Dating business cycles in France: A reference chronology

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Comité de datation des cycles de l'économie francaise (CDCEF)

- October 2020: start of the French business cycle dating committee (CDCEF) under the umbrella of the French Economic Association (AFSE)
- 9 experts: economists, econometricians, conjuncturists, historians

Comité de datation des cycles de l'économie francaise (CDCEF)

- Information available on on the AFSE website: dates, methodology, members, announcements ...

Objectives of the committee

- Identify with a great accuracy the phases of the French business cycles (expansion/recession) since 1970
- That is, provide a turning points chronology in the French business cycle (Peaks/Troughs)
- Establish and publicly release an unique reference chronology, available to researchers, economists, policy-makers ... interested in the French economy
- Update the chronology on a regular basis
- Importantly: an *ex post* chronology, not nowcasting/forecasting

Why a committee?

- A long history of empirical business cycle analysis at the international level, that started with the NBER in the wake of the Great Depression (A. Burns and W. Mitchell)
- In 1978, the NBER launched a business cycle dating committee for the U.S. economy (chronology starts in 1854) currently composed of 8 members
- The CEPR started in 2003 the CEPR-EABCN business cycle dating committee for the euro area as a whole
- Other committees exist in some countries (Brazil, Canada, Spain) but with a low audience
- So, put France in international standards with an independent committee, supported by the AFSE

Why a committee?

A dating chronology is useful for:

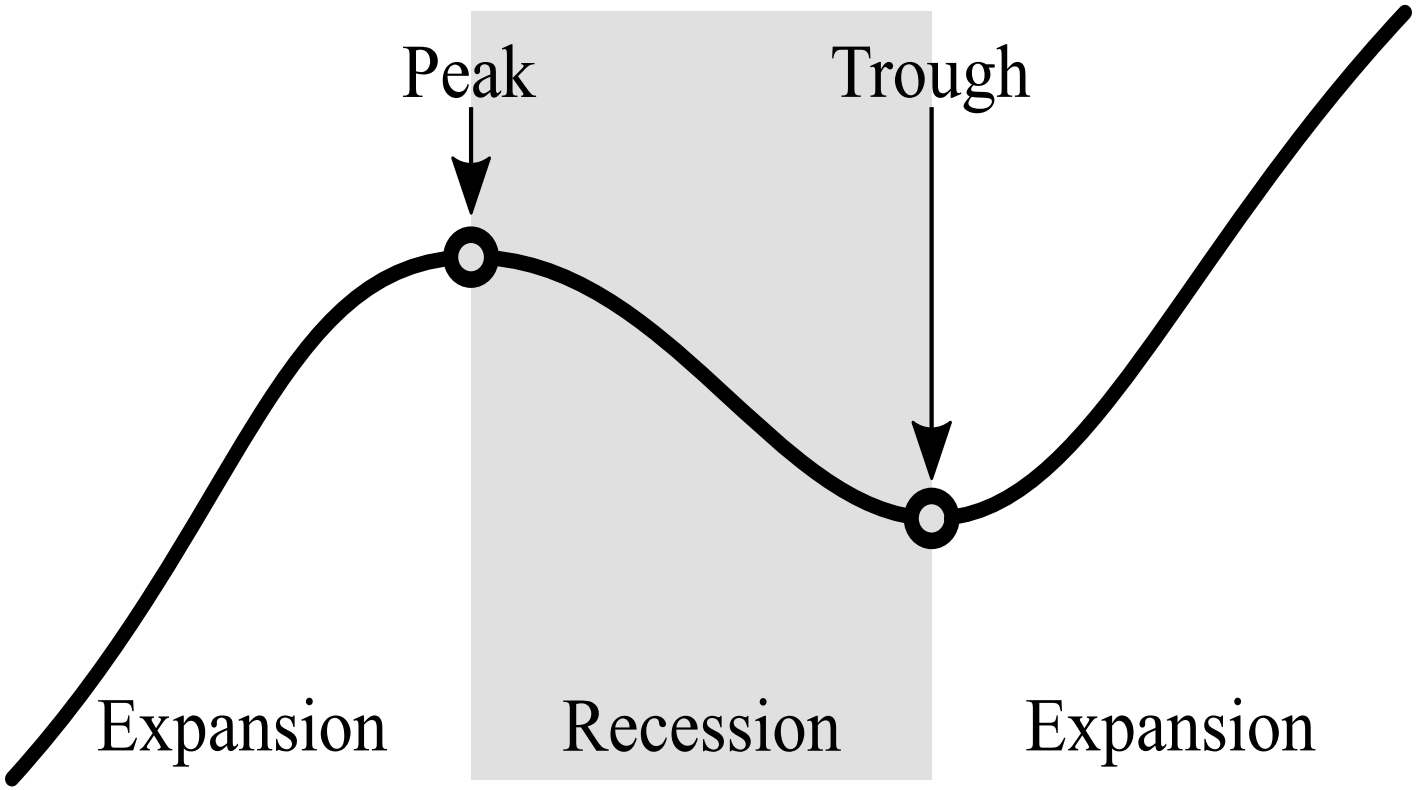
- Conjunctural analysis: develop *leading indicators*, assess their accuracy and their lead/lag wrt recessions. More generally, a chronology is useful to classify macroeconomic indicators (leading/coincident/lagging) wrt business cycles
- International cycles comparisons in international economics, assessing synchronisation among business cycles
- Comparing economic and financial cycles in macro-finance
- Guiding economic policies as monetary/fiscal measures differ along business cycles, as well as their impact (eg multipliers)
- Calibration of some DSGE models

Which definition of the cycle?

