

“Meet your lecturer” series

Cyclical Fluctuations

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November 25, 2020

- ▶ I am a Macro professor at UCL
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Macro Economics live from London

Franck Portier's professional page


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#2021EconJobMarket: More than 50% drop in hirings is expected; being able to go two years in a row on the market should be the new normal

Warning: this are the results of an anonymous Google poll. I have no control on who are the respondents and how representative they are. Responses were collected between April 24 and May 7, 2020. I have now gathered 75 responses to the Google poll on next year Econ job market prospects. Summary: Results are showing ... [Continue reading](#) →

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Econ 0039: Sample Course Assessment Exam posted.

I have posted in the "Previous exams" section of the course page an example of a "Course Assessment" exam, which is a minor revision of the 2018-2019 exam. Note that the weights assigned to each question have changed (20% for part A, 40% for B, 40% for C). These are the weights that will be used ... [Continue reading](#) →

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- RePEc page
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About this site

This website gathers professional information about my teaching and research activities. It is not a blog in the sense that I am not systematically posting to share random thoughts about economics, the meaning of life, the European Champions League, etc...

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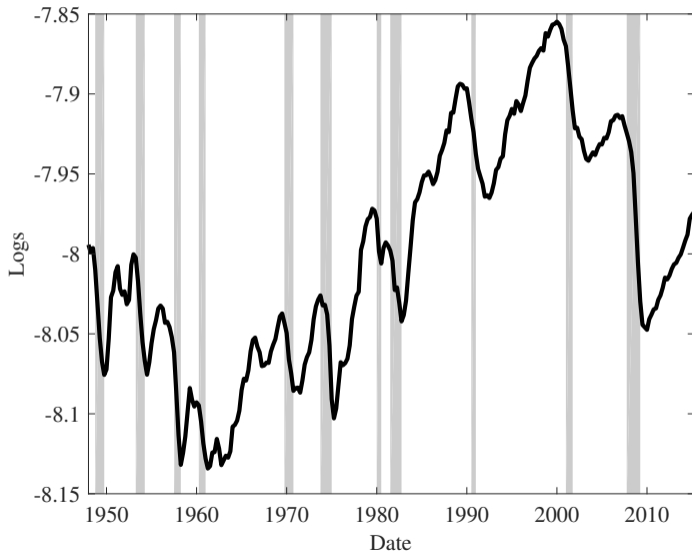
Tweets by @FpPortier

 **Franck Portier**
@FpPortier

Based on my work with PAUL BEAUDRY (now deputy-governor of the Bank of Canada) & DANA GALIZIA (now professor at Carleton University)

- ▶ The economy is quite cyclical (*to be defined*)
- ▶ This has implications for modelling and policy.

Figure 1: Cyclical fluctuations : U.S. Non-Farm Business Hours Per Capita



Roadmap

- I. Cyclicalilty
- II. Instability
- III. Implications for Modelling and Policy

Roadmap

- I. Cyclicality
- II. Instability
- III. Implications for Modelling and Policy

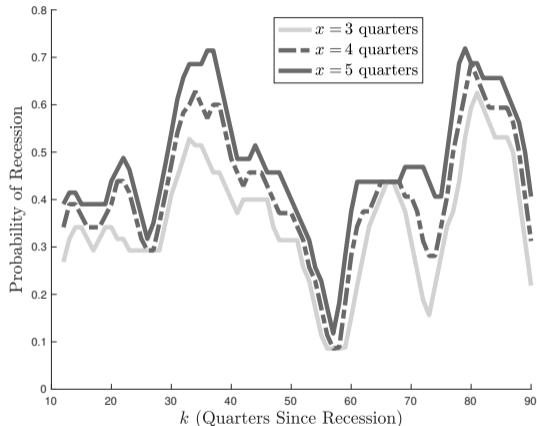
I. Cyclicity

Table 1: Recent U.S. Business Cycles, as identified by the NBER's Business Cycle Dating Committee

<u>BUSINESS CYCLE REFERENCE DATES</u>		<u>DURATION IN MONTHS</u>			
Peak	Trough	Contraction	Expansion	Cycle	
<i>Quarterly dates are in parentheses</i>		<i>Peak to Trough</i>	<i>Previous trough to this peak</i>	<i>Trough from Previous Trough</i>	<i>Peak from Previous Peak</i>
April 1960(II)	February 1961 (I)	10	24	34	32
December 1969(IV)	November 1970 (IV)	11	106	117	116
November 1973(IV)	March 1975 (I)	16	36	52	47
January 1980(I)	July 1980 (III)	6	58	64	74
July 1981(III)	November 1982 (IV)	16	12	28	18
July 1990(III)	March 1991(I)	8	92	100	108
March 2001(I)	November 2001 (IV)	8	120	128	128
December 2007 (IV)	June 2009 (II)	18	73	91	81

I. Cyclicity

Conditional Probability of Being in a Recession (US)

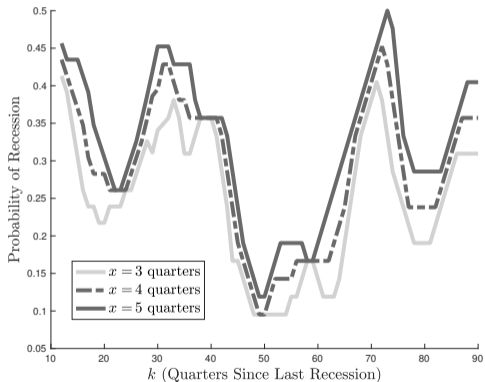


Notes: This shows the fraction of time the economy was in a recession within an x -quarter window around time $t + k$, conditional on being in a recession at time t , where x is allowed to vary between 3 and 5 quarters.

