, in general, they lead the cycle. Nominal exchange rates are procyclical. The main discrepancy is in the phase-shift. Finally, there is a clear positive

correlation between terms of trade and net exports for the Spanish economy, terms of trade moving with a lag, sharing this fact with Italy. This indicates that prices adjust to current account shifts. For the remaining countries, there is a clear negative correlation, with terms of trade leading net exports. Both movements are consistent with theoretical predictions.

5. Stability

The preceding sections have described an overall picture of the Spanish business cycle regularities across a long period of time that comprises two decades. There is, however, little controversy about the deep structural changes suffered by the Spanish economy during those years. In addition to the common, to other OECD countries, shocks (oil price, technological progress, financial innovation) and the common changes in policy regimes (exchange rates, stricter monetary policies, budget deficits), Spain went through a very specific process. This was a fast political transformation that, in economic terms, was reflected in: an increasing openness (that culminated with Spain joining the EC in 1986 and the ERM in 1989), a strong liberalisation, the partial removal of an obsolete productive public sector structure, the increase in the size of the «welfare state» (both a tax reform and a wider transfer scheme) and a notable flexibility of the labour market. For these reasons, it might be of interest to analyse different subsample periods. In particular we consider broadly two decades:

- the 1970s (I), running from 1970: 1 to 1979:4, including the first oil shock, the abandonment of Bretton-Woods and the political transition in Spain.
- the 1980 (II), from 1980: 1 to 1991:4, including the second oil shock, the structural reforms in the Spanish economy, the integration into the EC and ERM membership.

Thus, in order to gain some insight into the differences in regularities across periods, we compute volatilities and comovements for the two subsamples [14].

When comparing these subsamples a large part of the results of the previous sections still hold. These are, basically, 1) the high volatility in consumption and, especially, in investment, 2) the procyclicality of employment, consumption, imports, investment and exchange rates; and 3) the countercyclicality of prices. However, there are remarkable differences worth noting. Table 5 summarises the most interesting discrepancies found when analysing these subsamples separately. Contrary to the whole sample period, we find no international evidence to compare with on a subsample basis.

[14] In a previous version of this paper we computed homoscedasticity tests on the standard deviations across subsamples as well as recursive cross-correlations over time to examine their stability properties. In both cases we found evidence of heteroscedasticity and lack of stability, particularly in average labour productivity, money and government consumption.

TABLE 5
Main differences across subsamples
Real Facts

Volatility		(I)	(II)
Lower vol. in	*GDP*	1.38	0.81
Higher vol. in	*C*	0.94	1.40
	G	0.78	1.35
	I	3.36	5.79
	M	4.18	5.04
	NX	0.67	1.19
	L^t	0.65	1.59
	LP^t	0.63	0.95
Lower vol. in	*X*	3.09	2.65
Comovements (with output)			
	G	s-coun.	s-proc.
	I	lag	syn
	X	proc.	w-coun.
	NX	syn	lead
	L^t	lag	syn
	LP^t	s-proc.	w-coun.

Nominal Facts

Volatility		(I)	(II)
Lower vol. in	M4 level (growth)	1.23(0.72)	0.81(0.65)
	M1 level (growth)	4.01(5.28)	2.57(1.72)
	P level (growth)	1.75(1.25)	1.09(0.81)
	VM4 level (growth)	2.07(1.11)	1.05(0.74)
	VM1 level (growth)	3.90(5.11)	2.60(1.86)
Comovements with output			
	M4 level (growth)	s-proc. (w-proc.)	s-coun. (w-coun.)
	M1 level (growth)	s-proc. (a-cyc.)	a-cyc. (s-proc.)
	VM4 level (growth)	s-coun. (w-coun.)	s-proc. (w-proc.)
Comovements with prices			
	M4 level (growth)	(–) (–)	(+) (+)

Open Economy Facts

Volatility	(I)	(II)
Lower vol. in TT^{ne}	4.58	3.24
TT	2.54	0.99
Higher vol. (r) in e	7.70	8.16
Comovements with output		
TT^{ne}	s-proc., lead	w-coun., lag
e	s-proc., lag	s-proc., lead
Comovements with net exports		
TT^{ne}	(+), lag	(–), lead

«*s*» stands for strong, «*w*» for weak, «proc» for procyclical, «coun» for countercyclical and «a-cyc» for acyclical.

