

Cartelization Policies of the 1930s and the International Great Depression

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How Much did Cartelization Depress World in 1930s?

Cole and Ohanian (2004) & Ohanian (2009) - Cartel policies key to U.S. depression

Other countries had cartelization - e.g. Germany (Hitler) and Italy (Mussolini)

Analyze world depression of 1930s using panel dataset - 18 countries

MLE to estimate contribution of cartelization, money and productivity shocks

Exploit cross-country differences in cartel policies to identify impact
1st GE study of int'l depression

Quantifying Contribution of Cartelization in 1930s

TFP: Cole-Ohanian (1999), Kehoe-Prescott (2007)., *Great Depressions of 20th Century*

DSGE studies of single country, no cross-country data

Deflation/monetary contraction/Gold Standard: Eichengreen & Sachs (1985), Bernanke (1995)

Cross-country regressions, no GE framework

Paper integrates two literatures, and includes cartel policies

Main Findings

Estimated model fits data well

Cartel policies - not deflation or TFP - main factor driving employment

Imposing cartel policies was very costly.

Much different view on gold standard evidence.

Outline

Cartel policies as marginal rate of substitution distortions

Data

Model - endogenous monetary non-neutrality

Quantitative methodology & findings

Policy Experiments

Robustness

Conclusion

Cartelization Policies as Labor Distortions

Policies:

- ① expanding industrial cartels,
- ② government nominal wage/price fixing, and
- ③ increasing worker bargaining power.

U.S.: Hoover's *Nominal Wage Maintenance*, Roosevelt's *New Deal*,

Italy: Mussolini's *Corporatist Policy* and Fascist labor union.

Germany: Hitler *New Plan*

Need common model framework to exploit cross-country differences

To accomplish this, model cartel policies as *marginal rate of substitution distortions*

Policies as Distortions That Break $MRS = MPL$ Condition

- Optimality condition for firms and households are

$$MUC * W/P = -MUL$$

$$P * MPL = W$$

- Policies creating firm or worker market power, or setting W/P other than market clearing create wedge.
- Increasing firm's monopoly power means

$$P * MPL > W,$$

$$MUC * MPL > -MUL$$

generates a wedge.

2. Increase in worker bargaining power increases W , generates job rationing:

$$MUC * W/P > -MUL$$

and

$$MUC * MPL > -MUL.$$

3. Wage setting that reduces W below competitive level means worker rationing

$$P * MPL > W,$$

and

$$MUC * MPL > -MUL.$$

Data Summary

Panel data set

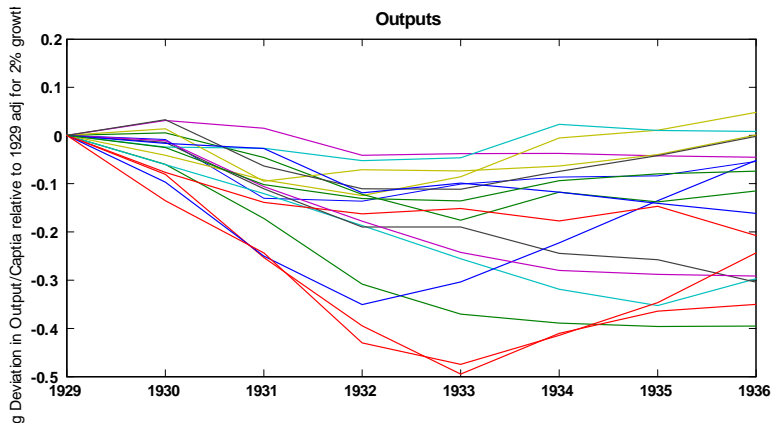
- 18 Countries - chosen for consistent availability of real GNP
 - Australia, Austria, Canada, Czechoslovakia, Denmark, Finland, France, Germany, Hungary, Italy, Japan, Netherlands, Norway, Spain, Sweden, Switzerland, U.K., U.S.
- Database includes several macroeconomic variables (though not all countries have all variables):
 - GNP, deflator, consumption, investment, employment, and capital stock.

