

# Oil Production Disruptions and Surges in Major Producers

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## 1 Motivation and Methodology

- Motivation
- Methodology

## 2 Results

- Incorporating Hotelling
- Disruptions and Jumps

# Endogenous Cycles

- Previous work (*Oil, Dollars, Debt, and Crises*): endogenous self perpetuating cycle of oil prices and credit crises
  - 1980s: banks and sovereign debt crisis (countries don't go out of business)
  - 2000s: housing (home prices never go down) and then sovereign debt crises
- Geopolitical catalysts at turning points of the cycle
  - “Arab oil embargo” coincided  $\Rightarrow$  correction for depreciating Dollar
  - Some effects are permanent (real 70s shock in 1979 after Iranian revolution)
  - Sometimes, geopolitical and financial “shocks” themselves are endogenous (e.g. our anticipation of “the Arab Spring” and the sovereign debt crisis)

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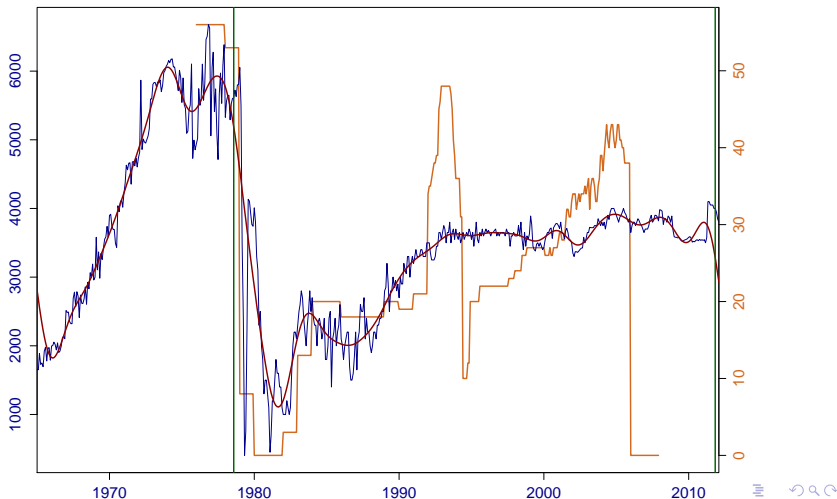


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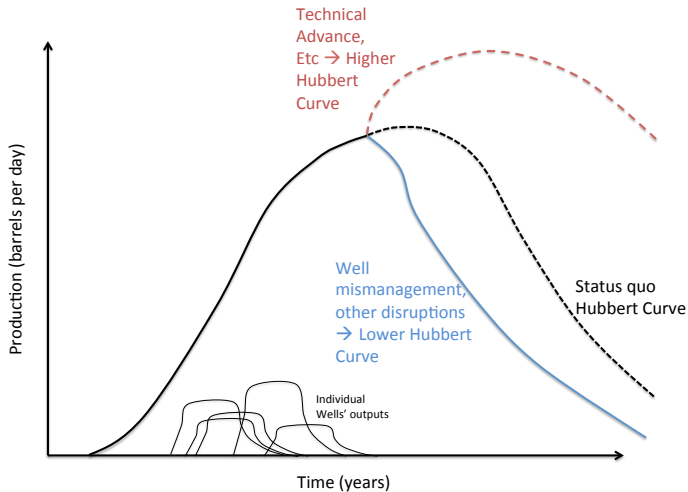
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# Amy's Conjecture: Does Regime Change Lead to Disruption?

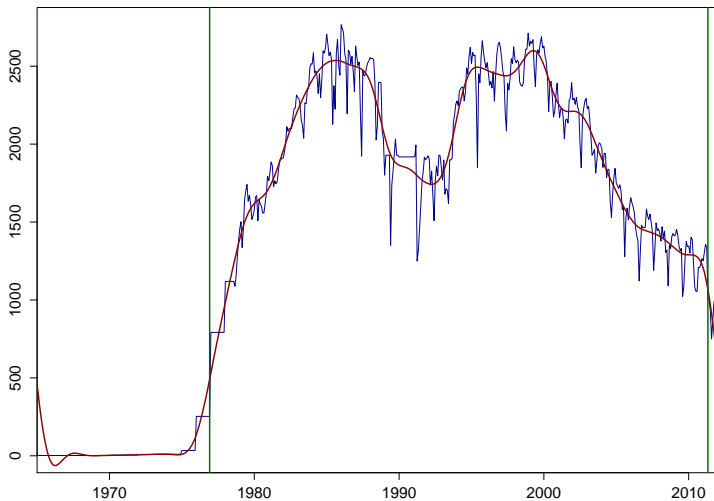
Iran: Production plummets in 1979 and never recovers despite investment



