Anatomy of a Credit Crunch: From Capital to Labor Markets

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- Develop a model with firm-level borrowing constraint and labor market frictions
- Calibrate to financial variables during the Great Recession and try to match unemployment fluctuations
- Heterogentity in wealth/productivity across firms leads to misallocation in steady state and reallocation following financial tightening
- A friction in the reallocation of labor across firms leads to unemployment in the interim

Overview

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- Entrepreneurs rent capital and labor subject to a "collateral constraint" to produce
- Agents can trade risk-free debt in zero net supply

Individual Preferences

- Individuals maximize CRRA utility

$$\sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\sigma} - 1}{1-\sigma}$$

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  subject to natural borrowing constraint on risk-free debt holdings
- Each period, choose to be worker/unemployed and earn wage/benefits or entrepreneur and earn profits
- All agents pay lump sum taxes to fund unemployment benefits

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- With probability $1 - \psi$, idiosyncratic productivity redrawn from Pareto distribution

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$$V_W(a,z) = \sup_{c \geq 0} \left\{ u(c) + \beta \mathbb{E}\left[V(a',z') \right] \right\}$$

$$a' = (1+r)(a+w-c-\tau)$$

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- Each period, individual makes static occupation decision:

$$V(a,z) = \max\{V_W(a,z), V_E(a,z)\}$$

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- Fired/new workers must leave the labor market

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- New/fired workers:

$$JD_t = \int \left[\max\{l_{-1} - l_t(a,z), 0\} + \mathbf{I}_{\{l_{-1}>0\}}\mathbf{I}_{\{l_t(a,z)=0\}}\right] G_t(da, dl_{-1}, dz$$

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- Unemployed workers at end of period t:

$$U_{t+1} = U_t + JD_t - M_t - UB_t$$

UB_t is unemployed workers from beginning of t who became entrepreneurs

Equilibrium

- Steady state equilibrium with constant A, wage, interest rate, and distribution G
- Agents behave optimally given prices
- Risk-free debt market clears: total wealth equals capital
- Labor market clears: labor demand equals measure of workers inside labor market

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- Look at aggregate and firm-level results

Calibration

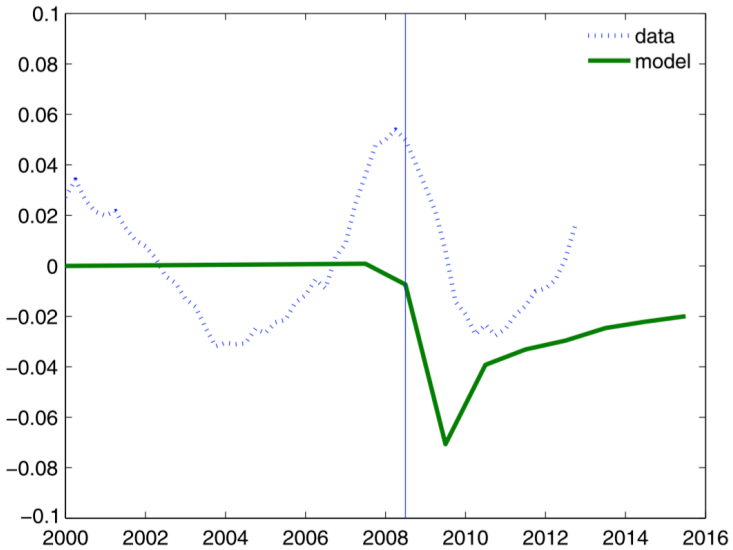
- One period is a year
- CRRA: $\sigma = 1.5$
- Depreciation: $\delta = 0.06$
- Capital share: $\frac{\alpha}{\alpha+\theta} = 0.33$
- Labor market friction: $\gamma = 0.667$
- Calibrate the rest of the parameters to match moments from US data:

Calibration.

	US data	Model	Parameter
Top 10% employment	0.69	0.69	$\eta = 5.25$
Top 5% earnings share	0.30	0.30	$\alpha + \theta = 0.79$
Establishment exit rate (annual)	0.10	0.10	$\psi = 0.89$
Real interest rate (annual)	0.02	0.02	$\beta = 0.93$
Credit market instruments to non-financial assets	0.70	0.70	$\lambda = 7.5$

Credit Shock

- In $t = 0$, unexpected announcement of deterministic credit path: $\{\lambda_1, \lambda_2, \lambda_3, \lambda_4\} = \{7.5, 4.5, 3.0, 3.5\}$, then, for $t \geq 5$, $\lambda_t = 0.75\lambda_{t-1} + 0.25 * 7.5$



