



Economic Crises and the Lender of Last Resort

Vincent Bignon

Banque de France

Clemens Jobst

Oesterreichische Nationalbank

The views present here are mine or those of the authors and are not necessarily those of the Bank of France, the Austrian National Bank or the Eurosystem.



Disentangling views on LLR

- How wide should a central bank opens the discount window to stabilize crises?
 - Macro view: stabilizing shocks
 - Banking view: moral hazard
- Empirical challenges:
 - Moral hazard makes crises endogenous to (expected) changes in eligibility for discount window
 - CBs broaden eligibility with financial crises
 - Financial crises are (too) rare events to study a panel



The paper

- Create a panel of crises (disease)
 - Create many crisis, hurt at various point in time
 - Origin of crises is not expectation of bail out
- Study the impact of disease on defaults in other economic sectors
- Did districts more exposed to treatment fared better during those decade(s)-long crises?
 - Before the invention of the concept of stabilization policy
 - When the only difference in economic policy *at the district level* is variations in eligibility to discount window
 - Check loss impairment of the CB after the end of the (episode) of crises
- Study: France, 1826-1913



Does eligibility to LLR matter?

- With perfect financial markets, trading a non-eligible asset against an eligible is costless
 - ⇒ No room for eligibility to impact the default rate
 - ↔ When private funding dries up, access to central bank money is costless
 - ↔ Effective interest rate = Monetary policy rate
- When differences in assets liquidity, segmented markets:
 - ⇒ Positive transaction cost of access to CB money
 - ↔ **Effective interest rate > Monetary policy rate**



Method

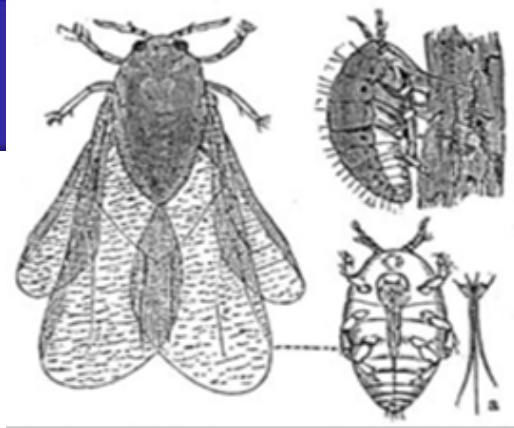
- Diff-in-Diff approach exploiting
 - the timing and size of the income shock and
 - the timing and varying eligibility to central bank

$$DR_{it} = \alpha Shock_{it} + \beta Elig_{it} + \gamma Shock * Elig_{it} \\ + t_t + d_i + t_t * d_i + \varepsilon_{it}$$

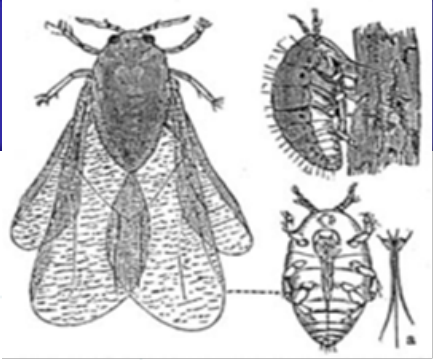
- What do we need?
 - Measure for default at the local level
 - (exogenous) Variations in eligibility rule
 - Income shock independent of eligibility rule

