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Business Cycles' Characteristics of the Mediterranean Area Countries

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Abstract

In this paper we investigate the characteristics of business cycles fluctuations in the countries of the Mediterranean region by applying the Christiano-Fitzgerald bandpass filter to the output series of 12 Mediterranean countries over the period 1950-1998. The main properties of business cycle fluctuations (persistence, volatility, asymmetry and synchronization) are computed with reference to the deviation or growth cycle definition of the business cycle. Overall, the results of our analysis suggest, as expected, the existence of important differences in the characteristics of business cycle fluctuations among countries belonging to different economic level of development. Moreover, the average reduction of the degree of synchronization among Mediterranean countries seems to suggest a weakening of the economic links among Mediterranean countries, and thus a reduction of the economic importance of the links in this area in comparison to the European continental area.

1. Introduction

The overwhelming majority of empirical studies on business cycle fluctuations have analysed stylized facts focussing on the cross-country differences and similarities of macroeconomic fluctuations in developed countries (Kydland and Prescott, 1990, Backus and Kehoe, 1992, Bergman *et al*., 1998, Correia *et al*., 1992, Blackburn and Ravn, 1992, Fiorito and Kollintzas, 1992, Englund *et al*., 1992, Brandner and Neusser, 1990, Dimelis *et al*., 1992, and Christodoulakis *et al*., 1995, Stock and Watson, 1998, Basu and Taylor, 1999, Gallegati and Gallegati, 2001, 2003). Much less attention has been devoted in the literature to examining the sources of macroeconomic fluctuations and business cycle characteristics in developing countries both individually (Alper, 2000, Metin-Ozcan, Voyvoda and Yeldan, 2001, and Turhan-Sayan and Sayan, 2001) and as a group (Kose and Riezman, 1998, 2001), as well as in comparison with the developed countries (Mendoza, 1995).

In our study we describe the business cycle characteristics of a group of 12 Mediterranean countries analyzing the main properties of the real GDP series, *i.e.* persistence, volatility, asymmetry and synchronization, over the period 1950-1998. The analysis describes the key features of business cycle fluctuations in the following countries: Algeria, Egypt, France, Greece, Israel, Italy, Jordan, Morocco, Spain, Syrian Arab Republic, Tunisia and Turkey. Our approach in this paper is a-theoretical: [1] in particular, the aim of our paper is to describe the empirical evidence on the differences and similarities among countries characterized by different levels of income, but belonging to a same geographical area.

The paper is as follows. After establishing business cycle chronology in section 2, section 3 analyzes persistence and volatility of business cycles output component. Section 4 and 5 provides evidence of business cycle asymmetry and synchronization, respectively. Section 6 concludes the paper.

2. Establishing business cycle chronology

Dating business cycles, *i.e.* identification of turning points, recession and expansion phases, may be obtained determining peaks and troughs in the level of a series, *classical cycles*, or in the level of a detrended series, *growth cycles*. In this paper the reference cycle chronologies for the 15 Mediterranean countries are established using the “growth

rate" cycle definition, which delineate periods of cyclical upswings and downswings around an underlying trend. Growth cycles are more useful for business cycle analysis in countries that experience sharp contractions and expansions in growth rates. In a growth cycle a recession is defined as a phase where output is below its trend, while an expansion is a phase where output is above its trend. The procedure used to identify peaks and troughs in the growth rate cycle are analogous to those used in identifying classical business cycle turning points, the only difference being that they are applied to growth rates of the same time series, rather than their levels (see Canova, 1994). Identified turning points are selected using a minimum amplitude rule which requires the amplitude from peak to trough and from trough to peak to be at least as large as one standard error of the cyclical component of output.

Growth cycles, and then countries' business cycle characteristics, depend on the method used for the trend-cycle decomposition. In this paper we isolate fluctuations at business cycle frequencies using the Christiano and Fitzgerald's (1999) least squares optimal approximation of the *ideal band pass filter*. The filter, after removing the drift in the raw series, allows the extraction of the component of the raw data with periodicity between 2 and 8 years, i.e. a typical business cycle frequency range with annual data (see Stock and Watson, 1998). The advantage of using such a filter in our case is linked to the reduced number of data that have to be dropped from the beginning and end of the filtered series in comparison to, for example, the Baxter and King's (1999) filter.[2] We examine the business cycle properties of real GDP series for 12 Mediterranean countries using annual data at constant prices (million 1990 international Geary-Khamis dollars) over the period 1950-1998 (Maddison, 2001).

The peaks and troughs dates for all 15 GDP series are reported in Table 1. The information in Table 1 points to three major periods of international recession, during 1958-1960, 1973-1975, and 1993-1995, and three major periods of international expansion, 1956-1959, 1963-1965 and 1979-1981. In the time-span of our sample the countries have experienced from 6.5 to 11 cycles, which means that the typical or average cycle lasts from about 7.5 to 4.5 years.