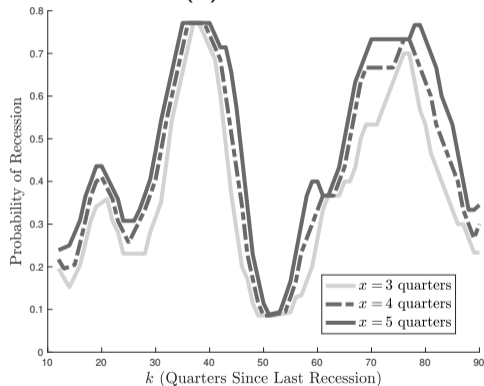
I. Cyclicity

Conditional Probability of Being in a Recession

a) Canada

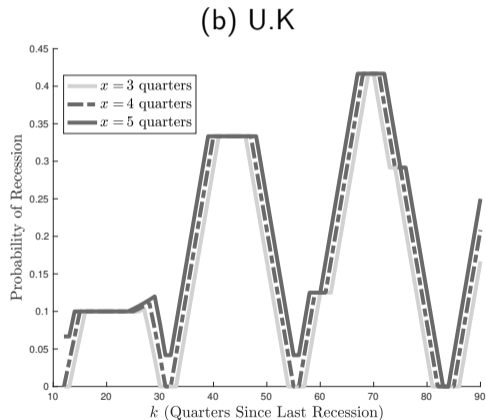
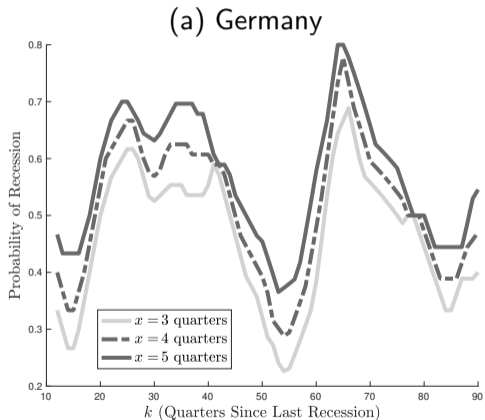


(b) France



I. Cyclicity

Conditional Probability of Being in a Recession



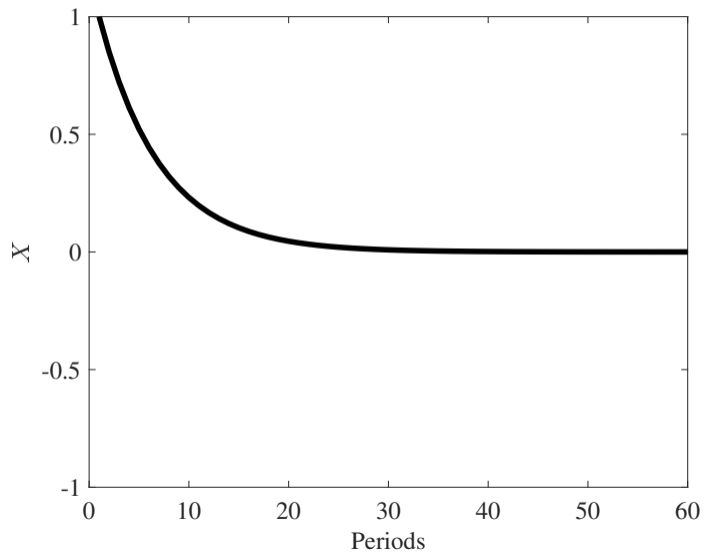
I. Cyclicality

Cyclicality

- ▶ I now can be more precise about what I mean by cyclicality
 - × If activity is high today,
 - × in, say, 20 periods in the future, economic activity is expected to be low,
 - × and then in 40 period expected to be high again and so on.
- ▶ Different from the more standard view (by standard, I mean in most macro models):
 - × If activity is high today,
 - × we expect it to return to the mean.
- ▶ The two views differ on whether or not we should worry about big booms.