Three types of cycles are generally considered in the empirical literature

- Growth cycle/output gap = deviation to the long-run trend
- Acceleration cycle = increase/decrease in the growth rate of the economy
- **Business/Classical cycle** = increase/decrease in the level of economic activity = positive/negative growth

Business cycles



How to characterize business cycles?

- Seminal definition of Burns and Mitchell:
  Business cycles are a type of fluctuation found in the major aggregates of economic activity in a country [...]: a cycle consists of periods of expansion occurring at approximately the same time in several areas of activity followed by periods of recession...
- Evidence of 2 main characteristics:
  1. Co-movement
  2. Non-linearity
- Need of approaches/ models able to account for both characteristics when dating business cycles

Methodology adopted by the committee

- Not easy to identify business cycles, as they are non-observable and have thus to be estimated.
- A standard approach is to use the simple rule of 2 negative quarters of GDP growth, but not enough as we focus only on 1 dimension (Duration)
- Again Burns and Mitchell on the definition of a recession:
  a significant decline in economic activity in the various industries lasting more than a few months. This significant decline would normally be found in
  GDP, employment, industrial production, manufacturing and trade sales

Methodology adopted by the committee

- Identification based on the 3D's principle: Duration / Depth / Diffusion. Overall the 3D's have to be accounted for.
- Duration: a recession should last a minimum number of months (typically 6)
- Depth: A recession is a major event; a long period with a slightly negative output growth is not necessarily a recession
- Diffusion: a recession should be largely visible in the main macro variables of the country (GDP, employment, production, income, ...)

Methodology adopted by the committee

- Our identification strategy rely on 2 pillars: (i) Quantitative approach and (ii) a Narrative appproach
- Pillar 1: use of econometric approaches to provide a list of potential candidates for recessions (non-parametric algorithm and parametric non-linear time series models)
- Pillar 2: use a narrative approach based on the views of the committee members (*expert's claims*)
- This 2-pillar approach seems the most appropriate as there is an uncertainty around the results from empirical models

Literature review

- Many papers have been propose to identified business cycles in France (we focus only on business cycles, not other types of cycles)
- Those chronologies are the outcomes of econometric approaches, either non-parametric algorithms of parametric models
- Common periods seem to emerge ...

Literature review

Table 1: **Dating chronologies for the French business cycle stemming from non-parametric approaches**

	DM	*Majetti*	*ABFL*	*CC*	*ECRI*	*TCB*
Peak	1974 Q3	1974 Q3	1974 Q3	1974 Q3	1974 M7	1974 M8
Trough	1975 Q1	1975 Q2	1975 Q1	1975 Q1	1975 M6	1975 M5
Peak	1980 Q1	1980 Q1	1980 Q1	1980 Q1	1979 M8	1980 M2
Trough	1980 Q4	1980 Q4	1981 Q1	1980 Q3	1980 M6	1981 M8
Peak					1982 M4	1982 M10
Trough					1984 M12	1985 M1
Peak	1992 Q3	1992 Q1	1992 Q1	1992 Q1	1992 M2	1992 M2
Trough	1993 Q1	1993 Q2	1993 Q1	2002 Q3	1993 M8	1993 M12
Peak			2002 Q4	2002 Q3	2002 M8	2002 M8
Trough				2003 Q2	2003 M5	2003 M5
Peak	2008 Q1	2008 Q1			2008 M2	2008 M2
Trough	2009 Q2	2009 Q1			2009 M2	2009 M8
Peak					2011 M4	2012 M2
Trough					2012 M11	2013 M4

Note : DM : Damette and Rabah (2010), data from 1970 to 2009 ; Majetti : Majetti (2012), data from 1970 to 2009 ; ABFL : Anas et al. (2007), data from 1970 to 2002 ; CC : Cotis and Coppel (2005), data from 1970 to 2003 ; ECRI : *Economic Cycles Research Institute*, dating updated in real-time from 1948 to 2020 ; TCB : *The Conference Board*, dating updated in real-time from 1945 to 2020. Shaded cells indicate the absence of dates for the study concerned.

Literature review

Table 2: **Dating chronologies for the French business cycle stemming from parametric approaches**

	DM	*Rabault*	*BBF*	*NB*	*DP*
Peak	1974 Q3	1974 Q4	1974 Q3		
Trough	1975 Q1	1975 Q1	1975 Q2		
Peak	1980 Q1			1979 Q4	
Trough	1980 Q4			1980 Q4	
Peak	1992 Q3			1992 Q1	
Trough	1993 Q1			1993 Q1	
Peak				1995 Q2	1995 Q3
Trough				1995 Q4	1996 Q4
Peak					2001 Q1
Trough					2003 Q2
Peak	2008 Q1		2008 Q2		2008 Q2
Trough	2009 Q2		2009 Q2		2009 Q2
Peak					2011 Q3
Trough					2013 Q3

