

Chronicle of a Deflation Unforetold

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Motivation

Lucas's 1995 Nobel lecture begins with Hume (1752) to display a tension at the heart of macroeconomics:

- ▶ neutrality of money seems “evident”
 - ▶ “If we consider any one kingdom by itself, it is evident that the greater or lesser plenty of money is of no consequence; since prices of commodities are always proportion'd to the plenty of money”
- ▶ but experience shows otherwise
 - ▶ “tho' the high price of commodities be a necessary consequence of the encrease of gold and silver, yet it follows not immediately upon that encrease, but some time is requir'd before the money circulate thro' the whole state, and make its effects be felt on all ranks of people”



Motivation (2)

How did Hume reach these two conclusions?

Mixture of

- ▶ loosely referenced empirical observations
 - ▶ “These facts I give upon the authority of Mons. de Tot”
- ▶ a priori reasoning: “magical” thought experiments
 - ▶ “suppose that, by miracle, every man in Britain shou’d have five pounds slipt into his pocket in one night”



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... Mons. de Tot [Dutot]’s observations were generated by just such an experiment, and they don’t support neutrality.

A little bit of magic

- ▶ August 1723 – September 1724: the French government reduced the nominal supply by 45%
- ▶ it did so in a series of four unforetold overnight reductions in the face value of currency
- ▶ 1723 – 1726: prices and wages fell slowly, and by less than 45%
- ▶ at the same time, (industrial) output contracted sharply
- ▶ 1726: the policy was reversed; (some) prices moved up quickly, output rebounded



Introduction

Monetary policy in 1720s France: a narrative

Quantitative evidence

In their own words

Conclusion

Coins and francs

the system consists of

- ▶ coins (physical objects, made of gold, silver)
 - ▶ produced by the mint on demand
 - ▶ medium of exchange, means of payment
- ▶ units of account (*livre* or *franc*)
 - ▶ denomination for contracts, debts, prices, wages
- ▶ relation between coins and francs : *legal tender*
 - ▶ a coin worth X gives the right to cancel a debt worth X



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 - ▶ a coin worth X gives the right to cancel a debt worth X
- ▶ legal tender value is set by government
- ▶ it can change over time:
 - ▶ stable from 1641 to 1690
 - ▶ changed many times between 1690 and 1726 (to raise seigniorage)



Reformations

A trick to raise revenue (borrowed from Spain):

- ▶ until t , the coin is worth 1
- ▶ at t , government offers the coin-holder a choice:
- ▶ pay y and the coin's value becomes $1 + x$ ($x > y$)
 - ▶ the coin is stamped ("reformed") as proof of payment
- ▶ not pay y and (eventually) the coin's legal value becomes 0

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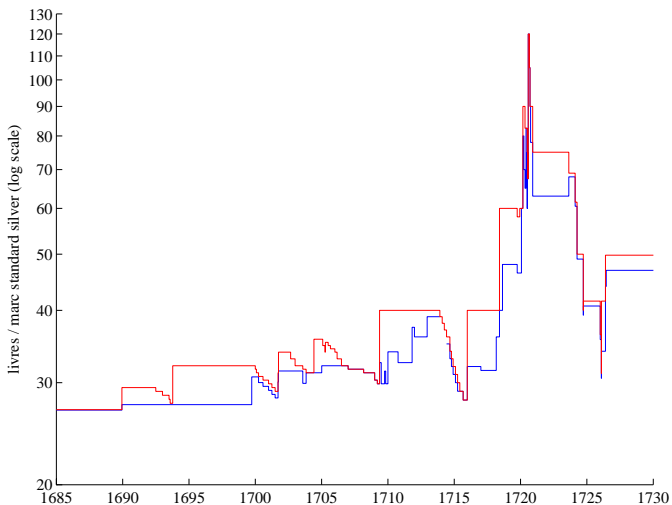
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These operations can be tracked by two indices:

- ▶ mint equivalent (ME): francs/weight of silver assigned to coins
- ▶ mint price (MP): francs/weight of silver paid by mint



ME and MP in France, 1685–1730



Monetary policy in the 1720s: motivation

Hard to ascertain because cabinet meetings were secret, no parliament.

Probable reasons:

- ▶ “tradition” of returning to prior level after emergencies
- ▶ prices and wages “too high”
- ▶ increase real value of government debt (anti-default)
- ▶ mis-aligned exchange rates (gap between MP and ME?)

Why unannounced?