Variety of sources - use most recently constructed data

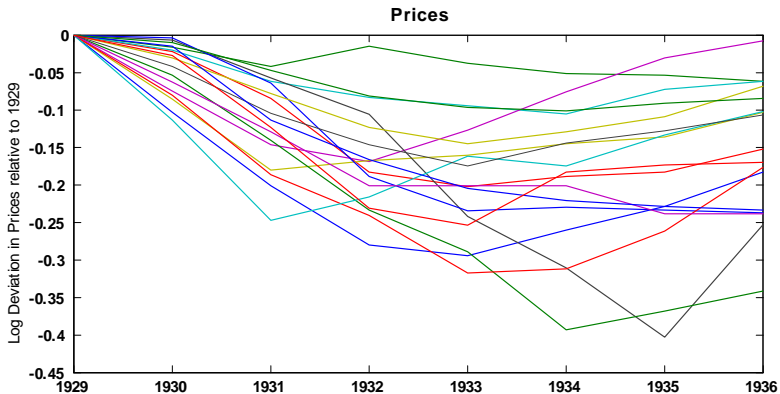
Main 7 have all of these data = Australia, Canada, France, Germany, Italy, UK, US..

Almost all other countries have all data except labor and TFP

Panel Data Informative



Panel Data Informative



Model

- Model with 3 shocks, and *endogenous monetary non-neutrality*
 - Estimate size of non-neutrality to optimize fit.
- Goods, Technology and Endowments
 - Output produced with K & L , *fixed and variable capacity*
 - Cash and Credit Goods *transactions demand for money*
- Agents
 - Representative household and firm
- Shocks
 - Money supply shock
 - Productivity shock
 - Labor policy shock

Nonneutrality

- Nonneutrality: Information imperfection
- See nominal wage, but...
 - Choose labor without knowing money or productivity shocks
 - Household must infer real wage from observing nominal wage
- Inference depends upon relative variances of two shocks.
- Inference parameter η : can generate purely neutral model to large non-neutrality
 - Let data determine optimal η .

Household

- Preferences

$$E \sum_{t=0}^{\infty} \beta^t \left\{ \log([\alpha C_{1t}^{\sigma} + (1 - \alpha) C_{2t}^{\sigma}]^{1/\sigma}) + \phi \log(1 - N_t) \right\},$$

- Cash good C_1 and credit good C_2 , plus labor, N
- Budget

$$\begin{aligned} & M_t + W_t X_t N_t + R_t K_t + (T_t - 1) \bar{M}_t + (1 - X_t) W_t \bar{N}_t \\ & \geq M_{t+1} + P_t [C_{1t} + C_{2t} + K_{t+1} - (1 - \delta) K_t], \end{aligned}$$

- Cash-in-advance

$$P_t C_{1t} \leq M_t + (T_t - 1) \bar{M}_t.$$

- X_t is labor shock, \bar{N} is average labor, $(1 - X_t) W_t \bar{N}_t$ is wedge tax rebate, $(T_t - 1) \bar{M}_t$ is money transfer and \bar{M} is average money holdings.

Technology

$$Y_t = Z_t (U_t K_t)^\theta N_t^{1-\theta},$$

$$Z_t = e^{z_t}, \quad z_t = \rho_z z_{t-1} + \varepsilon_{zt}, \quad \varepsilon_{zt} \sim N(0, \sigma_{\varepsilon z}^2)$$

$$C_{1t} + C_{2t} + X_t \leq Y_t.$$

$$K_{t+1} = (1 - BU_t^v)K_t + I_t$$

- U_t is the utilization level which increases depreciation.
- Estimate model with variable and fixed utilization.
- With VC measured TFP, $Z_t U_t^\theta$, is not true TFP, Z_t .

Policy

- Monetary Policy

$$T_t = \bar{\tau} e^{\tau_t}, \tau_t = \rho_{\tau} \tau_{t-1} + \varepsilon_{mt}, \varepsilon_{mt} \sim N(0, \sigma_{\varepsilon m}^2)$$

$$M_t = T_t M_{t-1}$$

- Labor Policy

$$X e^{x_t}, \text{ where } x_t = \rho_x x_{t-1} + v_t, v_t \sim N(0, \sigma_v^2)$$

Information and the Timing of Transactions

- 1 Household knows $\bar{s}_t = \{K_t, M_{t-1}, \tau_{t-1}, z_{t-1}, x_t\}$
- 2 Draw innovations $(\varepsilon_{zt}, \varepsilon_{mt})$ known only to firms
- 3 Given W , Workers choose N_t^s , firms choose N_t^d
- 4 Households learns innovations $(\varepsilon_{zt}, \varepsilon_{mt})$
- 5 Rest is standard