Table 1 – Growth cycle chronology for Mediterranean countries

	ALG	EGY	FRA	GRE	ISR	ITA	JOR	MOR	SPA	SYR	TUN	TUR
Peak	1954			1953		1953	1953			1954	1953	1953
Trough		1955	1953	1954	1953		1955	1955	1954	1955	1955	1954
Peak		1957	1957	1957	1959		1956		1958	1957	1956	1959

Trough	1958		1959	1960		1960	1960	1960	1960	1960	1959	
Peak	1960			1961			1961		1962	1962	1961	
Trough	1962	1961		1962	1962		1963				1962	1961
Peak	1965	1965	1964	1965	1965	1963	1965	1963			1965	1963
Trough	1966					1965	1966	1965	1964	1966		1965
Peak							1967		1966			1966
Trough		1968	1968	1968	1967		1968		1967		1967	
Peak	1970	1971			1969	1969	1969	1971	1969	1969	1968	
Trough	1971					1972	1970	1972	1971	1971	1970	
Peak	1972		1973	1972		1974	1973		1974	1972	1972	
Trough		1974	1975	1974		1975	1975		1975	1973	1973	1974
Peak		1977		1978		1976	1976	1976		1976		1976
Trough	1976				1977	1978	1977	1979		1979		
Peak	1979		1979		1981	1980	1980	1980	1980	1981	1981	
Trough	1981	1981	1981			1982		1981			1982	1980
Peak								1982				
Trough				1983	1984		1983	1983		1984		
Peak	1985	1985	1984	1985		1985		1986			1985	1984
Trough	1988	1987	1987	1987				1987	1986		1986	1985
Peak			1989	1989	1987		1988			1988	1987	1987
Trough				1990	1989					1989	1989	1989
Peak	1990	1990						1991	1991			1990
Trough		1991					1991					1991
Peak		1994		1992			1992			1993	1992	1993
Trough	1994	1995	1993	1993		1993		1993	1993		1995	1994
Peak			1995		1995	1995		1996	1995			
Trough										1996		

In Table 2 we present the number of cycles characterizing Mediterranean countries for the post-World War II period and for two sub-periods, before and after the first oil-shock. During the second half of the XXth century there are many differences among the countries of our sample, as we have countries which experience less than eight cycles (Algeria, Egypt, France, Israel and Italy and), between eight and ten cycles (Morocco, Spain, Syria and Turkey), and more than ten cycles (Greece, Jordan, and Tunisia). But when we halve the whole period, the comparison of the two sub-periods evidence that the number of cycles has changed significantly over time across countries. In particular, the countries with the highest number (and with the shortest length) of cycles, i.e.

Greece, Jordan and Tunisia, have reduced (increased) of about one third the number (average length) of cycles from the pre to the post first oil-shock period. And among the other countries Spain almost halved its number of cycles, while both Algeria and Syria reduced it of about one forth. In contrast, France, Italy and Turkey have experienced a slight increase in the number of cycles, while Morocco has doubled them from the first to the second sub-period.

Table 2 - Number of cycles in 1950-1998, 1950-1974 and 1975-1998

	FRA	*ITA*	*GRE*	*SPA*	*TUR*	*SYR*	*EGY*	*MOR*	*ISR*	*ALG*	*TUN*	*JOR*
1950 1998	8	7.5	10	8.5	9.5	9.5	7.5	9	6.5	8	11	11
1950 1974	3.5	3.5	6	5.5	4	5.5	3.5	3	3.5	4.5	6.5	6.5
1975 1998	4.5	4	4	3	5.5	4	4	6	3	3.5	4.5	4.5

3. Persistence and volatility

In this section we briefly discuss the basic time-series properties of business cycles fluctuations across Mediterranean countries investigating output persistence and volatility. Output persistence can be measured in the time domain by the autocorrelation function (ACF), which computes the correlation of GDP with its own past previous time periods, while a simple measure of economic volatility for all countries may be represented by the standard deviation of the cyclical component of output. Recent studies of business cycle fluctuations in developing countries (Mendoza, 1995, and Agenor *et al*., 1999) provide evidence of higher output volatility than that typically observed in developed countries. Our sample reveals a similar picture. Indeed, for the whole sample the standard deviation of the cyclical component of output of the European countries is between 0.8 (France) and 1.76 (Greece), while that of the African and Asian Mediterranean countries ranges between 1.86 (Egypt) and 5.31 (Syria). Moreover, such a picture remains unchanged in relative terms even when we analyze the basic characteristics of business cycles across the pre and post first oil-shocks periods. But even with a relative picture unchanged, some interesting differences emerge as evidenced in Figures 1 and 2.