- ▶ disruptions to economy less severe
- ▶ aftermath of Law’s System: stock of private debt small



Monetary policy (1)

- ▶ the government wants to lower the price level
- ▶ diminutions:

date	écu's value	diminution	cumulative diminution
	7.5		



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Sep 1724	4	-20.0%	-46.7%
recoinage			-44.7%

- ▶ apparent failure of prices and wages to react
- ▶ diminution of Sep 1724 announced to be “the last”



Monetary policy (2)

- ▶ manufacturing downturn in 1724–25
- ▶ harvest crisis of 1725
- ▶ looming European war: new taxes, another monetary reform
 - ▶ recoinage and augmentations

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Jan 1726	3.5	-12.5%	36.3
recoinage: new écu			
Feb 1726	5	+14.3%	41.5
May 1726	6	+20.0%	49.8



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- ▶ June 1726: government dismissed
 - ▶ unit of account remains (roughly) constant until 1914



Quantitative evidence

- ▶ prices:
 - ▶ on markets: only one sane market
 - ▶ producer and wholesale prices
- ▶ quantities produced and wages (manufacturing)

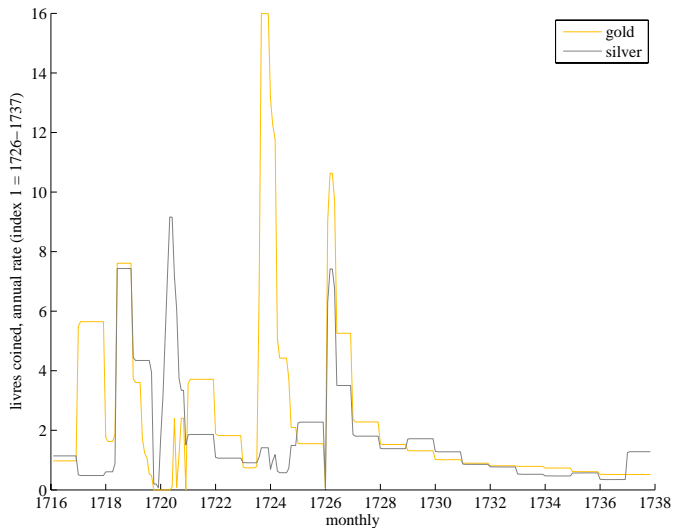
ME, MP, bullion prices

If p is price of bullion (in livres/pound):

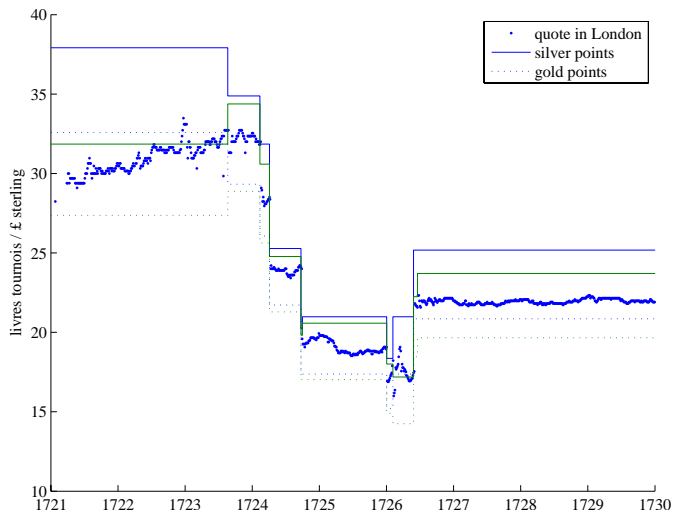
- ▶ $p = ME \Rightarrow$ coins melted (money stock falls)
- ▶ $p = MP \Rightarrow$ coins minted (money stock rises)
- ▶ No direct observations on p
- ▶ observations on minting flows
- ▶ observations on foreign exchange (claims to \sim bullion abroad)



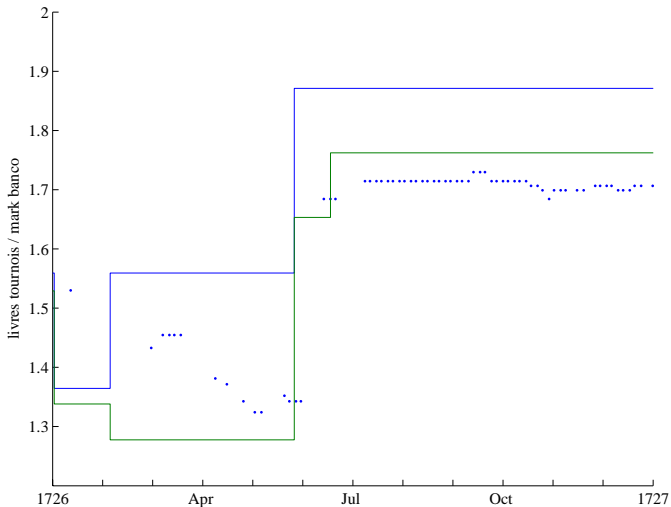
Minting volumes, 1716–38.