Regarding real facts discrepancies across subsamples, it is important to start by noticing the substantial reduction in output volatility. This could be interpreted either in favour of the more activist economic policy pursued or just as a consequence of smaller supply shocks suffered by the Spanish economy during the second subsample. The GDP components also diminish in volatility when considered in absolute terms, but not when considered in relation to output. A substantial relative increase is detected for consumption and government consumption. Investment and imports see their relative volatility changed in a very similar way. Exports are the only GDP component whose volatility diminishes in relative terms, although on a slight scale. Net export variability increases, both in absolute and relative terms. Regarding the labour figures, a remarkable increase in the volatility of employment takes place, both for the total and the wage earners group. Employment's volatility was below that of output for the first subsample, but it triples in relative terms during the second subsample. The large downturn in employment during the early 80's crisis and the rapid increase in the late 80's expansion are behind these figures. The increased flexibility in the labour market, due to the wide use of fixed-term contracts since 1984, might be partially responsible for the latter.

There are also interesting changes regarding the comovements of the real variables and GDP, as recorded in the lower part of Table 5 (upper panel). Government consumption, which was strongly countercyclical in the first subsample, becomes strongly procyclical in the second, in phase with output. This could be a sign of a budget policy based on revenues raised rather than on cycle-counteracting purposes. Exports, however, become countercyclical, providing evidence in favour of a higher degree of capacity utilisation. However, net exports behave similarly (countercyclically in both periods). Employment lags output in the first subsample, which is usually interpreted in terms of labour hoarding, and runs in phase in the second. However, the most remarkable change takes place in terms of observed average labour productivity, which was strongly procyclical in the first subsample (evidence in favour both of the RBC and the labour hoarding explanations) and becomes countercyclical in the second (in favour of a more traditional Keynesian-oriented demand rationing interpretation). In this respect, the evidence on the conjecture advanced in Section 3 about the possibility that the different patterns in labour productivity could be explained by changes in government consumption volatility is weak, since the latter has hardly changed in absolute terms whilst the former switches its correlation with output.

In Table 5 (middle panel) we present the main differences in the nominal facts across the subsamples. In the upper part we report the main changes concerning volatility. Contrary to the real facts, we report volatility figures in absolute rather in relative terms, since that is a more appropriate concept in this case. Regarding money, M4 and M1 suffer a substantial reduction in volatility, both in levels and in growth rates. This could be interpreted as a result of the more stringent monetary policy followed in

Spain since the late 70's and which has been defined in terms of controlling M4. There is also a smaller volatility both in prices and money velocities. Concerning comovements with output, the analysis in subsamples provides interesting differences: M4 and M1 that were procyclical in the first period, become countercyclical and acyclical respectively in the second period. This feature contradicts the monetarist paradigm and, if taken seriously, may jeopardize the conventional interpretation of the real effects of the pursued monetary policies: monetary contraction has accompanied years of output expansion and viceversa. Velocity was found to be countercyclical in the first period and procyclical in the second in the case of M4, while it remains countercyclical in terms of M1. The negative correlation between money and price level found for the whole sample period still holds for the first subperiod, both for HP levels and growth rates. In the second, however, a positive correlation between money and prices is detected for M4, which could be a sign of a successful monetary policy implementation.

In Table 6 (lower panel) we present the main discrepancies in the open economy facts across subsamples. There is again a substantial reduction in terms of trade volatility, referring both to total and non-energy imports. In the latter case, the reduction is even larger, which is consistent with the relative variability of energy prices. Nominal exchange rates (defined as \$US/peseta) become, however, more volatile during the 80's, a fact which is not surprising given the variability in the exchange rate of the \$US *vis-à-vis* the rest of the OECD currencies during that decade.

