# Has the Euro-Mediterranean partnership affected Mediterranean business cycles?

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**Abstract**

We date turning points of the reference cycle for 19 Mediterranean countries and analyze their structure and interdependencies. Fluctuations are volatile and not highly correlated across countries; recessions are deep but asynchronous, making average output losses in the area limited. Heterogeneities across countries and regions are substantial. Mediterranean cycles are time varying but their evolution is not linked with the Euro-Mediterranean partnership process. The concordance of cyclical fluctuations is poorly related to trade and financial linkages and to their evolution over time.

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# 1 Introduction

One of the main objectives of the Euro-Mediterranean partnership is to enhance economic and financial cooperation between members and to create an area of shared prosperity through sustained socioeconomic development, see http://www.eeas.europa.eu/euromed. To achieve this goal, the EU has established preferential relationships with non-EU Mediterranean partners, including bilateral association agreements and the European neighborhood policy (ENP). Bilateral association agreements try to establish an area with free trade and free financial flows, both in terms of North-South and of South-South relationships, and to create a common regulatory platform among partner countries. The ENP instead seeks to create an area of stability, prosperity, democracy and peaceful solution of conflicts by offering participating countries a stake in the EU internal markets, and supporting economic convergence toward EU standards with financial packages (the so-called ENPI instruments).

These association agreements produced structural reforms in a number of Mediterranean countries - trade was liberalized, entry barriers for foreign banks into domestic financial markets were lowered, and red tape for starting business reduced - changing the characteristics of the local economies. For example, the EU is now the first trading partner of Mediterranean countries and Mediterranean partners (excluding Turkey) account for about 5 per cent of the overall EU trade in goods. In addition, in the last five years Mediterranean exports (imports) to the EU increased by 11 (8) per cent a year, the fastest growing percentage of any commercial area with the EU in the world. Similarly, Foreign Direct Investments from the EU to the area, while still small in volume, have grown at the rate of 10 per cent a year.

Drawing from similar experiences elsewhere in the world, one can conjecture that the increased interconnection with the EU will have positive growth effects in the region in the years to come. However, increased interdependencies are likely to bring an important side effect: economies which in the past were insulated from EU cyclical fluctuations are now likely to be more affected by them. In addition, they may lead to new specialization patterns, affecting employment and the profitability of certain sectors. Thus, it is important to measure the impact of the Euro-Mediterranean partnership on Mediterranean business cycles and the externalities that EU policies may have for business cycles in non-EU countries.

How should cyclical fluctuations of a small economy change when it becomes more interconnected with a large economy? The interaction between trade openness, financial inte-

gration and cyclical dynamics is complex because direct and indirect effects may be present (see Imbs, 2010, for a review). Increased bilateral trade is expected to be accompanied by higher cyclical synchronization (see e.g. Canova and Dellas, 1993, or Frankel and Rose, 1998) but the impact of financial integration is unclear. Limited ability to borrow and lend internationally may hamper the transfer of resources across countries following changes in productivity growth, and thus lead to higher cyclical comovements (see Heathcote and Perri, 2004). On the other hand, if agents have limited information or face liquidity constraints, limiting capital flows may lead to lower cyclical comovements as investors may be unable to simultaneously withdraw capital from many destinations (see e.g. Calvo and Mendoza, 2000). Specialization is also an important dimension to consider, as countries with similar production structure will display high cyclical synchronization, even when trade and financial flows are limited. However, since trade and financial openness may lead to increased specialization, more cross-border interdependencies may indirectly make cyclical comovements lower (see Kraay and Ventura, 2007). Since some Mediterranean countries possess natural resources and others have comparative advantage in labor intensive sectors, this latter hypothesis may be relevant for the region. In general, to evaluate the effects of the Euro-Mediterranean partnership, one must know what cyclical fluctuations in the Mediterranean basin look like, whether the production structure, the level of development, the monetary regime, and the institutional framework may explain regional heterogeneities and understand what contributes to transmit fluctuations, both within the region and from EU to non-EU countries. Canova and Ciccarelli (2012) provide a first look at business cycles in the area but do not study the structure of cyclical fluctuations nor the transmission mechanism across countries. This paper fills this gap.

We contribute to the existing literature in three ways. For students of business cycles, we provide a turning point classification, previously unavailable for many countries in the region and for the Mediterranean as a whole, and a set of stylized facts summarizing features of the fluctuations in the area. This information is likely to be useful to test domestic and international models of the business cycle and to understand relative differences in the cyclical characteristics of developed, developing and frontier economies. For international macroeconomists, we provide novel evidence on the relationship between trade, finance and cyclical synchronization which questions the way standard models generate cross country transmission of business cycles. For policymakers, we provide a characterization of the

heterogeneities present in the cyclical fluctuations of the region, a necessary step to formulate policies better achieving integration goals, and an interim evaluation of the effects of the Euro-Mediterranean partnership.

We use up to five quarterly series (real GDP, unemployment, industrial production, real income, and real sales) for 19 Mediterranean countries in our exercises. Since not all the series are available for the entire time span, and since starting dates are often irregularly distributed, we use a weighting scheme to aggregate variables specific turning points in a reference cycle. The scheme reproduces well existing turning point dates for the major European countries of the area, generates fluctuations with reasonable features, and minimizes spurious patterns in frequencies of the cycles and in the relative duration of the phases.

Mediterranean cycles are different from those of other regions of the world: we document a vast heterogeneity of patterns in terms of persistence, volatility and comovements across countries and sub-regions. We find, for example, that cyclical upturns and downturns are not generally well synchronized, and while comovements increase in the 2008-09 recession, their absolute level is considerably below the one reported in Asia or Latin America. The number of complete cycles in different countries (regions) is also different and amplitudes and durations are very much country specific. Finally, the cross sectional distribution of output losses in recessions is quite spread out and North African countries suffer most.

The structure of cyclical fluctuations changes over time but, while the persistence and the volatility of business cycle phases are affected, the concordance of turning points is not. Thus, it is difficult to associate these variations with the institutional and the economic changes that the Euro-Mediterranean partnership has brought about. Moreover, while the correlation between bilateral interdependencies and the synchronicity of cyclical fluctuations has increased over time on average, it does not appear to be true that Mediterranean countries who signed trade agreements with EU saw this correlation increase more than the average. Hence, either the effects of the Euro-Mediterranean partnership have not yet materialized, because of institutional and political delays, or the heterogeneity of Mediterranean economies is so large that current policy measures, while going in the correct direction, only have minimal impact on cyclical comovements. The recent political turmoil in the Arab world suggests that both stories could be true and that more needs to be done before the Mediterranean becomes a meaningful economic entity.

The rest of the paper is organized as follows. The next section describes the methodology

used to date turning points of individual series and to aggregate them into a reference cycle, and the statistics used to summarize the characteristics of reference cycles. Section 3 presents the basic features of Mediterranean business cycles. Section 4 links cyclical fluctuations with trade and financial indicators. Section 5 concludes.

# 2 The methodology

The literature concerned with the detection of turning points has generally followed two approaches (see Hamilton, 2011, for a survey). The approach which is dominant, both in academics and in the real-time practice of dating committees, focuses attention on few aggregated time series and dates turning points in economic activity employing certain macroeconomic aggregates, for example, real GDP or an index of coincident indicators. Press releases of the NBER and the CEPR Business Cycle Dating Committees indicate that a handful of aggregated macroeconomic time series are typically looked at but that certain variables (such as employment and GDP) receive a larger weight in the decision to call a turning point or not (see e.g. NBER, 2008, or CEPR, 2010). The existing practice is therefore consistent with the idea that one should try first to aggregate information and then detect turning points using highly aggregated series.

As Harding and Pagan (2002) and (2006) have indicated, such an approach is inconsistent with the methodology employed by pioneers of business cycle analysis, who instead considered a large number of disaggregated series, identified turning points in each of these series, and then determined "reference cycle" turning points using the distribution of the turning points of the disaggregated series; see Burns and Mitchell (1946, pp. 13 and pp. 77-80).

The two methods are likely to give different classifications and, potentially, a different picture of cyclical phases, since the aggregation of non-linear functions (such as variable specific turning points) is not the same as the non-linear function of the aggregate. Nevertheless, there are theoretical and practical reasons to consider both methods useful. In general, little is known about the properties of the two approaches and, apart from a few cases where the choice is driven by special considerations (see e.g. Stock and Watson, 2010), it is a matter of taste which procedure is selected. In this study, we aggregate up turning point information and construct reference cycles for a country, a region, or an area.