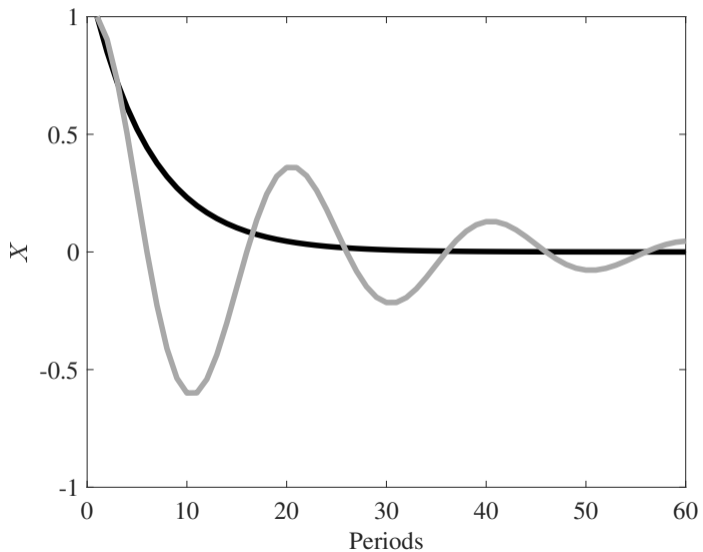
I. Cyclicity

Absence of Cyclicity



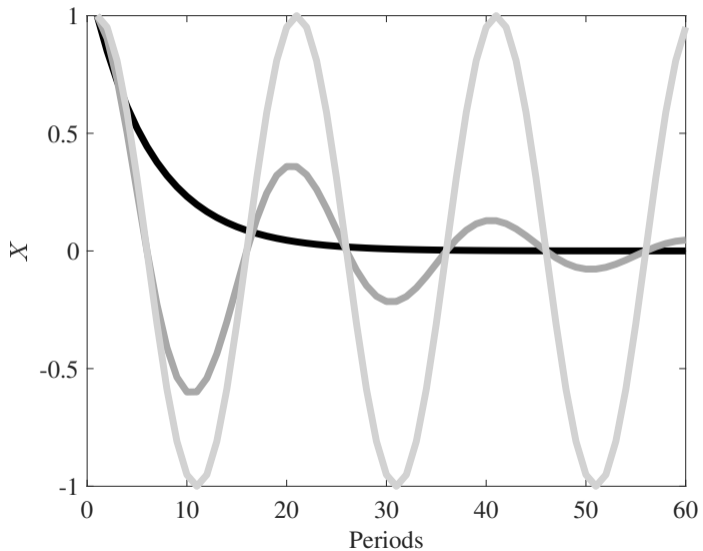
I. Cyclicalty

Cyclicalty



I. Cyclicity

“Strong” Cyclicity



1. Motivating Observations

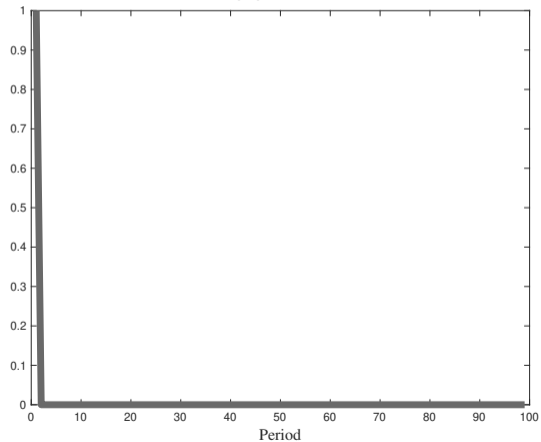
Looking for Peaks in Spectral Density

- ▶ One way to check if there is cyclicity is to look for a peak in spectral density
- ▶ Spectral density:
 - × Decompose a series into a sum of sine waves of different periods
 - × Look at the weight of each sine wave in explaining the series fluctuations