Regarding comovements, non-energy terms of trade become countercyclical in the second period, being procyclical in the first one. They also shift from leading to lagging the output cycle. Nominal exchange rate is procyclical in both subsamples. However, while it lags the cycle in the first period, it leads in the second period. The comovements between non-energy terms of trade and net exports display interesting differences: while in the first subsample a trade surplus (deficit) seemed responsible for real appreciation (depreciation) in the second it is the terms of trade that move first, leading current account imbalances in the expected direction, as was reported for the other European countries considered.

6. A sensitivity analysis

In this section we analyse the sensitivity of the «stylised» facts found in the previous sections, according to the choice of the parameter λ in the HP detrending procedure. As was mentioned in Section 2, we have extended this choice to the set (400, 6400, 500000) so that, for lower values of λ, the secular component becomes more similar to the original series whilst for higher values, it approximates a linear trend. The aim of this exercise is to examine to what extent the aforementioned stylised facts remain robust to different smoothing parameters which capture a different set of cyclical frequencies.

TABLE 6
Sensitivity Analysis: Correlogram of *GDP*

	Autocorrelation				
λ	*t*-1	*t*-2	*t*-3	*t*-4	*t*-5
400	0.88	0.62	0.31	0.02	−0.18
1600	0.90	0.71	0.47	0.24	0.05
6400	0.93	0.82	0.68	0.53	0.40
∞	0.96	0.90	0.84	0.76	0.69

Sensitivity Analysis: Volatility			
Variable	λ = 400	λ = 1600	λ = 6400
GDP	0.79	1.06	1.66
C	1.18	1.13	1.19
G	1.03	0.96	0.80
I	4.75	4.56	3.86
X	3.17	3.05	2.22
M	4.84	4.61	3.80
L^t	1.03	1.01	0.99
LP^t	0.89	0.76	0.59
*M*4	0.76	0.94	1.10
*M*1	2.84	3.22	4.19
*VM*4	1.22	1.78	2.56
*VM*1	2.72	3.03	3.74
P	1.06	1.64	2.73
TT	3.90	4.96	5.93
e	6.60	9.24	11.97

The volatility of real variables is in relative terms except for GDP.

Note to Table 5 and 6: C, G, I, X, M stand for: consumption, government consumption, investment, exports and imports respectively. *NX* are net exports, L^t is total employment and LP^t total labour productivity. *VM*4 and *VM*1 stand for velocity with *M*4 and *M*1, *P* for GDP deflator, *TT* for terms of trade and e for nominal exchange rate.

Table 6 (upper panel) reproduces the autocorrelation coefficients of cyclical GDP under the different values of λ. On the whole, that evidence implies a large dosis of caution when interpreting the results for high values of λ. As expected, when λ increases, the autocorrelogram decays very slowly indicating that most probably the cyclical series is non-stationary[15], particularly when $\lambda \approx \infty$. Therefore, the standard statistics reported diverge and hence it makes no sense to talk about volatility, comovements, etc.

In view of the previous observation, Table 6 (lower panel) reports the volatility of both real and nominal variables for two different values of λ (400, 6400) together with the benchmark case (λ=1600) to afford comparisons with the basic results in the paper. As may be observed the GDP

[15] For an exposition of results for non-stationary time series see Banerjee *et al.* (1993).

volatility increases with λ. However, the most salient «stylised facts» for the real variables remain unaltered. Consumption, investment exports and imports are also more volatile than output. Employment seems to have a similar volatility, whereas productivity is less volatile. The evidence for government consumption is less clear, though the contradictory result appears for lower values of λ. As regards the nominal variables, their volatilities increase with λ.

With regard to the comovements and timing of the relationships of the different series with output, prices and net exports, the results, which are not reported for the sake of brevity, are fairly consistent across the different λ's. The main exceptions seem to be in government consumption and exports. The first variable shifts from being countercyclical and lead the cycle to being procyclical and lag as λ rises, while the second variable becomes countercyclical for large values of λ.