Figure 1 - Persistence and Volatility (1950-1974)

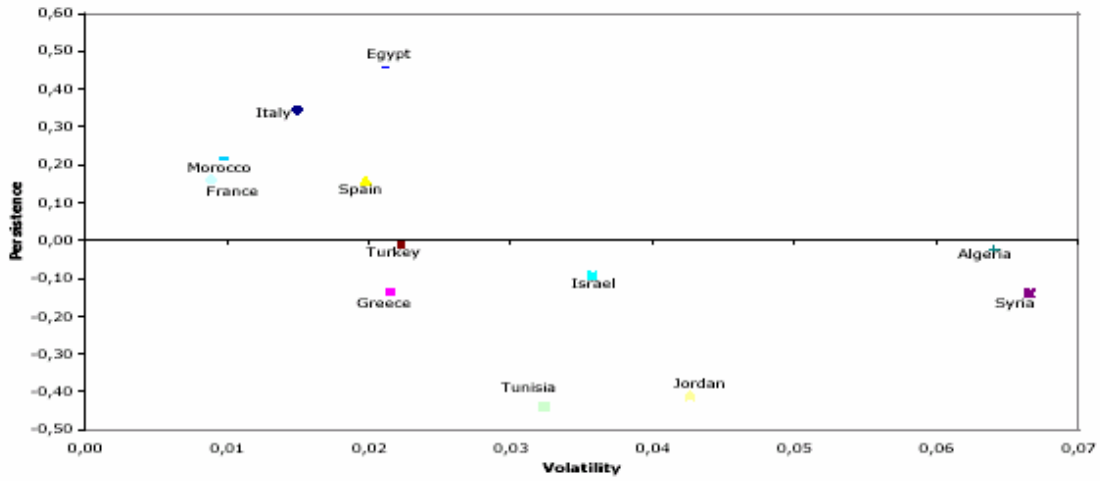
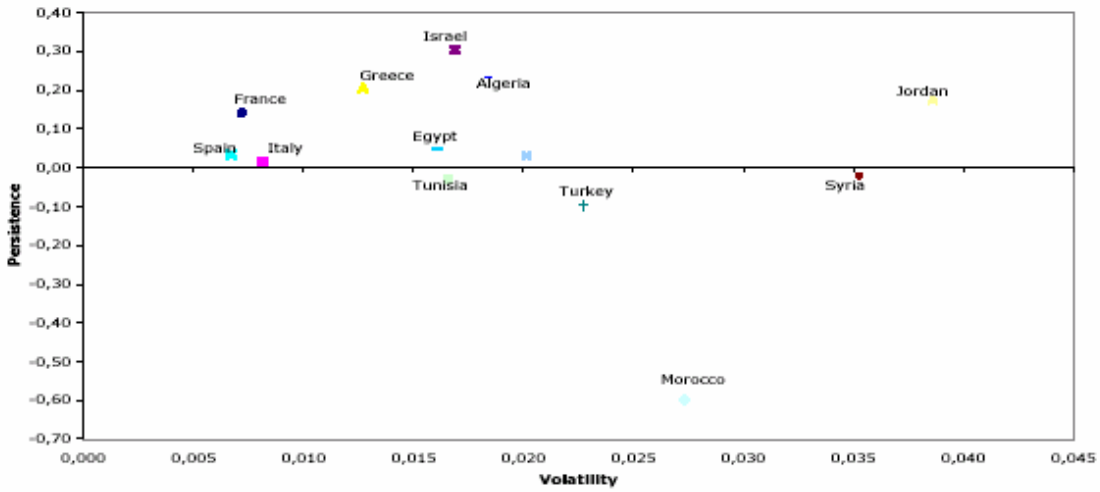


Figure 2 - Persistence and volatility (1975-1998)



Indeed, there is evidence of stabilization of the Mediterranean economy from the mid seventies as average output volatility decreases markedly from the pre first oil-shock period and the post first oil-shock period (from 3.28 to 2.01), as a consequence of the generalized reduction in countries' output volatility [3] (the only exceptions are Jordan and Turkey, where it remains almost unchanged, and Morocco, where it increases markedly).

The analysis of persistence and volatility in figures 1 and 2 suggests some similarities and some interesting changes in the main time-series properties of Mediterranean countries through time. In particular, in the last quarter of the previous century, according to a sort of stage of development and/or geographical closeness clubs, similarities emerge among the European Western Mediterranean countries, *i.e.* France, Italy, and Spain, which are characterized by a combination of low persistence and low volatility; among Algeria, Greece and Israel, characterized by positive

persistence and high volatility (compared to the Western European Mediterranean countries); and among Egypt and Tunisia, which are characterized by low or no persistence and high (as before) volatility. As regards the other countries of the sample, someone show high volatility and negative autocorrelation (Turkey), some others very high volatility with positive (Jordan), low (Syria) or negative autocorrelation (Morocco).