Phylloxera vastatrix

- Sucks out sap of vines (1863-90)
- Huge productivity shock to 20% workforce

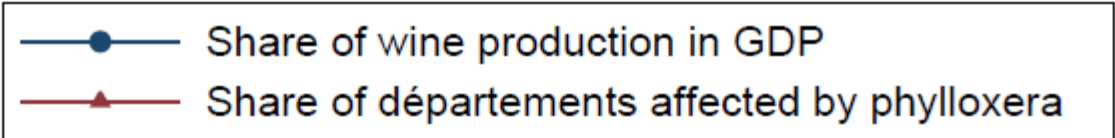
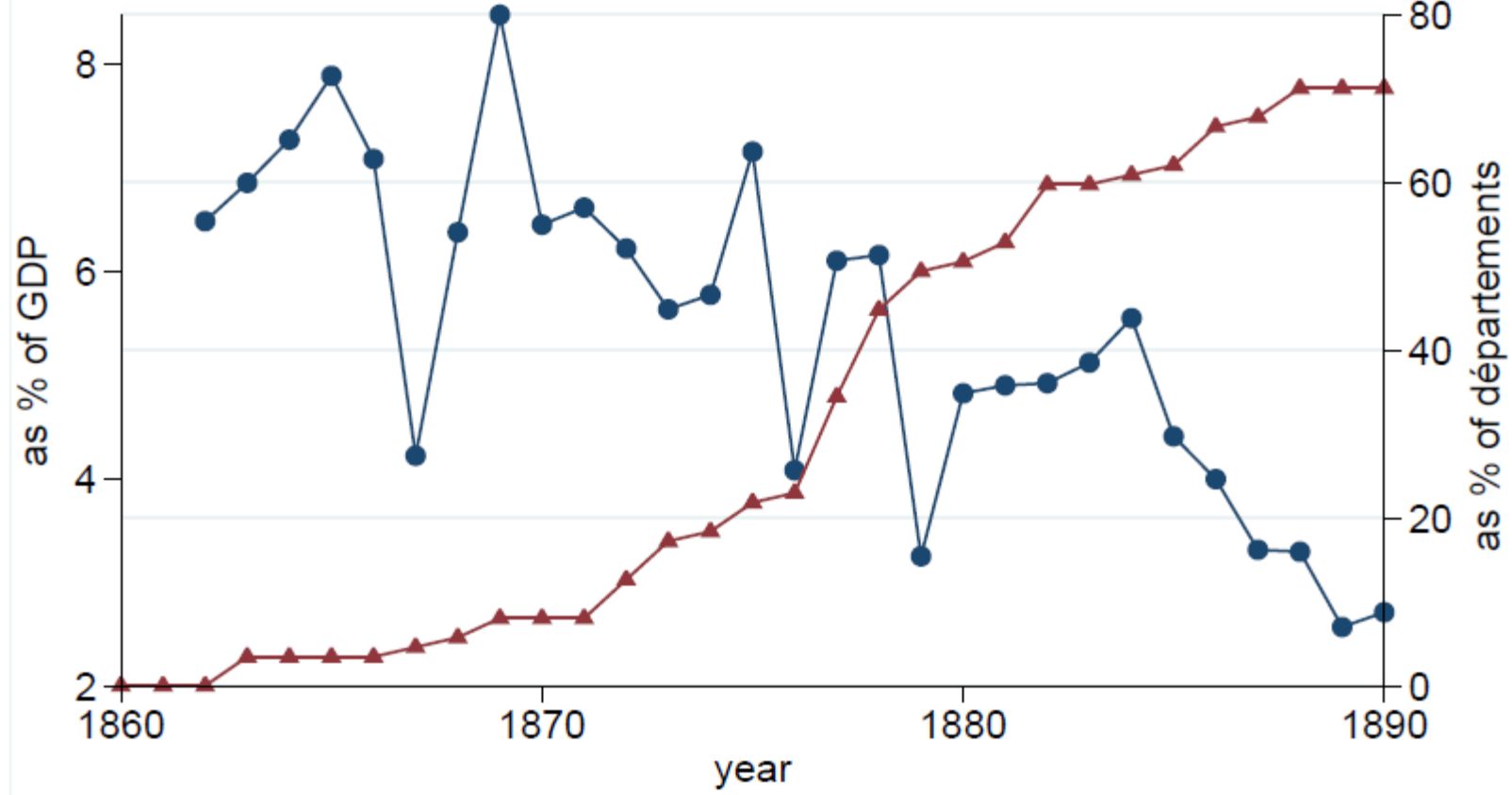