Household Signal Extraction

- Workers see nominal wage
- Use standard signal extraction formulae to infer z and τ realizations
- Formulae depend on relative variances of z and τ
 - If variance of z much higher than τ , low wage attributed to productivity
 - If variance of z much lower than τ , low wage attributed to money
- Define η as the *non-neutrality parameter*
 - $\eta \in [0, -1]$ = 0 (most non-neutral) and = -1 (purely neutral)

How Money Shock Works

- 1 Household FOC for Labor:

$$x_t + w_t - \frac{n_t N}{1 - N} = -E\{\lambda_t | w_t, \bar{s}_t\},$$

- 2 Firm's FOC for Labor:

$$z_t + \gamma(u_t + k_t - n_t) = w_t - p_t$$

- 3 Production function

$$y = z_t + \gamma(u_t + k_t) + (1 - \gamma)n_t$$

Sticky wage model very similar, except $-E\{\lambda_t | \bar{s}_t\}$ in (1); so just more nonneutral and cannot be tuned.

**Monetary Non-neutrality: Elasticity of Output
With Respect to Unanticipated Deflation**

η	Variable Capacity	Constant Capacity
0	-2	-1.1
-0.25	-1.5	-0.9
-0.50	-1.1	-0.7
-0.75	-0.5	-0.4
-1.00	0.0	0.0

Money in Model vs. Data

Can add either money demand or effective liquidity to the model.

Then the money supply in the model \neq that in the data.

Modify the CIA constraint with a stochastic shifter, $\tilde{\zeta}_t$:

$$\tilde{\zeta}_t p_t c_{1t} \leq m_t + (T_t - 1)M_t.$$

Now, $T_t M_t / \tilde{\zeta}_t$ is the *effective money supply*.

With this, observing the money supply is not enough to infer P_t , just as it is in the data.

Quantitative Analysis

- Parameter values
 - Standard values used where possible, others estimated MLE
- Fit assessed using Kalman smoothing
- Evaluates fit of both endogenous variables and the shocks

Parameters

- Preference, technology parameters are standard

θ	β	α	v	σ	ϕ	ρ_z
.33	.95	.50	1.1	.92	2	.80

- Depreciation
 - For fixed capacity set $\delta = .07$.
 - For variable capacity: BU^v
 - Want $\delta'(U) > 0$ and $\delta''(U) < 0 \Rightarrow v > 1$.
 - elasticity $1/(v - \gamma)$ to match those in literature (King and Rebelo) $\Rightarrow v = 1.1$.
 - B set so that steady state depreciation is .07
- MLE of shock process parameters

ρ_τ , ρ_x , σ_z , σ_τ , and σ_x .

Model Fit

Measure model fit for each variable using "pseudo" R^2 :

$$R^2 = 1 - \frac{\sum(\text{Actual} - \text{Predicted})^2}{\sum(\text{Actual})^2}.$$

- Measures share of data variation accounted for by model.
- Fit doesn't include constant term so measure can be negative.

Model Fit

Cumulative Share of Squared Variable Change Explained

	Variable Capacity				Fixed Capacity			
	Main 7		18 Countries		Main 7		18 Countries	
	1932	1936	1932	1936	1932	1936	1932	1936
Output	0.97	0.98	0.95	0.97	0.99	0.99	0.98	0.99
Prices	0.94	0.95	0.93	0.95	0.92	0.94	0.92	0.95
Cons.	0.78	0.88	0.74	0.82	0.84	0.92	0.82	0.87
Inv.	0.62	0.71	0.65	0.71	0.67	0.74	0.67	0.69
Labor	0.95	0.97	0.95	0.97	0.96	0.97	0.96	0.97
TFP	0.99	0.99	0.99	0.99	0.96	0.96	0.96	0.96
Money	0.82	0.81	0.74	0.78	0.82	0.78	0.75	0.77

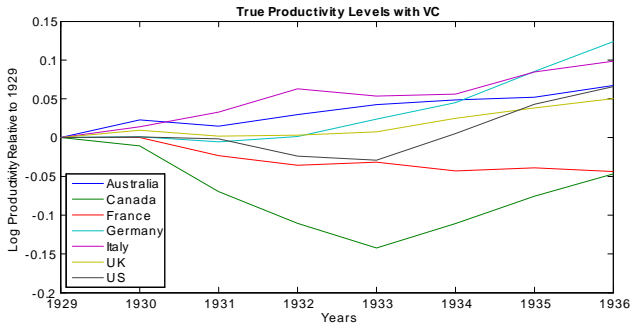
- Accounts for most of variation in endog vars and states
- Fit is robust to splitting sample into large and small depressions, gold and off-gold countries

Best Model

The ML criterion liked the fixed capacity model best.