4. Asymmetry

The turning points define the two main phases of each cycle, recessions and expansions. A recession is defined as the period between a peak and a trough in economic activity, while an expansion is defined as the period between a trough and a peak. In this section we compare some basic characteristics of recessions and expansions, such as duration, amplitude, *steepness* and *deepness* [4] of business cycles phases across countries in order to verify the hypothesis of business cycle asymmetry.

In order to derive descriptive statistics of business cycles asymmetry we define a state variable S_t, which equals one in recession phases, the year after a peak date to the date of the trough, and zero in expansion phases. We define the length or duration of a recession (expansion) as the number of years from peak to trough (trough to peak), so the average duration of recessions and expansions are:

$$DUR_{REC} = \frac{\sum_{t=1}^{T} S_t}{\sum_{t=1}^{T} (1 - S_{t+1}) S_t} \quad \text{and} \quad DUR_{EXP} = \frac{\sum_{t=1}^{T} (1 - S_t)}{\sum_{t=1}^{T} (1 - S_{t+1}) S_t}$$

The amplitude is defined as the absolute value of the distance from peak to trough (or *vice versa*), so that the average amplitude equals:

$$AMP_{REC} = \frac{\sum_{t=1}^{T} S_t (PT_t)}{\sum_{t=1}^{T} (1 - S_{t+1}) S_t} \quad \text{and} \quad AMP_{EXP} = \frac{\sum_{t=1}^{T} (1 - S_t)(TP_t)}{\sum_{t=1}^{T} (1 - S_{t+1}) S_t}$$

with PT_t and TP_t measuring the distance (in percentage terms) between the peak to trough and the trough to peak values, respectively.

In thinking of a phase of a business cycle as a triangle with the amplitude as height and the duration as the base, we can measure the *steepness* as the ratio between the amplitude and the duration, *i.e*.

$$STEEPNESS_{REC(EXP)} = \frac{AMPLITUDE_{REC(EXP)}}{DURATION_{REC(EXP)}}$$

Moreover, we can calculate *deepness* that pertains to relatives average levels of peaks and troughs and refers to the characteristics that troughs are further below trend than peaks are above.

The results of the analysis of business cycle asymmetry for Mediterranean countries are presented in Table 3. On average there is no evidence of *deepness*, as the level of peaks and troughs is identical (0.03), and no significant differences in the distance between peak to trough and from trough to peak (0.064 versus 0.066). But as expansions are longer than contractions (2.85 versus 2.45 years), there is evidence of business cycle asymmetry as contractions are steeper than expansions (0.038 versus 0.030). [5]

Table 3 – Analysis of business cycles asymmetry

	Deepness		**Duration**		**Amplitude**		***Steepness***	
	Recession	**Expansion**	**Recession**	**Expansion**	**Recession**	**Expansion**	**Recession**	**Expansion**
ALGERIA	-0.064	0.051	2.625	2.714	0.084	0.116	0.057	0.054
EGYPT	-0.026	0.025	2.833	3.286	0.057	0.051	0.023	0.015
FRANCE	-0.012	0.011	2.625	3.571	0.023	0.023	0.010	0.007
GREECE	-0.022	0.020	2.000	2.444	0.042	0.042	0.027	0.020
ISRAEL	-0.038	0.039	3.333	4.000	0.080	0.066	0.035	0.019
ITALY	-0.016	0.015	3.571	2.429	0.032	0.033	0.016	0.016
JORDAN	-0.043	0.046	2.300	2.000	0.089	0.086	0.050	0.058
MOROCCO	-0.025	0.029	1.800	2.667	0.054	0.057	0.044	0.038
SPAIN	-0.032	0.030	2.755	2.921	0.058	0.060	0.031	0.027
SYRIA	-0.067	0.077	2.333	2.667	0.139	0.150	0.085	0.063
TUNISIA	-0.024	0.030	1.500	2.875	0.056	0.061	0.043	0.029
TURKEY	-0.025	0.026	1.700	2.700	0.052	0.049	0.038	0.025
Average	**-0.033**	**0.033**	**2.448**	**2.856**	**0.064**	**0.066**	**0.038**	**0.031**

With the exception of duration statistics that refers to number of years, all measurement is made in terms of percentage changes.

But a deeper look at individual countries' statistics reveals the existence of very large differences among the countries of our sample. In particular, for some countries (Jordan, Morocco, Syria and Tunisia) cycles exhibit deepness, as peaks are further above trend

than troughs are below (the opposite for Algeria). Moreover, the level of peaks and troughs for the countries of the sample goes from two to four times the values of France and Italy (the lowest values in our sample).