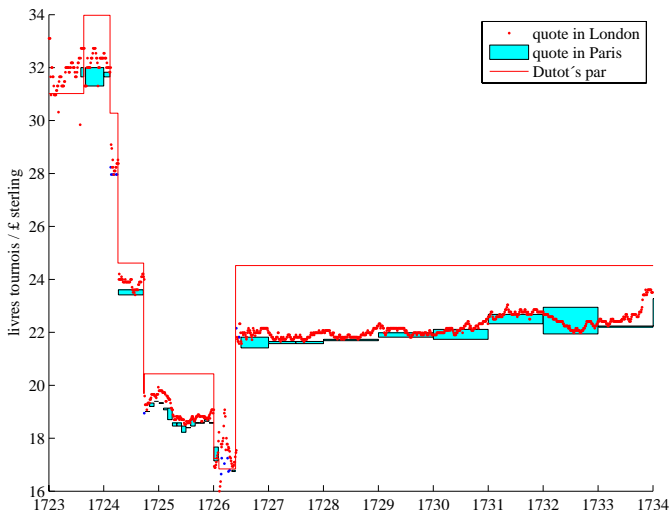
Exchange rates on Paris in London, 1721–29.



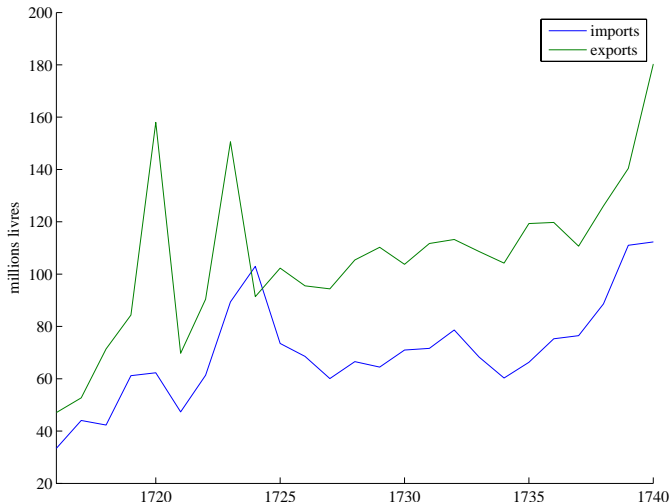
Exchange rates on Paris in Hamburg, 1726



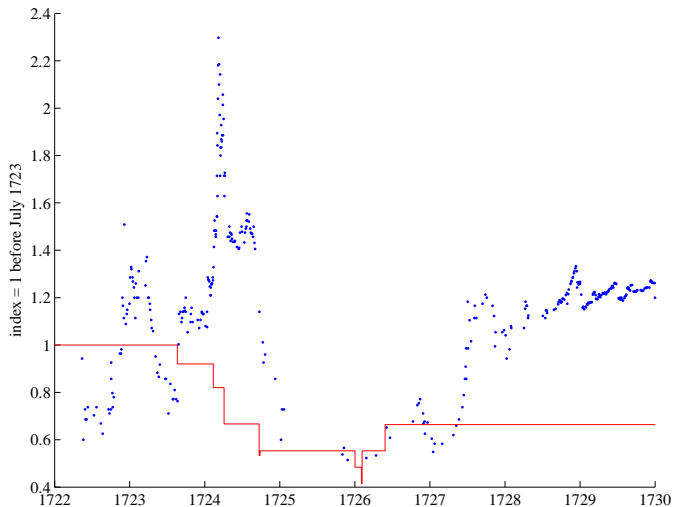
Exchange rate on London in Paris, 1723–34