Significant aggregate shock

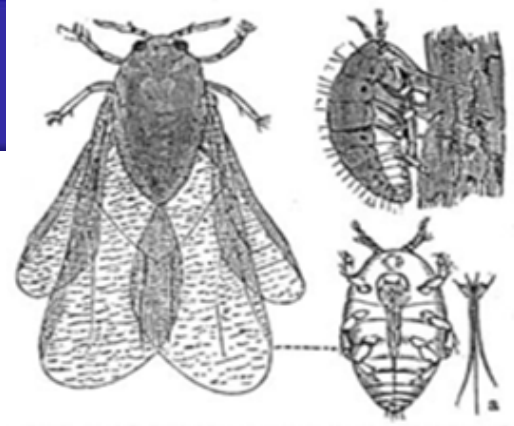


Phylloxera and Share of Wine Production in GDP

France 1862-1890

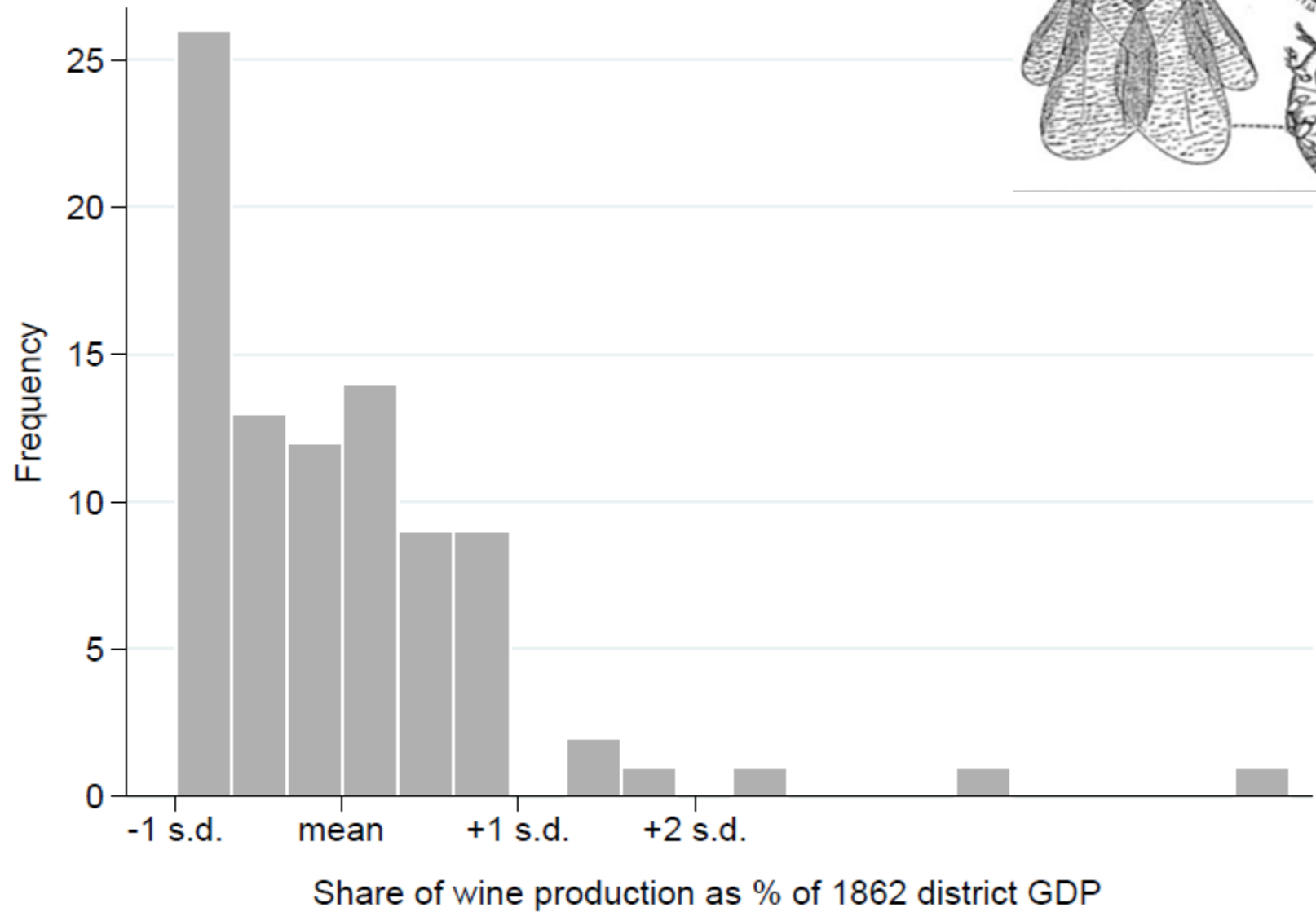
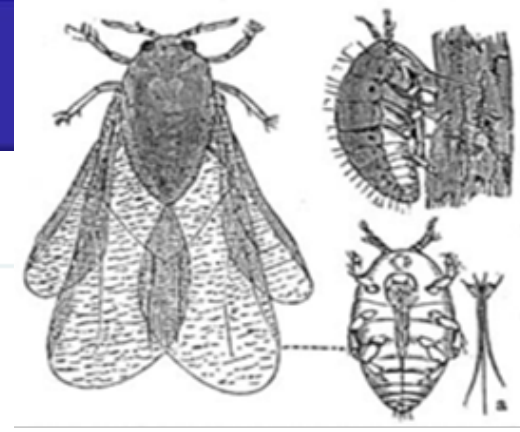