# Disruptions in Either Direction



# Example of Positive Disruption (Technical Advance): UK



# Example of Status Quo Hubbert Curve: US



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# Data and Approach

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  - Algeria, Angola, Brazil, Canada, China, Former Soviet Union, Indonesia, Iran, Iraq, Kuwait, Libya, Mexico, Nigeria, Norway, Qatar, Saudi Arabia, UAE, UK, USA, and Venezuela
- Did not impose parametric form on Hubbert curves
  - Only imposed minimal smoothness conditions
- Abstract from short-term fluctuations (weather, etc.)
- Statistical approach:
  - Define “disruptions” or “jumps”  $\equiv$  significant (5% level) deviations at wave(let)lengths lower than 32 months
  - Regress (orthogonal) wavelet decompositions of output on similar decompositions of WTI price, S&P500, Gold price, US 10 year Treasury yield, US Manufacturing PMI

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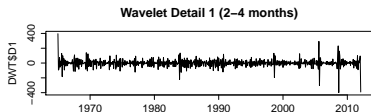
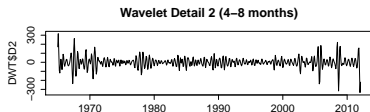
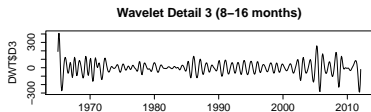
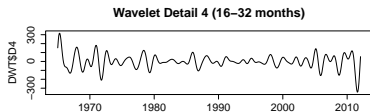
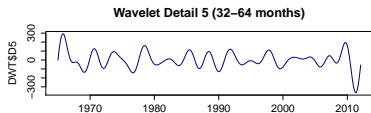
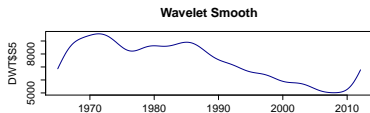
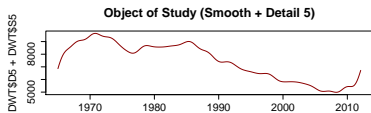
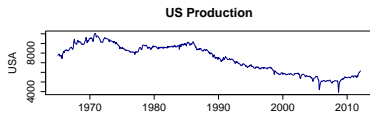
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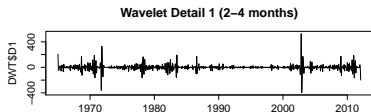
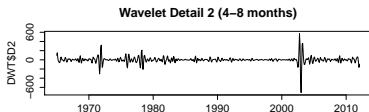
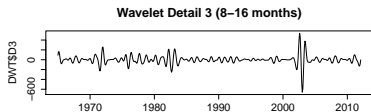
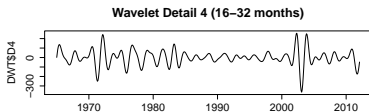
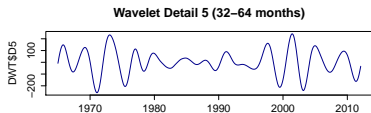
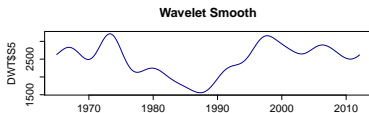
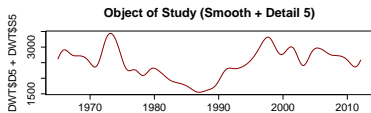
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# Example 1: DWT Decomposition of US Production



# Example 2: Decomposition of Venezuelan Production



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# Saudi Production Responses 1

	Prod Detail 1 (2–4 months)	Prod Detail 2 (4–8 months)
DWTID1	1.60 (8.42)	
DSP500D1	0.84 (0.67)	
DGoldD1	3.36*** (0.58)	
DUS10yrD1	-1.23 (81.72)	
DPMID1	-5.31 (8.84)	
DWTID2		16.86*** (5.97)
DSP500D2		1.42*** (0.53)
DGoldD2		2.11*** (0.47)
DUS10yrD2		-23.13 (51.47)
DPMID2		-17.83** (8.01)
R <sup>2</sup>	0.33	0.39
Adj. R <sup>2</sup>	0.32	0.38
Num. obs.	566	566