Our effort is constrained by strong data limitations. Data availability forces us to con-

centrate attention on up to five quarterly real indicators (GDP, industrial production, unemployment rate, real income and sales) and for 19 Mediterranean countries only - Algeria, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Jordan, Lebanon, Malta, Macedonia, Morocco, Portugal, Serbia, Slovenia, Spain, Tunisia and Turkey. These five series are chosen to maintain the closest match with the practice of the NBER and the CEPR dating committees and because additional quarterly indicators, such as consumption or investment, are generally available only for the 2000s. Because not all series are available for all countries and, for the same country, the starting date of the series often differ, we experimented with numerous time varying weights when constructing country specific reference cycles. Our approach can be thought of as the discrete time counterpart of the weighting scheme for stratified data used by Stock and Watson (2010). Since industrial production data is available in the majority of the countries, we also comment on what would happen if, as it is commonly done, turning points were obtained from this series only.

We use the (log) level of individual series to date turning points. The alternative would be to detrend the data and date turning points in the residual series. This alternative, however, may lead to specification and measurement errors since there is no consensus on how to split a time series into underlying (unobservable) components and since, in short samples, the dates one obtains may depend on the assumptions used to separate the trend and the cycle (see e.g. Canova, 1999).

## 2.1 Dating turning points in individual series

To date turning points in the individual series we use a variant of Pagan and Harding (2002) algorithm, which extends Bry and Boschan's (1971) methodology to quarterly data. Since the approach is relatively well known, we only briefly describe its features.

An observation $y_t$ is a candidate peak of a variable $y$ if $y_t \in \max\{y_{t-2}, y_{t-1}, y_t, y_{t+1}, y_{t+2}\}$, and a candidate trough if $y_t \in \min\{y_{t-2}, y_{t-1}, y_t, y_{t+1}, y_{t+2}\}$. This condition is weaker than a rule that imposes, for example, that a candidate peak satisfies $y_{t-2} < y_{t-1} < y_t > y_{t+1} > y_{t+2}$ and a candidate trough satisfies $y_{t-2} > y_{t-1} > y_t < y_{t+1} < y_{t+2}$. Therefore, we impose additional restrictions to reduce the set of potential candidate turning points. A candidate is accepted as an actual turning point if the following censoring rules hold:

- Peaks and troughs must alternate. In case of a violation, e.g. a peak is followed by a

peak, the lower of the two peaks is eliminated.

- A peak (trough) must be higher (lower) than the previous trough (peak).
- The minimum length of a peak-peak and of a trough-trough cycle is 5 quarters.
- The minimum length of a peak-trough and of a trough-peak phase is 2 quarters.
- Turning points occurring in the first 2 and in the last 2 quarters are eliminated.
- Peaks (troughs) at the beginning or end which are lower (higher) than the initial (ending) values are eliminated.

The first two restrictions are obvious. The third and the fourth are arbitrary but typical in the literature. For robustness, we have also produced a turning point classification requiring that a complete cycle must last, at least, 7 quarters and that expansion and recession phases last, at least, 3 quarters (see on-line appendix B). The last two constraints avoid that measurement errors and data revisions spuriously affect turning point dates. These censoring rules were sufficient to uniquely date turning points in all the series for all countries.

## 2.2 Constructing a reference cycle for each country

Consider a series $y_{it}^j, i = 1, \ldots, 5$ in country $j = 1, \ldots, 19$. Given the turning points dates of each individual series, we calculate at each $t$ the distance in quarters to the nearest peak and create the new series $mp_t(i)^j$. Similarly, we calculate at each $t$ the distance in quarters to the nearest trough and create the new series $mt_t(i)^j$. We then aggregate $mp_t(i)^j$ and $mt_t(i)^j$ over $i$ and look for dates where the two aggregates reach their minimum. Intuitively, low values in $mp_t^j$ ($mt_t{}^j$) indicate that several series are close to a peak (trough) at time t. Thus, local minima of $mp_t^j$ and $mt_t^j$ are candidate peaks and troughs of the reference cycle. The same censoring rules used to date individual turning points are then applied to the candidates, and a unique set of reference cycle turning points dates is selected for each country.

It is not obvious how to aggregate the individual $mp_t(i)^j$ and $mt_t(i)^j$, especially because not all series start at the same date. We have experimented with a number of alternatives. The schemes we consider are (i) a simple average of all five series; (ii) a simple average of GDP, industrial production and unemployment only, (iii) the median value of $mp_t(i)^j$ and

$mt_t(i)^j$, as suggested by Pagan and Harding, (iv) a weighted average of all five series. As it will be clear below, (iv) seems the best as long as the weights are optimized. In this case the procedure is able to reproduce the existing CEPR turning point classification for the major European countries of the region and generates recession and expansion phases for these countries with the expected features.

## 2.3 Constructing a reference cycle for a region

With reference cycles for each country $j = 1, \ldots 19$, we apply the same techniques described in the previous subsections to construct a reference cycle for a sub-region or the area. That is, for each $j$, we construct two new series $rp_t^j$ and $rt_t^j$, measuring the distance in quarters to the nearest peak and the nearest trough. The two series are then aggregated over $j$ belonging to a region using equal weights and we search for minima in the two aggregated series. We then apply the same censoring rules used for individual series and for countries to identify a regional or an area reference cycle turning point.

We considered various regional sub-groupings. Geography, the production structure, the monetary regime and the level of development are employed to cluster countries since these factors can potentially shape the features of cyclical fluctuations. We consider four geographical regions - Major European countries (Portugal, Spain, France, Italy, Greece), other European countries (Malta, Cyprus, Croatia, Macedonia, Serbia and Slovenia), East Mediterranean countries (Turkey, Lebanon, Jordan and Israel) and the North African countries (Egypt, Algeria, Tunisia and Morocco); we separate Euro-area countries from non Euro-area countries; we divide poor countries from rich ones using 29000 US dollars, in 2010 PPP adjusted units, as cut off point; and cluster countries using the share of industrial value added: above the mean are Algeria, Croatia, France, Italy, Macedonia, Spain and Tunisia, below the mean all the others.

The Mediterranean reference cycle is obtained aggregating the reference cycles of the 19 countries using the same censoring rules previously described.

## 2.4 Summary statistics

We summarize the features of the reference cycle using the average duration of expansions and recessions; the average amplitude of expansions; the magnitude of the output losses in

recessions; the bilateral concordance of turning points; and a recession diffusion index.

The duration statistic measures the persistence of the cyclical fluctuation and differences in the two cyclical phases inform us about the presence of asymmetries and non-linearities in the process generating cyclical fluctuations. We compute amplitudes of expansions and output losses in recessions using both real GDP and industrial production. While industrial production is an imprecise proxy of the level of aggregate economic activity, especially in countries where the service sector is large, it has the advantage of being more generally available than GDP. The amplitude measure is reported in percentage terms, relative to the previous trough; that is, we report the level of GDP (IP) at the peak relative to the level of GDP (IP) at the trough minus one. We report only the amplitude of expansions since the amplitude of recessions is generally small (recall that we date level cycles) and can be directly inferred from duration and output loss measures. Output losses in recessions are computed using the actual decrease in GDP (IP) or using its triangular approximation. Letting $D_i$ be the duration of recession $i$ and $C_i$ its amplitude, the average triangular approximation to the cumulative movements is $CUM = (0.5/I)\sum_i(D_i * C_i)$. This statistic is typically of interest among policymakers and approximates the welfare losses of business cycles that can be computed in theoretical models. The concordance index is instead a pairwise measure of the synchronization of the reference cycle turning points and tells us how much cyclical fluctuations in two countries are in phase. The diffusion index shows the percentage of countries in a region which have a trough at a specific date and informs us about cyclical heterogeneities. A value close to zero (one) at some date indicates the prevalence of peaks (troughs) at that date; values around 0.5 at many dates indicate considerable cross country turning point heterogeneities.

# 3 The features of Mediterranean business cycles

We organize the presentation of the results in four parts. First, we discuss the best way to aggregate individual turning points into a reference cycle for a country. Second, we describe the features of the reference cycles for countries, for the Mediterranean and for selected sub-regions. Third, we present summary statistics characterizing these cycles. Fourth, we study how summary statistics change over time.