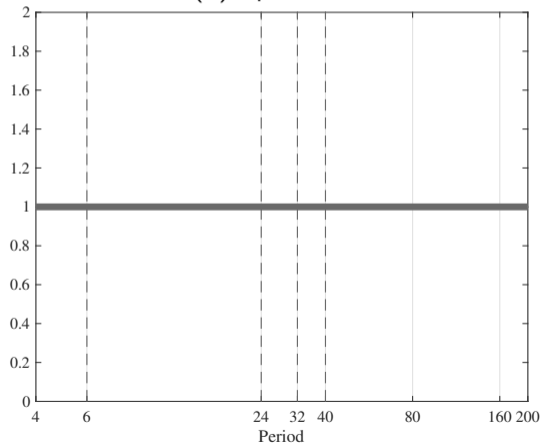
1. Motivating Observations

Figure 2: Process: $x_t = \varepsilon_t$

(a) IRF



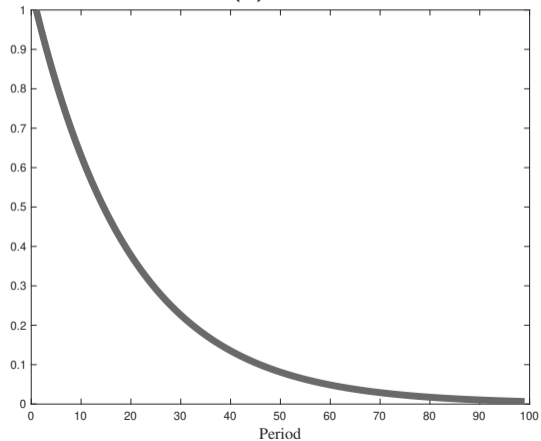
(b) Spectrum



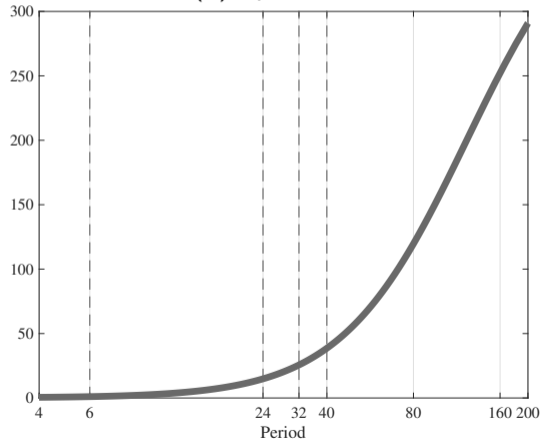
1. Motivating Observations

Figure 3: Process: $x_t = .95x_{t-1} + \varepsilon_t$

(a) IRF



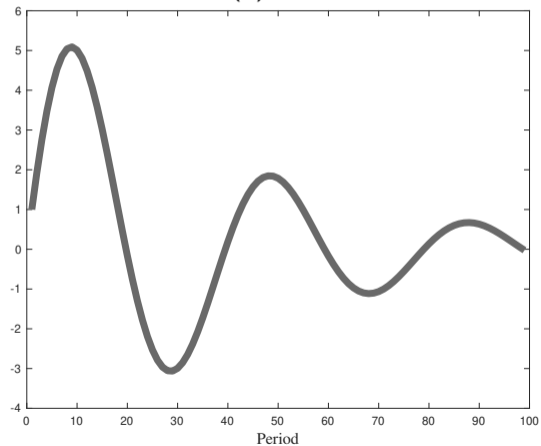
(b) Spectrum



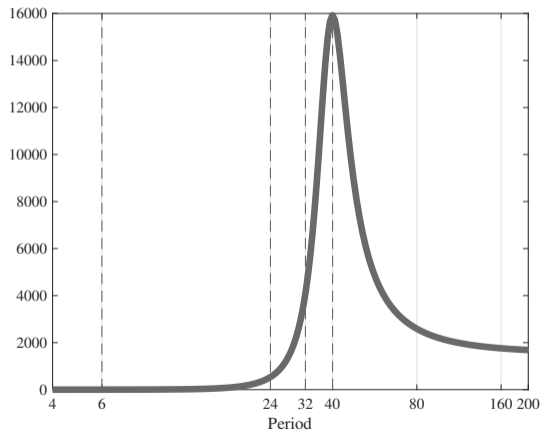
1. Motivating Observations

Figure 4: Process: $x_t = 1.92x_{t-1} - .95x_{t-2} + \varepsilon_t$

(a) IRF

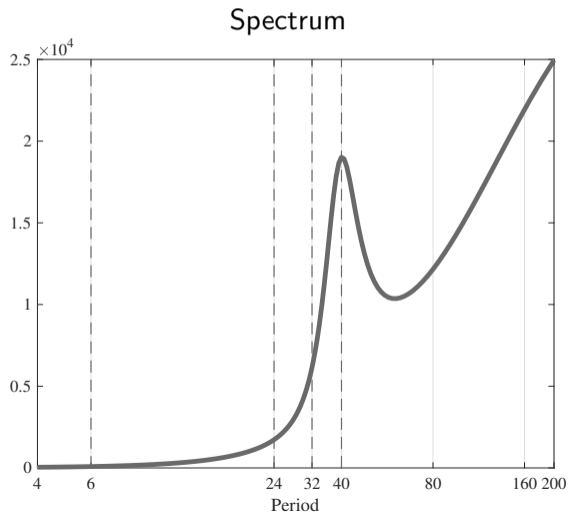


(b) Spectrum



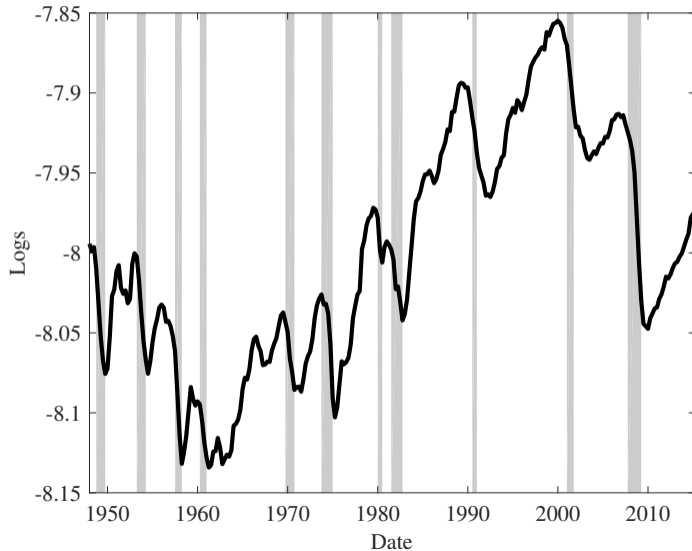
1. Motivating Observations

Figure 5: Process: $x_t = x_{1t} + x_{2t}$, $x_{1t} = 1.92x_{1t-1} - .95x_{1t-2} + \varepsilon_{1t}$, $x_{2t} = .95x_{2t-1} + \varepsilon_{2t}$



