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Abstract

This paper investigates the Tunisian business cycle with an objective of constructing an index for an early detection of the recession periods using parametric and non-parametric methods. First, several indicators are studied separately. Then, a combined approach based on the MSVAR Model of Krolzig (1997), is considered to study the adequacy of the leading composite indicator as a tool of detecting the occurrence of recessions. We find that financial variables rapidly respond to changes of economic conditions and encompass market expectations regarding future economic activity. Therefore, a revised composite indicator with the inclusion of financial variables constitutes a more reliable tool for economic authorities to be used in detecting recessions.

ملخص

هذه الورقة تحقق في دورة الأعمال التجارية التونسية بهدف إنشاء فهرس للكشف المبكر عن فترات الركود باستخدام الأساليب البارامترية وغير البارامترية. أولا ، يتم دراسة العديد من المؤشرات على حدة. ثم، يتم اعتبار نهج موحد على أساس نموذج من (MSVAR Krolzig 1997) ، ودراسة مدى ملاءمة المؤشر المركب باعتبارها أداة للكشف عن وقوع حالات الركود. نجد أن المتغيرات المالية تستجيب بسرعة للتغيرات في الأوضاع الاقتصادية وتشمل توقعات السوق بشأن النشاط الاقتصادي في المستقبل. لذلك، يشكل المؤشر المركب مع ادراج المتغيرات المالية أداة أكثر موثوقية للهيئات الاقتصادية لاستخدامها في الكشف عن حالات الركود.

1. Introduction

Policy-makers, managers and investors are always interested to know sooner when their economies are at risk of difficult and unpleasant times, such as recessions, and when they will recover from such times. This is most relevant today because of the uncertainty with regard to the national and international economic situation.

Burns and Mitchell (1946) assume that although economic sectors' fluctuations seem to be different, there exists an unobserved state common to all of them, which they call the "business cycle". "Business cycle fluctuations occur around a long-term growth trend, and typically involve shifts over time between periods of relatively rapid economic growth (expansion or boom), and periods of relative stagnation or decline (contraction or recession)". They are costly, since every recession in which the economy is involuntarily driven results in a loss of output that cannot be regained.

Previous studies on business cycles dating are based on the surveillance of movement of single series considered as proxies for the business cycle such as real Gross Domestic product (GDP) or Industrial production Index (IPI). However, using single series causes several problems, such as a shifting of turning points overtime or extra cycles. Thus, it seems to be more appropriate to use a series less subject to revisions, and which accurately represents the general level of the economy. One such series would be a country's composite indicator. It has the strength of being much less subject to revisions or changes than single series. It particularly means that the composite indicator generally exhibits a more accurate and stable reading of the course of each business cycle phase and of the turning points than would a single series. Thus, combining the key variables in a composite indicator does this well by capturing important and different aspects of the overall state of economic activity.

While there is a reference chronology for the US business cycle, maintained by the Dating Committee of the NBER, there is no such official chronology as regards the other economies. Moreover this field of research is largely debated in developed countries mainly in the Euro-zone (Anas and Ferrara, 2002 among others), In Austria (Boehm and Moore, 1984), and more generally in industrial countries. However, there is no extensive literature describing cyclical fluctuations in less developed countries. One of the reasons could be the fact that such countries are not very sensitive to external shocks since they are not industrially based economies. Another reason could be also the difficulty to get real time data permitting to detect in time business cycle fluctuations. Moreover, official business cycle chronology cannot be made without a composite indicator showing in time the occurrence of the downturns. Such an exercise is very difficult if not impossible in the less developed countries due to the absence of many determinant components like unemployment rate; householders wages, construction index, consumer confidence questionnaires; transportation services, among others.

In this paper, we aim to overcome these problems in the case of Tunisia, known to be an economy essentially based on services and classified as less developed. Our objective is to try to exploit available published information; essentially regularly published financial and monetary data to detect in advance the business cycle turning points. To our knowledge, Tunisia does not yet publish such official dating. This is, however, indispensable for the analysis and prediction of cyclical fluctuations. Knowing correctly in what phase of the business cycle the Tunisian economy is and what state it is likely to be in few months helps firms and public authorities to adopt appropriate measures on a timely basis and adjust their policies sufficiently in advance, avoiding more damaging deterioration or recession.

In addition, we are motivated to see if the combination of the whole information into a composite indicator improves the early detection of recessions. Can financial variables predict and signal recessions in developing and industrially non-strong countries, or on the

contrary, are they less informative about the state of the economy than those in developed countries are?

The paper is organized as follows. Section 2 explores the existing literature on business cycles and on composite leading indicators. Section 3 presents the parametric and the non-parametric methodology to establish business cycle chronology and to identify leading variables. Section 4 is devoted to the construction of the leading indicator using Markov-switching vector autoregressive model. Section 5 presents the empirical application and Section 6 concludes the paper.

2. Literature Review

The problem of dating the business cycle has recently received many contributions, with several proposed statistical parametric and non-parametric methodologies. The latter class essentially derives from the seminal work of Bry and Boschan (1971) who proposed an automated procedure based on a set of decision rules. The procedure gives as output a chronology of recession and expansion dates allowing knowing in which phase the economy were in a given date, whereas the best-known parametric model is the Markov-switching (MS) model of Hamilton (1989) fitted to quarterly US GDP.

However, the great interest is to identify those dates before they occur, so that one can take right decisions in the right time. This is, in fact, the driven idea of new research on business cycle monitoring. Several works suggest that financial data, mainly monetary supply, stock market indices, interest rates spreads and asset prices tend to shift direction in advance of the business cycle. They exhibit turning points in economic activity with a lead of about six months in advance.