Phylloxera vastatrix



- Sucks out sap of vines (1863-90)
- Huge productivity shock to 20% workforce
- Fiscal authorities were passive
 - No single lag structure, unpredictable spread within district
- Three measures of shock
 - Presence_{it} : Presence of phylloxera
 - Shock_{it} : Presence of phylloxera AND drop in wine production
 - W_shock_{it} : Presence AND drop weighted by the size of the drop during year t
- **Each weighted by share of wine production in local GDP in 1862**

Frequency distrib. of crises

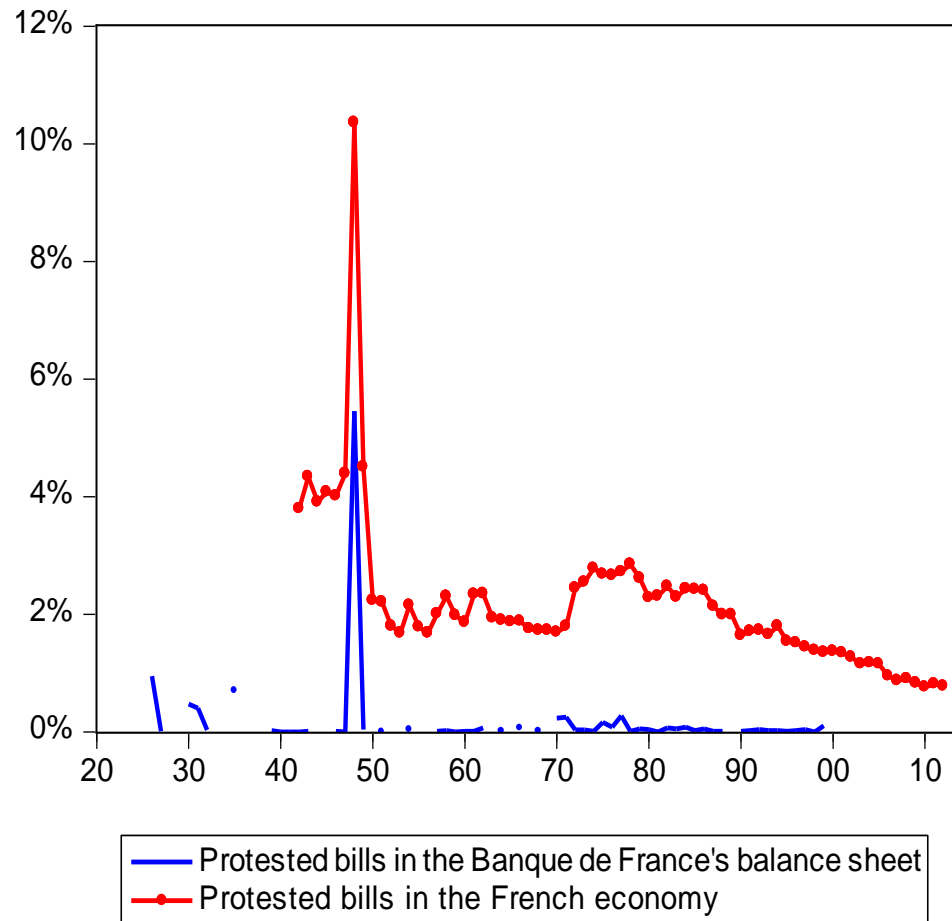


Source: Author's computation using Delafortrie and Morice (1959) and Galet (1957)

The 'European' discount system

- Outright purchase of (short-term) bills of exchanges, i.e. of a commitment to pay to someone in given location bearing guarantee of endorsers
- Counterparty screening : Local discount committees decided according to « good standing » of the traders/endorsers
- “Skin in the game” : discounter became liable of the good end of the bill

Bills in default in BoF portfolio (1820-1913)



'European' discount window

- No “banks only” policy
- But farmers excluded
- Locally eligibility restricted by the ability to collect payment at maturity
- Increasing branching reduces cost to access CB since it increases
 - number of agents eligible to refinancing facilities
 - number of securities eligible for discounting



Results

	Baseline	Additional controls	Wine intensive	1863-1890
	b/se	b/se	b/se	b/se
Shock	0.69***	1.21***	1.17***	0.72
	0.23	0.40	0.42	0.45
BdF branches	-0.02	-0.02	-0.02	0.00
	0.01	0.01	0.01	0.01
BdF*shock	-0.46***	-0.75**	-0.91**	-0.72**
	0.11	0.35	0.36	0.29
Deposit bank branches		-0.00	-0.00	-0.00
		0.00	0.00	0.00