## 3.1 Aggregating variable specific turning points

We have experimented with several schemes to construct national reference cycles. The results we report below are obtained weighting the turning points of the individual series. We choose this scheme for three reasons. First, with this aggregation scheme, the turning points dates that the algorithm produces for the European countries of the region broadly correspond to the turning point dates produced by the CEPR committee. All other aggregation approaches we consider either fail to reproduce these dates or give too many false alarms (that is, turning points that the CEPR does not record as such, see table 1). Second, the average length of the cycles that the scheme produces for European countries is around 5-8 years; with all other schemes, the average length of the cycles is shorter. This is particularly true when the turning point classification is based on IP only. Thus, if the standard approach is employed one may obtain a distorted view of the cyclical fluctuations in European countries and possibly for the Mediterranean as a whole. Third, the duration of expansions and recessions that the scheme produces for European countries is asymmetric, with expansions lasting roughly 8-10 times longer than recessions, which is very much in line with the conventional wisdom, see e.g. Artis et al. (2004) and (2005). With other aggregation schemes, the duration of the cycles is much more symmetric and recessions appear to be long. The weights we have used (0.3 for GDP, 0.25 for unemployment, 0.2 for industrial production, 0.15 on income and 0.1 on sales) are chosen to optimize these features. If these weights are varied, the performance relative to the CEPR classification worsens. When one or more variables are unavailable the weights are adjusted proportionally so that they add up to one. When this occurs, which is the case for many non-European countries, the aggregate scheme matters much less and all approaches tend to produce similar turning point dates. We report turning point dates for each of the 19 countries in the on-line appendix A. The on-line appendix B reports a chronology of the turning points for the individual series in each country, both when a five-quarters and a seven-quarter minimum duration rule are employed to classify complete cycles.

## 3.2 The national reference cycles

National reference cycles tend to have diverse features. In some countries, e.g., Greece, Italy and Portugal, cycles tend to be relatively frequent and short but in others, e.g., Jordan or

Spain, the opposite is true. Recessionary phases are, on average, shorter than expansionary phases, but not uniformly so, and long expansions are observed in some countries, see e.g. Cyprus from 1995:3 to 2008:3; France from 1958:3 to 1974:3 and from 1993:3 to 2008:1, Jordan from 1995:3 to 2009:3, Slovenia from 1999:1 to 2008:3, and Spain from 1982:3 to 1991:4 and from 1993:2 to 2007:3.

Interestingly, reference cycles of developed, less developed and frontier economies are not very different. In fact, in each group, there are countries displaying short or long cycles and these could be symmetric or asymmetric. Thus, reference cycles do not cluster along a development indicator. Similarly, being a member of the EU is irrelevant for the structure of cyclical fluctuations: the only difference being that turning points are slightly more frequent in non-EU countries. A detailed investigation of the effects of institutional and geographical factors on Mediterranean cyclical fluctuations is in the next subsection.

The most recent recessionary episode gives a useful snapshot of how heterogeneous reference cycles are nowadays. The Mediterranean seems to be split into three different portions: the first portion includes countries which experienced a recession and by 2010 are back into an expansionary phase; the second comprises countries which entered a recession and have not yet displayed a cyclical trough; and the third includes countries displaying only an irregular and temporary slowdown in economic activity but no recession. In the first group we have Croatia, Egypt, France, Italy, Lebanon, Malta, Morocco, Portugal, Slovenia, Tunisia and Turkey; in the second group we have Cyprus, Greece, Israel, Jordan, Macedonia, Serbia and Spain; Algeria is the only country without a recession. Note that there is considerable variation in the turning point dates in the first two groups: peak dates are scattered over the 2007:3-2009:3 period but 2008:2 and 2008:3 have the highest frequency; trough dates instead are almost uniformly distributed between 2008:2 and 2009:2. Therefore, while there is a certain degree of synchronization in entering the recession, there is a high degree of non-synchronization in exiting it. This observation is consistent with Canova et al. (2007), who suggested that G-7 cycles are more synchronized in recessions than in expansions, and Imbs (2010), who termed the 2008-09 recession "the first global recession in decades", because of the synchronicity in the timing and the generality of the phenomenon.

The heterogeneities Mediterranean countries displayed in the 2008-09 recessions are highlighted in Figure 1, which presents the dynamics of output and of the unemployment rate since each country's last cyclical peak. For comparison, the cyclical peak is normalized

to 100 and scaled so that it occurs in period 1 in each country. Clearly, the dynamics entering (and exiting) the recession are country specific. We have countries with mild and relatively short output recessions (France, Morocco, Italy, Portugal and Tunisia), countries with sharp and short output recessions (Lebanon) and countries with relatively long and mild recessions (all the others, including those which have not experienced a cyclical trough). Some countries display a sustained trend increase in unemployment since the last cyclical peak (e.g. France, Italy and Spain), in others the unemployment rate is quite acyclical (e.g. Egypt, Morocco and Tunisia) and in one the unemployment rate falls during the recession (Croatia). Note that the unemployment rate lags the reference cycle in major European countries by one or two quarters, but elsewhere the two are practically coincident. Hence, even during this "global" recession, differences in the size of output and unemployment losses, and in the duration and the persistence of the recessionary episode are quite large.

## 3.3 The Mediterranean and the regional reference cycles

The Mediterranean reference cycle we construct is useful because it is the first of its kind for the area, can be used to compare business cycles in the region with those of continental Europe, and thus helps us understand to what extent the Mediterranean is integrated into the world business cycle. Before we describe its features, it is useful to recall that the number of series employed to construct the indicator varied with time. In particular, at the beginning of the sample only data from the Major European and from some of the Eastern Mediterranean countries is available; for the last decade, data for all countries is more or less available. Hence, the Mediterranean reference cycle reflects the cyclical development of Europe more than those of the Middle East or Africa at the beginning of the sample; but it is more balanced in its regional coverage at the end of the sample.

The Mediterranean displayed 7 complete cycles over the last fifty years. Their length is quite irregular, varying from a minimum of just above 2 years to a maximum of 13 years and with mean value of 6.7 years. The persistence of business cycle phases varies over time. For example, the 1970s were a particularly turbulent period and three recessions materialized from 1974 to 1982; the rest of the sample has been more stable and one complete cycle, featuring long expansions and relatively short recessions, took place in each decade. Interestingly, while the US and part of Europe were booming, the Mediterranean experienced a rather long recessionary phase between 1997 and 2001. Rather than being due to contagion

effects of crises taking place elsewhere in the world, the main reason for this extended recession is that many countries displayed unsynchronized troughs and very slow and uncertain recoveries, making the regional indicator very sluggish in this phase.

Figure 2 zooms in on the last recession and shows the dynamics of real activity and of unemployment around the Mediterranean peak (which occurred in 2008:2). Once again, the level of the two series in each country is normalized to 100 at the cyclical peak. Consistent with the expectations, real activity displays an inverted U-shaped pattern even though, in some countries, this occurs with a lag relative to the Mediterranean peak. There are also several outliers and, for example, during the recessionary phase (which lasted until 2009:2) Cyprus, Lebanon, Algeria and Morocco quickly surpass the activity level achieved at the Mediterranean peak. The unemployment rate has the typical U-shaped pattern. Significant outliers here are Italy, Spain, Turkey and Croatia: in the first three, the unemployment rate starts increasing up to six quarters prior to the Mediterranean peak: in Croatia, it is falling before and after the peak.

Given the considerable amount of heterogeneities present in Mediterranean reference cycle, one may want to know whether there are common cyclical features in some groups of countries, and, if this is the case, what characteristics matter most to group fluctuations in the region. For this reason, we construct reference cycles clustering individual country information using geographical characteristics, the production structure of the economy, the monetary regime, and the wealth per-capita at the end of the sample. When we use geographical characteristics, we consider four groups. In the Major European countries group we have France, Italy, Spain, Portugal, Greece; in the Other European countries group we have Croatia, Slovenia, Serbia, Macedonia, Malta, Cyprus; in the Eastern Mediterranean group we have Turkey, Israel, Lebanon, Jordan; and in the North Africa group we have Morocco, Tunisia, Egypt, Algeria. When we split countries according to their monetary arrangements, we put countries which belong to the Euro area (France, Italy, Spain, Portugal, Greece, Slovenia, Malta, Cyprus) in one group and the rest in the non-Euro area group. When we reorganize business cycle information using a wealth indicator, we choose 29.000US dollars for GDP per- capita (PPP adjusted) in 2010 as cut off point. Thus, France, Italy, Spain, Israel are the rich countries, while all the others are poor. Finally, when we use the share of industry in value added, we consider two groups: Algeria, Croatia, France, Italy, Macedonia, Spain and Tunisia which have values larger than average, and Cyprus,

Greece, Israel, Jordan, Lebanon, Morocco, Portugal, Serbia and Turkey which have values below average. Table 2 reports turning points dates clustering the 19 countries into these alternative regional groups. Figure 3 report a diffusion index for each sub-group.

When geographical proximity is used to group countries, regional heterogeneities are overwhelming. Turning points are poorly synchronized both within and across subregions and certain subregions experience many more (short) cycles than others. For example, the Major European countries group displays only 3 complete reference cycles over the last 30 years with recessions starting in 1980:1, 1992:1 and 2008:1. On the contrary, the Other European countries group displays 5 full complete cycles over the same period; and the North African countries group has 5 complete cycles but now for the shorter sample starting in 1990:1. Thus, not only the concordance of regional cycles is low; the persistence of regional cycles is also quite different.