In the last decade, there has been extensive empirical works on the reliability of monetary variables and financial market indicators, in particular, as leading indicators. Fiorito and Kollintzas (1994), Andreou, Osborn and Sensier (2000), Estrella and Mishkin (1998), Stock and Watson (1993) and others stipulate that monetary policy contains incremental information useful in predicting recessions and that stock market prices, monetary supply, interest rates and interest rate spreads are considered as leading indicators.

In the same vein, when we observe of the well-known American composite leading indicator, we remark that more than 60% of weights are associated to financial variables. Additionally, according to Chauvet (1999) and Chauvet and Potter (2000), the important leading indicators are apparently to be identified among financial variables.

Hence, monetary and financial information seems to give early signs of changes in the state of the economy following the recent literature on business cycle survey.

3. Turning Point Chronology and Time Series Classification

3.1 Non-parametric Methodology

The classical way to make the business cycle turning point's chronology is the non-parametric methodology proposed by Bry and Boschan (1971), widely used by practitioners because of its simplicity since it is not based on any formal statistical framework. Business cycles should be dated according to when the direction of economic activity changes. The peak of the cycle refers to the last month before the reference series begin to fall and the trough refers to the last month before the same series begins to rise.

In order to select among available financial data the leading indicators able to detect earlier the business cycle turning points, we refer to the Banerji (1999) test permitting to identify if the series understudy has a statistically significant advance with reference to the turning points of the reference business cycle.

We calculate the statistic of the test as follow: first, we calculate the N differences in timing at turns. Since each difference can be positive or negative, the observed set of differences would be just one of 2^N). Then we sum the differences after assigning positive sign to each of them. We use the outcome R to calculate the confidence level of rejection of the hypothesis of non-significance of leads as:

$$100(1-(R/2^N))$$

3.2 Parametric Methodology

A clear distinction between business and growth cycles has to be done. As the growth cycle is defined by the deviation to the trend, once the trend has been extracted, the peaks and troughs are not so difficult to locate because of the symmetry of the growth cycle. However, the business cycle is non-linear and strongly asymmetric, insofar as expansion and recession periods do not present the same stylized facts as regards, for instance, duration, persistence or volatility (see for example Clements and Krolzig (2003), for a discussion on business cycle asymmetries). Therefore, business cycle expansions and recessions are more difficult to locate: the business cycle asks for further concepts to be measured and need to be analyzed in time domain rather than in frequency domain.

Among the well known tools to survey business cycles is to is to consider the non-linear models able to take into account time series asymmetry. Hamilton (1989) proposed the Markov-Switching model also known as the regime-switching model. The latter involves multiple structures that characterize time series behaviors among different regimes. By permitting switching between these structures, it is able to capture their complex dynamic patterns. In Markov-Switching models, the switching mechanism is controlled by an unobservable state variable that follows a first order Markov chain so that the state of the economy can be separated into recessions and expansions. Moreover, the Markovian property regulates that the current value of the state variable depends on its immediate past value.

We consider the case of a reduced form of a Markov switching model with only two states summarized by the discrete random variable S_t ¿$(1, 2)$, denoting recession (resp. expansion) when it takes the value of 1 (resp.2). For simplicity, we will assume that y_t is normally distributed conditional on the state, $y_t \square S_t = i \rightarrow N(\beta_i, \sigma_i^2)$ then:

$$y_t = \beta_{S_t} + \varepsilon_t \tag{1}$$

We consider that $\varepsilon_t \rightarrow N(0, \sigma_{s_t}^2)$ and $\beta_{s_t} = \beta_1(1-S_t)+\beta_2$

The probability that X_{t+1} is in the state j considering that X_t was in the state i is called one-step transition probability ($P_{i,j}$). The matrix P of transition probabilities is given by:

$$P = \begin{bmatrix} p_{11} & p_{21} \\ p_{12} & P_{22} \end{bmatrix} \tag{2}$$

where:

$$\begin{aligned} P(S_t = 1/S_{t-1} = 1) &= p_{11} & P(S_t = 1/S_{t-1} = 2) &= p_{21} = 1 - p_{22} \\ P(S_t = 2/S_{t-1} = 1) &= P_{12} = 1 - p_{11} & P(S_t = 2/S_{t-1} = 2) &= p_{22} \end{aligned} \tag{3}$$

All the importance is to estimate the relevant parameters vector $\theta = (P_{11} P_{22} \beta_1 \beta_2 \sigma_1^2 \sigma_2^2)$ using the maximum likelihood estimation method.

In order to identify leading variables, we can informally compare graphs of a binary regime indicator variable with the regime probabilities, or more formally using the Quadratic Probability Score[1] written as:

$$QPS = \frac{1}{T}\sum_{t=1}^{T} ¿(\Pr(S_t \square I_{t-1}) - \lambda_t)^2, \qquad (4)$$

¿

where $\Pr(S_t \square I_t)$ is the ex ante forecast probability of a recession in the next period formed using information available up to the current period (I_{t-1}), λ_t is a dummy variable taking the value one when the business cycle chronology indicates that the economy was in recession in month t. In particular, a model with a small QPS statistic might be preferred to another model with a larger QPS statistic as it more closely reproduces the reference chronology.

3.3 The composite indicator construction

By definition, univariate Markov Switching models as proposed by Hamilton (1989) are only able to capture some stylized facts of the business cycle. They can represent the non-linearity or asymmetry stressed in some part of the literature but, obviously, they are unable to reflect the idea of co-movement among economic time series. In order to consider this co-movement and to estimate a common regime probability of a set of variables, Krolzig (1997) performed the extension of the Markov-Switching model to the multivariate case.