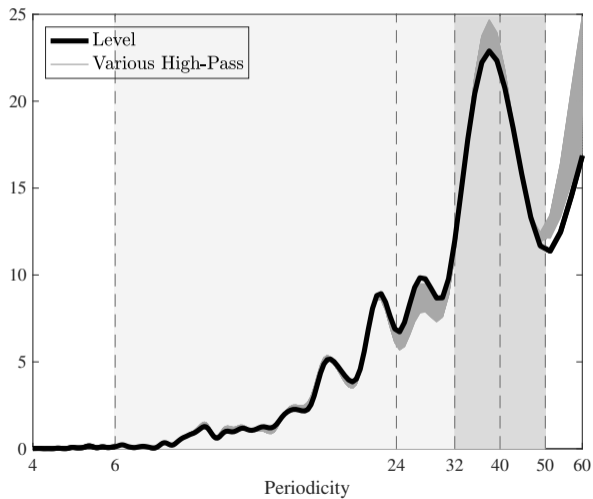
I. Cyclicity

Non-Farm Business (NFB) Hours Per Capita



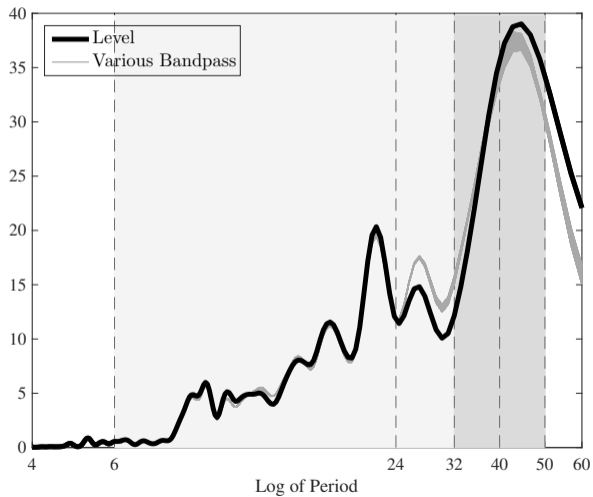
1. Motivating Observations

Non Farm Business Hours per Capita Spectrum



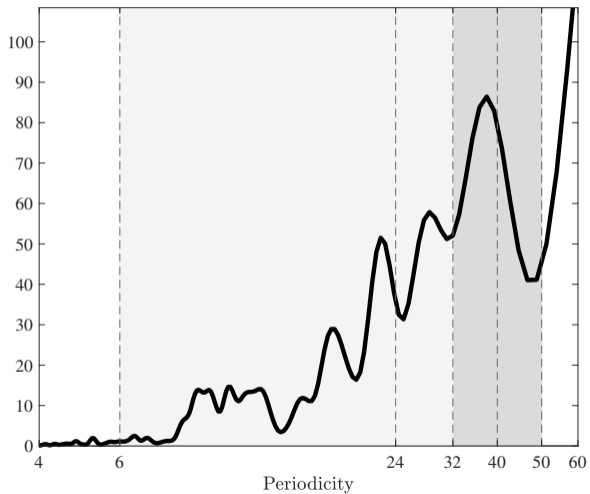
1. Motivating Observations

Capacity Utilization Spectrum



1. Motivating Observations

Investment-Output ratio

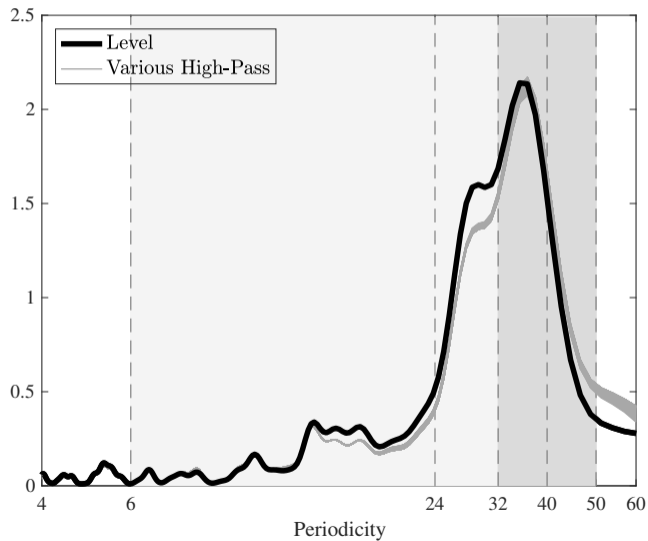


1. Motivating Observations

- ▶ The cycle is also a financial cycle

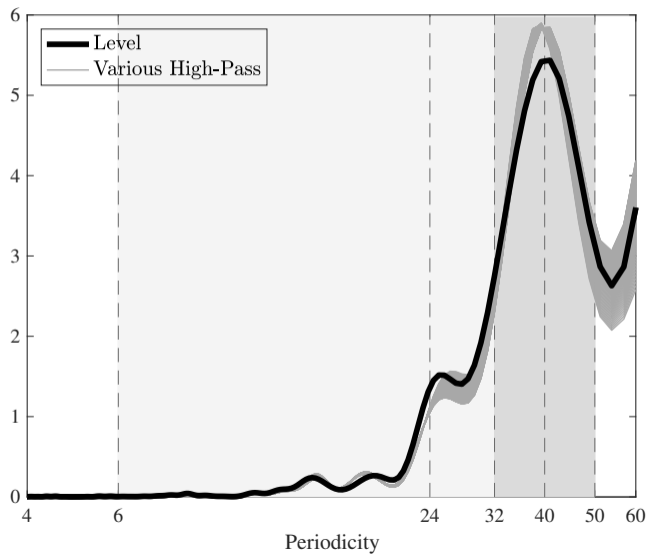
1. Motivating Observations

Chicago Fed National Financial Conditions Index



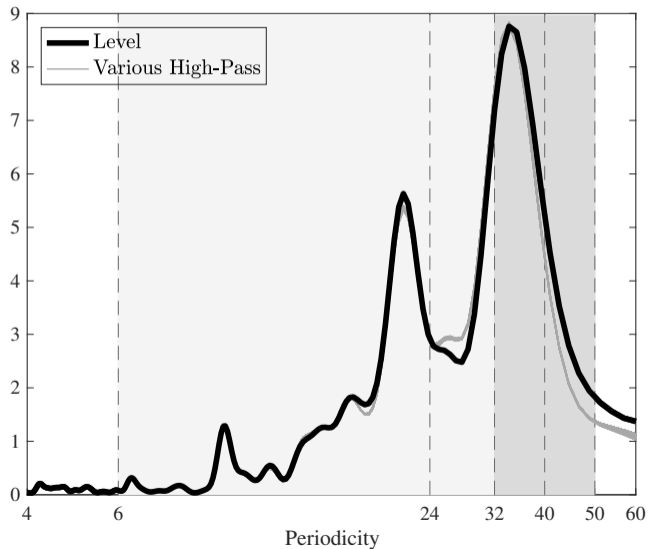
1. Motivating Observations

Delinquency Rate



1. Motivating Observations

Spread (BBA bonds-FFR)



1. Motivating Observations

Wrapping up

- ▶ Data seems to tell us that there is indeed cyclical

Roadmap

- I. Cyclicalilty
- II. Instability
- III. Implications for Modelling and Policy

II. Instability

An example

- ▶ Macro variables dynamics (removing trend) is well explained by AR(3) linear models
- ▶ Assume