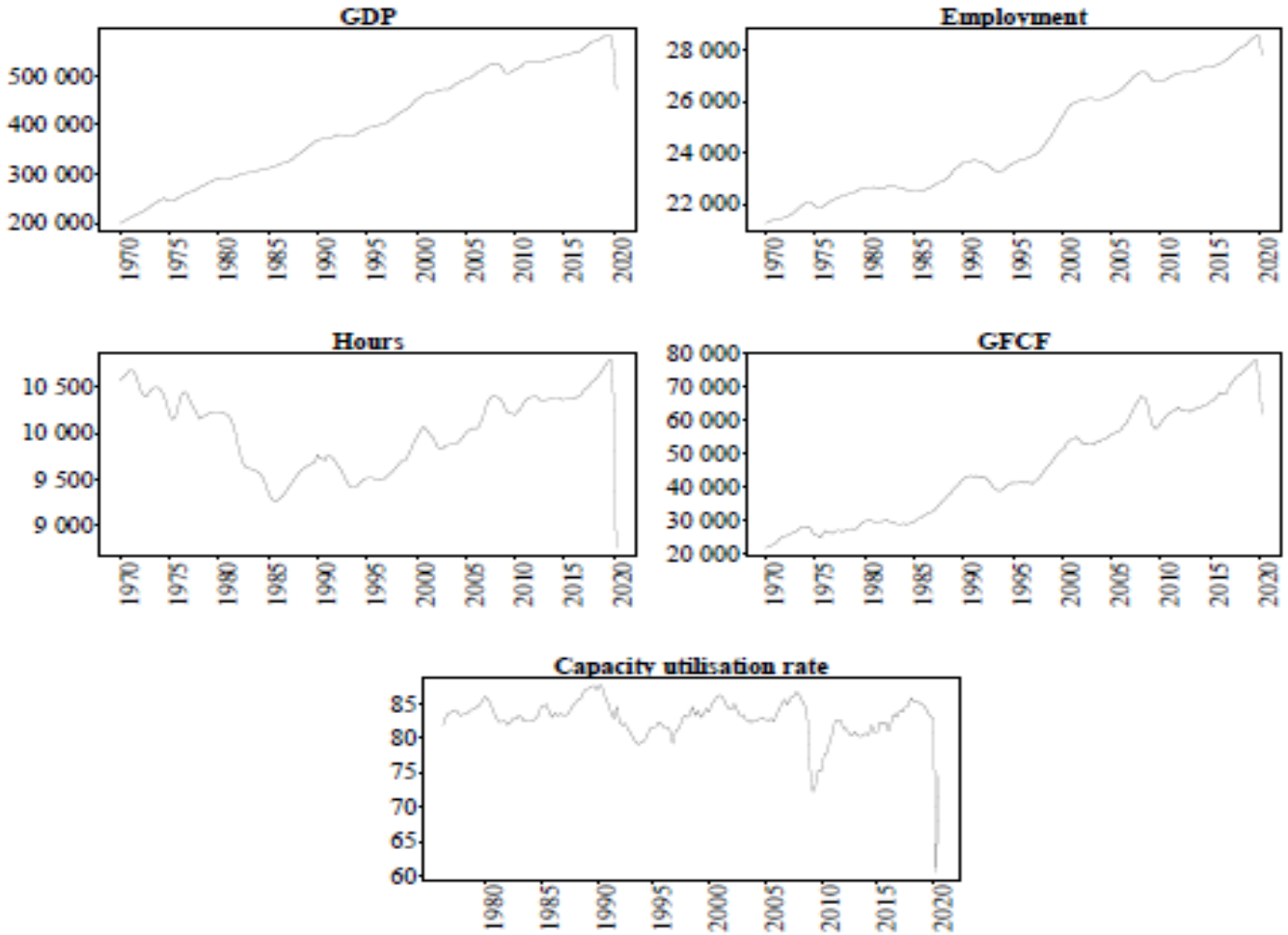
Note: DM : Darnette and Rabah (2010), data from 1970 to 2009 ; Rabault : Rabault (1993), data from 1950 to 1990 ; BBF : Bec, Bouabdallah and Ferrara (2015) ; NB : Nguiffo-Boyom (2006), data from 1979 to 2005 ; DP : Doz and Petronevich (2015), data from 1990 to 2014 (we have dropped very short-term fluctuations identified by those authors). Shaded cells indicate the absence of dates for the study concerned.

Data

- Official data starting in 1970, available end of 2020, seasonally adjusted
- Various variables have been tested, but we focus on the following 5:
  1. Real GDP
  2. Total employment
  3. Hourly volume of all jobs
  4. Investment by NFC
  5. Production Capacity Utilization rate

Data

Figure A1 – **Quarterly macroeconomic variables used since 1970**



Non-parametric approach

- Core algorithm: Bry-Boschan based on the following rule for a given variable Y_t
  1. Peak at date t if $\{Y_t > Y_{t-k}, Y_t > Y_{t+k}, k = 1, \ldots, K\}$
  2. Trough at date t if $\{Y_t < Y_{t-k}, Y_t < Y_{t+k}, k = 1, \ldots, K\}$
- K=2 for quarterly time series and 5 for monthly
- Alternance rule
  1. in the presence of a double-dip, the lowest value is chosen,
  2. in the presence of a double peak, the highest value is chosen.