An N-dimensional process $(Y_t)_t$ follows an MS (k)-VAR (p) process if it verifies the following equation:

$$Y_t - \beta(S_t) = \sum_{j=1}^{p} ¿\varphi_j(S_t)((Y_{t-j}) - \beta(S_{t-j})) + \varepsilon_t, \qquad (5)$$

¿

where $(\varepsilon_t)_t$ is a Gaussian white noise process with finite variance-covariance matrix Σ (S_t), $\varphi_j, (j = 1, \ldots, p)$ is an $(N \times N)$ coefficient matrix, $Y = (Y_1, \ldots, Y_T)'$ is the $(T \times 1)$ vector associated to the business cycle indicator and $(S_t)_t$ is an unobservable discrete variable, supposed to represent the current state of the economy (S_t ¿$\{1, \ldots, k\}$, k being the number of regimes).

4. Empirical Illustration

4.2 Tunisian business cycle chronology

Tunisia has a diverse economy, with important agricultural, mining, tourism, and manufacturing sectors. Governmental control of economic affairs, while still heavy, has gradually lessened over the past decade with increasing privatization, simplification of the tax structure, and a prudent approach to debt. The chart billow (Figure 1) shows GDP composition by sector showing the weight of services in the economy. The latter comes essentially from touristic activities. Unfortunately, there is no official dating of the Tunisian

[1] The QPS score is originated in weather forecasting by Brier (1950) and introduced to economy by Diebold and Rudebusch, (1989).

business cycle, so we will try to see if financial and monetary available information can help to detect earlier business cycle turning point in a service-oriented economy like Tunisia.

We start by identifying Tunisian business cycle turning points with the help of parametric and non-parametric methods. For this aim, we use the monthly Industrial production index (IPI) from January 1976 to August 2006 as a proxy for the Tunisian economy rather than GDP (commonly used in the literature) only because the latter is not available on a monthly scale from 1976.

Moreover, even if it refers only to the manufacturing sectors, IPI is known to be a high quality indicator of the Tunisian business cycle firstly because it is the most sensitive sector to business cycle fluctuations and then because it is more homogeneous across time.

From IPI time plot represented in Figure 2, we observe that long periods of sweet growth that signal prosperity or expansion periods separates brief periods of rough slowing down that indicates short recessions. Moreover, increases in increasing periods are slower than decreases in decreasing period. Those findings are for the asymmetry between regimes.

Table 1 gives the Bry and Boshan (1971) chronology for Tunisian expansions and recession from 1976 to 2006. We considered only two states recessions and expansions. We mention that based on the criteria of minimum duration, we have not considered short-term fluctuations as cycles. We identified seven recessions with durations varying and lasting 14 months in average (See Appendix 1 for a survey of the Tunisian economy during the obtained business cycles).

We remark a relative stability in the duration of cycles, except a big disparity between 1990 and 2003, where the duration has shifted to between 4 and 8 years.

4.2 Non-parametric Selection of the candidate variables

We select leading indicators among 16 available financial indicators. (See Table 2 for Data Presentation) Data are in a monthly scale and extracted from different official sources (Central bank of Tunisia, INS, and BVMT).

We tested the correlation between cyclical components of each series extracted with HP filter and the cyclical components of the reference series in order to classify data into pro-cyclical and contra-cyclical series. We founded a strong correlation between data and we extracted only one contra-cyclical series: the "Stock Market transaction volume"(-0.90).Therefore, we consider its opposite values.

We estimate empirical densities using the non-parametric kernel density method. They seem, in most of the cases, to be strongly asymmetric around their mean values. Their distribution tails are fat and we can point out two or three peaks. Thus, their dynamics follow a mix of distributions and at least, two main states could be determined: Expansion and Recession.

We applied the Bry and Boshan (1971) procedure to each series in order to compare their relative turning points with those of the reference business cycle chronology identified in the last section. We observed that “Avoir ex", “TMM”, “bourse”; “USD/TND” presents an important number of recessions indicating that they are very sensitive to the fluctuations of the business cycle.

From Figure 3, we remark that some series present an important number of recessions as (“USD/TND”, “TMM”, “Reserve”, “BOURSE”, “Avoirex” and “CONCMT”) while some others did not present any cyclical fluctuation (essentially the three Credit series).

In addition, dates identified in most of the reliable indicators are in conformity with reference recessions. In fact, the set dating traduces easily the distance between series and, we can remark that several variables present a lead according to the IPI dating. However, if we

compare series in term of lead and lag relative to the reference starting and ending recessions, we find also an important number of false signals or missed recession.

We tested time distance between series with the help of the "Banarji test". Testing Results confirm the obtained time distance. In fact, five financial series were leading with a significance rate higher than 95% (see Table 3).

4.3 Parametric Selection of the candidate variables

In this section, we consider the parametric selection and we estimate separately for each variable an univariate Markov switching model with two regimes[2]. We calculate the durations of expansions and recessions respectively as $\frac{1}{1-p_{22}}$ and $\frac{1}{1-p_{11}}$ and we exclude series with too short or too long phases of recession. We use Smoothed probabilities to identify recession and expansion dates: a month is considered to be in recession when the inferred probability is greater than 0.5, and a period of recession must last at least six consecutive months.

Quadratic Probability Scores (QPS) are reported in Table 4 and show that BVMT", "EURTND", "RESERVE", "CRDCT", "Avoirex", "Engagex", "CONCMT" and "MM2" present a considerable lead lasting from four to nine months.

Therefore, we confirm again that, in general, monetary and financial variables are able to detect earlier economic downturns.

At the end of this selection exercise, We validate six leading series from the two selection exercises which are : "Avoirex" (outside assets), "Engagex"(outside commitments), "RDCT"

(short term credit), "ONCMT"(medium term financing of the economy), "reserve" and "MM2" (monetary supply M2). We excluded the BVMT series because its sample is short compared to other series since it starts in 1998 and so, it will limit our investigation sample to seven years instead of twenty two years.