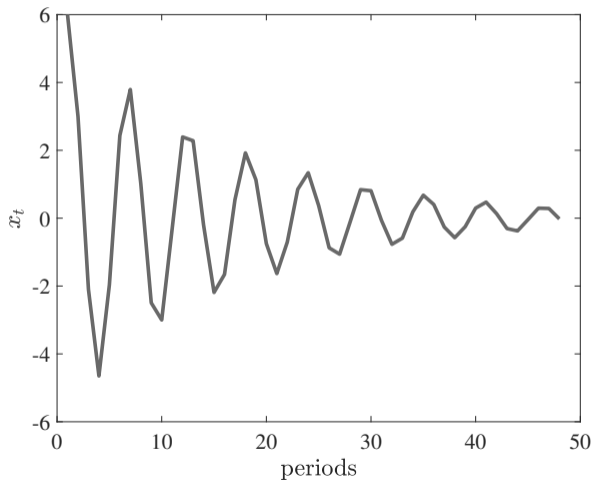
$$x_t = \alpha x_{t-1} - 0.6x_{t-2} - 0.3x_{t-3} + \epsilon_t, \quad (1)$$

and $\alpha = 0.5$

II. Instability

An example

Figure 6: Impulse Response, $\alpha = 0.5$

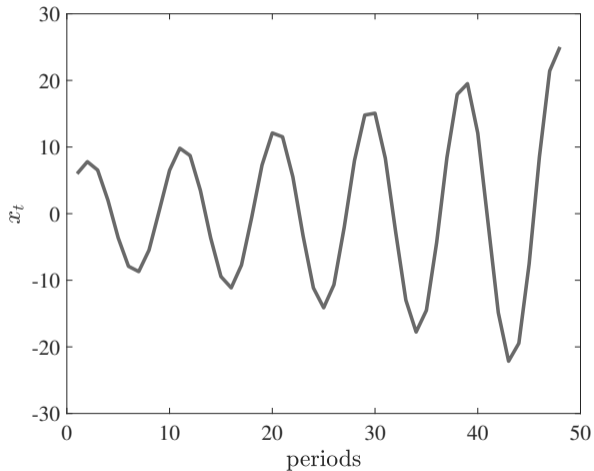


$$x_t = \alpha x_{t-1} - 0.6x_{t-2} - 0.3x_{t-3} + \epsilon_t,$$

II. Instability

An example

Figure 7: Impulse Response, $\alpha = 1.3$

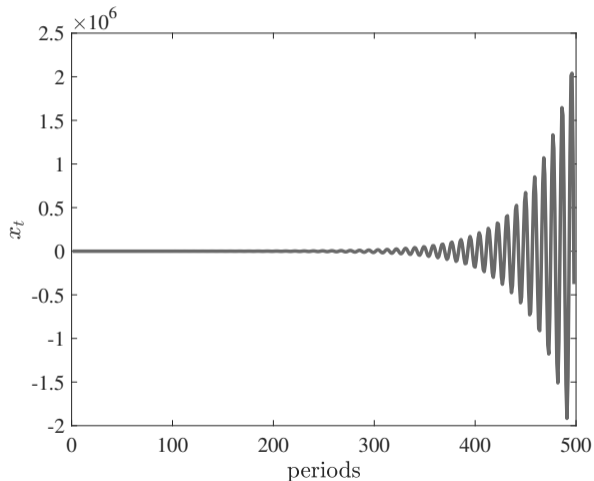


$$x_t = \alpha x_{t-1} - 0.6x_{t-2} - 0.3x_{t-3} + \epsilon_t,$$

II. Instability

An example

Figure 8: Impulse Response, $\alpha = 1.3$



$$x_t = \alpha x_{t-1} - 0.6x_{t-2} - 0.3x_{t-3} + \epsilon_t,$$

II. Instability

An example

- ▶ Assume instead

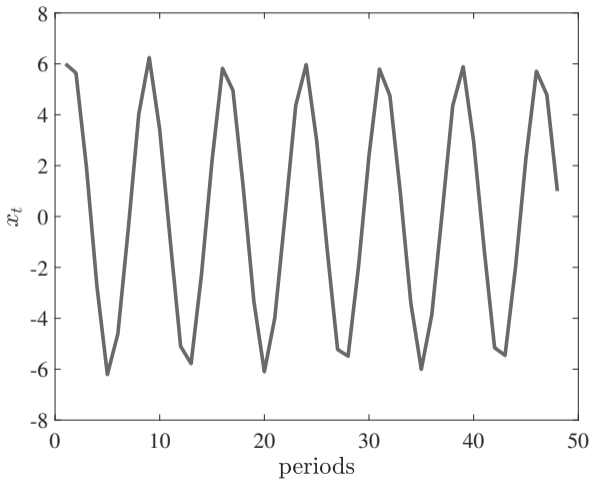
$$x_t = \alpha x_{t-1} - 0.6x_{t-2} - 0.3x_{t-3} - 0.01x_{t-1}^3 + \epsilon_t, \quad (2)$$