Trade balance



Price of shares in the Compagnie des Indes, 1722–29

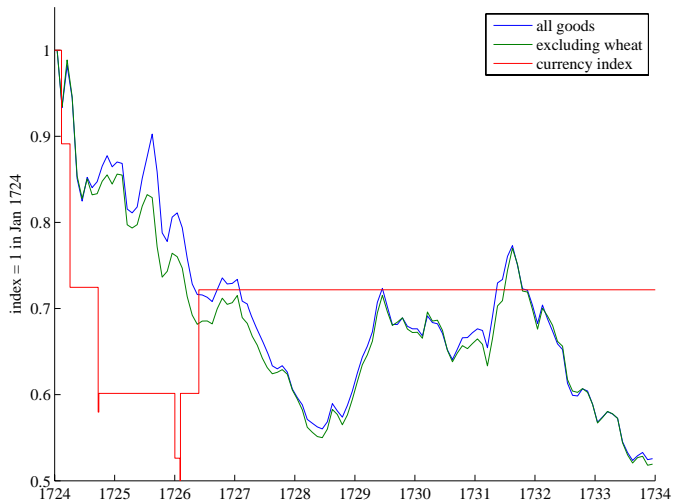


Markets day by day

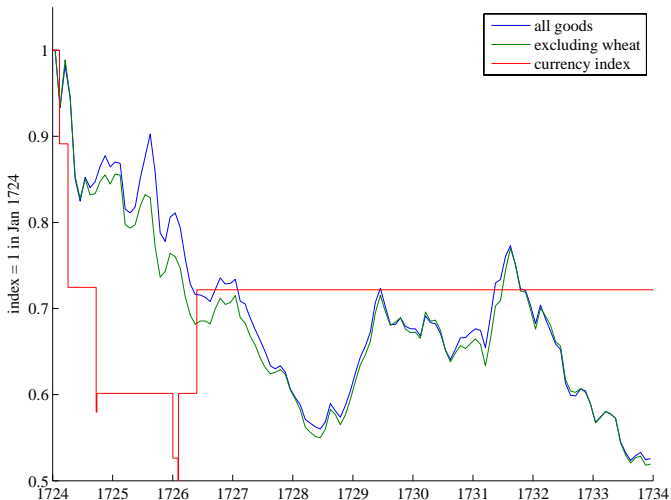
		high	wheat low	mode	bread high	low	eggs avg	pork avg	candles avg	butter avg	
Feb 1724	1	25.5			3.75		52.5	6.75	14.5	95	
	5	25.5			3.75		52	7.75	14.5	75	
	9	25			3.5		57.5	7.75	14.5	80	
	*	12	24.25		3.5		65	7.75	14.5	85	
		16	24.5		3.5		70	6.75	14.5	85	
Apr 1724	1	27.5			3.25				14.5	85	
	*	5	23.5		3.25				14.5	85	
		8	25		3.25				14.5	92	
		12	24.5		3.25				14.5	90	
Sep 1724	6	25			3		29	6.75	10.5	60	
	9	25.25			3		29.5	6.75	10.5	63	
	13	26.5			3.25		30	6.75	10.5	60	
	16	27.25			3.25		34	6.75	10.5	72	
	20	26.75			3.25		34	6.75	10.5	66	
	*	23	25		3.25		35	6.75	10.5	65	
		27	25.75		3.25		32	6.75	10.5	63	
		30	26		3.25		36.5	6.75	10.5	65	
	May-Jun 1726	15	24.5	12	20	2.75	2.5	24	5.75	9.75	46
		18	24	12.5	18.25	2.75	2.5	23	5.75	9.75	46
22		24	12	19	2.75	2.5	25	5.75	9.75	46	
25		23.25	12	18.5	2.75	2.5	23.5	5.75	9.75	46	
*		29	23.25	12	20.5	2.75	2.5	23.5	5.75	9	43
		1	23.25	12.5	19.9	2.75	2.5	23.5	6	9	42
		5	23.25	13	21	2.75	2.5	25	6.25	9	
		8	23.25	13	22	2.75	2.5	24.5	7.25	9	42
		12	23	13	21	2.75	2.5	23.5	6.75	9	40



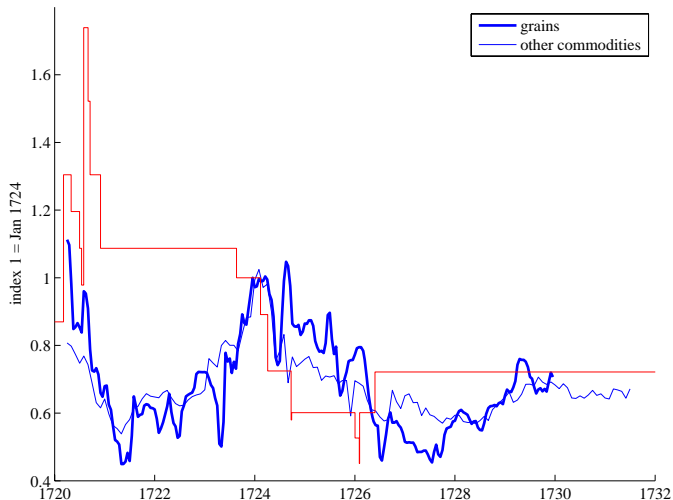
Foodstuffs: the Halles, monthly, 1724–33