In Figure 4, we plot the selected leading indicators together with the reference chronology. We remark clearly the advance of the financial indicators since the shaded area corresponding to the reference recessions always follows the dates of slowdowns indicated by filtered probability bigger than 0.5. We notice particularly that the 1987's, 1992's, 2001's and 2004's recessions are detected with an advance of at least four months.

4.4 The Composite leading Indicator

In the above section, we founded that a large number of monetary and financial variables have a time lead of at least three months. This enabled us to construct a composite leading indicator that exploits a vast and complex array of information on the Tunisian economy. More importantly, because the leading variables, in any given period, contain information on the same common shocks that will hit the business cycle only later.

We report in Table 5 the parameters estimation from the MSVAR model and we plot in Figure 5 the recession periods detected with the new composite leading indicator.

Once again, financial variables, even being combined together, succeed to detect earlier the business cycle turning points. In addition, we state that the number of false signal decrease considerably. Thus, considering co-movement helps a lot in signalling correct information.

[2] Estimation is done using Gauss program and the MSVARLib2.0 package written by Bellone, 2005

5. Conclusion

This paper has attempted to establish for the first time a reference chronology for the Tunisian business cycle. Results show that between January 1976 and August 2006, there were seven recession periods. The paper aimed also to identify leading variables from a set of available indicators using parametric and non-parametric models with an objective of constructing a composite leading indicator able to detect earlier the occurrence of a recession. The analysis highlights the potential benefits of incorporating financial variables such as exchange rate, credits, money reserve and stock market returns in the advanced composite index. Financial variables rapidly respond to changing economic conditions and encompass market expectations regarding future economic activity. Therefore, a revised composite indicator with the inclusion of financial variables constitutes a more reliable tool for economic authorities to predict recessions.

The approach followed in this paper may well have considerable potential as a tool for exploring business cycle fluctuations with the purpose of suggesting optimal policies to decisions makers and to investors in order to avoid recessions or to prepare strategic actions in conformity with the economic context.

This research was hindered by the unavailability of some interesting indicators proposed in the literature as leading variables like interest rate spread, banking transactions. They are founded to improve detecting, modelling and forecasting business cycle fluctuations.

Finally, we propose for further extensions to study the effect of external shocks on the local business cycle by adding some international variables. In addition, it is also of great interest to study the convergence of business cycles from different countries belonging to a same area or having strong bilateral relations. Moreover, business cycle chronology can be made referring to a composite coincident indicator rather then GDP or IPI. Finally, the analysis can be also made using other kinds of regime-switching models like STAR family models, so that we evaluate their usefulness and use them or combine them with the proposed methodology and compare the obtained results.

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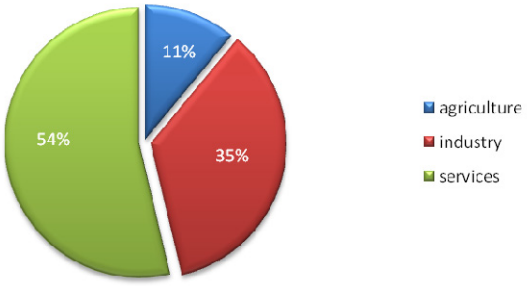
Figure 1: Tunisian GDP Composition by Sector



Source: CIA Factbook

Figure 2: Tunisian IPI: 1976-2006

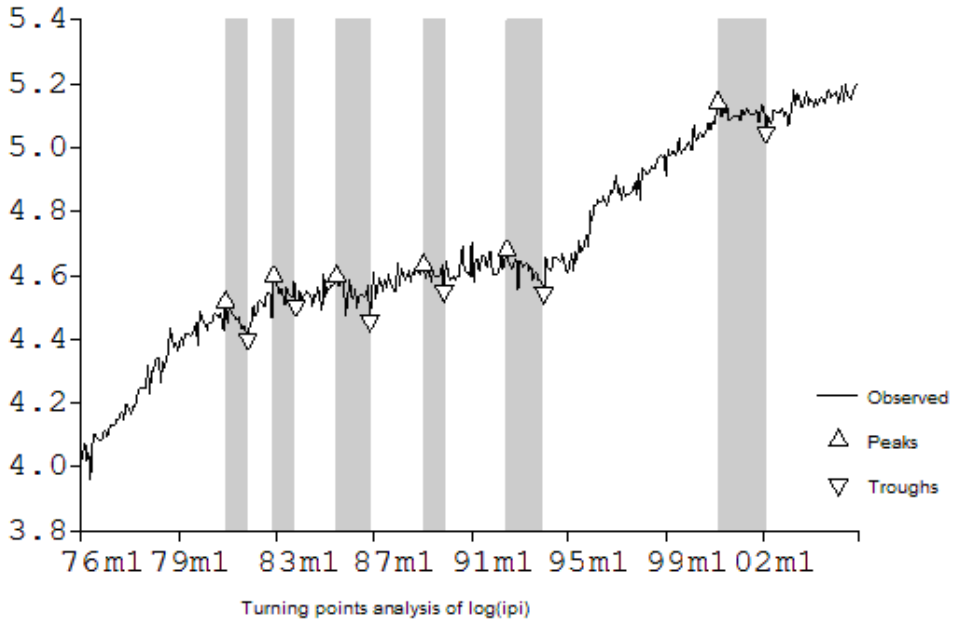
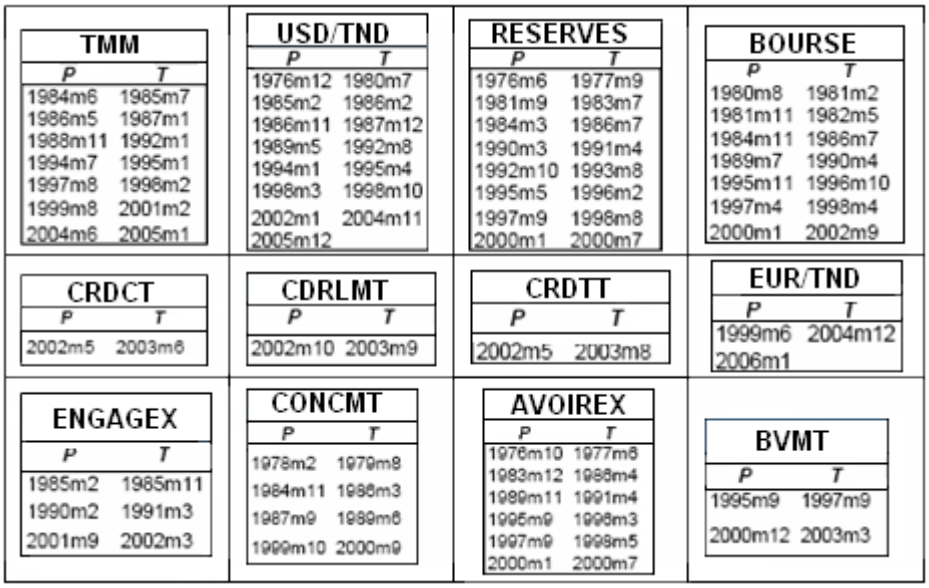