Cyclical amplitude of expansions and contractions is almost everywhere the same (main exceptions are Algeria, Israel, Syria and Tunisia), but with average absolute values which differ across countries ranging from 0.02 to 0.03 (France and Italy), from 0.04 to 0.06 (Egypt, Greece, Morocco, Spain, Tunisia and Turkey) and from 0.08 to 0.15 (Algeria, Israel, Jordan, and Syria). As regards duration no characteristic patterns seems to emerge among Mediterranean countries with the exception that expansions are everywhere longer than contractions (the only exceptions are Italy and Jordan). Consequently, contractions are everywhere steeper than expansions, with the degree of *steepness* going from 0.01 to 0.04 for Egypt, France, Greece, Israel, Italy, Spain and Turkey, and being greater than 0.04 for the other Mediterranean countries. Finally, as regards business cycle characteristics, empirical evidence from the Mediterranean countries seems to suggest an inverse relationship between the country's development level and the amplitude and severity of business cycle fluctuations. Indeed, both business cycles' amplitude and *steepness* of Mediterranean developing countries are above the average level of the sample (the opposite for the most developed Mediterranean countries).

5. Synchronization

Synchronization refers to the tendency of recessions and expansions in one country to occur at about the same time as in other countries. In this subsection we provide evidence in terms of linkage and synchronization of fluctuations in economic activity for the Mediterranean countries looking at the international nature of real GDP cyclical patterns across those countries.

The degree of synchronization between countries may be measured by the contemporaneous cross-correlation of the cyclical component of real GDP. Recently, Harding and Pagan (1999) has proposed the use of an index of concordance which measures the fraction of time spent in the same phase by two countries' business cycles. The degree of concordance is defined as

$$IC_{ij} = \frac{1}{T}\sum_{t=1}^{T}\left[S_t^i S_t^j + \left(1 - S_t^i\right)\left(1 - S_t^j\right)\right]$$

- where indexes *i* and *j* refer to the countries for which business cycles.

Table 4 – Index of concordance and contemporaneous cross-correlations

	FRA	*ITA*	*GRE*	*SPA*	*TUR*	*SYR*	*EGY*	*MOR*	*ISR*	*ALG*	*TUN*	*JOR*
FRA	-	0.51	0.68	0.57	0.46	0.30	0.64	0.49	0.38	0.56	0.38	0.52
ITA	0.21	-	0.41	0.57	0.46	0.53	0.40	0.67	0.40	0.50	0.50	0.63
GRE	0.29	-0.20	-	0.52	0.50	0.45	0.70	0.49	0.49	0.58	0.50	0.64
SPA	0.41*	0.33*	-0.06	-	0.43	0.50	0.38	0.51	0.59	0.39	0.43	0.52
TUR	-0.20	-0.06	0.03	0.01	-	0.55	0.56	0.49	0.53	0.41	0.50	0.42
SYR	-0.26	0.07	-0.18	0.11	0.08	-	0.44	0.57	0.53	0.37	0.50	0.60
EGY	0.30*	-0.43	0.41*	0.01	0.12	0.03	-	0.55	0.45	0.56	0.49	0.44
MOR	0.06	0.10	-0.01	0.04	-0.25	0.07	0.23	-	0.34	0.43	0.40	0.49
ISR	0.27	0.06	0.03	0.35*	-0.14	-0.09	-0.03	-0.09	-	0.51	0.51	0.47
ALG	-0.03	-0.06	0.27	-0.34	0.04	-0.20	0.09	-0.20	0.12	-	0.54	0.49
TUN	-0.33	-0.16	0.25	-0.10	0.20	0.08	0.08	-0.18	-0.09	0.36*	-	0.63
JOR	0.08	0.05	0.21	0.13	-0.10	0.33*	-0.02	-0.11	0.20	-0.06	0.24	-

In Table 4 we present the results for the index of concordance (in the upper triangle) and the contemporaneous cross correlation coefficients (in the lower triangle) of real GDP among the business cycles of the Mediterranean countries for the whole sample. The values of the contemporaneous cross-correlations demonstrate the strength of the linkages among countries' business cycles. The results suggest the existence of several links among the following countries:

- France and Spain, Italy and Spain;
- Egypt, France and Greece,
- Israel and Spain, Jordan and Syrian Arab Republic, Algeria and Tunisia.