However, we like the variable capacity model because

Prods



3.pdf

Estimated Non-neutrality is Small

- Size of non-neutrality is very small in fixed capacity model
 - elasticity is **-0.15**, elasticity range is 0 to -1.1
- size of non-neutrality is moderate in variable capacity model
 - elasticity is **-0.7**, elasticity range is 0 to -2
- Why isn't elasticity larger?

Why Non-Neutrality is Small

- No systematic pattern between deflation and real variables

Correlation Between Output, Deflation, and Cumulated Price Change (All Countries)

	1930	1931	1932	1933	1934	1935	1936
Corr (y, π)	-0.33	-0.23	0.51	0.21	-0.03	0.38	-0.07
Corr (y, p)	-0.33	-0.33	0.04	0.04	-0.02	0.07	0.18

- Price is way of accounting for affects of lagged inflation on output.

Labor Due to Labor Policy Shocks

**Fraction of Variation Accounted for by Individual Shocks
for Seven Main Countries - Fixed Capacity**

	Money		TFP		Wedge	
	1932	1936	1932	1936	1932	1936
Output	0.09	0.05	0.80	0.84	0.49	0.41
Price Level	0.59	0.63	-0.66	-0.96	-0.54	-0.50
Consumption	0.04	0.04	0.49	0.66	0.36	0.38
Investment	0.06	0.04	0.51	0.60	0.23	0.26
Labor	0.17	0.08	0.38	0.37	0.83	0.81
TFP	0.00	0.00	0.96	0.96	0.00	0.00
Money (M1)	0.82	0.78	0.00	0.00	0.00	0.00

Labor Policy Shocks: Negative and Large

Correlation Between Labor, Deflation, and TFP (Main 7 Countries)

	1930	1931	1932	1933	1934	1935	1936
Corr (l, π)	0.17	0.48	0.86	-0.17	-0.49	0.13	-0.14
Corr (l, tfp)	0.76	0.00	0.22	0.38	0.24	0.00	-0.04

- Because no systematic pattern between prices and labor or TFP and labor
- Estimated labor distortions coincided with cartel policies

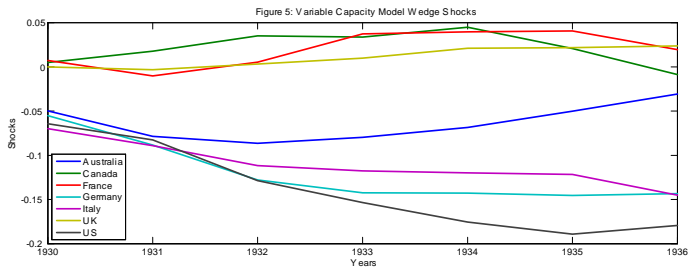
Cross-Country Differences in Cartel Shock and Actual Policies

Three patterns

- ① Wedge becomes large and grows in three countries - U.S., Italy and Germany.
- ② No wedge change in Canada, France and UK.
- ③ Wedge rises in Australia, then declines during recovery.

Interpret patterns in context of policies that were or were not adopted.

Wedge Shocks in VC Model



Cartel/Labor Policies in the 1930s

- US -
 - Hoover encourage firms to fix nominal wages in exchange for union protection.
 - Nominal wages fixed, hours and employment decline quickly.
 - FDR's New Deal expanded Hoover program by cartelizing industry if wages rose
 - *high real wages means job rationing.*

Cartel/Labor Policies in the 1930s

- Germany -
 - Hitler expanded cartels, dissolved unions, created gov boards to set wages.
 - Real wage fell sharply, non-market mechanisms created to allocate labor
 - By WWII German real wages down to 1913 levels.
 - Restrictions on leaving jobs, who could be hired, no jobs for married women, young were fired and replaced with married men, restrictions on who could register for unemployment
 - *real wages low meant worker rationing.*

Cartel/Labor Policies in the 1930s

- Italy -
 - Fascist labor unions set wages, cartels expanded and created
 - Labor organized under obligatory Fascist unions - union leaders selected by government. Early 1930s, policies promoted higher real wages through inflexible nominal wages, deflation. Real wages then declined substantially relative to productivity through the mid and late 1930s.
 - In 1933, new law prohibited plant expansion or creating new plants, which de facto restricted entry.