- ▶ and keep $\alpha = 1.3$

II. Instability

Introductory example: a Limit Cycle

Figure 9: Impulse Response with $-0.01x_{t-1}^3$

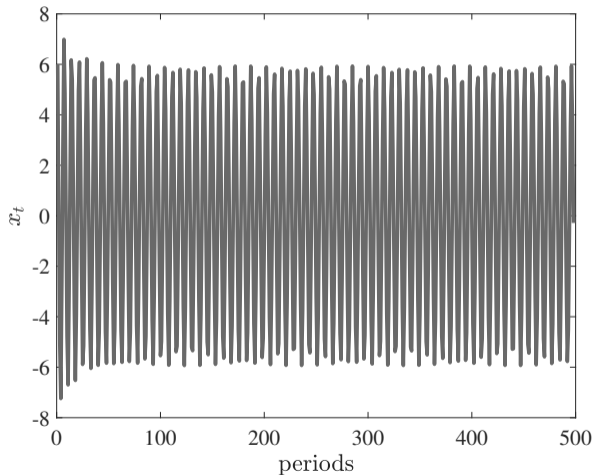


$$x_t = 1.3x_{t-1} - 0.6x_{t-2} - 0.3x_{t-3} - 0.01x_{t-1}^3 + \epsilon_t,$$

II. Instability

Introductory example: a Limit Cycle

Figure 10: Impulse Response with $-0.01x_{t-1}^3$

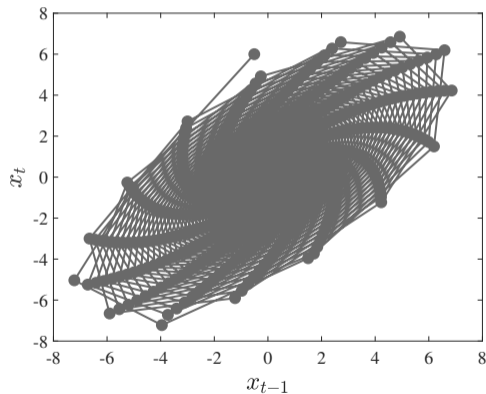
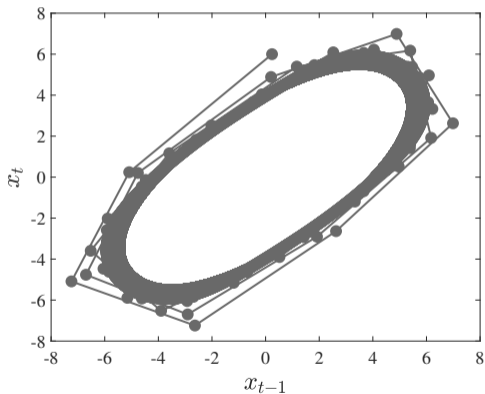


$$x_t = 1.3x_{t-1} - 0.6x_{t-2} - 0.3x_{t-3} - 0.01x_{t-1}^3 + \epsilon_t,$$

II. Instability

Introductory example

Figure 11: In the (x_t, x_{t-1}) plane with $-0.01x_{t-1}^3$ and $\alpha = 1.3$ or with $\alpha = 0.5$ and no cubic term.



$$x_t = \alpha x_{t-1} - 0.6x_{t-2} - 0.3x_{t-3} - 0.01x_{t-1}^3 + \epsilon_t,$$

II. Instability

Implications

- ▶ Working with linear model rules out local instability because it implies explosion.
- ▶ Therefore, the economic system is seen as stable, fluctuating only because of shocks
- ▶ Adding nonlinearities opens the door to *local* instability.
- ▶ Market economies can be intrinsically unstable, but not explosive
- ▶ Fluctuations are not caused by good and bad luck (shocks), but are inherent to market forces.

Roadmap

- I. Cyclicalitity
- II. Instability
- III. Implications for Modelling and Policy

III. Implications for Modelling and Policy

A Reduced form setup

- ▶ Assume that agents actions depend on
 - × what they have done in the past
 - × what the other are doing
- ▶ What is the impact impact of what the others are doing on what I do?
 - × negative (*substitutabilities*): typically the case of Walrasian equilibrium
 - × positive (*complementarities*): example consumption with unemployment risk.

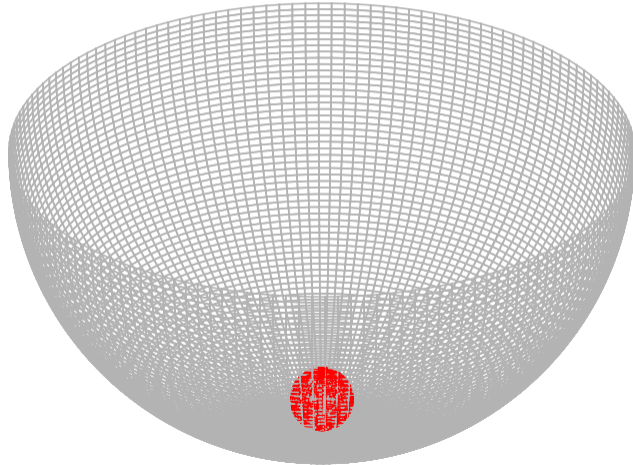
III. Implications for Modelling and Policy

Main result

- ▶ The more *substitutabilities*, the more stable and acyclical the dynamics is.
- ▶ There is always a degree of *complementarities* such that the model will become locally unstable
- ▶ With non-linearities, a limit cycle will appear.

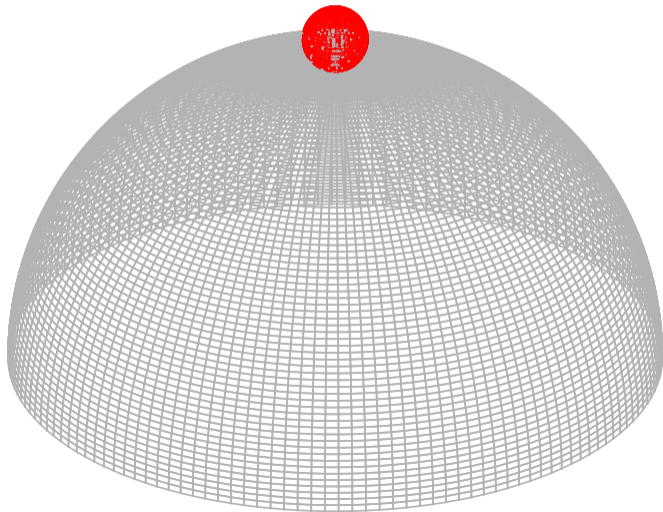
III. Implications for Modelling and Policy

Figure 12: With substitutabilities



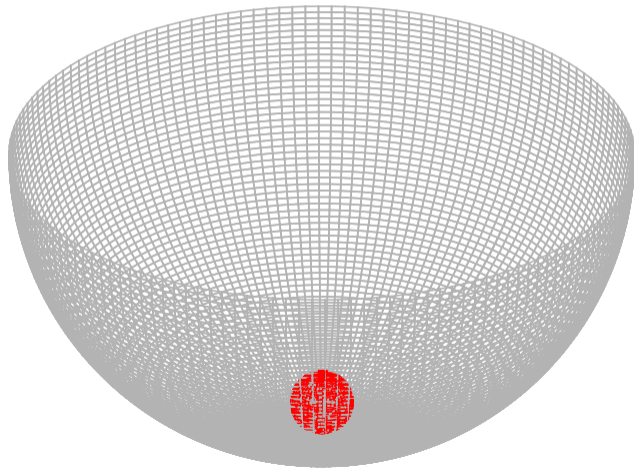
III. Implications for Modelling and Policy