Deposit bank branches*shock		0.13*	0.15*	0.07
		0.08	0.08	0.09
Population density		-0.00011***	0.00392	-0.00004
		0.00003	0.00352	0.00003
Firms per capita		-3.23**	-2.86*	-5.01
		1.36	1.61	3.23
Farmsize*shock		-0.082	-0.056	0.035
		0.063	0.064	0.063
fixed effects	yes	yes	yes	yes
N	6880.00	6880.00	3010.00	2080.00



Robustness (1)

	Baseline	Additional controls	Wine intensive	1863-1890
	b/se	b/se	b/se	b/se
Shock	0.71***	1.00**	0.94**	0.50
	0.26	0.41	0.43	0.50
BdF branches	-2.20	-1.94	-4.34	-0.00
	3.60	3.48	4.75	2.62
BdF*shock	-199.35***	-209.80*	-255.38**	-208.01*
	61.44	118.51	123.86	114.05
Deposit bank branches		-0.78	-0.21	-0.85
		1.34	1.65	1.90
Deposit bank branches*shock		35.29	40.26	10.96
		30.81	30.06	35.81
Population density		-0.00012***	0.00329	-0.00005
		0.00003	0.00371	0.00003
Firms per capita		-3.10**	-2.71	-5.08
		1.38	1.70	3.29
Farmsize*shock		-0.076	-0.055	0.050
		0.073	0.080	0.067
R^2	0.545	0.548	0.731	0.399
Observations	6880	6880	3010	2080

When allowing spatial autocorrelation

	(1)	(2)	(3)	(4)	(5)	(6)
BdF*shock	-0.456***	-200.113***	-0.159**	-0.121**	-0.744**	-211.187*
	0.113	59.381	0.063	0.054	0.338	115.801
Wdecline	0.68***	0.71***			1.21***	1.02**
	0.23	0.25			0.39	0.40
Decline			0.19			
			0.12			
Presence				0.11		
				0.09		
BdF branches	-0.02*		-0.02*	-0.02*	-0.02*	
	0.01		0.01	0.01	0.01	
BdF branches per capita		-2.47				-2.21
		3.59				3.46
Deposit banks branches					-0.00	
					0.00	
Branches deposit banks per capita						-0.718
						1.332
Deposit banks*shock					0.13*	36.56
					0.07	29.88
Population density					-0.00011***	-0.00011***
					0.00003	0.00003
Firms per capita					-3.299**	-3.174**
					1.35442	1.376
Farmsize*shock					-0.086	-0.0804
					0.061	0.072