Figure 3: Bry & Boshan Chronology: Individual Indicators



TMM

P	T
1984m6	1985m7
1986m5	1987m1
1988m11	1992m1
1994m7	1995m1
1997m8	1998m2
1999m8	2001m2
2004m6	2005m1

USD/TND

P	T
1976m12	1980m7
1985m2	1986m2
1986m11	1987m12
1989m5	1992m8
1994m1	1995m4
1998m3	1998m10
2002m1	2004m11
2005m12	

RESERVES

P	T
1976m6	1977m9
1981m9	1983m7
1984m3	1986m7
1990m3	1991m4
1992m10	1993m8
1995m5	1996m2
1997m9	1998m8
2000m1	2000m7

BOURSE

P	T
1980m8	1981m2
1981m11	1982m5
1984m11	1986m7
1989m7	1990m4
1995m11	1996m10
1997m4	1998m4
2000m1	2002m9

CRDCT

P	T
2002m5	2003m6

CDRLMT

P	T
2002m10	2003m9

CRDTT

P	T
2002m5	2003m8

EUR/TND

P	T
1999m6	2004m12
2006m1	

ENGAGEX

P	T
1985m2	1985m11
1990m2	1991m3
2001m9	2002m3

CONCMT

P	T
1978m2	1979m9
1984m11	1986m3
1987m9	1989m6
1999m10	2000m9

AVOIREX

P	T
1976m10	1977m8
1983m12	1988m4
1989m11	1991m4
1995m9	1998m3
1997m9	1998m5
2000m1	2000m7