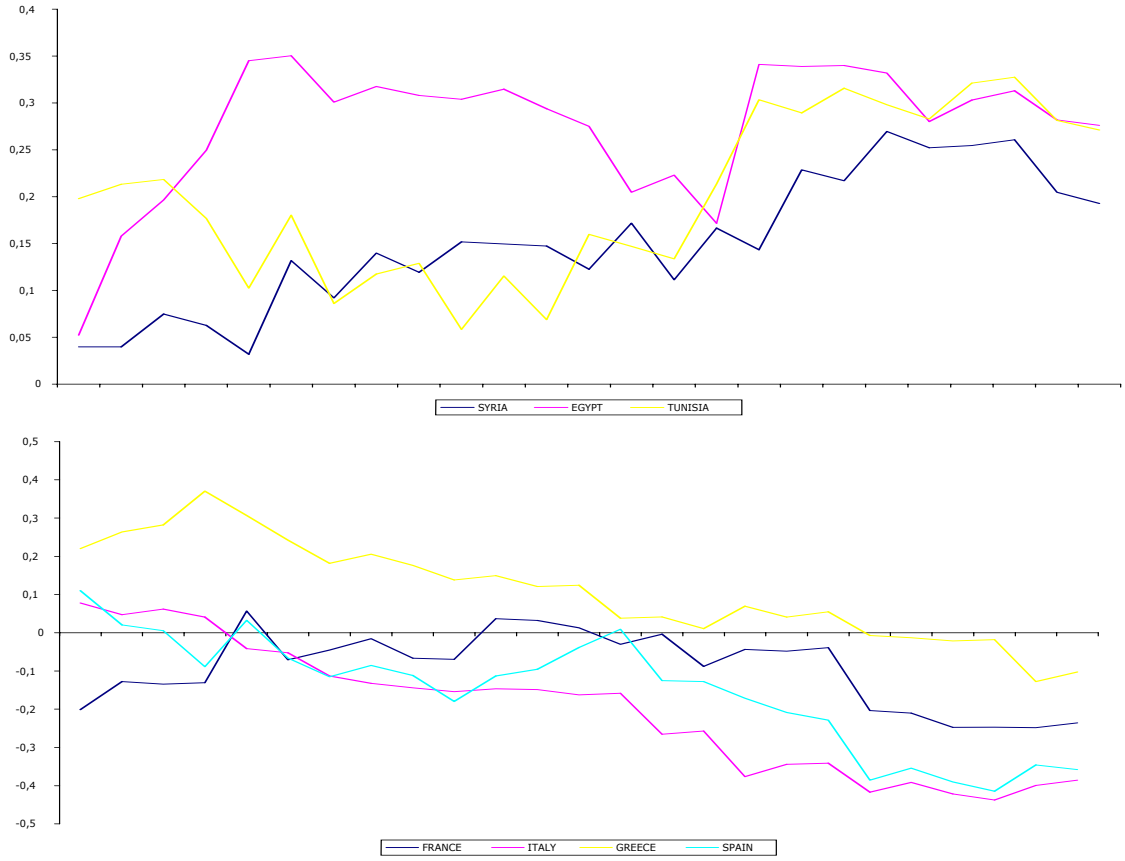
Table 5 – Index of concordance: average values

	FRA	*ITA*	*GRE*	*SPA*	*TUR*	*SYR*	*EGY*	*MOR*	*ISR*	*ALG*	*TUN*	*JOR*	***AV***
1950-98	0.50	0.51	0.53	0.49	0.49	0.51	0.50	0.49	0.48	0.48	0.50	0.53	**0.50**
1950-74	0.51	0.51	0.56	0.52	0.53	0.51	0.51	0.48	0.49	0.46	0.47	0.54	**0.51**
1975-98	0.47	0.51	0.51	0.46	0.43	0.45	0.49	0.50	0.45	0.50	0.50	0.52	**0.48**

Moreover, we examined whether synchronization between the cyclical components of output of all countries has changed over time calculating the average index of concordance for each county changed before and after the first oil-shock. The results show that the average concordance index decreases everywhere from the first to the second sub-period, with the only exceptions of Algeria, Morocco, Tunisia (increases), and Italy (unchanged) and the highest values of the concordance numbers recorded for Greece and Jordan, 0.56 and 0.54 respectively, before the mid seventies, and for Jordan in the last quarter of the XX^{th} century.