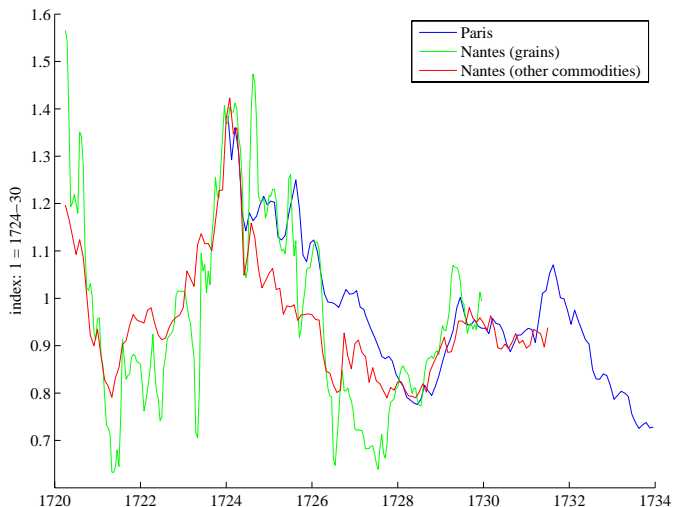
Grains: the Halles, weekly, 1724–33



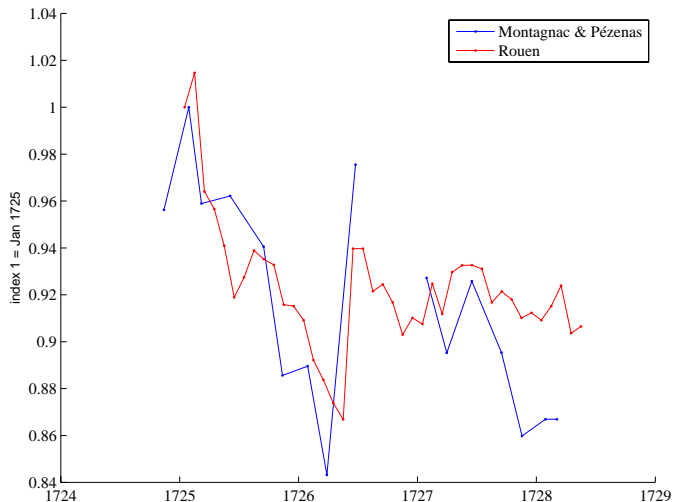
Grains and other commodities: Nantes, monthly, 1720–31



Paris and Nantes, compared



Prices of cloths (Pézenas and Montagnac fairs, Rouen cloth-hall)



Price changes at fairs (%)

	ME	Price changes (%)		
		mean	median	std dev
Amiens cloth-hall (107 cloths) Jan 1724 to Oct 1724	-40	-25	-25	6.5
Clermont fair (42 cloths) May 1724 to Aug 1724	0	7	5	6.7
St. Germain fair (22 cloths) Feb 1724 to Feb 1725	-40	-33	-33	6.0



Sources

- ▶ woolen industry regulated: quality standards set and enforced
- ▶ regional inspectors certify each bolt
- ▶ from 1714, they are asked to produce a census
- ▶ semi-annual reports listing:
 - ▶ location, type of cloth (name, width, length), wool prices, cloth price, looms working, looms idle, producers, pieces produced
 - ▶ many reports are missing
- ▶ some reports on regional fairs (quantities brought, sold, prices)

18th c. spreadsheets

Departement de Toulouse ESTAT des Manufactures de Draperies & autres Etoffes de Laine.

<i>Ville</i> de Fabrique.	NOMS des Etoffes.	MATIERES qui s'emploient dans la Fabrique des Etoffes.	PRIX courant des Maitres.	LONGUEUR des Etoffes.	LARGEUR des Etoffes.	PRIX des Etoffes.	MESTIERS laineux en charge espece d'Etoffes.	MESTIERS laineux travail.	NOMBRE des Fabriquans.	PIECES d'Etoffes fabriquées.
<i>Alby</i>	<i>Drogy ravinée</i>	<i>Laine de laine - Lustrage</i>	1.15 ⁰ .	36 aul'	1/2 aul'	2.15 ⁰				370.
	<i>Rago</i>	<i>même laine</i>	même prix	60 aul'	3/8 aul'	même prix	50	32.	20	
	<i>Bayetta</i>	<i>Laine de pain Commune</i>	1. ⁰ .	33 x 34 aul'	3/8 aul'	2. ⁰ .				
<i>Gaillac</i>	<i>Burata</i>	<i>Laine de pain</i>	1.15 ⁰	45 aul'	1/2 aul'	2. ⁰ .				60.
	<i>Caria</i>	<i>même laine</i>	même prix	même long'	même larg'	2.15 ⁰	10	4	4	
	<i>Rago</i>	<i>même laine</i>	même prix	même long'	même larg'	même prix				
<i>Lisle</i>	<i>Caria</i>	<i>même laine</i>	1.15 ⁰	45 aul'	1/2 aul'	2.15 ⁰				120.
	<i>Cordelata</i>	<i>Laine commune de pain</i>	1. ⁰ 3/4	même long'	même larg'	2. ⁰ .	12	2	3	
	<i>Sargues larges</i>	<i>dit en laine de pain la plus commune</i>	même prix	38 aul'	3/8 aul'	1.16 ⁰ aul'				
<i>Rabastin</i>	<i>Sargues étroites</i>	<i>même matière</i>	même prix	même long'	1/2 aul'	1. ⁰ 6/8 aul'				50.
	<i>Sargues larges</i>	<i>même matière</i>	même prix	même long'	même larg'	même prix	8	16	2	
	<i>Sargues étroites</i>	<i>même matière</i>	même prix	même long'	même larg'	même prix				
							80	54	31	600.

On a recoté par le dernier Etat des Manufactures d'Etoffes de ce Departement qu'il y avoit 70 Maitres barons, & qu'il a été fabriqué 770 Pièces d'Etoffes. Le présent Etat fait voir qu'il y a actuellement 80 Maitres barons, & qu'il a été fabriqué 600 Pièces d'Etoffes. Par conséquent le présent Senechal est 20 Maitres de plus que le precedent de la quantité de Maitres barons, & de 170 Pièces d'Etoffes.