BVMT

P	T
1995m9	1997m9
2000m12	2003m3

Figure 4: Filtered Probabilities of Recession

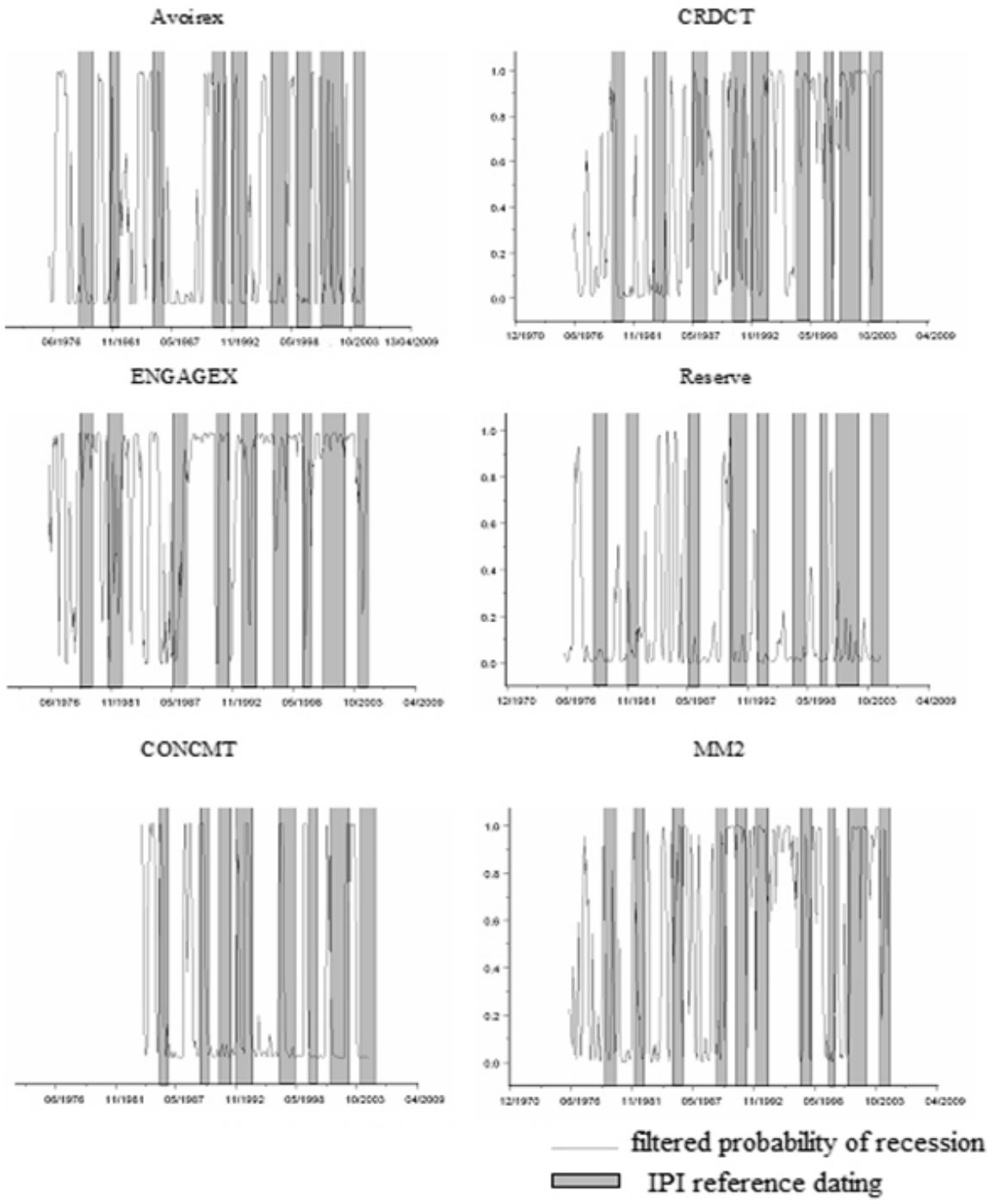


Figure 5: The Composite Leading Indicator

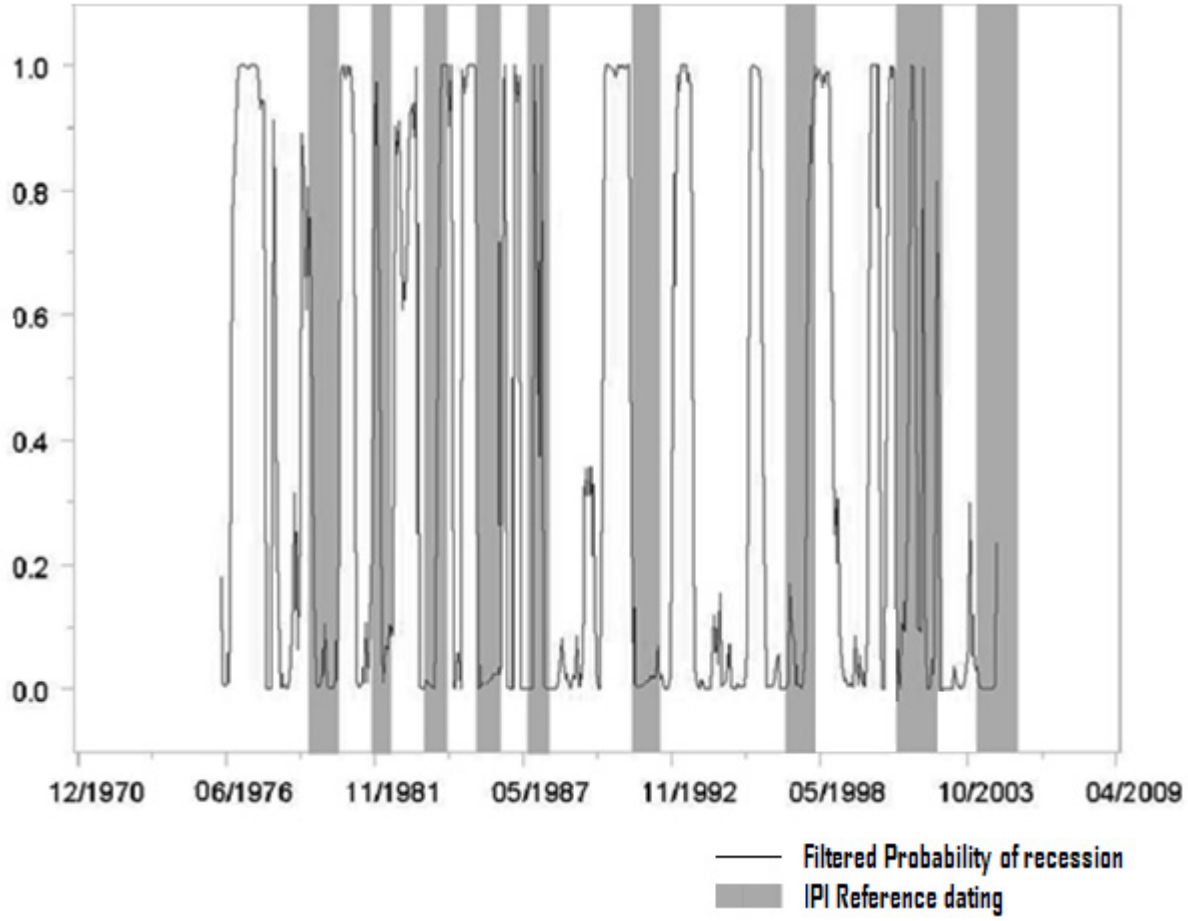


Table 1: Tunisian Business Cycle Chronology (1976-2006)

				Duration (Month)		
Cycle	Trough	Peak	Trough	Expansion	Contraction	Cycle
1	1980:M8	1981:M9	1982:M7	13	10	23
2	1982:M7	1983:M8	1984:M6	13	10	23
3	1984:M6	1986M1	1987:M5	20	16	36
4	1987:M5	1989:M6	1990:M4	25	10	35
5	1990:M4	1992:M10	1994:M3	30	17	47
6	1994:M3	2001:M1	2002:M12	73	23	96
7	2002:M12	2004:M4	2004:M11	17	8	25