On the exogeneity of branching

- Issue
 - 200 cities got a branch and about 580 got none
 - How were branch location chosen?
- History (only openings, no closures)
 - Political pressure/ threat to the renewal of the privilege
 - Competitive pressure by other banks (MFIs)
- Regression (opening = 1, no opening=0) explained by
 - Default rate and measure of the shock
 - Population density, density of firms
 - Political importance of city (dummy prefecture)
 - Presence of another branch in the district
 - Branches of deposit banks

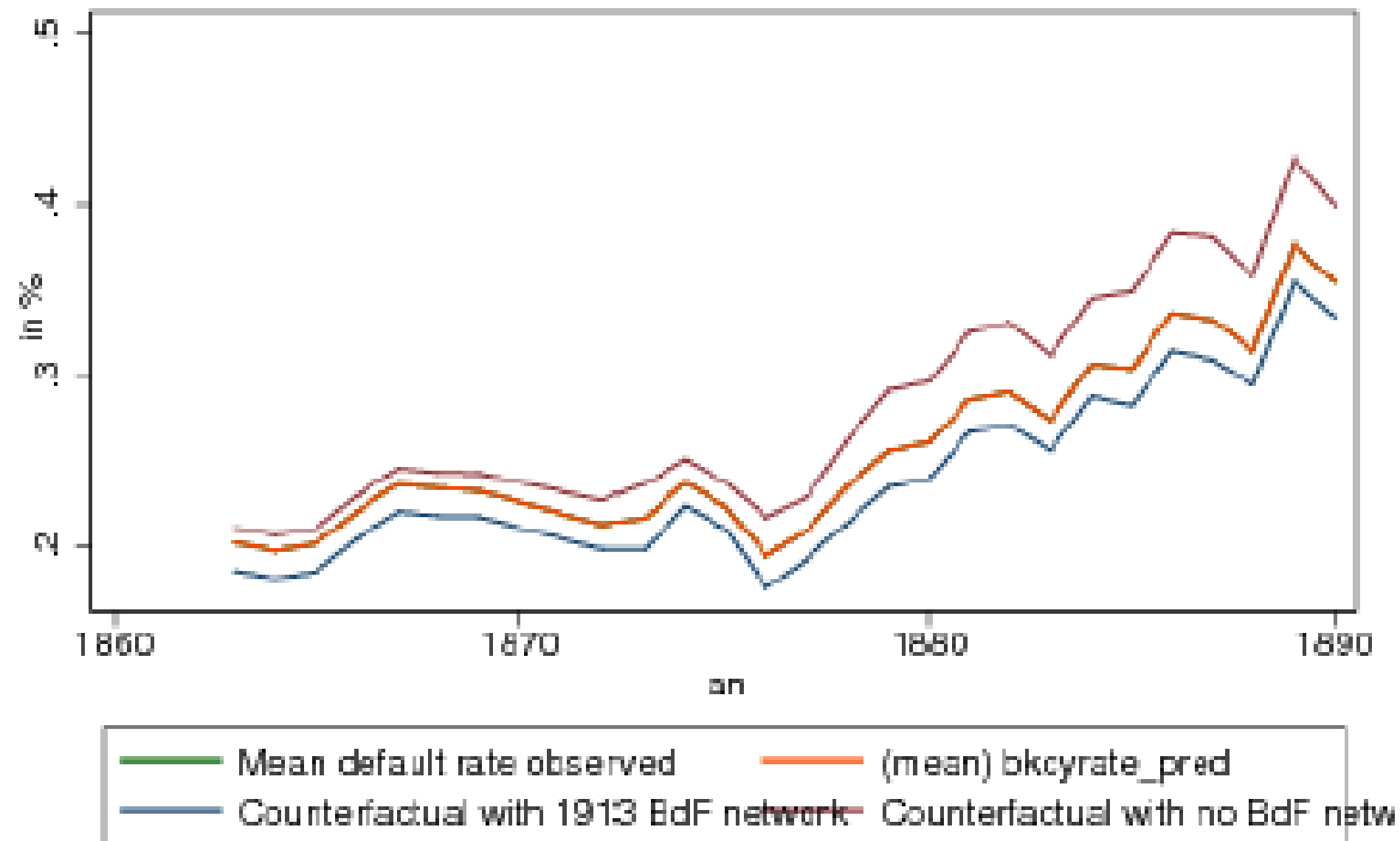


Checking endogeneity

	Default	Default	Shock	Shock	Default shock	Default shock
Default rate avg	0.00	2.56e+61			0.00	3.66e+61
Phylloxera			0.70	1.04	0.72	0.98
BoF present in district		0.00143***		0.00142***		0.00143***
Deposit bank city		4.82***		5.17***		4.81***
Capital city		4.99***		4.92***		4.98***
City pop		1.00		1.00		1.00
Pop rank = 1		1.00		1.00		1.00
Pop rank =2		0.55*		0.55*		0.55*
Pop rank =3		0.38**		0.39**		0.38**
Pop rank =4		0.09***		0.09***		0.09***
Pop rank =5		0.06***		0.06***		0.06***
District pop		1.000001***		1.000002***		1.000001***
District surface		1.00017*		1.00015		1.00017*
No. of subjects	1074	1054	1076	1059	1074	1054
No. of failures	86	80	88	82	86	80
Time at risk	50460	35088	50682	35268	50460	35088
Adj. R-Squared	0.00	0.37	0.00	0.37	0.00	0.37
LR chi2	0.202	392.235	0.624	400.815	0.742	392.236



Counterfactual





Lessons from the past?

- Economically
 - A proper empirical setup to show that wide access to lender of last resort need not fuel moral hazard