Finally in order to examine the evolution of synchronization over time, we compute the contemporaneous cross-correlation coefficients using a 25-years rolling window. The main findings of the rolling regression analysis may be summarised according to the presence of a positive stable, increasing or decreasing relationships between countries. A positive stable relationship emerges among France, Egypt and Greece; Italy and Spain; Egypt, Morocco and Tunisia; Jordan and Syria. There is evidence of increased synchronization during the time span of our sample for France and Italy, for Algeria with France and Greece, for Israel and Jordan, and for Syria, Tunisia and Turkey. Evidence of decreasing synchronization emerges for Egypt and Greece, for Jordan vs. France, Greece and Spain, for Spain and Syria, for Algeria vs. Israel and Tunisia, and for Israel vs. Syria and Tunisia. To summarize, the predominant result emerging from the rolling regression analysis suggests that the links among the economies of countries characterized by different levels of economic development have not increased over time (the only exception seems to be Algeria). Moreover, some interesting results emerge for Greece and Turkey, that is the countries interested in participating to the European Monetary Union and the European Union respectively. In particular, Greece displays greater synchronization with Algeria, Egypt, and Tunisia than with European countries, while Turkey evidences a changing pattern of synchronization represented by a positive increasing relationships with some MENA countries, i.e. Egypt, Syria and Tunisia, and a decreasing relationships with all the European countries, France, Greece, Italy and Spain (see Figure 3).

Figure 3 – Turkey's rolling cross-correlation coeffs



Thus, the evidence presented about synchronization and its evolution over time show that there is a change in the synchronization pattern across Mediterranean countries that involves both a reduction in the coincidence of expansions and contractions over time, and a change in the synchronization links which may determine the emergence of clusters of countries characterized by similar levels of economic development.

6. Concluding remarks

In this paper we investigate the characteristics of business cycle fluctuations (persistence, volatility, asymmetry and synchronization) across 12 Mediterranean countries over 1950-1998. The main findings of the paper can be summarized as follows:

- Output volatility varies markedly across Mediterranean countries according to their stage of development. In the time span of our sample there is evidence of a generalized reduction in countries' output volatility (the only exceptions are Jordan and Turkey,

where it remains almost unchanged, and Morocco, where it increases markedly) and the emergence of clubs of countries with similar characteristics based on their stage of development and/or geographical closeness;

- On average there is no evidence of deepness as the level of peaks and troughs is identical and no significant differences in the distance between peak to trough and from trough to peak (*i.e.* amplitude). But as expansions are longer than contractions there is evidence of business cycle asymmetry as contractions are steeper than expansions. Looking at individual countries' statistics the empirical evidence from the Mediterranean countries seems to suggest an inverse relationship between the country's development level and the amplitude and severity of business cycle fluctuations. Indeed, both business cycles' amplitude and *steepness* of Mediterranean developing countries are above the average level of the sample (the opposite for the most developed Mediterranean countries)

- From the rolling regression analysis of countries' cross-correlations and of the concordance statistics derived from the concordance index emerge some changes in the synchronization pattern across Mediterranean countries, as there is a reduction in the coincidence of expansions and contractions over time, and a change in the synchronization links among countries.

Overall, the results of our analysis suggest, as expected, the existence of important differences in the characteristics of business cycle fluctuations among countries belonging to different economic level of development. Moreover, the average reduction of the degree of synchronization among Mediterranean countries seems to suggest a weakening of the economic links among Mediterranean countries, and thus a reduction of the economic importance of the links in this area in comparison to the European continental area.

Notes

[1] A-theoretical in the sense that we do not use a theoretical framework, such as the RBC e.g., as a guideline for our research, or evaluate which model "fits better" the data; using a band-pass filter implies assuming a certain set of characteristics about the cause of growth and the business cycle and their decomposition. Moreover, as Canova, 1991, points out the band-pass filter methodology may alter measures of relative variability, persistence and comovements of the series. Previous studies (Fiorito and Kollintzas, 1994, Christodoulakis *et al*., 1995) show that alternative detrending procedures do not affect basic results.

[2] Christiano and Fitzgerald's (1999) approximate filter requires dropping two years at the beginning and end of the filtered series against the three years required by the Baxter and King's (1999) filter.

[3] These results are, at least partially, with recent empirical works on output volatility in developing countries (see Kose *et al*. 2002)

[4] *Steepness* and *deepness* of business cycles phases are defined in Sichel (1993).

[5] Similar results have been obtained even in previous studies on European and G7 countries (see for example, Gallegati and Gallegati, 2001, 2003).

References

Agenor P.R., McDermott C.J. and E.S. Prasad, 1999, "Macroeconomic Fluctuations in Developing Countries: Some Stylized Facts", *IMF Working Paper no.35,* March 1999.

Alper C.E., 2000, "Stylized Facts of Business Cycles, Excess Volatility and Capital Flows: Evidence from Mexico and Turkey", *WP No. ISS/EC-00-07*, Bogazici University Center for Economics and Econometrics.

Backus D.K. and Kehoe P.J. 1992, "International Evidence on the Historical Properties of Business Cycles"*, American Economic Review,* 82, 864-88.

Basu S., 1998, "Technology and Business Cycles: How Well Do Standard Models Explain the Facts?", in Fuhrer J.C. and S. Schuh *(eds.) Beyond Shocks: What Causes Business Cycles?,* The Federal Reserve Bank of Boston Conference Series No.42.