Cartel/Labor Policies in the 1930s

- Australia-
 - Long standing collective bargaining & arbitration system. Unions, which accounted for roughly 1/2 of employment, kept nominal wages fixed, real wage rose.
 - New policy after 1931 reduced nominal wages and labor distortion disappeared.

Cartel/Labor Policies in the 1930s

- Canada & UK, no such policies.
- France adopts strong union policies in late 1930s and remains depressed.
- Major puzzle - Canada. No banking crises. No labor/cartel policies. Remains depressed.

Money Shocks

- Have important real role in variable capacity early but not late.
- Have no significant real role in fixed capacity model
- Deflation largely over after 1933, and this implies strong rebound, which is not in the data.
 - TFP also largely rebounds after 1933.
 - Hence wedge shocks ends up with important role after 1933.
- Wedge Shocks not taking place of deflation - regress wedge shocks on inflation+1 lag $R^2 = 0.05$.

Higher Non-neutrality of Money?

- The ML criterion prefers fixed capacity model with low non-neutrality to variable capacity with moderate non-neutrality.
- If we allow ML to select higher depreciation elasticity, which reduces utilization elasticity, selects higher depreciation elasticity
 - lowers preferred non-neutrality.
- Plot ML estimates for fixed η .

Policy Analysis

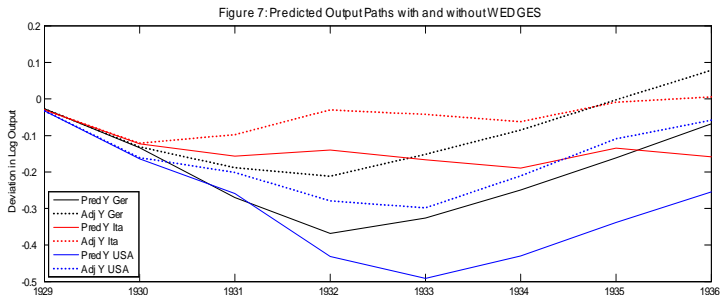
Because we have an explicit model, we can do counterfactuals:

- ① What would have happened without the Cartel policies?
- ② What would have happened if countries stayed on Gold?

To undertake these counterfactuals we need to construct alternative policy sequences for each country.

Eliminating Cartel Policies

We set the cartel shocks, $X_t = 0$, to see their impact.



Cartel policies were very costly for Germany, Italy and the U.S.

Going off Gold

- Constructed alternative policy:
 - constructed standard price path for those who stay on gold
 - This was the average price deflation for France, the Netherlands and Switzerland.
 - We then adjusted the early-leavers money supply to match this deflation once they went off.
- The impacts were quite small largely because the deflation paths were not very different.
 - Especially for Germany, deflation was only 1.5% less per year.

Is Money/Deflation More Important in Alternative Models?

- Not to a first order approximation
- Abstracting from other state vars. class of log-lin models:

$$y_{it} = \beta \pi_{it} + \varepsilon_{it}$$

- Fit regressions, with and without country fixed effects
- Deflation unimportant

Regressions of Output on Deflation and Country Fixed Effects

Regression	β_{π}	$\beta_{\pi-1}$	R^2
No Country Effects	0.98		.08
No Country Effects	1.79	0.10	.24
Country Effects	-.13		.846
Country Effects	.81	-.39	.847
Country Effects Alone			.845

- Regression of Y on dP 1930-33 gives $R^2 = 0.33$, so
- Variable Capacity model results similar to no-country effects regression estimates.
- Fixed Capacity model results similar to country fixed effects regression estimates.

Conclusions

- ① The labor wedge shock is required to get hours.
 - Money doesn't capture much of this, even though the estimation procedure gives it the chance to do this.
 - Model says that labor market policies are much more important than is commonly recognized, especially after 1932.
- ② Money is important for prices but important for output only early on
 - Important role from money rests on utilization channel to affected measured productivity.
- ③ TFP largely explains much of output, but not much of hours.
 - This runs counter to the Kehoe-Prescott line
- ④ Cartel policies were very costly.
- ⑤ Gold standard - standard story is rejected
 - model says output difference coming from TFP and policy shock.
 - model says money has major role in the price difference.