

Assignats or Death: Inflationary Finance in Revolutionary France

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- ▶ Constitutional reform occurred in the midst of hyperinflation
 - ▶ Addressed public finance issues responsible

Inflationary Finance and the Rules of the Game

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 - ▶ Given overlap of political instability and hyperinflation

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 - ▶ Misleading estimates of the revenue-maximizing inflation rate

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- ▶ On the wrong side of the bond finance “Laffer curve:”
 - ▶ “New loans can only increase the current deficit”

- Jacques Necker (1789)

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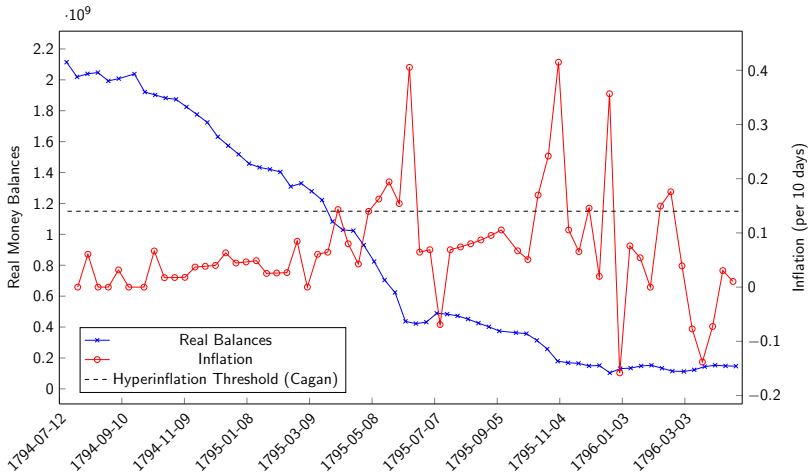
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 - ▶ Inflation remained mild until July 1794
- ▶ From 1794 to 1796, prices increased by more than 11,000%

The Beginning of Hyperinflation

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Real Balances and Inflation



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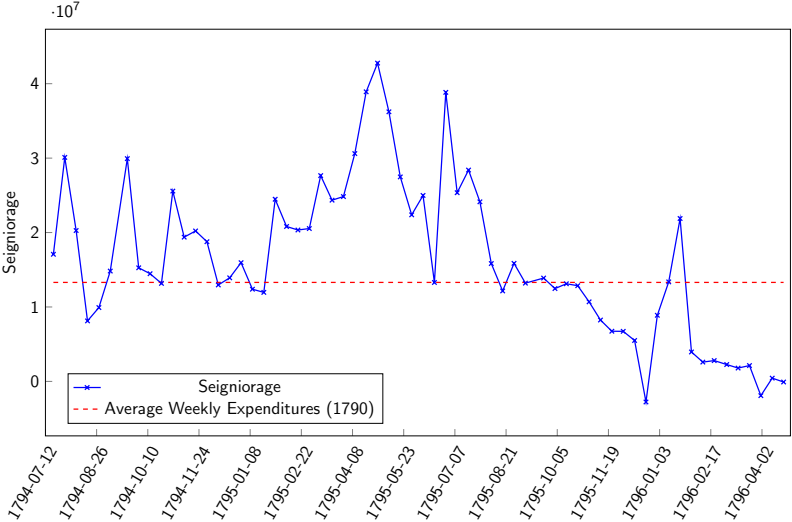
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 - ▶ Demand for the *assignat* collapsed as a result

Real Seigniorage (in December 1790 pounds)



Public's View of Constitutional Reform and Inflation

“We must believe that the hope of a new Constitution would bring consolation in the hearts and would reduce the price of commodities. Whatever the cause, the price of goods and particularly that of edibles has increased by almost a third. This circumstance should hasten the debates to which the new plan of Constitution will give rise, and above all determine the government to put a very prompt economy in its finances.”

Courrier français (1795)

Evidence from Police Reports

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- ▶ “Courage and patience is needed; it is only gradually [...] that the Constitution will be organized, that the price of foodstuffs will decrease and abundance will be reborn with trust.”

Evidence from the Constitutional Convention

- ▶ Politicians worried that hyperinflation would lead to a coup
 - ▶ And that such a coup would likely result in their deaths
- ▶ “[W]e run the risk of being hooked to the lantern.”