In the most recent recession, these tendencies are evident. In the Major European countries the recession lasted one year, twice as long as in the Other European countries or in the North Africa groups, while for the Eastern Mediterranean group a trough cannot be identified in the sample. This is because Eastern Mediterranean countries are heterogeneous in both the timing of the upturn and the magnitude of the fall. In fact, while Turkey follows the pattern of the Major European countries group, Israel and Jordan have not yet displayed a trough and in Lebanon a recession started in the early 2007 and terminated by 2008:2.

The other classifications confirm the presence of profound differences in the nature of cyclical fluctuations in the Mediterranean. The Euro area group displays seven complete cycles, most of which are concentrated in the early part of the sample, with expansions being generally longer than contractions while the non-Euro group displays six complete cycles, but its time distribution is reversed (four cycles occurred in the last 15 years), and cycles are more symmetric. Moreover, at least at the beginning of the sample, expansions phases for the non-Euro group are quite long, suggesting a growth convergence pattern. Complete cycles are more numerous in the rich region; the frequency of complete cycles is larger in the earlier part of the sample in the rich region and more equally divided for the poor region; recessions are generally shorter than expansions in the rich region but quite long in the poor region. The region composed of countries with high share of industrial VA, on the other hand, has less cycles than the region with low share of industrial VA and, in the latter, expansions are very short and roughly of the same length as recessions.

Figure 3 highlights the presence of cyclical heterogeneities within each of the sub-regions we consider. Recession probabilities are, in fact, often around 50 percent, suggesting that cyclical synchronization in all subgroups is weak.

## 3.4 Durations, Amplitudes, Output losses and Concordances

We summarize the cyclical information present in the reference cycles we have constructed in table 3. Cyclical fluctuations are generally asymmetric: the average duration of expansions exceeds, and sometimes considerably, the average duration of recessions. The Mediterranean spends about 75 per cent of the time in expansions, while the proportion varies between 62 and 90 per cent when we consider a geographical classification, between 55 and 84 per cent when we use the monetary classification, between 76 and 78 per cent when we use a wealth classification and between 75 and 60 when we use a VA classifications. Expansions last, on average, from 3 years to almost 8 years depending on the grouping; recessions last, on average, from one to over 4 years depending on the grouping. The largest asymmetries in the duration of business cycle phases occur in major European countries; in the Eastern Mediterranean and non-European countries asymmetries are moderate. Interestingly, the duration of cyclical phases is very marginally related to the wealth of a country, while geography, the share of industrial VA, and the monetary regime matter.

The volatility of cyclical fluctuations is significant. The average percentage change in either GDP or IP for the Mediterranean is around 35-40 per cent. Thus, the peak is, on average, more than one third higher than the trough. However, there are important regional differences. For example, in other European countries, GDP at the peak is over 70 per cent higher than at the trough, while in the North African region the peak is only 10 per cent higher. Similarly, in Euro area countries the peak is, on average, higher than the trough by about 60 per cent while for non-Euro countries the peak is only 10 per cent above. As in the case of duration, the wealth classification seems to be irrelevant for clustering amplitudes: both rich and poor countries have peaks that are about 35-40 percent higher than troughs.

The cumulative loss in recession for the Mediterranean is small and it is generally larger when industrial production growth is used. The loss for Major European and Euro area countries is also relatively small. The average losses for the remaining classifications are positive. To understand this somewhat puzzling outcome it is important to remember that recession dates are chosen using the reference cycle for the region (or the area) while losses

are calculated averaging the movements in domestic GDP (or IP) over those dates. If there is a large heterogeneity in the timing of the recessions for the countries in the group or if real activity in some countries is strongly asynchronous with the reference cycle, positive and possibly large numbers could result. Since GDP (IP) fluctuations of countries in the Eastern Mediterranean or countries not adopting the Euro often show countercyclical movements with respect to the reference cycle we construct, the result ensues.

There is a positive but moderate association between cyclical phases across countries: the mean of the concordance index is 0.62 (the mode is 0.65), the cross sectional distribution ranges from 0.3 to about 0.9, and the standard deviation is 0.10. The concordance of cyclical phases is higher among Major European countries and lower among the rest of the countries or between these and the Major European countries. The concordance of turning points for other regional classifications is quite dispersed and although the mean is slightly higher (about 0.70), the distribution is far from normal. Interestingly, when we consider only pairs of countries which share a border the concordance is lower (0.61), while when we consider the concordance of each non-Euro area country with Euro area countries the concordance is higher (0.76). Thus, geography does not seem to matter much for the synchronicity of cyclical turning points in the region.

To summarize, in the Mediterranean cycles phases are generally asymmetric with expansions lasting, on average, longer than recessions; fluctuations are not very highly correlated across countries and this is true even for countries sharing a border or having similar structural characteristics; recessions can be deep but average output losses in the area are limited due to the lack of synchronization of output turning points. Perhaps the most remarkable feature which distinguishes the Mediterranean from other regions in the world is the considerable cyclical heterogeneity. Cyclical upturns and downturns are generally not highly synchronized even across countries sharing similar structural features, and while synchronization increases in the most recent recessionary episode, its absolute level is quite low. Amplitude, durations and concordance measures all have regional and country specific characteristics. Finally, the cross country distribution of output losses in recessions is quite spread out and, e.g., losses in the Middle East or North Africa are different from those experienced by the major European countries of the area.

While the snapshot is not very encouraging as far as regional integration is concerned, one should also be aware that time averaged statistics may mask important convergence

tendencies. After all, it is only since 1995 that the EU has taken policy measures to foster Mediterranean integration. For this reason, we next examine the evolution of amplitude, duration and concordance measures over two sample periods.

## 3.5 Are there time variations in the cyclical fluctuations?

While for many countries the sample is not very long, studying time variations in the structure of cyclical fluctuations is important from at least two perspectives. First, we would like to know whether the globalization trends, which have led to a much higher synchronicity in the cyclical fluctuations between the developed and developing world, are shared by the countries in the Mediterranean. Second, we want to know whether enhancing political and economic ties has also brought about significant cyclical changes. We split the sample at two different dates: at 1995, when the Euro-Mediterranean process started, and at 2000, to allow for delays in the effects of the partnership agreements.

Table 4, which reports regional and Mediterranean statistics over the two samples suggests that duration statistics are changing, but both the magnitude and the direction of the change is phase and region specific. For example, when the Mediterranean reference cycle is used, recessions last 7.2 quarters in the first period and 9.5 quarters in the second, while booms last roughly 20 quarters in the earlier period and 21.5- 26 quarters in the later period, depending on the cut-off date. The length of booms increases in the second sample in all European countries while it decreases in the Eastern Mediterranean and in North Africa. Conversely, the length of recessions is roughly unchanged in the major European countries, it decreases in the other European countries and in the Eastern Mediterranean, and it increases in North Africa. A similar heterogeneity appears with the other regional classifications. In Euro area countries cyclical phases have become more asymmetric (the length of booms increases and the length of recessions decreases on average), while in non-Euro area countries both phases become less persistent (both the length of booms and recessions decreases on average). In rich countries, asymmetries are exacerbated in the latter part of the sample, while they are smoothed out in poor countries, primarily because expansions become less persistent. When VA is used to group countries, cycles are very asymmetric in the first part of the sample and much less in the second for both high and low VA countries and 1995 is used as cut-off point. The difference is reduced for low VA countries when 2000 is used as cut-off point.

Time heterogeneities are also evident in amplitude measures. For the Mediterranean as

a whole, expansions become stronger in the second sample when we use 1995 as cut-off date while the opposite is true when using 2000 as cut-off date. We also find that in European countries expansion phases have become stronger while in the Middle East and North Africa they have become weaker. In Euro area countries the amplitude of expansions is larger (smaller) when we use the 1995 (2000) cut-off point while for non-Euro area countries no change is visible. Finally, the amplitude of expansions increases, both in rich and poor countries, regardless of the cut-off point used, while the evidence for high and low VA countries is mixed.

Interestingly, there are only minor changes in the distribution of the concordance index across subsamples. The mean value of the index is 0.62 for the whole sample, 0.60 for the sample up to 2000, and 0.64 for the sample starting at 2001. Thus, while synchronization increases, the increase is marginal as compared to the one reported in, e.g., Imbs (2010), who looked at a large cross section of developed and developing countries.

To sum up, cyclical fluctuations are changing over time and duration and amplitude measures are more affected than synchronicity measures. However, depending on the classification used, cyclical asymmetries are exacerbated or smoothed out, persistence increased or decreased, and volatility reduced or boosted. Hence, not only cyclical fluctuations in the Mediterranean are heterogeneous; their time evolution is also diverse. Thus, the region stands apart from the globalization trends observed elsewhere and the time variations we detect seems hard to link, directly or indirectly, to the Euro-Mediterranean process.