Non-parametric approach

- The Depth measure is defined as

$$Depth = (Y_P - Y_C)/Y_P$$

- A Severity measure summarizes Depth and Duration:

$$S = |0.5 \times Depth \times Duration|$$

- Diffusion is assessed by counting the number of occurrences (alternatives such as concordance index by Harding and Pagan, 2002)

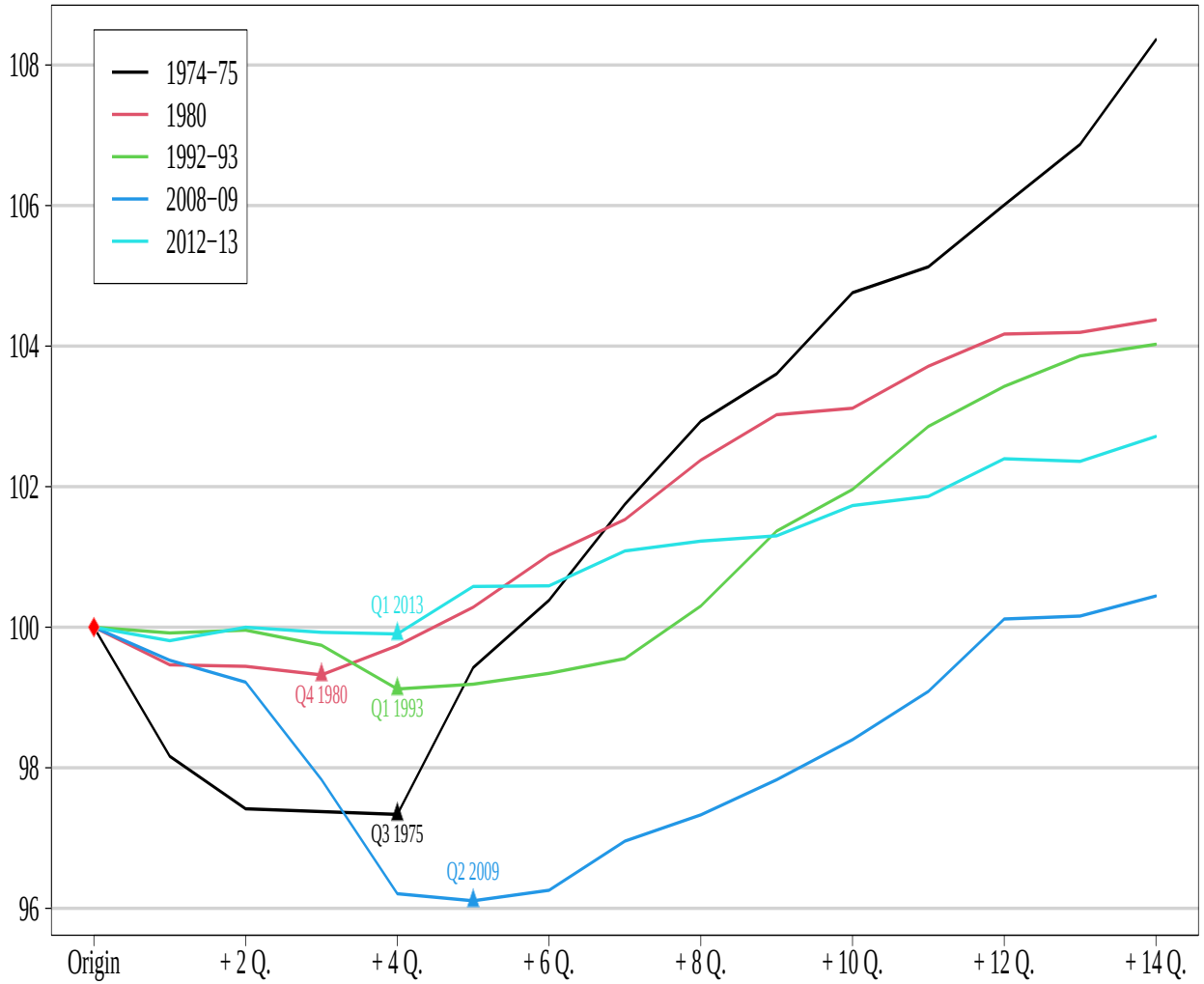
Non-parametric approach

Table: **Dating of the GDP business cycle using a non-parametric approach**

	GDP	*Duration*	*Depth*	*Severity*
Peak	1974 Q3			
Trough	1975 Q3	4	-2.7	5.4
Peak	1980 Q1			
Trough	1980 Q4	3	-0.7	1.0
Peak	1992 Q1			
Trough	1993 Q1	4	-0.9	1.8
Peak	2008 Q1			
Trough	2009 Q2	5	-3.9	9.7
Peak	2012 Q1			
Trough	2013 Q1	4	-0.1	0.2
Peak	2019 Q3			

Note: Duration in quarters, Depth in %, Severity $= \mid 0.5 \times \text{Duration} \times \text{Depth} \mid$.