A Model of Inflationary Finance: Assumptions

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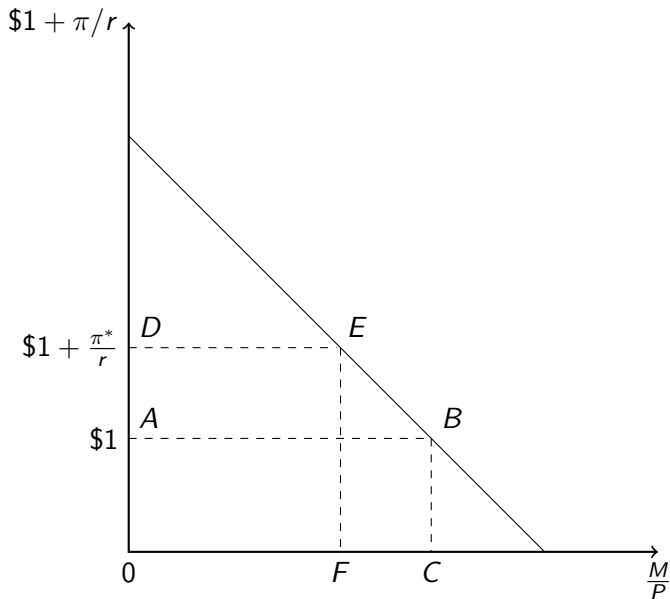
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- ▶ Government possesses monetary monopoly

The Demand for Money



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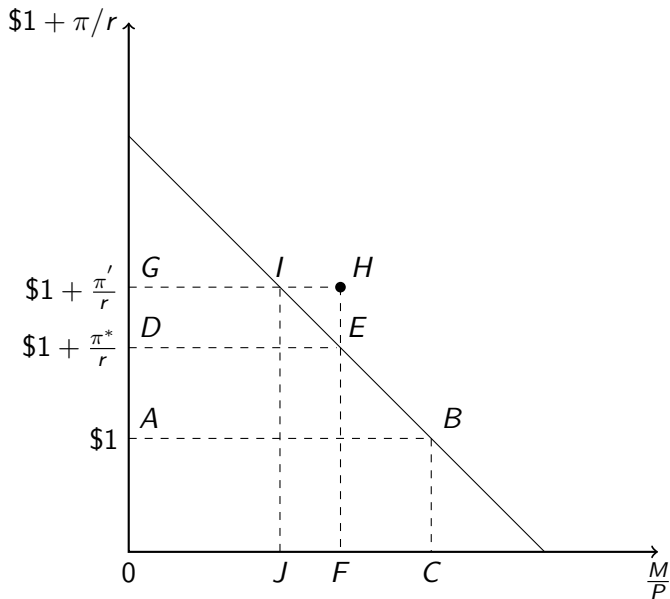
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 - ▶ Possible to push the public off their demand curves

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- ▶ With a known end date, cooperation cannot be sustained
 - ▶ Government's dominant strategy is to maximally inflate

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- ▶ Estimation requires minimal assumptions about expectations
 - ▶ Cannot rely on adaptive or rational assumptions

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- ▶ Gold price correlated with prices of other commodities

TABLEAU de la mise en émission, du brûlement, du restant en circulation et du cours de la papier-monnaie en France.