# 4 What is the role of trade and financial links?

The policies that the EU has adopted to foster the economic integration of the Mediterranean have primarily involved political cooperation and a number of preferential bilateral agreements, aimed at establishing a free trade and a free financial flow area and at offering to participating non-EU countries a stake in the EU internal markets. The idea that free trade and free financial flows lead to dynamic convergence and to cyclical synchronicity is strongly ingrained in the mind of European policymakers. But what do we know about the effects of opening goods and financial markets to foreign competition on cyclical fluctuations?

There has been considerable empirical work over the last 20 years studying the relationship between trade, financial links, and synchronicity of cyclical fluctuations (see, e.g.,

Canova and Dellas, 1993, Canova and Marrinan, 1998, Imbs, 2004 and 2006, Kose et. al, 2009 and Kalemli, et al., 2012). The conclusions the literature has reached are somewhat controversial and depend exactly on the variables considered and the countries involved.

Theory is not more informative about the role of free trade and free financial flows for business cycle fluctuations. In the standard real business cycle model of Backus et al. (1994) trade in goods generally leads to higher cyclical synchronicity since production of final goods depends on intermediate goods produced domestically and abroad. However, in such a model, final goods are homogenous. If the possibility to trade fosters production specialization, a lower level of international synchronization may emerge.

The impact of opening up financial markets is also theoretically unclear. There are models suggesting that higher financial integration leads to lower output synchronization. For example, in Morgan et al (2004), when financial markets are integrated, positive shocks to the collateral value imply that local firms will get more credit from local and foreign banks, positively boosting output. For a given supply of funds, foreign firms will get less credit, thus making foreign production contract and inducing negative output comovements. Such a mechanism is also present, although in a different format, in RBC models: the country hit by a positive idiosyncratic productivity disturbance experiences an increase in the marginal product of capital and labor and this makes foreign capital flow into the country. Since the foreign country experiences a decrease in the capital stock for a given productivity level, output comovements will be negative. Finally, models in the tradition of Obstfeld (1994) may also produce negative output correlations. Here financial integration shifts investment toward risky projects, enabling countries to specialize according to their comparative advantage, thus leading to lower output synchronization.

There are also models where financial integration leads to positive output comovements (see the early contribution of Calvo and Mendoza, 2000). The current wave of models e.g. Perri and Quadrini (2010), Mendoza and Quadrini (2010) generates positive comovements because banks and firms have collateral requirements. When there is a negative shock to the domestic banking sector, and the economies are financially integrated, banks cut their lending globally and shrink their balance sheet. Foreign banks from non-affected countries stop lending to domestic firms because the limited enforcement of debt contracts increases the cost of default in bad times. Thus, asset prices fall and shocks to domestic banks balance sheet spread internationally, making foreign banks net worth fall and financing costs increase.

These mechanisms reinforce each other leading to higher output comovements.

To learn about the role of improved trade and financial linkages in the Mediterranean, we examine how the distribution of the bilateral concordance index relates to the distribution of bilateral trade and financial linkages. We construct bilateral trade (financial) measures summing up imports and exports (capital inflows and outflows) of a country pair and dividing the result by the sum of total exports and imports (capital inflows and outflows) of the two countries and averaging the result over time. We compute both simple and rank correlations. Since the results are similar, we focus the discussion on rank correlations and note the differences when they occur.

The correlation between concordance and trade indices is low - for the full sample it is only 0.22. Thus, countries with similar cyclical timing are not necessarily those with high bilateral trade relationships. When we split the sample at the end of 2000, the rank correlation is unchanged across subsamples (0.20 in the first sample, 0.19 in the second). There is a slight increase over time when simple correlations are used (from 0.17 to 0.25) but, overall, the relationship remains weak even in the 2000s.

To look at the same issue from a different angle, we have computed the percentage of the cross sectional dispersion of the concordance index explained by the cross section dispersion of bilateral trade measures. This percentage is just 7.0 and for the subsamples it is even lower (1.5 per cent in the first, 6 per cent in the second). Thus, trade is a minor determinant of the synchronicity of cyclical fluctuations in the Mediterranean and the recent increase in trade flows has not brought about larger cyclical synchronization.

Why it is that trade does not matter? One possibility is that concordance measures are inappropriate to measure cyclical synchronicity because, as suggested by a referee, a larger concordance may result if expansions have longer durations. We have repeated the exercise using GDP (IP) bilateral correlations in place of bilateral concordance measures. The results are unchanged: the correlation between output correlations and trade is 0.23 for the full sample and 0.20 and 0.24 for the two subsamples. Another possibility could be that bilateral trade relationships do not capture the extent of trade interdependencies in the region because third countries, outside of the Mediterranean, may act as assemblers and exporters of domestically produced products. While this could be an explanation, it is hard to identify who these third countries could be. A third possibility is that it is easier to trade between countries which share a border, thus making average bilateral correlations

not very informative. We have repeated the exercise using bilateral concordances of the countries sharing a border: the correlation is indeed higher (0.36) and it is increasing in the two subsamples (from 0.26 to 0.44). However, since the number of country pairs is smaller, we cannot reject the hypothesis that these correlations are similar to the original ones we have presented. Finally, the generally low correlation between business cycle synchronization and trade could be due to the fact that bilateral trade in the Mediterranean is limited and that, for many countries, the main trade partner is the EU. To check for this possibility we have considered the concordance of cyclical fluctuations of Morocco and Tunisia, who signed trade agreements with the EU in the middle of the 1990s, with Major European countries and examine the evolution of the trade-concordance correlation over time. We want to see whether the concordance index is better correlated with trade for this restricted group of countries and whether signing a trade agreement with the EU has changed not only the extent of bilateral trade but also the synchronicity of cyclical fluctuations. For the full sample the rank correlation between the two indices is 0.35, higher than what we obtained for all possible Mediterranean pairs. However, the percentage of the cross sectional dispersion of concordances explained by the dispersion of trade indices is still low (4 per cent) and trade explains less of the concordance of cyclical fluctuations in the 2000s than in the earlier part of the sample (0.12 vs. 0.34).

Hence, not only the synchronicity of the cyclical fluctuations does not have much to do with trade; there is also little evidence that changes in trade relationships are associated with variations in concordance of cyclical fluctuations. Since trade does not seem to matter, what else could explain the dispersion of concordances in the Mediterranean? A few suspects come to mind. The first is financial interdependencies. Financial and banking interdependencies are quite low in the area but have increased considerably over the last 10 years. To examine their importance, we have correlated concordance measures with bilateral capital movements for Cyprus, France, Greece, Italy, Jordan, Portugal, Spain, Tunisia and Turkey, which are the only countries for which capital flows are available. The rank correlation is still low (0.23) and the percentage of the dispersion of the concordance index explained is equally small (11 per cent). The rank correlation slightly increases if the concordance distribution obtained after 2001 is used (0.29), but the percentage of the dispersion explained by financial interdependencies decreases (0.03). Thus, financial interdependencies are unlikely to be "the factor " explaining the dispersion of concordances.

Two other suspects are remittances and tourism flows. While remittances and tourism are important components of GDP and employment in some of the countries of the region (e.g. Morocco, Tunisia, Egypt and Jordan), data on these two flows is scant, and this renders a systematic investigation of their relationship with cyclical fluctuations difficult to perform. Finally, it could be that institutions (such as the rule of law, the voice and accountability of the political system, etc.) could be important to explain the concordance of cyclical fluctuations in the area. Altug et al. (2011) have studied this relationship for a large cross section of countries and found that institutions shape business cycle fluctuations more than standard macroeconomic factors. Their analysis, however, includes only a few Mediterranean countries and they happen to have similar institutions. Thus, it is difficult to extend their conclusions to the basin, where institutional differences turn out to be quite large.

# 5 Conclusions

This paper systematically examines the dynamics of business cycles in the Mediterranean and relates their features to production, trade, financial, wealth and macroeconomic indicators.

Overall, the Mediterranean basin is far from an integrated economic area, cyclical fluctuations in the region are quite idiosyncratic and standard geographical, production, monetary and wealth indicators have a hard time to fully account for existing heterogeneities. While some cyclical convergence is taking place, the process appears to be at the very early stages and not clearly connected with the policy measures that the EU has adopted. At the cost of oversimplifying, the Mediterranean appears to be a colorful archipelago, where islands have their own cyclical life and are not well interconnected. There are instances where regional commonalities are important (such as in Mediterranean Europe) but also cases where idiosyncrasies dominate even within sub-regions (such as in the North Africa). Structural factors account, in part, for the differences, indicating that a process of homogenization is necessary prior to integration efforts. The EU has invested quite a lot to enhance trade and financial interdependencies, hoping that homogenization and integration would come together through these channels. So far the policies do not seem to have achieved their purpose. This could be due to the fact that, contrary to other regions of the world, trade and financial interdependencies are only a minor channel of cyclical transmission in the region. It could also be due to the uncertainties about the associated political process or to implementation

delays. After all, even though the process started in 1995, it is only since 2007 that the Euro-Mediterranean partnership has been fully shaped. Thus, one may just want to wait and see. Alternatively, one may want to design measures to reduce national idiosyncrasies. The cyclical heterogeneities we have described do not seem to have a straightforward economic reason; institutional and cultural features may go a long way to account for these differences.