Table 2: Data Presentation

Variables	Description	Variables	Description
BVMT	BVMT index	**CONCCT**	Financing of the economy in short term
Bourse	global volume of transaction	**CONCMT**	Financing of the economy in medium term
EUR-TND	Euro/TND Exchange rate	**CONCLT**	Financing of the economy in long term
USD-TND	USD /TND Exchange rate	**MM2**	Money supply
TMM	Monetary market rate	**Engagex**	outside Commitments
CRDCT	Short term Credit	**Avoirex**	outside assets
CRDLMT	medium and long term Credit	**Epargne**	Saving
CRDTT	Total Credit	**Reserve**	Reserve

Table 3: Banerji test Results

	k=1	k=2	k=3	k=4	k=5	k=6	k=7	k=8	k=9
BVMT	**76.75**	70.61	64.65	58.59	51.56	45.51	38.18	31.84	26.95
EUR/TND	0	0	0	0	0	0	0	0	0
USD/TND	**76.15**	71.48	66.58	61.18	55.93	51.34	46.48	42.04	37.40
RESERVE	**98.83**	98.54	98.19	97.73	97.22	96.58	95.63	94.58	93.24
CRDCT	0	0	0	0	0	0	0	0	0
CRDLMT	0	0	0	0	0	0	0	0	
CRDTT	0	0	0	0	0	0	0	0	0
AVOIREX	98.93	**98.93**	98.83	98.63	98.24	98.05	98.05	97.75	97.36
ENGAGEX	96.88	96.88	96.88	96.88	**96.88**	93.75	92.19	85.94	81.25
CONCMT	99.61	99.56	99.61	99.61	99.61	99.61	**99.61**	95.31	95.31
MM2	99.90	99.90	99.90	99.90	99.90	99.90	99.90	99.90	**99.90**

Notes: results are given in percentage. We read : BVMT leads the reference series by 1 month with a significance level of 76,75 %

Table 4: QPS Statistics

	Lag (+) advance(-) in months										
	9	6	3	1	0	-1	-2	-3	-4	-6	-9
BOURSE	***0.222***	0.229	0.229	0.240	0.244	0.250	0.254	0.261	0.263	0.254	0.249
BVMT	0.622	0.568	0.494	0.472	0.460	0.448	0.441	0.429	***0.426***	0.447	0.489
TMM	0.352	0.378	0.351	0.308	***0.290***	0.290	0.298	0.307	0.318	0.347	0.345
EUR/TND	0.663	0.692	0.582	0.582	0.566	0.565	0.574	0.578	0.568	0.523	***0.453***
USD/TND	***0.458***	0.467	0.520	0.520	0.521	0.525	0.530	0.539	0.548	0.552	0.553
RESERVE	0.247	0.250	0.263	0.263	0.262	0.262	0.264	0.268	0.272	0.261	**0.246**
CRDCT	0.463	0.434	0.414	0.398	0.384	0.370	0.358	0.353	***0.350***	0.355	0.379
CRDLMT	**0.326**	0.373	0.384	0.390	0.391	0.394	0.393	0.395	0.401	0.413	0.415
CRDTT	0.226	***0.226***	0.240	0.256	0.267	0.269	0.270	0.267	0.266	0.261	0.259
EPARGNE	0.434	0.430	0.426	0.426	0.426	0.427	0.426	0.428	0.432	0.443	0.460
AVOIREX	0.337	0.341	0.354	0.359	0.355	0.354	0.353	0.356	0.357	0.337	***0.305***
ENGAGEX	0.568	0.562	0.549	0.550	0.551	0.554	0.563	0.559	0.552	0.543	***0.530***
CONCCT	***0.433***	0.434	0.450	0.458	0.465	0.473	0.480	0.487	0.499	0.533	0.556
CONCMT	0.684	0.689	0.691	0.701	0.696	0.696	0.703	0.694	0.684	0.676	0.678
CONCLT	***0.554***	0.557	0.573	0.571	0.571	0.572	0.571	0.570	0.566	0.558	0.575
MM2	0.369	0.367	0.380	0.395	0.405	0.409	0.415	0.422	0.423	0.433	***0.361***

Table 5: MSVAR Parameters Estimation of the Composite Leading Indicator

		Estimates	**Std-errors**	**Pvalues.**
	P11	0.821430***	0.036345	0.000000
Transition Probability	P22	0.884253***	0.024991	0.000000
	P11	0.39327271		
Ergodic Probability	P22	0.60672729		
	Reserve	-0.753537***	0.077324	0.000000
	CRDCT	0.253586***	0.073461	0.000631
	AVOIREX	-0.809937***	0.076067	0.000000
	engagex	-0.162296*	0.098008	0.098717
	CONCMT	0.275582***	0.060937	0.000009
β regime1	MM2	-0.213633*	0.121102	0.078676
	Reserve	0.495693***	0.063116	0.000000
	CRDCT	-0.166918**	0.079145	0.035721
	AVOIREX	0.532804***	0.061071	0.000000
	engagex	0.106737	0.070672	0.131954
	CONCMT	-0.181247**	0.084333	0.032371
β regime2	MM2	0.140379**	0.045477	0.002201
	Reserve	0.567172***	0.076659	0.000000
	CRDCT	0.601034***	0.078104	0.000000
	AVOIREX	0.514676***	0.065658	0.000000
	engagex	1.127029***	0.148823	0.000000
	CONCMT	0.382330***	0.052487	0.000000
δ regime1	MM2	1.874859***	0.242724	0.000000
	Reserve	0.660769***	0.066260	0.000000
	CRDCT	1.187524***	0.120894	0.000000
	AVOIREX	0.599053***	0.060652	0.000000
	engagex	0.882869***	0.094146	0.000000
	CONCMT	1.318577***	0.134486	0.000000
δ regime2	MM2	0.370240***	0.039720	0.000000

Notes: * : Significant at 1% level; ** : Significant at 5% level; *** : Significant at 10% level; Estimation Period : 1983m1- 2004m12

Appendix 1: Survey of the Tunisian Economy during the Extracted Business Cycles

Cycle 1:

The successive contractions in the Tunisian Business cycle during 1981-1982 may be attributed to both domestic and international factors. In fact, the financial system faces serious difficulties in covering its debts, which freeze as more and more of its unpaid resources limit their loans to the economy. These difficulties comes at most of the time from the inefficiency of the real or personnel guarantees granted in favour of banks as well as of incapacity or unsuitability of the judicial covering of banking debts. In addition, this period was governed by a difficult international environment with the generalization of the stagnation of the growth in the developed countries and, as a consequence, the slowing down of the international exchange.