Missing data

	1714	1715	1716	1717	1718	1719	1720	1721	1722	1723	1724	1725	1726	1727	1728	1729	1730	1731	1732	1733	1734	1735	1736	1737	1738	1739	1740
Abbeville			x	x	x	x	x	x	x	x		x	x		x				x								
Alençon	x											x		x	x												
Amiens			x	x	x	x	x	x	x	x		x		x	x				x		x			x	x		
Auch			A										x											x	x		
Auvergne											x	x			x	x											
Aumale	x		x	x	x	x						x		x	x				x	x	x	x		x			
Beauvais			x	x							x	x		x	x								x				
Bourges			x	x	x	x	x				x		x														
Bretagne (basse)								A				x															
Bretagne (haute)			A		A		x				x	x	x	x	x	x				x	x						
Caen	x	x	x	x	x	x	x							x	x					x					x	x	x
Carcassonne				A							A		x	x	x	x	x							x	x		
Castres, St-Pons	x	x	x	x				x	x	x	x	x	x	x	x	x	x										
Dreux						x									x	x											
Faix			A							x		x															
Granilliers	x	x	x	x	x	x	x				x	x															
Limousin											x	x			x	x											
Mantouan			A									x	x														
Montpellier			x								x	x	x	x	x	x											
Moulins			A																								
Nîmes												x	x														
Orléans			A		x								x	x													
Poitiers				x	x						x	x	x	x	x												
Reims							x	x			x	x		x													
Rouen		x										x		x													
Saintonge			A								x	x	A			x	x										
Sedan					A	x						A	x			A	x										
Sologne			x	x	x	x						x	x														
Toulouse			A			x						x	x	x													
Troyes (Champagne)			A				A	A				A															

Statistical model

- ▶ Each series is log-normalized:

$$y_{it} = \log(Y_{it}), \quad \Upsilon = \frac{y_{it} - \bar{y}_i}{\sigma_{yi}}$$

- ▶ The model is:

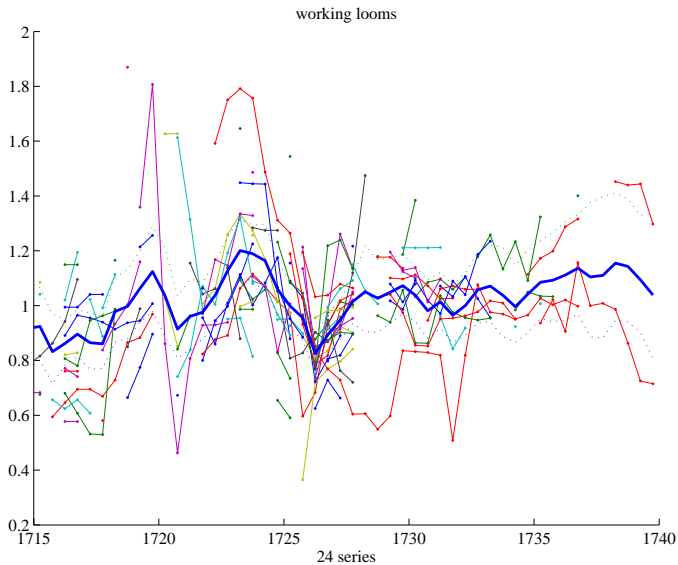
$$\begin{aligned} \Upsilon_{it} &= \lambda_i \mu_t + g_t + \epsilon_{it}, \\ g_t &= - \sum_{i=1}^{s-1} g_{t-i} + \omega_t, \\ \mu_t &= \mu_{t-1} + \nu_t + \xi_t, \\ \nu_t &= \nu_{t-1} + \zeta_t \end{aligned}$$

$$\epsilon_{it} \sim (0, \sigma_\epsilon^2), \quad \omega_t \sim (0, \sigma_\omega^2), \quad \xi_t \sim (0, \sigma_\xi^2), \quad \zeta_t \sim (0, \sigma_\zeta^2), \quad \sigma_\zeta^2 \equiv 1, \quad \lambda_i = 1.$$

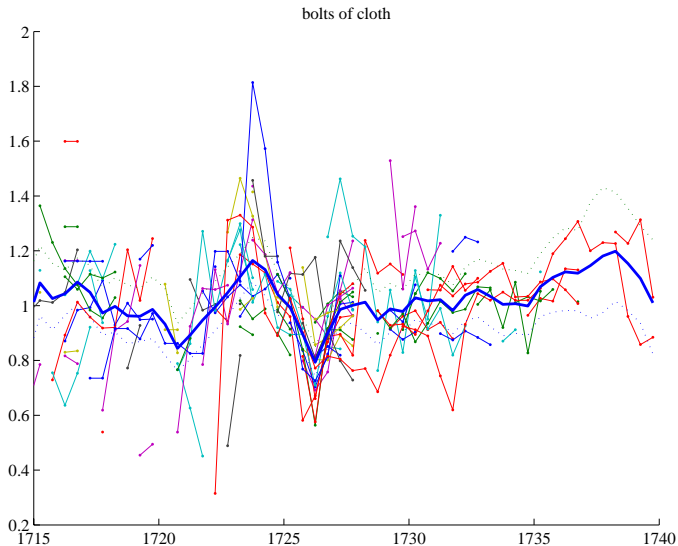
- ▶ The common index is scaled by the average of σ_{yi} .
- ▶ with $\sigma_\xi^2 = 0$, this is a HP filter with smoothing parameter chosen by MLE.