The paper has focused attention on how trade and financial interdependencies affect the synchronicity of cyclical fluctuations, primarily because the literature has stressed their importance in other regions of the world. Trade and financial interdependencies have increased in recent years but other channels could be as or more important to explain the cyclical patterns we have described. For example, in many countries migrations are important and remittances constitute a large portion of GDP. The 2008–09 recession had an important impact on remittances and on the ability of several non-EU Mediterranean countries to sustain local demand, which may explain the higher degree of cyclical synchronization found in the latter part of the sample. The current austerity measures implemented in the EU are also likely to reduce external receipts of many non-EU countries. Similarly, tourism revenues are quite important for certain countries and local employment is heavily skewed toward tourism related sectors. The Arab spring of 2011 has disrupted tourism flows in North Africa and increased them in Cyprus, Turkey and Spain, thus altering the transmission pattern of cyclical fluctuations in the region. Data on these flows is scarce and only a few attempts to measure their impact on cyclical transmission exist, see e.g. Canova and Dallari (2013). A better understanding of the interconnections present in the Mediterranean could be obtained if reliable data on bilateral migration and tourism flows would be available for a large number of countries and for a sufficiently long period of time.

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Table 1: Comparison of dating schemes

| CEPR dates | | Simple average | | Weighted 3 | | Median | | IP | | Weighted average | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Peaks | Troughs | Peaks | Troughs | Peaks | Troughs | Peaks | Troughs | Peaks | Troughs | Peaks | Troughs |
| | | 1974:1 | 1975:2 | 1974:1 | 1975:2 | 1974:3 | 1975:4 | 1974:3 | 1975:3 | | |
| 1974:3 | 1975:1 | 1976:4 | 1977:4 | 1977:1 | 1977:3 | 1977:1 | 1977:3 | 1979:4 | 1980:3 | 1974:2 | 1975:2 |
| 1980:1 | 1982:3 | 1979:3 | 1981:1 | 1979:4 | 1980:4 | 1979:3 | 1980:4 | 1984:3 | 1985:3 | 1976:4 | 1977:2 |
| 1992:1 | 1993:3 | 1984:2 | 1985:3 | 1984:4 | 1985:3 | 1983:4 | 1985:4 | 1990:2 | 1991:2 | 1980:1 | 1980:4 |
| 2008:1 | 2009:1 | 1992:1 | 1993:3 | 1992:1 | 1993:3 | 1992:1 | 1993:2 | 1992:1 | 1993:2 | 1992:1 | 1993:1 |
| | | 1995:1 | 2000:4 | 1995:2 | 2001:1 | 1995:1 | 1995:4 | 1995:2 | 1996:2 | 2008:1 | 2009:1 |
| | | 2008:2 | 2009:2 | 2008:2 | 2009:2 | 1996:3 | 1998:2 | 1999:1 | 2000:2 | | |
| | | | | | | 1999:1 | 2001:2 | 2000:4 | 2001:2 | | |
| | | | | | | 2008:3 | 2009:2 | 2004:1 | 2005:1 | | |
| | | | | | | | | 2007:2 | 2009:2 | | |

| Length | Relative | Length | Relative | Length | Relative | Length | Relative | Length | Relative | Length | Relative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 | 8 | 19 | 2.25 | 21 | 2.5 | 19.8 | 2.3 | 15.5 | 2.7 | 34 | 10 |

Notes: "Length" measures the length of the average cycle in quarters. "Relative" measures the relative duration of expansions to contractions.

Table 2: Regional and Mediterranean reference cycle turning points

| Major European Countries | | Other European Countries | | East Mediterranean Countries | | North Africa Countries | | Overall Mediterranean | |
|---|---|---|---|---|---|---|---|---|---|
| Peaks | Troughs | Peaks | Troughs | Peaks | Troughs | Peaks | Troughs | Peaks | Troughs |
| 1964q1 | 1964q4 | 1984q2 | 1985q3 | 1958q2 | 1959q1 | 1991q4 | 1992q2 | | 1959q1 |
| 1974q2 | 1975q2 | 1990q2 | 1992q3 | 1978q3 | 1994q3 | 1996q4 | 1997q2 | 1961q4 | 1965q2 |
| 1976q4 | 1977q2 | 1993q1 | 1995q3 | 2000q3 | 2001q4 | 2001q1 | 2003q4 | 1974q3 | 1975q3 |
| 1980q1 | 1980q4 | 1996q4 | 1998q2 | 2004q4 | 2005q2 | 2005q1 | 2005q4 | 1976q4 | 1977q2 |
| 1992q1 | 1993q3 | 2008q3 | 2009q1 | 2008q2 | | 2008q2 | 2008q4 | 1979q3 | 1982q4 |
| 2008q1 | 2009q1 | | | | | | | 1992q4 | 1993q3 |
| | | | | | | | | 1997q4 | 2001q4 |
| | | | | | | | | 2008q2 | 2009q1 |
| Euro Countries | | Non-Euro Countries | | Rich Countries | | Poor Countries | | | |
| Peaks | Troughs | Peaks | Troughs | Peaks | Troughs | Peaks | Troughs | | |
| 1964q1 | 1964q4 | 1958q2 | 1959q1 | 1958q2 | 1959q1 | 1974q1 | 1975q2 | | |
| 1974q2 | 1975q2 | 1978q3 | 1993q4 | 1964q1 | 1964q4 | 1976q4 | 1977q2 | | |
| 1976q4 | 1977q2 | 1994q4 | 1998q4 | 1967q3 | 1968q3 | 1990q2 | 1993q4 | | |
| 1979q4 | 1982q4 | 2000q2 | 2004q1 | 1974q3 | 1977q3 | 1997q4 | 2001q3 | | |
| 1992q1 | 1993q3 | 2004q4 | 2005q4 | 1978q3 | 1982q4 | 2008q2 | 2009q1 | | |
| 2000q4 | 2001q4 | 2008q2 | 2008q4 | 1992q1 | 1993q3 | | | | |
| 2008q2 | 2009q1 | | | 2007q4 | 2009q1 | | | | |
| High VA Countries | | Low VA Countries | | | | | | | |
| Peaks | Troughs | Peaks | Troughs | | | | | | |
| 1956q4 | 1958q3 | 1976q4 | 1977q2 | | | | | | |
| 1974q3 | 1975q3 | 1978q3 | 1979q4 | | | | | | |
| 1977q1 | 1977q3 | 1981q4 | 1983q3 | | | | | | |
| 1979q3 | 1980q4 | 1984q2 | 1985q3 | | | | | | |
| 1981q2 | 1982q4 | 1990q2 | 1990q4 | | | | | | |
| 1992q1 | 1992q3 | 1993q1 | 1993q4 | | | | | | |
| 1996q4 | 2004q1 | 1994q4 | 1997q3 | | | | | | |
| 2008q1 | 2009q1 | 1998q3 | 1999q4 | | | | | | |
| | | 2000q2 | 2001q4 | | | | | | |
| | | 2004q3 | 2005q1 | | | | | | |
| | | 2008q2 | | | | | | | |

Notes: Reference cycles turning points are computed by equally weighting the turning points of the countries belonging to the region. In the Major European group we have France, Italy, Spain, Portugal, Greece; in the Other European group we have Croatia, Slovenia, Serbia, Macedonia, Malta, Cyprus; in the Eastern Mediterranean group we have Turkey, Israel, Lebanon, Jordan; and in the North Africa group we have Morocco, Tunisia, Egypt, Algeria. Euro area countries are France, Italy, Spain, Portugal, Greece, Slovenia, Malta, Cyprus, non-Euro area the rest. France, Italy, Spain, Israel are the rich countries, while the others are poor. Algeria, Croatia, France, Italy, Macedonia, Spain and Tunisia have high share of industrial value added,the rest have low shares.