## Saudi Production Responses 2

	Prod Detail 3 (8–16 months)	Prod Detail 4 (16–32 months)	Prod Detail 5 (32–64 months)
DWTID3	11.72*** (4.20)		
DSP500D3	0.53 (0.61)		
DGoldD3	3.22*** (0.39)		
DUS10yrD3	-46.47 (53.79)		
DPMID3	-5.40 (7.66)		
DWTID4		5.13 (3.72)	
DSP500D4		0.99 (0.63)	
DGoldD4		3.23*** (0.45)	
DUS10yrD4		149.40*** (50.59)	
DPMID4		-31.46*** (5.32)	
DWTID5			40.52*** (5.18)
DSP500D5			-1.06*** (0.37)
DGoldD5			2.42*** (0.37)
DUS10yrD5			202.59*** (29.30)
DPMID5			14.11*** (4.12)



## Libyan Production Responses 1

	Prod Detail 1 (2–4 months)		Prod Detail 2 (4–8 months)
DWTID1		-1.09 (2.52)	
DSP500D1		0.04 (0.20)	
DGoldD1		0.07 (0.17)	
DUS10yrD1		24.17 (24.45)	
DPMID1		-4.39* (2.64)	
DWTID2			-1.15 (1.86)
DSP500D2			0.30* (0.17)
DGoldD2			-0.31** (0.15)
DUS10yrD2			10.29 (16.00)
DPMID2			-6.86*** (2.49)
R <sup>2</sup>	0.90	0.01	0.03
Adj. R <sup>2</sup>	0.90	0.00	0.02
Num. obs.	566	566	566

## Libyan Production Responses 2

	Prod Detail 3 (8–16 months)	Prod Detail 4 (16–32 months)	Prod Detail 5 (32–64 months)
DWTID3	-0.89 (1.29)		
DSP500D3	0.58*** (0.19)		
DGoldD3	-0.20 (0.12)		
DUS10yrD3	-74.35*** (16.56)		
DPMID3	12.69*** (2.36)		
DWTID4		4.30*** (0.96)	
DSP500D4		-1.07*** (0.16)	
DGoldD4		-0.46*** (0.12)	
DUS10yrD4		-136.43*** (13.04)	
DPMID4		19.12*** (1.37)	
DWTID5			2.63* (1.54)
DSP500D5			-0.82*** (0.11)
DGoldD5			0.04 (0.11)
DUS10yrD5			10.90 (8.72)
DPMID5			19.58*** (1.23)

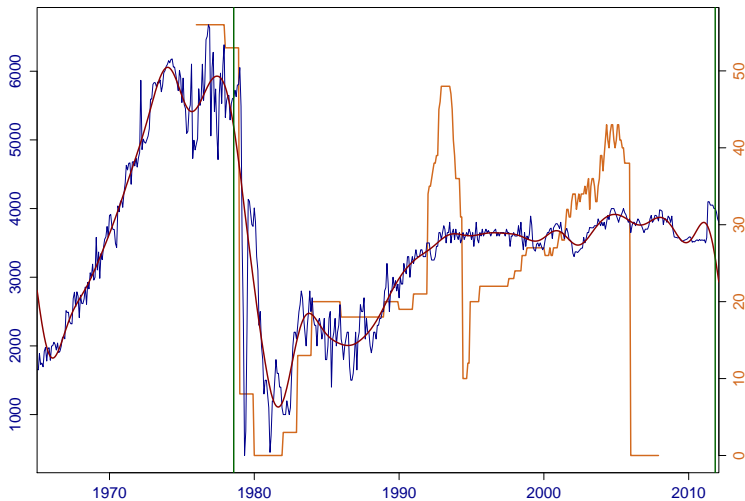
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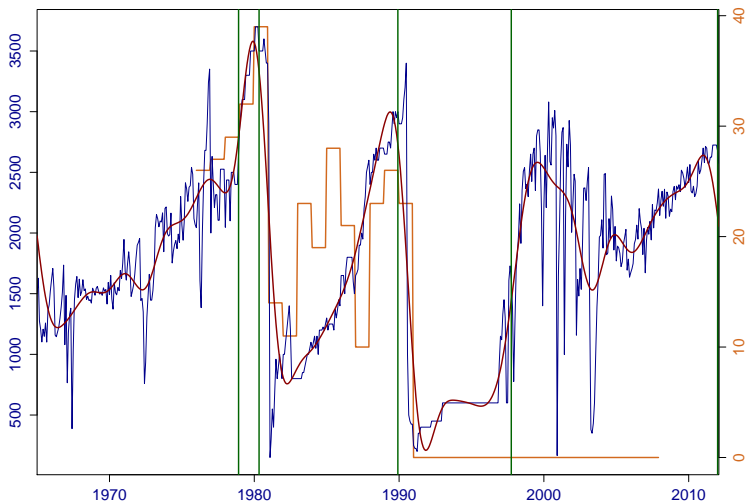
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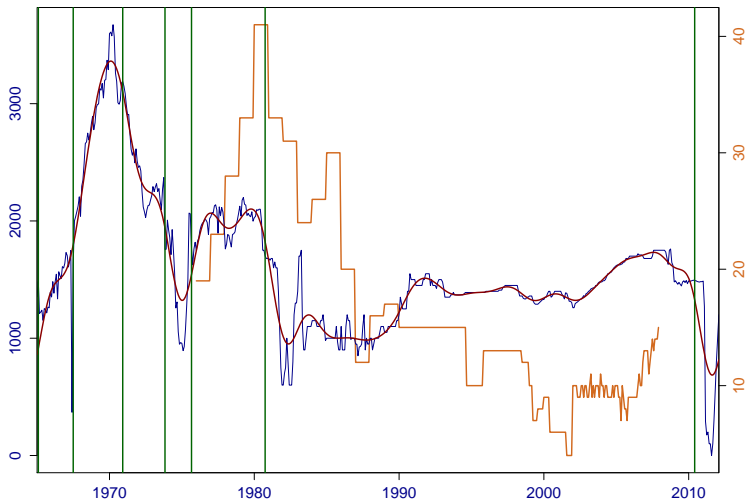
# Iran: Regime Change Leading to Disruption