Basu S. and A.M. Taylor, 1999, "Business Cycles in International Historical Perspective", *NBER Working Paper No. 4698*.

Baxter M. and R.G. King, 1999, "Measuring Business Cycles: Approximate Band-Pass Filters for Economic Time Series", *Review of Economic and Statistics,* 81, 575-93.

Bergman U.M., Bordo M.D. and L. Jonung, 1998, "Historical evidence on Business Cycles: the International Experience", in Fuhrer J.C. and S. Schuh (*eds*.) *Beyond Shocks: What Causes Business Cycles?,* The Federal Reserve Bank of Boston Conference Series No.42.

Blackburn K. and Ravn M.O. 1992, "Business Cycles in the United Kingdom: Facts and Fiction", *Economica*, 59 (236), 383-401.

Brandner P. and Neusser K. 1990, "Business Cycles in open economies: stylized facts for Austria and Germany", *Working Paper n. 40, Austrian Institute of Economic Research*.

Canova F. 1991, "Detrending and business cycle facts"*, European University Institute, Paper Eco n. 91/58*, Florence.

Canova F. 1994, "Detrending and Turning Points", *European Economic Review*, 38, 614-23.

Christiano L.J. and T.J. Fitzgerald, 1999, "The Band-Pass Filter", *NBER Working Paper No. 7257.*

Christodoulakis N., Dimelis S.P., and T. Kollintzas, 1995, "Comparisons of Business Cycles in the EC. Idiosyncracies and Regularities", *Economica*, 62, 1-27.

Correia I., Neves J. and S. Rebelo 1992, "Business Cycles from 1850 to 1950. New Facts about Old Data", in *European Economic Review*, 37.

Dimelis S., Kollintzas T., Prodromidis K., Chalikias J. and N. Christodoulakis 1992, "Main Stylized Facts of Greek Economic Aggregates: 1948-1989", *Institute for Economic Research, Athens University of Economics and Business*.

Englund P., Persson T. and L. Svensson 1992, "Swedish Business Cycles: 1861-1988", in *Journal of Monetary Economics*, 30, 343-371.

Fiorito R. and T. Kollintzas 1992, "Stylized Facts of Business Cycles in the G7 from a Real Business Cycles Perspective", *CEPR Discussion Paper 681*.

Gallegati Marco and Mauro Gallegati, 2001, "European Business Cycles"*, Quaderni del Dipartimento di Economia n.149*, Università di Ancona

Gallegati Marco and Mauro Gallegati, 2003, "The Business Cycle *Puzzle*: Empirical Evidence from the G7",*International Journal of Financial Economics*, forthcoming.

Harding D. and A.R. Pagan, 2001, "Dissecting the Cycle: a Methodological Investigation", *Journal of Monetary Economics*, forthcoming.

Kose M.A. and R. Riezman, 1998, "External Shocks and Economic Dynamics: The Case of African Countries", *Journal of African Finance and Economic Development*, 3(1), 1-42.

Kose M.A. and R. Riezman, 2001, "Trade Shocks and Macroeconomic Fluctuations in Africa", *Journal of Development Economics*, 65, 55-80.

Kose M.A., E.S. Prasad, and M. Terrones, 2002, "Dynamics of Macroeconomic Volatility in an Integrated World Economy", *IMF Working Paper no.,* 2002

Kydland F.E. and E.C. Prescott 1990, "Business Cycles: Real Facts and a Monetary Myth", in *Federal Reserve Bank of Minneapolis Quarterly Review*, Spring, 3-18.

Maddison, 2001. *The World Economy. A Millennium Perspective,*

Mendoza E.G., 1995, "The Terms of Trade, the Real Exchange Rate, and Economic Fluctuations", *International Economic Review*, 36, 101-37.

Metin-Ozcan K., E. Voyvoda and E.Yeldan, 2001, Dynamic of macroeconomic Adjustment in a Globalized Developing Economy: Growth, Accumulation and Distribution, Turkey 1969-1998", *Revue Canadienne d'Etudes du Developpement*, 22(1), 219-53.

Sichel D.E., 1993, "Business Cycle Asymmetry: a Deeper Look", *Economic Inquiry*, 31, 224-36.

Stock J.H. and M.W. Watson 1998, "Business Cycle Fluctuations in U.S. Macroeconomic Time Series", *NBER Working Paper No. 6528.*

Turhan-Sayan G. and S. Sayan, 2001, "Use of Time-frequency Representations in the Analysis of Stock Market Data", in E. Kontoghiorghes, B. Rustem and S. Siokos (eds.), *Computational Methods in Decision-making, Economics and Finance*, Kluwer Applied Optimization Series.