Table 3: Statistics of the reference cycle

| Countries | Major European | | Other European | | East Mediterranean | | North Africa | | Mediterranean | |
|---|---|---|---|---|---|---|---|---|---|---|
| | TP | PT | TP | PT | TP | PT | TP | PT | TP | PT |
| Duration | 31.60 | 3.67 | 16.75 | 6.40 | 31.50 | 18.50 | 12.00 | 4.00 | 20.71 | 7.86 |
| Concordance | 0.78 | | 0.59 | | 0.60 | | 0.64 | | 0.62 | |
| Using real GDP growth | | | | | | | | | | |
| Amplitude | 0.35 | | 0.74 | | 0.25 | | 0.11 | | 0.41 | |
| Loss Actual | -0.02 | | 0.52 | | 4.38 | | 0.04 | | 0.60 | |
| Loss TRA | -0.02 | | 0.48 | | 5.27 | | 0.06 | | 0.57 | |
| Using IP growth | | | | | | | | | | |
| Amplitude | 0.36 | | 0.14 | | 0.78 | | 0.01 | | 0.26 | |
| Loss Actual | -0.14 | | -0.13 | | 1.34 | | 0.03 | | 0.23 | |
| Loss TRA | -0.13 | | -0.09 | | 2.06 | | 0.03 | | 0.15 | |
| Countries | Euro | | Non-Euro | | Rich | | Poor | | | |
| | TP | PT | TP | PT | TP | PT | TP | PT | | |
| Duration | 24.33 | 4.86 | 20.20 | 16.83 | 25.50 | 7.14 | 25.25 | 7.80 | | |
| Concordance | 0.75 | | 0.57 | | 0.74 | | 0.61 | | | |
| Using real GDP growth | | | | | | | | | | |
| Amplitude | 0.62 | | 0.08 | | 0.35 | | 0.42 | | | |
| Loss Actual | -0.11 | | 1.69 | | 0.07 | | 0.53 | | | |
| Loss TRA | -0.02 | | 2.20 | | 0.17 | | 0.53 | | | |
| Using real IP growth | | | | | | | | | | |
| Amplitude | 0.23 | | 0.16 | | 0.34 | | 0.23 | | | |
| Loss Actual | -0.17 | | 0.78 | | 0.09 | | 0.17 | | | |
| Loss TRA | -0.13 | | 0.93 | | 0.06 | | 0.07 | | | |
| Countries | High VA | | Low VA | | | | | | | |
| | TP | PT | TP | PT | | | | | | |
| Duration | 21.42 | 7.35 | 7.8 | 4.8 | | | | | | |
| Concordance | 0.59 | | 0.65 | | | | | | | |
| Using real GDP growth | | | | | | | | | | |
| Amplitude | 0.17 | | 0.07 | | | | | | | |
| Loss Actual | 1.21 | | 0.11 | | | | | | | |
| Loss TRA | 1.19 | | 0.12 | | | | | | | |
| Using real IP growth | | | | | | | | | | |
| Amplitude | 0.13 | | 0.08 | | | | | | | |
| Loss Actual | 0.50 | | 0.20 | | | | | | | |
| Loss TRA | 0.48 | | 0.18 | | | | | | | |

Notes: Duration measures average length (in quarters) of cyclical phases; Concordance the average concordance of bilateral turning points in a region; Amplitude the average percentage change in GDP or Industrial production in expansions. Loss Actual is the actual loss in GDP or industrial production in recessions; Loss TRA its average triangular approximation to the loss. Each column represents the average statistics computed over time and countries using the regional (overall) reference cycles. Losses are measured relative to the previous peak and are in percentages. TP indicates booms, PT recessions.

Table 4: Statistics of the reference cycle, subsamples

| | | Using 1995 as cut off date | | | | | Using 2000 as cut off date | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Countries | | Major European | Other European | Eastern Mediterranean | North Africa | Overall | Major European | Other European | Eastern Mediterranean | North Africa | Overall |
| Durations | | | | | | | | | | | |
| Before | TP | 25.00 | 10.50 | 78.00 | | 20.40 | 25.00 | 8.67 | 51.00 | 18.00 | 19.83 |
| | PT | 3.60 | 8.00 | 33.50 | 2.00 | 7.20 | 3.60 | 7.50 | 33.50 | 2.00 | 7.20 |
| After | TP | 58.00 | 23.00 | 16.00 | 12.00 | 21.50 | 58.00 | 41.00 | 12.00 | 10.00 | 26.00 |
| | PT | 4.00 | 4.00 | 3.50 | 4.50 | 9.50 | 4.00 | 2.00 | 3.50 | 5.33 | 9.50 |
| Concordance | | | | | | | | | | | |
| Before | | 0.76 | 0.42 | 0.68 | 0.48 | 0.56 | 0.79 | 0.56 | 0.72 | 0.61 | 0.64 |
| After | | 0.80 | 0.61 | 0.56 | 0.66 | 0.63 | 0.75 | 0.60 | 0.46 | 0.65 | 0.60 |
| Amplitude- GDP growth | | | | | | | | | | | |
| Before | | 0.32 | 1.44 | | | 0.26 | 0.32 | 0.41 | 0.35 | 0.27 | 0.48 |
| After | | 0.47 | 0.72 | 0.25 | 0.11 | 0.38 | 0.47 | 1.21 | 0.19 | 0.09 | 0.36 |
| Amplitude-IP growth | | | | | | | | | | | |
| Before | | 0.38 | 0.04 | 5.01 | | 0.46 | 0.38 | 0.08 | 1.59 | -0.14 | 0.30 |
| After | | 0.26 | 0.18 | 0.39 | 0.09 | 0.20 | 0.26 | 0.25 | 0.17 | 0.11 | 0.20 |
| Countries | | Euro | Non-Euro | Rich | Poor | | Euro | Non-Euro | Rich | Poor | |
| Durations | | | | | | | | | | | |
| Before | TP | 22.75 | 41.00 | 19.20 | 29.00 | | 24.00 | 29.33 | 19.20 | 24.67 | |
| | PT | 5.40 | 32.00 | 7.50 | 7.00 | | 5.40 | 26.67 | 7.50 | 7.00 | |
| After | TP | 27.50 | 6.33 | 57.00 | 21.50 | | 26.00 | 6.50 | 57.00 | 27.00 | |
| | PT | 3.50 | 9.25 | 5.00 | 9.00 | | 3.50 | 7.00 | 5.00 | 9.00 | |
| Concordance | | | | | | | | | | | |
| Before | | 0.63 | 0.55 | 0.79 | 0.53 | | 0.74 | 0.59 | 0.77 | 0.61 | |
| After | | 0.79 | 0.58 | 0.54 | 0.62 | | 0.76 | 0.56 | 0.68 | 0.61 | |
| Amplitude- GDP growth | | | | | | | | | | | |
| Before | | 0.31 | 0.07 | 0.31 | 0.30 | | 1.03 | 0.07 | 0.31 | 0.42 | |
| After | | 0.57 | 0.08 | 0.51 | 0.41 | | 0.27 | 0.10 | 0.51 | 0.47 | |
| Amplitude-IP growth | | | | | | | | | | | |
| Before | | 0.39 | 0.37 | 0.33 | 0.49 | | 0.32 | 0.21 | 0.33 | 0.21 | |
| After | | 0.14 | 0.06 | 0.38 | 0.21 | | 0.09 | 0.08 | 0.38 | 0.22 | |
| Countries | | High VA | Low VA | | | | High VA | Low VA | | | |
| Durations | | | | | | | | | | | |
| Before | TP | 23.4 | 8.00 | | | | 22.3 | 6.75 | | | |
| | PT | 4.33 | 4.00 | | | | 4.33 | 5.00 | | | |
| After | TP | 16.50 | 7.5 | | | | 16.00 | 12.00 | | | |
| | PT | 16.50 | 6.0 | | | | 16.5 | 4.00 | | | |
| Concordance | | | | | | | | | | | |
| Before | | 0.47 | 0.69 | | | | 0.54 | 0.71 | | | |
| After | | 0.62 | 0.64 | | | | 0.63 | 0.58 | | | |
| Amplitude- GDP growth | | | | | | | | | | | |
| Before | | 0.19 | 0.07 | | | | 0.17 | 0.04 | | | |
| After | | 0.10 | 0.08 | | | | 0.12 | 0.14 | | | |
| Amplitude-IP growth | | | | | | | | | | | |
| Before | | 0.31 | 0.09 | | | | 0.08 | 0.07 | | | |
| After | | 0.05 | 0.08 | | | | 0.11 | 0.10 | | | |

Notes: Duration measures average length (in quarters) of cyclical phases; Concordance the average concordance of bilateral turning points in a region; Amplitude measures the average percentage change in GDP or Industrial production in expansions. TP indicates booms, PT recessions.