- Historically
 - New data
 - Role of CB branches in stabilizing crises during gold standard the continent
- Policy implications
 - Properly designed, widely opened discount facility stabilize crises



Empirical design: Summing up

- Start from a real productivity shock
 - ⇒ Result not explained by changes in MP expectations
- Shock induced by disease (and not financial crisis)
 - ⇒ Rule out reverse causality induced by moral hazard
 - ⇒ Spread gradually onto the territory
- BoF was prohibited to refinance agriculture
 - ⇒ Rule out endogeneity of eligibility to shock
- Shock transmitted as income shock to other sectors
 - ⇒ Traditionally a task of monetary policy
- Share of the population exposed to shock/Size of shock varies across districts
 - ⇒ Control group is identified



Impact of phylloxera on Bank of France discounting volumes

	(1)	(2)	(3)
Dependent variable: Annual volume discounted by the BdF in each district			

Presence _{ij}	58.00* (34.18)		
Shock _{ij}		56.72 (36.05)	
W_shock _{ij}			34.87** (16.58)
# BdF branches	44.98* (22.90)	44.11* (22.55)	42.92* (22.48)
# BdF auxiliary offices	35.56 (28.33)	35.21 (28.25)	34.99 (28.24)
Trend	0.63*** (0.12)	0.61*** (0.11)	0.47*** (0.02)

N	4502	4502	4502
r2	0.820	0.820	0.820

Phylloxera as an income shock to the services and industry

	(1)	(2)	(3)
Independent variable: Default rate in % at district level			
Presence _{it}	0.0533 (0.0702)		
Shock _{it}		0.1023* (0.0603)	
W_shock _{it}			0.2815** (0.1401)
Trend	0.00340*** (0.00002)	0.00338*** (0.00002)	0.00338*** (0.00002)
N	7363	7363	7363
r2	0.474	0.475	0.476