Non-parametric approach



Non-parametric approach: Diffusion

	GDP	*Employment*	*Hours*	*Investment*	*CUR*	*IP Manuf*
Peak			1971 Q1			
Trough			1972 Q3			
Peak	1974 Q3	1974 Q2	1973 Q4	1974 Q2		1974 M8
Trough	1975 Q3	1975 Q4	1975 Q2	1975 Q3		1975 M5
Peak			1976 Q3	1976 Q1		
Trough			1978 Q1	1976 Q4		
Peak	1980 Q1	1980 Q1	1979 Q4	1980 Q3	1980 Q1	1979 M8
Trough	1980 Q4	1980 Q3		1981 Q3	1982 Q1	1980 M10
Peak		1982 Q4		1982 Q2		1981 M12
Trough		1985 Q1	1985 Q4	1984 Q2		1983 M10
Peak	1992 Q1	1991 Q1	1990 Q1	1991 Q1	1990 Q2	1990 M2
Trough	1993 Q1	1993 Q3	1993 Q3	1993 Q4	1993 Q4	1993 M11
Peak			1995 Q3	1996 Q1	1995 Q3	
Trough			1996 Q2	1997 Q1	1996 Q4	
Peak		2002 Q4	2000 Q4	2001 Q3	2001 Q1	2001 M3
Trough						2001 M11
Peak						2002 M8
Trough		2003 Q3	2002 Q3	2003 Q2	2003 Q4	2003 M5
Peak					2004 Q4	
Trough					2005 Q4	
Peak	2008 Q1	2008 Q2	2007 Q4	2008 Q1	2007 Q4	2008 M4
Trough	2009 Q2	2009 Q4	2010 Q1	2009 Q3	2009 Q2	2009 M3
Peak	2012 Q1	2012 Q2	2012 Q1	2011 Q4	2011 Q4	2011 M5
Trough	2013 Q1	2012 Q4	2012 Q4	2013 Q1	2013 Q3	2012 M10
Peak			2014 Q1	2016 Q1		2013 M11
Trough			2014 Q4	2016 Q3		2014 M5
Peak	2019 Q3	2019 Q3	2019 Q4	2019 Q4	2018 Q1	2019 M5

Parametric approach: Threshold models

- A Threshold AR (TAR) model with Bounce-Back (Bec et al., 2014, BBF models) applied to a stationary time series dx_t is given by:

$$\phi(L)dx_t = \mu_t + \varepsilon_t \tag{1}$$

and

$$\begin{aligned} \mu_t &= \gamma_0(1-s_t) + \gamma_1 s_t \\ &+\lambda_1 s_t \sum_{j=\ell+1}^{\ell+m} s_{t-j} + \lambda_2(1-s_t)\sum_{j=\ell+1}^{\ell+m} s_{t-j} + \lambda_3 \sum_{j=\ell+1}^{\ell+m} dx_{t-j-1} s_t \end{aligned} \tag{2}$$

where

$$s_t = 0 \text{ if } dx_{t-1} > \kappa \text{ and } 1 \text{ otherwise,} \tag{3}$$

Parametric approach: Threshold models

- BBF models are useful to characterize the bounce-back that we generally after a recession (U, V or D)
- LR tests for non-linearity are carried out through the Hansen procedure based on bootstrap
- Estimation is carried out using NLLS
- Decision rule:
  1. Within the quarters classified in the recession regime by the model, we retain recessions with a minimum duration of 2 quarters.
  2. In addition, quarters which, although not consecutive, are less than 4 quarters apart are grouped in the same recession.

Parametric approach: Threshold models

	GDP	*Employment*	*Productivity*	*Investment*	*CUR*
	$BBF_c(2,1,2)$	BBD(4, 3, 0)	BBU(2, 1, 2)	$BBF_c(2,4,1)$	BBD(2, 1, 1)
γ_0	0.13	0.02	0.09	0.29	-0.01
	(0.06)	(0.01)	(0.06)	(0.13)	(0.10)
γ_1	-0.06	-0.06	0.06	-0.94	-0.33
	(0.12)	(0.02)	(0.10)	(0.37)	(0.31)
λ_1	1.14	*0.00*	*0.46*	1.60	*0.00*
	(0.25)		(0.10)	(0.29)	
λ_2	*0.00*	*0.00*	*0.46*	*0.00*	*0.00*
			(0.10)		
λ_3	*0.00*	-0.17	*0.00*	*0.00*	-0.62
		(0.04)			(0.15)
ϕ_1	0.39	1.18	0.30	0.40	0.19
	(0.07)	(0.07)	(0.08)	(0.08)	(0.09)
ϕ_2	0.34	-0.53	0.42	0.16	0.36
	(0.07)	(0.11)	(0.07)	(0.07)	()0.11)
ϕ_3		0.46			
		(0.11)			
ϕ_4		-0.26			
		(0.07)			

Parametric approach: Threshold models

	GDP	*Employment*	*Productivity*	*Investment*	*CUR*
Peak	1974 Q3	1974 Q2	1974 Q3	1974 Q2	
Trough	1975 Q3	1975 Q2	1975 Q3	1975 Q3	
Peak				1976 Q2	
Trough				1976 Q4	
Peak	1980 Q1	1981 Q1			1980 Q3
Trough	1980 Q4	1981 Q3			1981 Q1
Peak		1982 Q4		1982 Q2	
Trough		1985 Q1		1983 Q2	
Peak			1986 Q3		
Trough			1987 Q1		
Peak	1992 Q1	1991 Q2		1992 Q2	1990 Q3
Trough	1993 Q1	1993 Q3		1993 Q2	1991 Q3
Peak				1996 Q1	
Trough				1997 Q1	
Peak					1998 Q3
Trough					1999 Q2
Peak		2003 Q1	2002 Q3	2001 Q3	
Trough		2003 Q3	2003 Q2	2002 Q2	
Peak			2006 Q2		
Trough			2007 Q1		
Peak	2008 Q1	2008 Q2	2008 Q1	2008 Q3	2008 Q3
Trough	2009 Q2	2009 Q3	2009 Q2	2009 Q3	2009 Q2
Peak	2012 Q1		2012 Q1		2011 Q4
Trough	2012 Q4		2013 Q3		2012 Q3