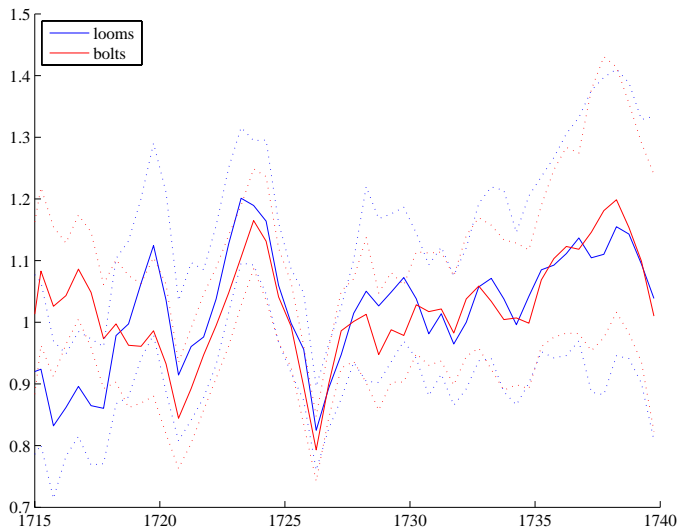
Looms working



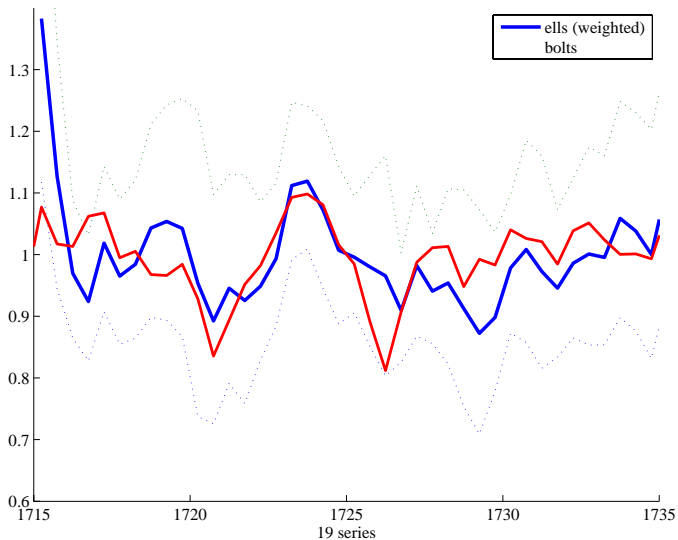
Bolts produced



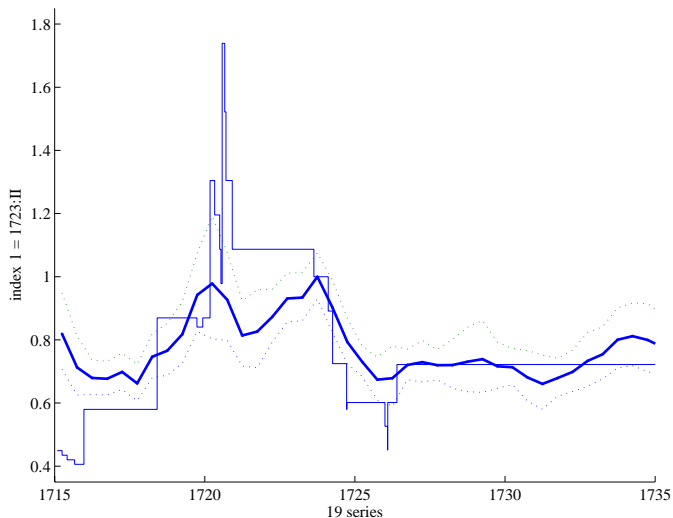
Indices of bolts and looms



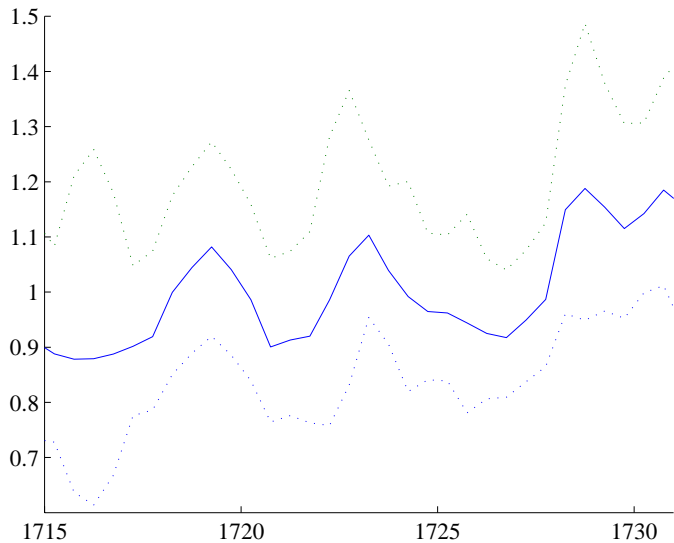
Comparison of weighted and unweighted quantities