DATES.	MONTANT DE L'ÉMISSION.	RETIÉE DE LA CIRCULATION.	RESTANTE EN ÉMISSION.	COURS MOYEN en numéraire pour 100 livres en assignats.	DATES.	MONTANT DE L'ÉMISSION.	RETIÉE DE LA CIRCULATION.	RESTANTE EN ÉMISSION.	COURS MOYENS en numéraire pour 100 livres en assignats.
1 ^{er} JUIN 1791	1,112,000,000	200,000,000	912,000,000	851 ss. nd.	AN 4.				
1 ^{er} OCTOBRE 1791	1,451,500,000	300,000,000	1,151,500,000	82	1 ^{er} VENDÉMAIRE	20,353,719,780	3,122,575,487	17,271,144,293	21. 18. 3d.
2 ² SEPTEMBRE 1792	2,589,000,000	617,000,000	1,972,000,000	66	11	3,226,877,627	17,879,337,898	1 19 3	
1 ^{er} JANVIER 1793	3,625,906,618	800,000,000	2,825,906,618	61	21	21,886,215,525	3,209,299,627	18,595,915,896	1 10 8
AN 2.					1 ^{er} BRUMAIRE	22,801,411,658	3,339,242,627	19,462,168,831	1 2 3
16 FLOREAL	7,961,164,318	2,069,785,117	5,891,479,201	37	11	23,902,163,852	3,425,697,727	20,476,466,125	16 6
21	7,981,171,318	2,069,785,117	5,911,379,201	37	21	24,974,799,695	3,503,692,227	21,471,107,468	15 6
1 ^{er} PRAIRIAL	8,026,941,998	2,121,173,117	5,905,768,881	36	1 ^{er} FIMAIRE	25,929,355,022	3,583,424,227	22,346,133,493	14 6
11	8,092,439,133	2,150,497,334	5,942,041,799	36	21	27,004,645,009	3,664,932,127	23,339,712,972	11 3
1 ^{er}	8,185,235,383	2,179,189,934	6,006,045,449	34	21	27,994,803,586	3,884,015,127	24,210,788,459	12 6
1 ^{er} MESSIDOR	8,236,218,735	2,181,920,934	6,054,297,801	34	1 ^{er} NYVÔSE	29,254,871,618	5,581,466,190	23,673,405,428	9 6
11	8,296,218,735	2,214,166,934	6,082,051,801	34	11	31,236,703,586	5,681,466,190	25,555,237,396	8 9
1 ^{er}	8,400,685,654	2,233,432,734	6,167,252,920	34	1 ^{er} PLEVYÔSE	33,697,286,102	5,700,000,000	28,997,286,102	9 3
1 ^{er} THERMIDOR	8,471,239,365	2,253,833,734	6,217,405,635	34	11	38,752,689,790	5,500,000,000	33,252,689,790	8 9
11	8,577,705,127	2,268,966,734	6,308,738,393	34	11	39,676,128,947	5,775,000,000	33,901,128,947	8 9
1 ^{er} FRACTIDOR	8,658,897,886	2,289,811,734	6,369,086,152	32	1 ^{er} VENTÔSE	40,278,801,162	5,775,000,000	34,503,801,162	7 6
11	8,704,033,434	2,306,567,734	6,397,465,700	32	11	41,094,778,942	5,800,000,000	35,294,778,942	6 6
1 ^{er}	8,750,319,973	2,321,327,734	6,428,992,239	31	11	41,905,732,831	5,900,000,000	36,005,732,831	7 9
21	8,817,512,027	2,340,701,734	6,476,810,293	31	11	42,809,191,331	6,250,940,127	36,558,191,204	7 9
AN 3.					1 ^{er} GERMINAL	43,912,615,731	6,764,653,627	37,147,962,104	8 3
1 ^{er} VENDÉMAIRE	8,931,655,594	2,358,291,234	6,573,364,360	31	11	44,066,801,339	7,355,030,627	36,711,770,712	8 3
11	8,997,588,404	2,379,291,234	6,618,297,170	29	1 ^{er} FLOREAL	45,339,579,229	8,426,045,627	36,913,533,602	7 8
11	9,094,858,058	2,420,299,234	6,674,628,824	28	11	45,452,979,229	9,270,596,627	36,221,982,602	5 9
1 ^{er} BRUMAIRE	9,157,346,628	2,436,091,754	6,721,254,874	28	1 ^{er} PRAIRIAL	45,543,793,804	9,732,781,127	35,800,494,677	4 6
11	9,259,869,163	2,446,471,754	6,813,397,409	27	11	45,563,449,229	10,136,093,127	35,427,356,102	3 9
21	9,337,949,423	2,462,727,754	6,875,221,669	26	1 ^{er} MESSIDOR	45,569,443,297	10,140,493,127	35,428,950,170	3 6
1 ^{er} FIMAIRE	9,422,023,508	2,461,037,754	6,960,985,754	25	11	45,576,169,977	10,885,206,669	34,690,963,308	
11	9,507,737,366	2,469,086,254	7,038,651,112	24	21	45,578,809,297	11,070,049,711	34,508,759,586	
1 ^{er} NYVÔSE	9,595,186,066	2,477,480,261	7,097,705,805	23	11	45,578,809,317	11,174,474,711	34,404,334,606	
11	9,600,369,366	2,500,369,261	7,134,619,266	23	1 ^{er} THERMIDOR	45,578,809,317	12,023,219,288	33,555,590,028	
1 ^{er}	9,717,218,455	2,518,303,272	7,228,915,183	21	11	45,578,810,025	12,505,354,528	33,072,469,497	
11	9,828,263,637	2,538,984,732	7,289,278,905	20	21	45,578,810,025	12,743,905,807	32,834,904,218	
1 ^{er} PLEVYÔSE	9,900,109,222	2,550,255,710	7,349,853,512	19	RESRIPTIONS				
11	10,040,627,717	2,563,612,732	7,477,014,985	18	ET MANDATS.				
11	10,163,824,037	2,575,783,732	7,588,040,305	18	22 GERMINAL	60,700,000			16
1 ^{er} VENTÔSE	10,296,584,997	2,593,736,732	7,702,848,265	17	11 FLOREAL	91,831,125			12 1
11	10,431,489,913	2,607,799,732	7,823,690,181	17	11	138,045,325			12 10
21	10,613,205,978	2,622,679,732	7,990,526,246	16	11	212,999,025			12 1
1 ^{er} GERMINAL	10,787,371,498	2,638,718,732	8,148,652,766	15	11 PRAIRIAL	353,374,025			7 1
11	10,985,429,063	2,655,483,382	8,329,945,681	13	11	402,025,025			7 10
21	11,240,427,947	2,668,203,787	8,572,224,160	12	Pour 100 francs en mandats.				
1 ^{er} FLOREAL	11,588,193,032	2,678,684,787	8,909,508,245	11	22 GERMINAL	60,700,000			16
11	11,996,423,654	2,693,129,137	9,303,294,517	10	11 FLOREAL	91,831,125			12 1
1 ^{er}	12,497,483,623	2,717,027,417	9,780,456,206	8	11	138,045,325			12 10
11	12,789,403,825	2,732,536,038	10,056,867,787	7	11 PRAIRIAL	353,374,025			7 1
21	13,189,403,825	2,749,036,038	10,440,367,787	8	11	402,025,025			7 10