Parametric approach: Markov-Switching models

- MS model with 2 regimes is given by (Hamilton, 1989)

$$dx_t - \mu(S_t) = \sum_{i=1}^{p} \phi_i(S_t) dx_{t-i} + \sigma(S_t)\varepsilon_t$$

  where S_t is a random variable with values in $\{1, 2\}$

- S_t as a two-regime first-order Markov chain, that is for each t

$$P(S_t = j | S_{t-1}, S_{t-2}, S_{t-3} \ldots) = P(S_t = j | S_{t-1} = i) = p_{ij}$$

- Various possible extensions: more regimes, TV proba, multivariate setting

Parametric approach: Markov-Switching models

- Estimation is carried using EM algorithm and involves filtering techniques
- Leads to estimation of predicted, filtered an smoothed proba of being in a given regime for any date t:

$$P\left(S_t = j | dx_{t-1}, \ldots, dx_1, \hat{\theta}\right)$$

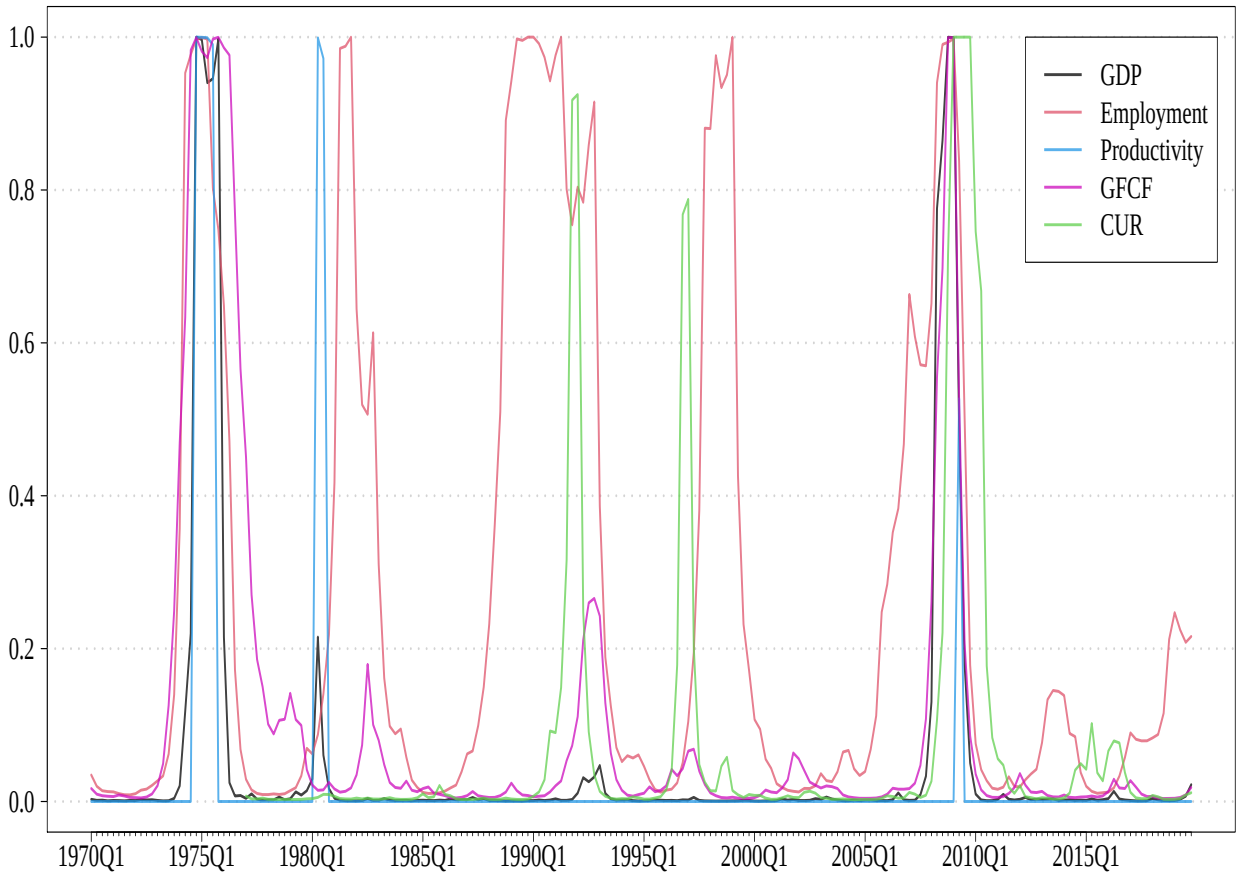
and

$$P\left(S_t = j | dx_t, \ldots, dx_1, \hat{\theta}\right)$$

and

$$P\left(S_t = j | dx_T, \ldots, dx_1, \hat{\theta}\right)$$

Parametric approach: Markov-Switching models



Parametric approach: Markov-Switching models

	GDP	*Employment*	*Productivity*	*Investment*	*CUR*
Peak	1974 Q3	1974 Q1	1974 Q3	1974 Q1	
Trough	1975 Q4	1976 Q1	1975 Q3	1976 Q4	
Peak			1980 Q1		
Trough			1980 Q3		
Peak		1981 Q1			
Trough		1982 Q4			
Peak		1988 Q2			1991 Q3
Trough		1992 Q4			1992 Q1
Peak		1997 Q3			1996 Q3
Trough		1999 Q1			1997 Q1
Peak			2006 Q2		
Trough			2006 Q4		
Peak	2008 Q1	2006 Q4		2008 Q1	2008 Q3
Trough	2009 Q1	2009 Q3		2009 Q2	2010 Q2

Parametric approach: Markov-Switching models

- Markov-Switching model are tricky to estimate when dealing with French data
- Only the 2 biggest recessions tend to appear: 1974-75 and 2008-09
- Adding a 3rd regime doesn't solve the issue
- The multivariate extension doesn't lead to better results in terms of business cycles replication
- The Covid recession leads to even more complicated estimation issues

Narrative approach

- Following the quantitative approach 6 periods could potentially be of interest:
  1. 1974-75: 1st oil shock
  2. 1980: Second oil shock
  3. 1992-93: Investment cycle
  4. *2002-03: in the wake of the Internet bubble*
  5. 2008-09: Great Recession
  6. *2012-13: From austerity to monetary "whatever it takes"*

Narrative approach

Oil shocks in 1974-75 and 1980

- A bunch of factors at the roots
  1. Decline in investment, since early 1970s
  2. Sharp rise in wages following 1968 strike and Grenelle Agreements
  3. Jump in the price of all commodities, including quadrupling in oil price between Oct. 1973 and early 1974
  4. Monetary instability with the death of the Bretton Woods system
- Economic policies tended to fight inflation at the cost of employment

Narrative approach

The investment cycle of 1992-93

- Illustration of how the end of an investment cycle can turn into a recession when accompanied with monetary policy out of sync
- A remarkable sustained expansion phase at the end of the 80s, mainly driven by investment more than 8% per year in 1998-90
- Pro-cyclical monetary policy and pro-cyclical fiscal expansion