Summarising, although there are interesting differences across the different values of λ stemming from the significantly different set of frequencies captured by the parameter, the results seem to confirm the previous conclusions, giving rise to some robustness in the business cycle regularities.

Finally, in order to compare our results with those obtained from annual observations, it is worth mentioning a recent paper by Arranz (1993) who has also undertaken a similar study with annual data during the period 1964-88. Arranz uses, among several other detrending methods, the HP filter with a value of λ equal to 400. The results in this paper show similar regularities for the real and open economy variables but somewhat different conclusions with respect to certain features of the monetary aggregates. In particular, he finds that the contemporaneous correlations between prices and money are always positive for all monetary aggregates. The source of this divergence will be the subject of further research.

7. Conclusions

In this paper we have provided an empirical description of business cycles in Spain, using recently available quarterly data from 1970 to 1991 drawn from standardised national accounts. We compare the regularities, in terms of movements and comovements, of Spanish business cycle fluctuations with those of some representative OECD countries. We also examine their stability by repeating the analysis in two separate subsamples. As in most of this literature, the filtering method used to extract the trend component is the HP procedure.

The main results can be summarised as follows:

1. Volatility seems to be lower in output when compared with most OECD countries and higher in consumption (even higher than GDP's), government spending, employment and in the terms of trade. However, it is lower in productivity.

2. In terms of comovements, all aggregate demand components are procyclical, including government consumption. Net exports, however, are countercyclical. Money is procyclical but it does not lead clearly the cycle as in other countries. Prices are countercyclical as in most industrialised countries. There is a surprising negative correlation between money and prices, at least in HP filtered levels, and money velocity is countercyclical. Terms of trade and nominal exchange rates are procyclical.

3. In terms of stability, the main changes in the cyclical patterns of the Spanish economy when comparing the 70's with the 80's are as follows: a substantial reduction in output volatility as well as in the rest of the demand components, although on a smaller scale than output. There is also a lower volatility in the nominal variables (money, prices and velocity) and the terms of trade. There is, on the contrary, an extraordinary increase in employment variability. In terms of comovements, the main changes affect government consumption which becomes strongly procyclical, while labour productivity becomes countercyclical in the second subsample. Although the correlation between money and prices becomes positive in the 80's, a striking feature arises, namely money becomes countercyclical.

4. Regarding economic policy considerations[16], there is an apparent high degree of intervention in the Spanish economy. The impact of the successive energy crises has been lower in output than in employment. We detect an increase in the degree of discretionarity of fiscal policy and the opposite for monetary policy. Thus, there is some apparent success in the monetary control of inflation. Increasing openness has augmented the volatility of the external balance, while a negative correlation between exports and imports still holds. Liberalisation in the labour market has increased volatility in employment and productivity.

[16] For a discussion of monetary and fiscal policy developments see Appendix 2.

Appendix 1

All of the data are drawn from the Instituto Nacional de Estadística [INE] (Quarterly National Accounts, see INE., 1993) and the Statistical Bulletin of the Banco de España [BE].

The sample period is 1970: 1 to 1991: 4.

The demand variables are in real terms (expressed in 1986 prices).

Gross Domestic Product	(GDP)	[INE]
Consumption (total)	(C)	[INE]
Government consumption	(G)	[INE]
Investment (total)	(I)	[INE]
Fixed investment	(FI)	[INE]
Inventory investment	(II)	[INE]
Exports	(X)	[INE]
Imports	(M)	[INE]
Net exports	(NX)	[INE]
Employment (total)	(L^t)	[BE]
Employment (wage earners)	(L^w)	[BE]
Labour productivity (total)	(LP^t)	[BE]
Labour productivity (wage earners)	(LP^w)	[BE]
GDP price deflator	(P)	[INE]
Money	($M4$)	[BE]
	($M1$)	[BE]
Money Velocity	($VM4$)	[BE]
	($VM1$)	[BE]
Terms of trade (total)	(TT)	[BE]
Terms of trade (non energy)	(TT^{ne})	[BE]
Exchange rate (US$/pta.)	(e)	[BE]

Note: The statistical source is in brackets.