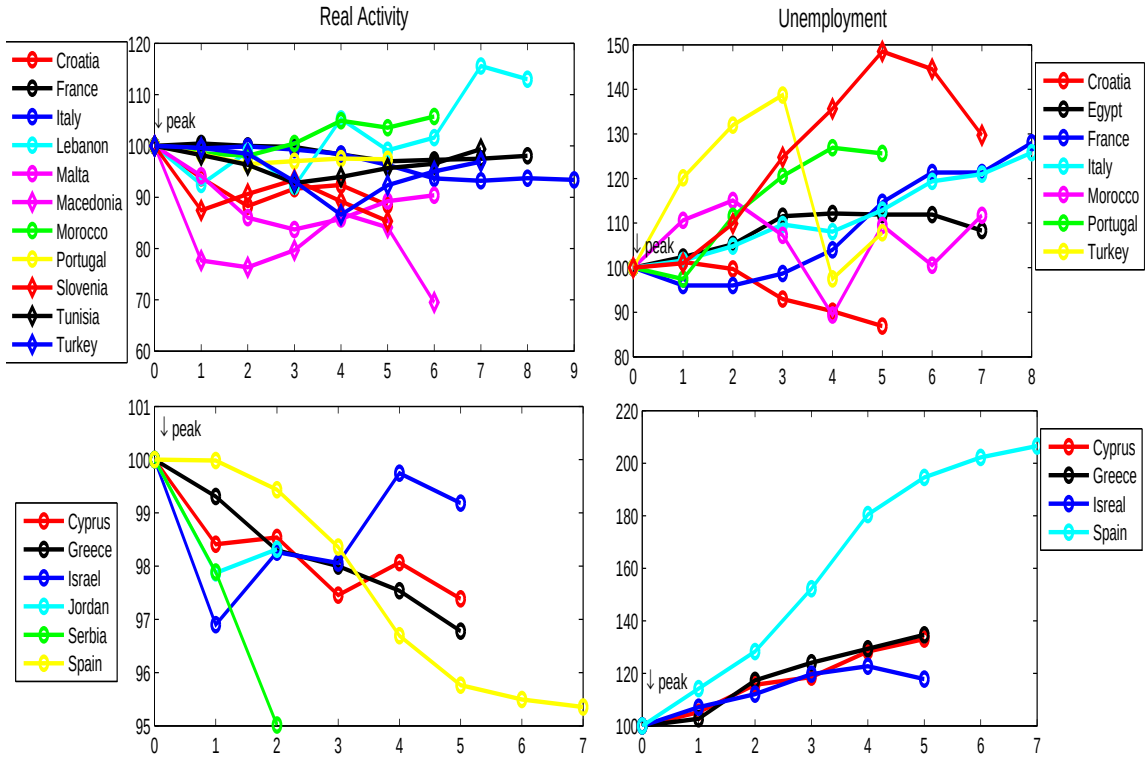



Figure 1: Dynamics since the last cyclical peak

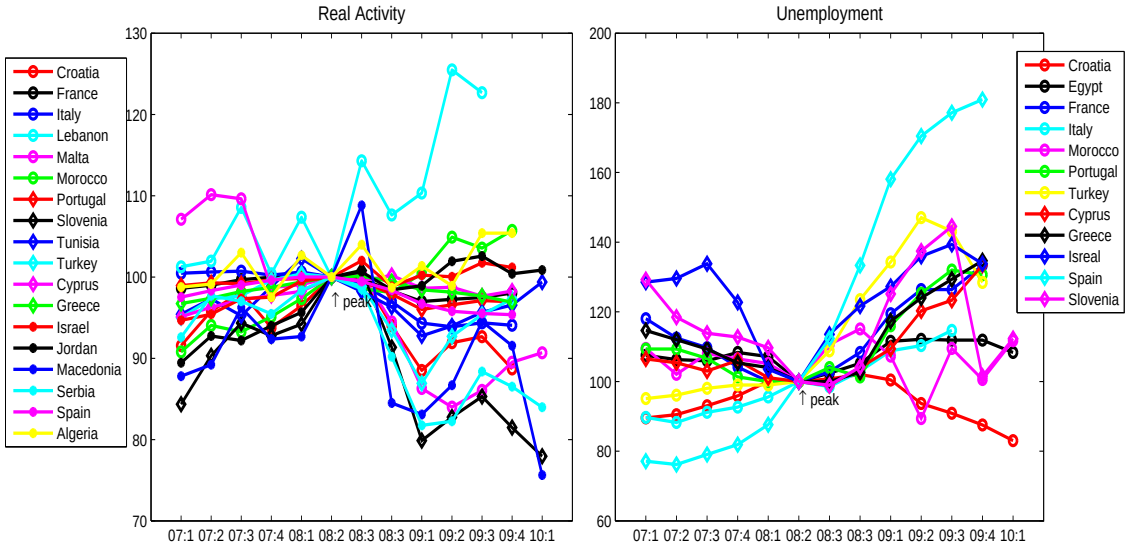
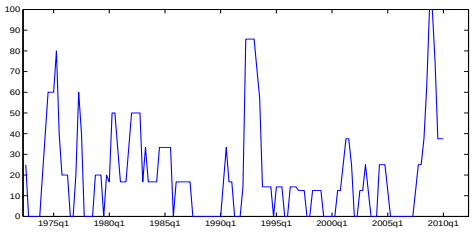
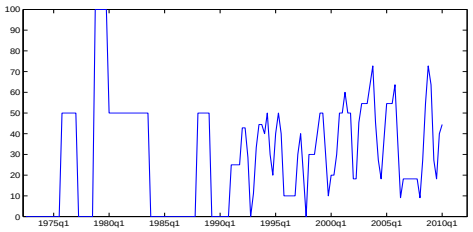


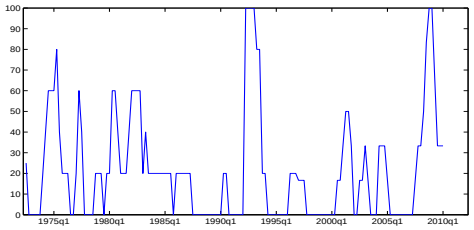

Figure 2: Dynamics around the Mediterranean cyclical peak



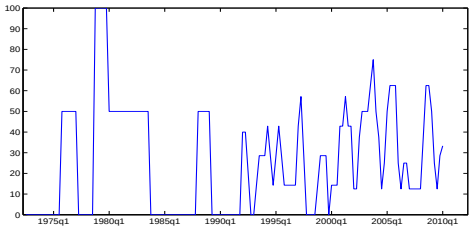

Euro area



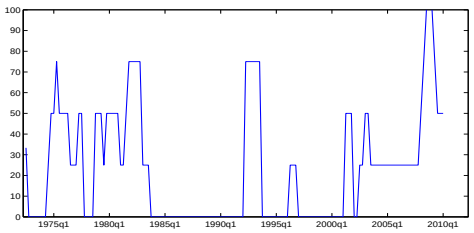

Non-Euro area



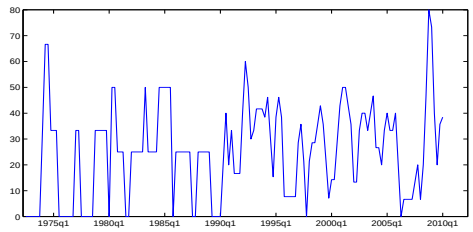

Major Europe



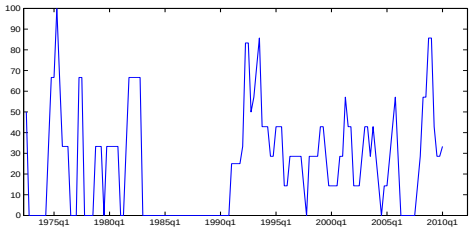

MENA countries



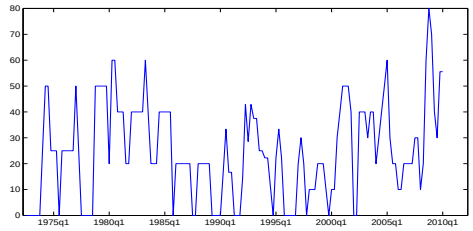

Rich countries



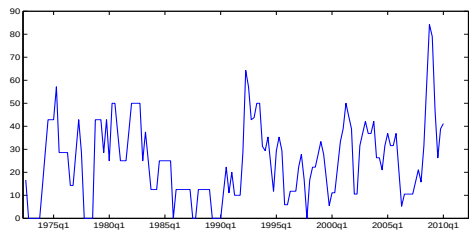

Poor countries



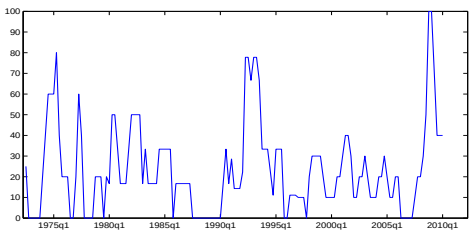

High Industrial VA




Low industrial VA




Mediterranean




All Europe

Figure 3: Recession Diffusion Indices