Weighted price index of bolts



Linens



Price changes in silks (%)

	ME	Prices		
		mean	median	std dev
prices in Lyon for 11 silks Dec 1723 to May 1724	-26	-32	-43	5.7
prices in Lyon for 44 silks before Sep 1724 to Nov 1724	-20	-16	-16	6.5



Wages in the Carcassonne district

	1712	1716	1719	1723	July 1724	Dec 1724	1726:s1	1726:s2
wages								
Carcassonne	1.00	0.87	1.24	1.27	1.26	0.84	0.85	0.97
Montagne	1.00	0.86	1.03	1.23	1.24	0.91		
Mazamet	1.00	1.02	1.03	1.48	1.49	1.04		
Dourgne	1.00	1.05	1.08	2.07	1.79	1.43		
all	1.00	0.88	1.12	1.26	1.26	0.88		
output prices								
Carcassonne	1.00	0.87	1.94	1.53	1.31	0.91	0.84	1.10
w/p	1.00	1.00	0.64	0.83	0.96	0.93	1.02	0.89
ME	1.00	1.00	1.50	1.88	1.25	1.04	1.04	1.24



In their own words

The government's baseline model

It is true that, far from seeing a reduction in the prices and wages, by a barely conceivable madness it seems that everyone in concert insists on doing the opposite of what common sense and reason dictate; since by giving almost double the weight of silver that one gave twelve or fifteen months ago, one obviously ought to receive the good at half its former rate, yet everyone is so accustomed to sell dearly that no one can bring themselves to lower their prices.

Courteilles, intendant in Bourges (Oct 1724)

What can explain the madness?



Price pressures

- ▶ grains (mediocre harvests in 1722, 1723), other foodstuffs
- ▶ fodder (energy shock!)
- ▶ wages
 - ▶ “excessive” demand for labor in industry
 - ▶ consumption habits of workers had changed
 - ▶ demographic factors

... might explain high prices in 1723, not failure to fall in 1724.

Expectations

- ▶ “wheat has increased, supposedly on a rumor of an impending diminution for the next day. The fear of losing on the coins the seller would receive is enough to produce the increase in prices.” (Feb 1724)
- ▶ “so far the diminutions have not had the expected result because merchants and workers foreseeing that more could take place have used this pretext to increase prices rather than lower them” (Apr 4, 1724)
- ▶ at the fair in Beaucaire (July 1724) “money was abundant which resulted in high prices because everyone wanted to spend it to avoid the feared diminution”
- ▶ government: “experience has shown us that the prices of commodities and goods is influenced less by the value of coins than by the fear of an impending reduction on coins and uncertainty over their future value” (Sept 1724)



Credibility

- ▶ after the 1st diminution, “almost all prices have increased, as must naturally happen until coins are closer to their intrinsic value and until Frenchmen and foreigners are convinced that you have firmly resolved not to vary once you have reached the point to which you undoubtedly want to reduce coins” (Feb 1724)
- ▶ “traders let themselves believe that it would become necessary to increase the value of coins to improve trade, and most still believe it” (March 1725)



Coordination failure/general equilibrium

- ▶ high price of cloth \Rightarrow high wages \Rightarrow high price of cloth
- ▶ high prices in neighboring provinces \Rightarrow high price in my province

Government tries to persuade producers, traders, merchants to lower their prices simultaneously (but rejects price controls)

Nominal Debts

- ▶ one reason for unannounced diminutions was belief that stock of private debt was low
- ▶ but there were leases, rental contracts, trade credit . . .
 - ▶ “in vain would one ask merchants to cut the price of their wares by a third if one does not reduce by a third the leases on their shops”
(mayor of Nantes, Apr 1724)

Conclusion

- ▶ magical experiment: unannounced, instantaneous proportional increase in nominal cash balances (“once and for all”)
 - ▶ not as clean as one would like (prior history of monetary policy, second-guessing of government)
- ▶ massive failure of the quantity theory
 - ▶ one lone market reacts sanely (foreign exchange)
 - ▶ other prices ignore monetary policy
- ▶ industrial recession: coincidence or causation?
 - ▶ some evidence that the downturn began in mid-1723
 - ▶ endogeneity: policy may have been prompted by “overheating”
 - ▶ evidence of “credit crunch”



Explanations

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 - ▶ the operation was well-publicized
- ▶ sticky prices?
 - ▶ failure of prices to respond to money documented even in market contexts (foodstuffs, wages)
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- ▶ the French are crazy?...