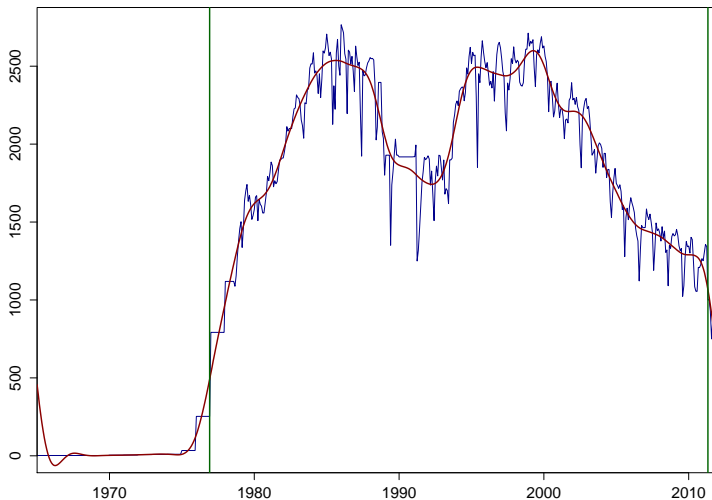
# Iraq: Boom, then War, then War, then Boom



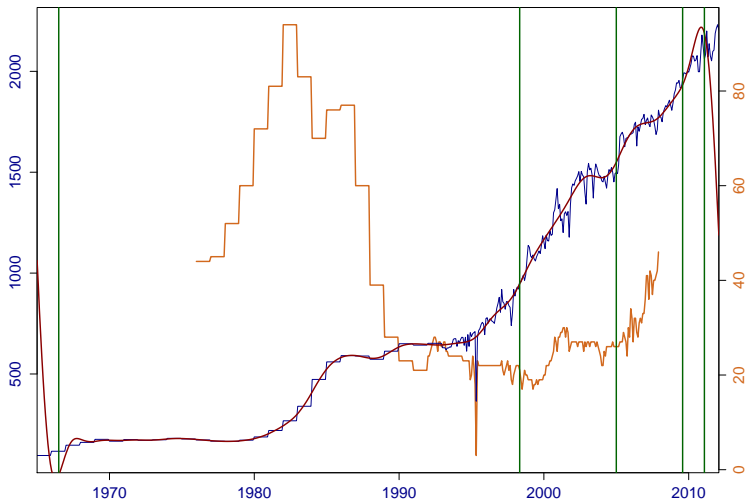
# Libya: Boom, then Regime Change, then Regime Insanity