Figure 13: With enough complementaries in a linear world



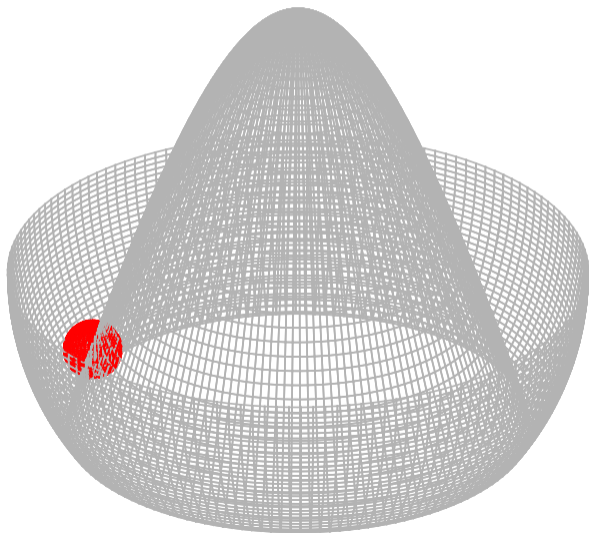
III. Implications for Modelling and Policy

Figure 14: With substitutabilities



III. Implications for Modelling and Policy

Figure 15: With enough complementarities but in a nonlinear world



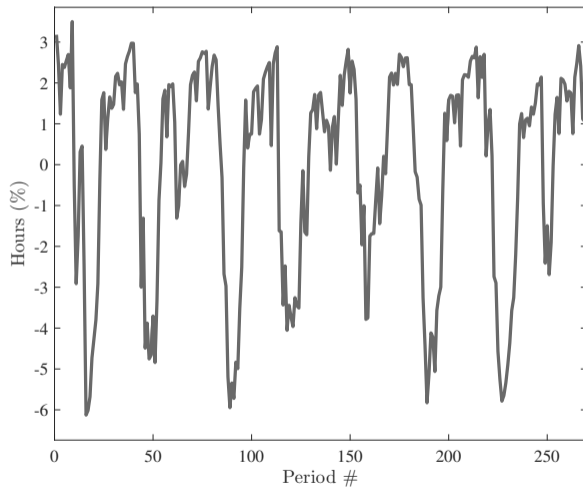
III. Implications for Modelling and Policy

A microfounded economic model

- ▶ Main mechanism:
 - × in booms, less defaults
 - × \rightsquigarrow cheap credit
 - × \rightsquigarrow more borrowing to buy goods (in particular durable goods and houses) \rightsquigarrow even less defaults \rightsquigarrow even cheaper credit
 - × \rightsquigarrow the boom is even bigger
- ▶ But at some point, satiation (lot of houses, TV sets, etc...), so that demands goes down
 - × \rightsquigarrow less sales \rightsquigarrow defaults increase
 - × \rightsquigarrow credit becomes more expensive \rightsquigarrow less demand \rightsquigarrow more default etc...
- ▶ Can this mechanism be strong enough to create cycles when estimated?
- ▶ Note: Expansion sows the seed of the next recession.

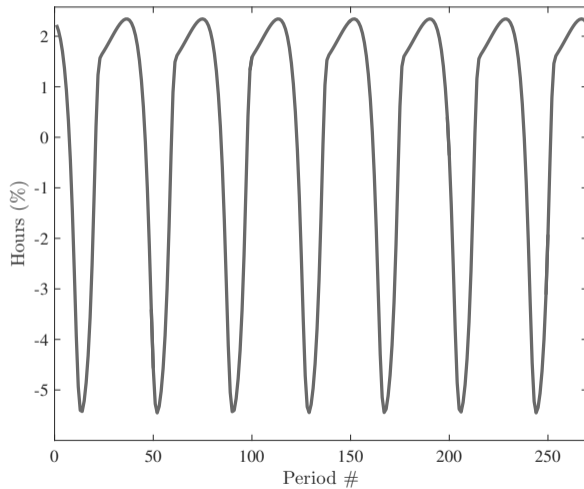
III. Implications for Modelling and Policy

Sample Draw for Hours



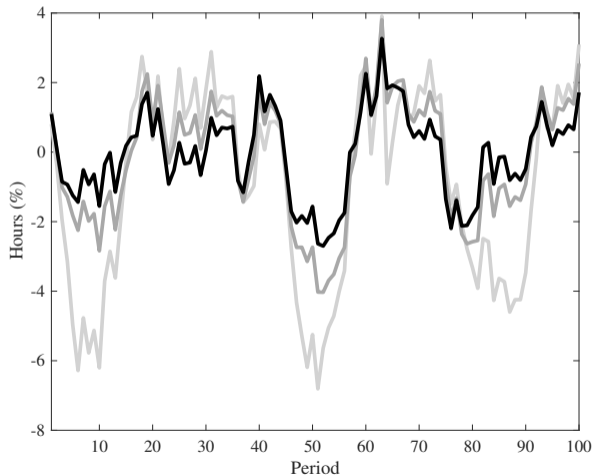
III. Implications for Modelling and Policy

Sample Draw for Hours, no shocks



III. Implications for Modelling and Policy

Policy experiment - Hours, One Stochastic Simulation, Increasing Monetary policy Reactivity



III. Implications for Modelling and Policy

Policy experiment -Hours Deterministic Simulation, Increasing Monetary policy Reactivity