Plan de cours à cause de l'émission des mandats.

Pour 100 francs en mandats.

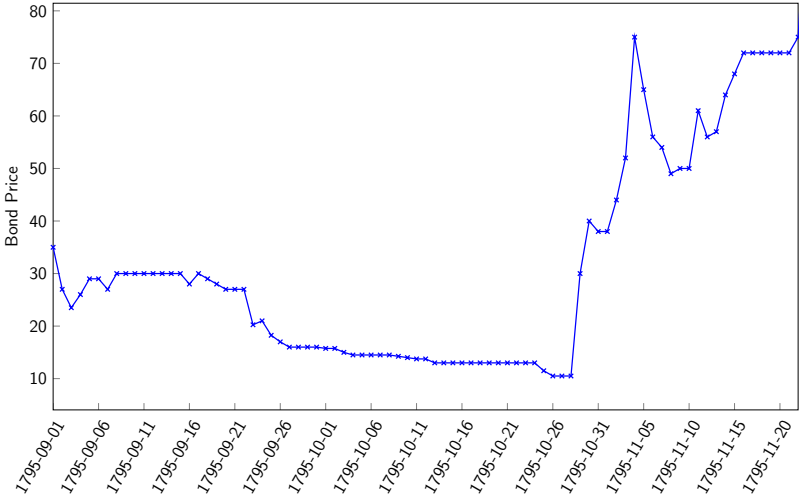
Summary Statistics

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Whole period (May 10 1794 to May 10 1796)					
<i>log(Real Money balances)</i>	73	20.24178	1.089679	18.45577	21.47849
$\Delta\log(Prices)$	73	.065968	.0986267	-.1582222	.4149466
First period (May 10 1794 to November 2 1796)					
<i>log(Real Money balances)</i>	54	20.77258	.7093434	19.00384	21.47849
$\Delta\log(Prices)$	54	.0688343	.088452	-.0689907	.4149466
Second period (November 12 1795 to May 10 1796)					
<i>log(Real Money balances)</i>	19	18.73318	.1431112	18.45577	18.94592
$\Delta\log(Prices)$	19	.0578215	.1256089	-.1582222	.3566732

Evidence of a Structural Break

Wald Test for a Structural Break		
Sample	May 10, 1794 - May 10, 1796	July 29, 1794 - March 22, 1796
Supremum Wald Statistic	657.1485***	421.1725***
P-value	0.000	0.000
Break Date	November 12, 1795	November 12, 1795
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$		

Perpetual Bond Prices and Regime Change



Qualitative Evidence

- ▶ Police report notes that:
 - ▶ “[T]he project of the Convention was to demonetize the *assignats* of ten thousands and five hundred pounds and that people added that several members of parliament did not hesitate to say in their societies that there was no other ways to bring in seven or eight billion of *assignats* on the fifteen which are circulating.”