Appendix 2. Fiscal and Monetary Policies

In order to characterise the profile of Spanish monetary and fiscal policies along the cycle, we report for each of the estimated expansion/recession phases the average (standard deviation) of the following variables:

- budget deficit in terms of nominal GDP
- monetary growth (in nominal terms and in terms of GDP)
- inflation rate

The statistics are shown in Table A.1. Our main conclusion is that fiscal policy has become more discretionary, the opposite being the case for monetary policy. Also the reduction in the inflation rate, by means of a tighter monetary policy, seems to have been successful in the more recent business cycle fluctuations.

TABLE A.1
The Policy Mix and the Cycle

Period	Phase	Budget deficit	Money Growth (a)	Money growth (b)	Inflation
1969-71	recession	+0.2	5.4	18.8	6.3
		(0.7)	(0.7)	(2.1)	(1.4)
1972-73	expansion	+0.7	4.8	24.6	10.2
		(0.7)	(1.2)	(0.9)	(2.3)
1974-76	recession	−0.0	−0.2	19.8	16.4
		(0.2)	(1.4)	(1.6)	(0.4)
1977-79	expansion	−1.3	−2.0	19.5	20.3
		(0.6)	(4.1)	(0.2)	(3.2)
1980-82	recession	−4.0	2.6	17.3	13.3
		(1.5)	(0.7)	(1.1)	(0.7)
1983-84	expansion	−5.1	1.5	15.5	11.7
		(0.5)	(0.6)	(1.4)	(0.1)
1985-86	recession	−6.4	0.7	13.3	(9.4)
		(10.7)	(3.8)	(1.4)	(2.4)
1987-90	expansion	−3.3	0.5	12.2	6.5
		(0.5)	(1.6)	(2.1)	(0.8)
1991-92	recession	−4.7	2.5	8.9	6.5
		(0.4)	(3.4)	(5.2)	(0.6)

Note:
The figures in brackets are standard errors.
(a) means money growth in terms of GDP;
(b) means money growth in nominal terms.

In the previous sections we have referred to fiscal policy only in terms of government consumption as a GDP component. We now use a more general definition, including all transfers and subsidies (besides public investment) on the spending side and subtracting all income revenues. There is a clear trend in budget deficits. During the first cycles, the general government's budget was basically balanced and there were clear signs of countercyclicality. Both are signs of a «healthy» fiscal policy. From 1977 onwards, budget deficits start to increase irrespectively of the position in the cycle. From the 1974-76 recession to the 1977-79 expansion there is a jump in the public deficit. This fact occurs again from the 1980-82 recession to the 1983-84 expansion. During the last expansion there were some signs of improvement while the deficit got worse again as the current recession began. Both shifts are attributable to cyclical fluctuations to some extent. However, given our procyclicality result in government consumption we must assign this cyclical component to the revenue side, so that the discretionarity label to fiscal policy still holds.

On the monetary side, there is some discretionarity in the first cycles: from clear monetary expansions both in the booms and recessions of the early 70's to a severe relative contraction in the next two phases of the late 70's. This discretionarity did not have satisfactory results in terms of inflation. In fact, inflation increased in the years of monetary contraction. However,

from 1980 onwards there seems to be a gradual monetary contraction with more positive results in terms of culting inflation down.

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Resumen

En este trabajo se analizan las principales regularidades cíclicas de la economía española, su evolución a lo largo del tiempo y algunas de sus implicaciones de política económica. Esta tarea ha sido posible gracias a la disponibilidad reciente de una base trimestral de Contabilidad Nacional para el período 1970-1991. Los resultados se comparan con los obtenidos para un conjunto de países de la OCDE empleando la misma metodología para el mismo período muestral. También se analizan los posibles cambios que se hayan podido producir en el comportamiento cíclico cuando el período muestral se divide en dos submuestras. Para extraer el componente cíclico de las series se utiliza el filtro de Hodrick y Prescott (1980).

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