Cycle 2:

The second recession during the period 1983-84 coincides with the stagnation in many economic activities, in particular mine sector, oil extraction and tourism. Employment situation did not improve the additional demand of employment reach about 70% against 82% in 1983. In addition, external payments were characterized by hard tensions, which are the cause of the deficit recorded for the first time for five years in 1983. The tourism revenue which constitutes, after the exports of phosphates, the main source of currency contribution, even suffered for the first time a drop, which reduced considerably transfers in cash and transfers made by Tunisian workers abroad, and as a consequence a deficit of 116MD in the balance of payments occurred.

Cycle 3:

During the period between 1986 and the beginning of 1987, the Tunisian economy suffered some decline, and distortions were expected within the framework of the economic budget, as a consequence of the decline of the oil excess and the increase in the cost of servicing of foreign debts. It was also aggravated by the increase at the beginning of the year in price of oil, by touristic flucutations, and by climatic conditions. In fact, oil prices, after the failure of negotiations between producing countries, experienced an unprecedented fall which returned the cost of a barrel of crude oil from 30 at the end of 1985 to $10 in July 1986. In spite of prices steadying at $15 , the oil excess for the year would be reduced to 50MD compared to the forecast of 150 MD. At the same time the oil income of the state decreased by approximately 70MD and 50MD respectively compared to the forecasts of the year and the realization of the previous year.

The touristic season, which looked promising in the light of the results of the back season of 1985 and bookings announced for the new season, was widely compromised following the eventsin the Mediterranean zone and the renewed tensions which ensued from it. In spite of the efforts displayed in marketing touristic products, the results of the first nine months showed a decline of 3.5 % of overnight stays and 47MD of touristic receipts in currencies, compared in the corresponding period of 85MD the previous year, which was problematic as the budget relied on an increase of more than 15% from one year to the next.

Finally, the conditions were marked by delays to expected precipitation, which affected the cereal harvest. This meant that it only totalled 6.1 millions quintals, which was equal to barelythe forecast . Tthis had the significant effect of doubling the imports required of this category of product.

In the beginning of 1987, a decline in the activity of the building sector and civil engineering (-5%) translated into the slowing down of growth of manufacturing industries for to local market.

Cycle 4:

The recession between 1989 and 1990 was the outcome of the continuous and accentuated chronic imbalance in the labour market in spite of the evolution of the market . Economic indicators signal bad health when the budget deficit reaches 4.1% of GDP. The agriculture and fishing sectors continued in 1989 to feel the harmful effects of the prolongation drought which prevailed during the two last agricultural years. Most affected were cereals and olives, who saw their yields increase by only 5.7%, following a regression of 23.7% the year before. Imports also saw an increase of 31%, against 26% in 1988 and 9% in 1987. This increase has affected the categories of products, and particularly energy, equipment goods and commodities. This period was also marked by an increase in global prices of raw materials and more particularly those of basic commodities, as well as an inrease in interest rates and exchange rates of principal currencies, mainly the dollar.

The expansion of internal monetary liquidity following the substantial increase in the foreign-exchange reserves of the country in 1988, which was not sufficiently channeled towards productive investment, fed domestic demand and more particularly imports. Besides, foods at the beginning of the year caused damage to the infrastructure and production cycles that engendered supplementary expenditures for the state as well as for the private sector.

In addition, if we have a look at international causes, we mention specifically the crisis of the Gulf, and its multiple repercussions on the economy, especially in terms of the balance of payments and the budget of the state, and this increased the fears of a recession and highlighted the danger of inflation.

These various factors reflect negatively on the budget of 1989, in spite of certain undeniable positive aspects such as the continuation of the progression of exports.

Cycle 5:

The contraction that occurred between 1992 and 1994 can also be attributed to bad weather conditions and its repercussions on agriculture and exports.

Cycle 6:

We also observed a period of recession that lasted about two years, between 2001 and –2002, which can be explained by the international economic and financial environment that was marked by a general slowdown of economic activity intensified by the events of 11 September. This situation led to a tightening of international demand and consequently a drop in commodities' prices, primarily, crude oil which, combined with the weakness in household consumption in several industrial countries helped to ease inflationary tensions starting in the second half of the year.

In the local context, this period was marked by an increase in bank's need for liquidity and an important drop in the net claims on aboard due. The negative impact of 11 September was seen notably in tourism where passenger air traffic showed a decrease of 17% in October and 27.2% in November. Air transport went down again in December 2001 by 20.3% against an increase of 21.6% the same month of the previous year.

Cycle 7:

The Tunisian economy showed a short contraction across eight months in the second half of 2004, notably under the effect of soaring crude oil prices and the increase of most other commodity prices, which explain the slower pace of all world economic activity. The textile sector also suffered from the excessive concurrence of Chinese products on the local market. In addition, the deterioration of the political situation in Iraq and bad conditions in the Gulf generally had a negative effect on the continuous increase of oil prices, which contributed a

very high Tunisian energy invoice. Finally, the year was also market by a depreciation of the dinar against the US Dollar and the Euro.