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- ▶ On November 12, 1795, a report to the minister of the Interior indicates that:
 - ▶ “We expect a partial demonetization of the assignats.”
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 - ▶ The public sees the *assignats*’ “annihilation as proximate.”

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 - ▶ α may not be independent of the “rules of the game”

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- ▶ If real balances and inflation are cointegrated
- ▶ Then we can estimate money demand using OLS

Augmented Dickey-Fuller Tests

Variable	t-Statistic	1% Critical Value	p-Value for Z(t)
1st Difference in Change in Money Demand	-6.668	-3.551	0.0000
1st Difference in Change in Prices	-14.305	-3.551	0.0000

Johansen Tests for Cointegration Across Periods

Period	# of Obs.	Max Rank	Eigenvalue	Trace Statistic	1% Critical Value
1	52	0	.	26.4951	20.04
		1	0.34174	4.7513*	6.65
		2	0.08732		
2	19	0	.	56.4976	20.04
		1	0.93324	5.0719*	6.65
		2	0.23428		
Period	# of Obs.	Max Rank	Eigenvalue	Trace Statistic	5% Critical Value
1-2	70	0	.	16.6470	15.41
		1	0.21164	0.0012*	3.76
		2	0.00002		

Results

	May 10 1794 to May 10 1796			July 29 1794 to March 22 1796		
	(1) 1st Period	(2) 2nd Period	(3) Entire Period	(4) 1st Period	(5) 2nd Period	(6) Entire Period
Inflation	-5.1329*** (0.9461)	-0.5215* (0.2492)	-2.7998** (1.3746)	-4.6019*** (0.9551)	-0.3512 (0.3057)	-2.2419 (1.4421)
Intercept	21.1259*** (0.1001)	18.7633*** (0.0320)	20.4265*** (0.1799)	21.0198*** (0.1202)	18.7535*** (0.0339)	20.3727*** (0.1983)
Seigniorage Maximizing Rate	19.5%	191.7%	35.7%	21.7%	284.8%	44.6%
<i>N</i>	54	19	73	46	14	60
<i>R-Squared</i>	0.4097	0.2095	0.0642	.3575	.1022	.0494

Robust Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results

- ▶ Cagan's alpha falls from **-5.13***** for the period establishment of the Directory to **-0.52*** for the period after.

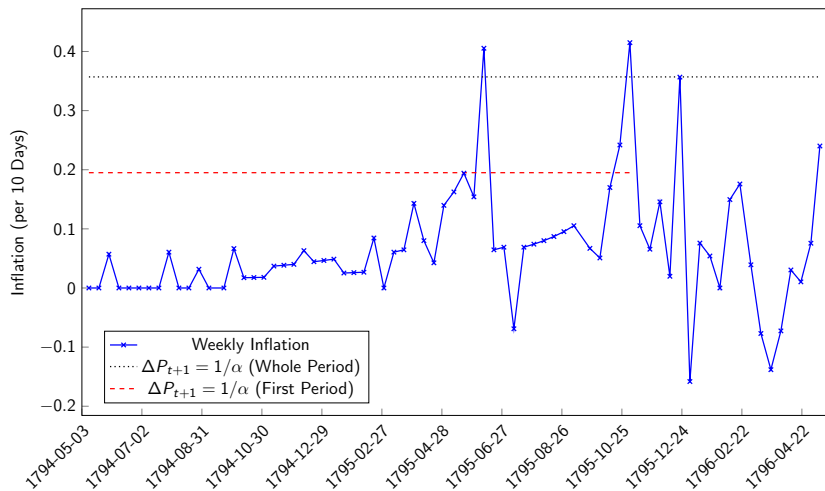
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Results

- ▶ Cagan's alpha falls from **-5.13***** for the period establishment of the Directory to **-0.52*** for the period after.
- ▶ This corresponds to an increase in the seigniorage maximizing rate of inflation from 19.5% to 191.7%!
- ▶ When we use the whole sample, the estimated seigniorage maximizing rate is 35.7% ($\alpha = \mathbf{2.79**}$).

Actual and Seigniorage-Maximizing Inflation



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 - ▶ Apply this insight to new episodes

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- ▶ Hyperinflation often accompanied by political instability
 - ▶ Political instability caused by weak institutions
- ▶ Weak institutions make regime change more likely
 - ▶ Hyperinflation is well-suited to studying “rules of the game”

Thank you!

Questions?