- Moderation of the economic activity at the beginning of 1990 associated with a tightening of economic policies in the US
- Spillovers to France, as companies put the brakes on their investments in 1991 and short-term interest rates increased from 4.5% in 1989 to 8.4% in 1992
- Appreciation to the French Franc pegged to the DM within the European Monetary System (by 20% between 1989 and 1992). Devaluation was avoided by raising short-term interest rate to 12% in 1993.
- A collapse of 7% in investment in 1993

Narrative approach

The Great Recession 2008-09

- A global financial crisis, visible in all advanced economies, originated in the U.S. (Lehman Brothers collapse in Sep. 2008)
- Housing bubble in the U.S. can be seen as the source of the shock
- Turned into a global recession, fueled by a crisis in access to liquidity.
- Global current account imbalances also played a role, pushed by the emerging economies (esp. China). Sharp increase in commodity prices until mid-2008 (140 USD/bbl mid 2008).
- Increase in
- GDP drop in France was 4 times greater than in 1992-93

Narrative approach

2002-03: from the Internet bubble to competitive disinflation policies

- 1997-2000: a strong growth period boosted by ICT and the new economy (*end of business cycles*).
- But unstable growth driven by "irrational market exuberance" and low interest rates.
- A triple shock for French competitiveness:
  1. Euro appreciation between Oct 2000 and end of 2002
  2. China in WTO in 2001: from 6% of export shares to 15% in 2010
  3. German competitive devaluation strategy
- So a weak support from external developments but a sustained household consumption/ job market.
- Our view is a sharp slowdown/ industrial recession in 2002-03, but not a recession, in opposition to Germany and Italy, more exposed to external trade.

Narrative approach

2012-13: from austerity to monetary "whatever it takes"

- Beginning of 2011, France has returned to a pre-crisis level of economic activity
- But a sudden shift in European budgetary policies towards austerity led European countries to a recession visible at the euro area level (according to CEPR-EABCN committee), mainly due to fiscal multipliers higher than expected.
- Situation improved starting from July 2012 when Draghi gave more monetary accommodation via a speech.
- In France, the severity of this phase is very low compared to others. Also, increase in public consumption and moderate level of inflation moderate the view.
- Overall the weakness of the Depth in the 3D's rule leads us to classify this event as a slowdown, not a recession

The Covid peak

- Models estimate a peak in 2019q3, as the strikes during the Q4 2019 generated a slight drop in the level of activity
- However, given the nature of the shock, well identified, we estimate that the start of the Covid recession is in 2020q1, meaning that the peak is located in 2019q4

Narrative approach: Conclusion

Table 7: **Recession dates in the French economy selected by the committee**

	Selected dates
Peak	1974 Q3
Trough	1975 Q3
Peak	1980 Q1
Trough	1980 Q4
Peak	1992 Q1
Trough	1993 Q1
Peak	2008 Q1
Trough	2009 Q2
Peak	2019 Q4