# UK: Technical Advance + Economics

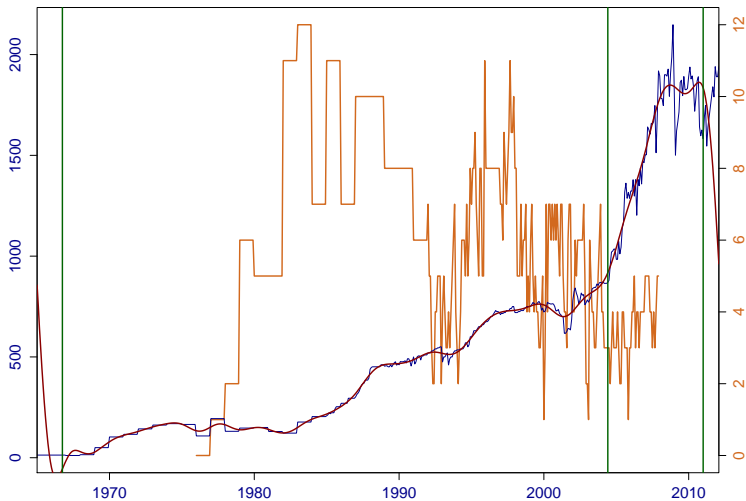


# Brazil: Technical Advance + Economics

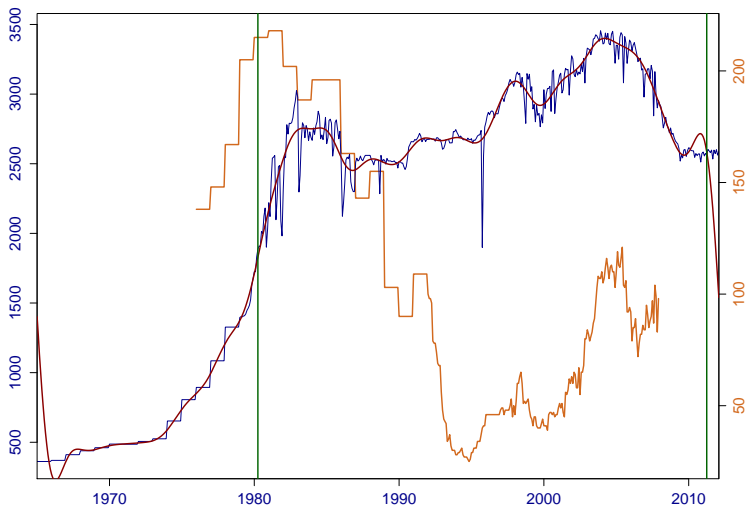




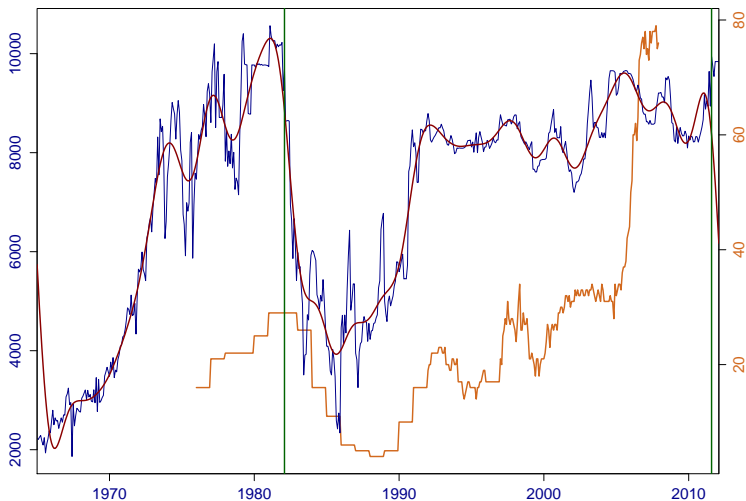
# Angola: Technical Advance + Economics



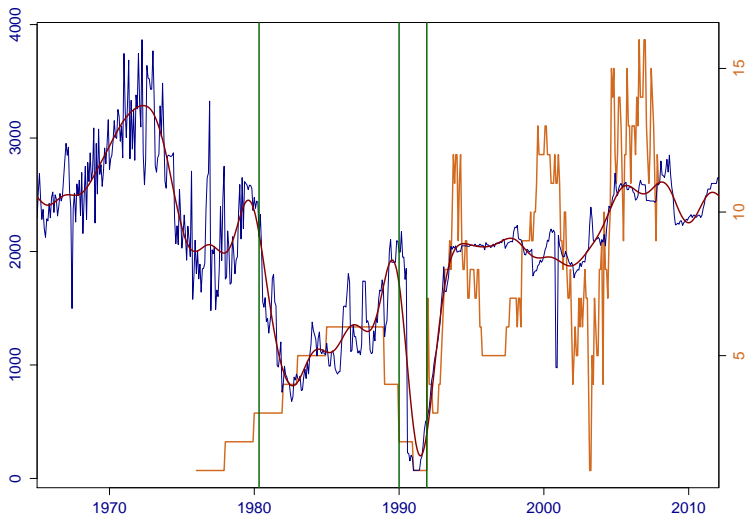
# Mexico: Economics, Technical Advance, or Both?



# Saudi Arabia: Responding to Economics (Mexico & UK?)



# Kuwait: Responding to Economics (Mexico & UK?) + War



# Venezuela: Boom (1970s), Plateau $\Rightarrow$ Regime Change (1999)!