Update: Covid recession

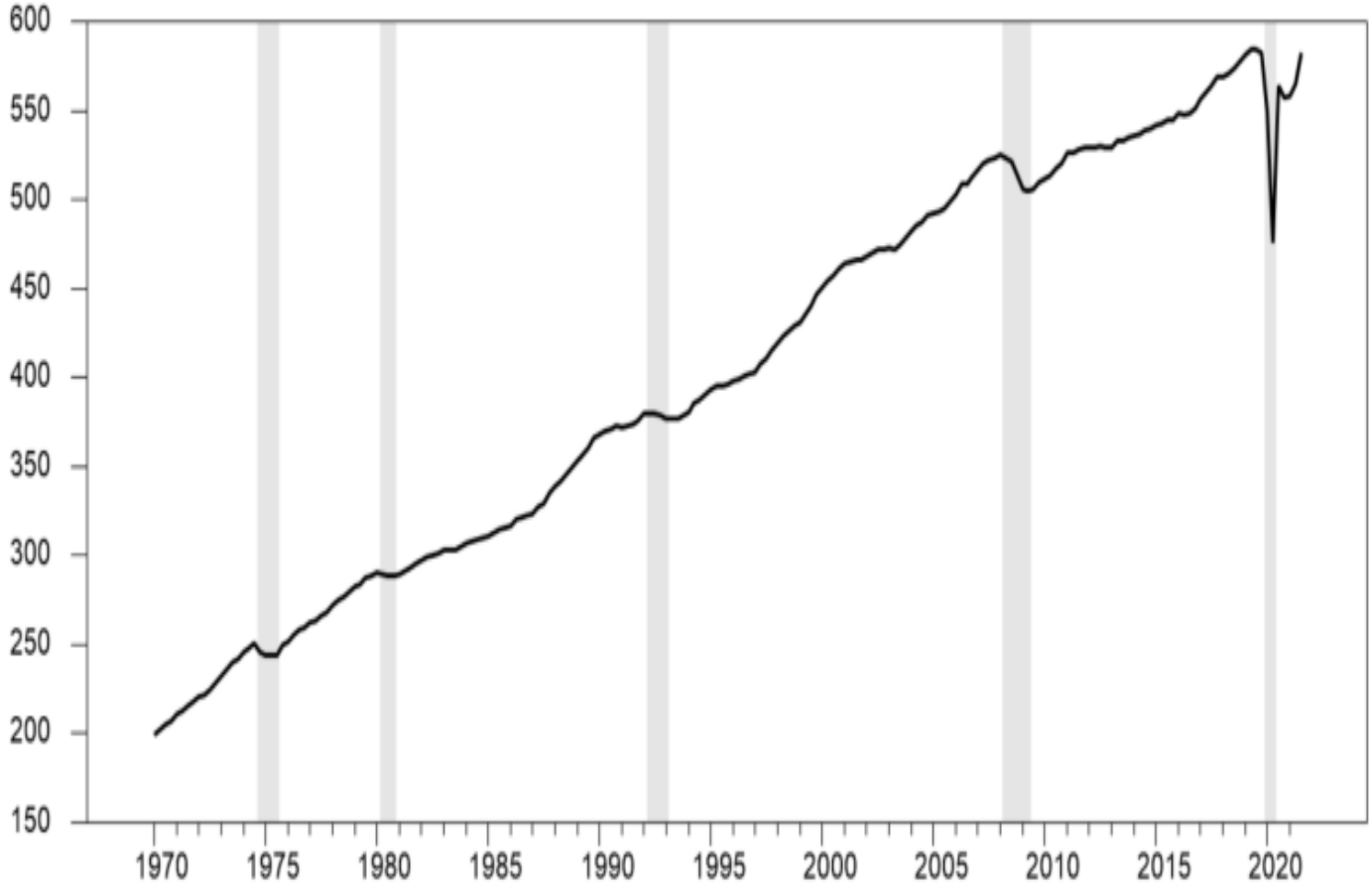
- One the objectives of the committee is to provide an update of the dating chronology.
- Thus on October 29, 2021, we released a press communique to inform that we identified the trough of the Covid recession in 2020q2
- It took us time to acknowledge this trough as the committee was concerned by the possibility of a double dip, given the strong health dominance on economic activity. A strong bounce-back in 2020q3, but on average the growth for 2020q4/2021q1/2021q2 is close to zero
- The very strong growth during the summer 2021 led the committee to conclude that if there is another drop in economic activity in the future, it will be considered as a recession independent from the Covid one.

Update: Covid recession

- So overall, the 5 recessions currently identified by the committee are below.
- The last 2 points are considered provisional (by convention), to account for data revision

	Dates selected
Peak	1974 Q3
Trough	1975 Q3
Peak	1980 Q1
Trough	1980 Q4
Peak	1992 Q1
Trough	1993 Q1
Peak	2008 Q1
Trough	2009 Q2
Peak	2019 Q4*
Trough	2020 Q2*

Update: Covid recession



Conclusions

- Creation of a new independent business cycle dating committee for France, under the AFSE umbrella
- A quarterly business cycle chronology for France since 1970, with 5 recessions so far, available to all researchers
- Updates on a regular basis (each time a recession is in the air)
- We plan to extend our chronology to a monthly frequency and to back-calculate it
- Incentive to continue studies on business cycles in France (e.g. sectoral approaches)