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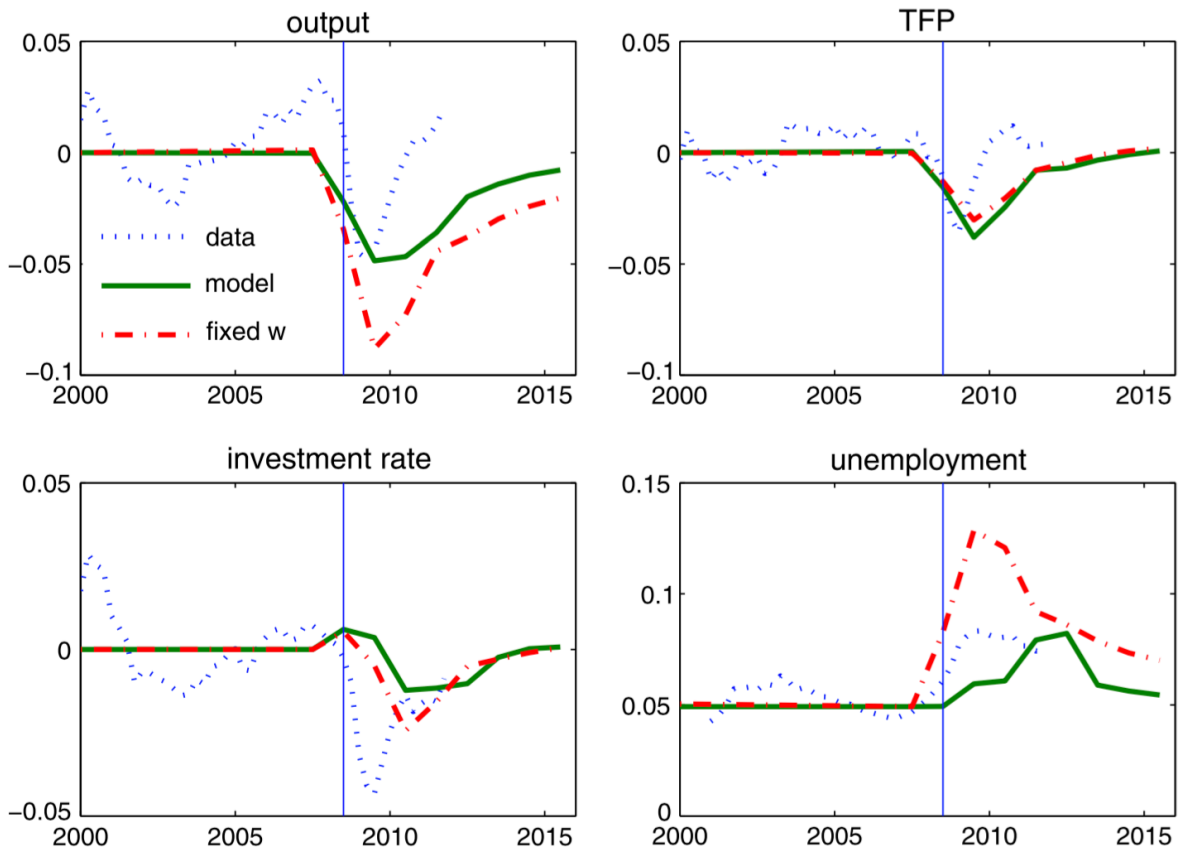
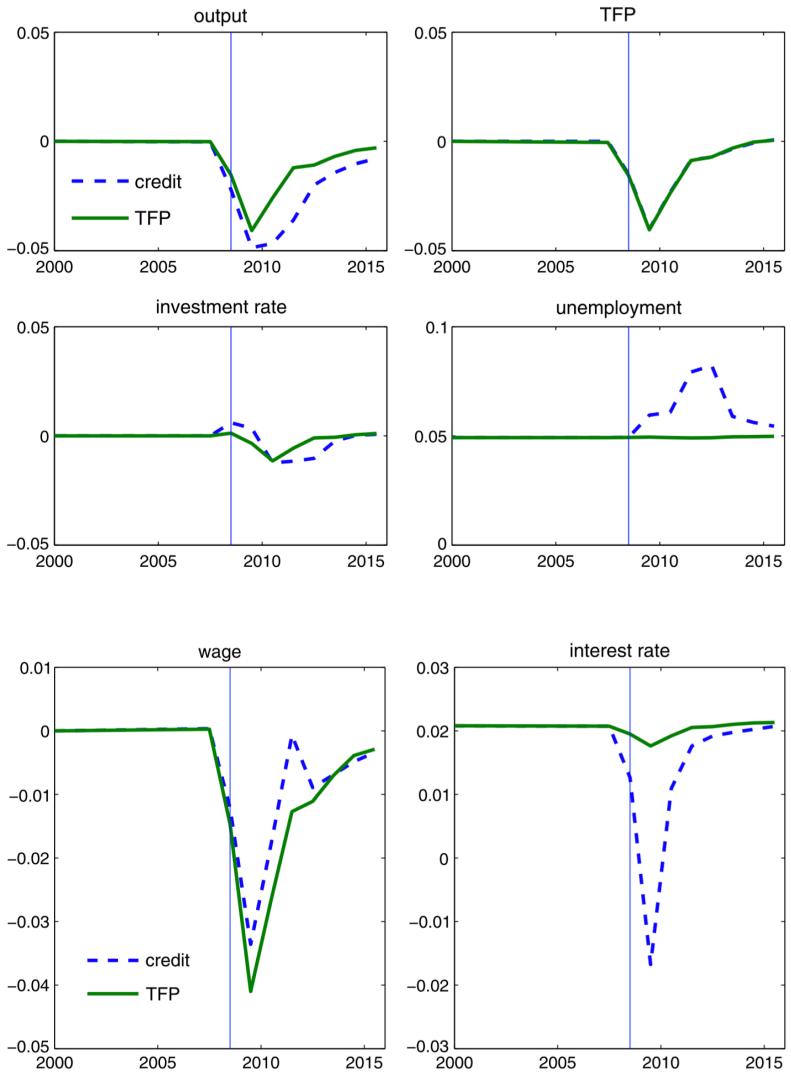
- Interest rate and wage fall, encouraging unconstrained, but less productive entrepreneurs to scale up
- Labor market friction prevents immediate reallocation of labor
- Effects are persistent as productive entrepreneurs rebuild wealth
- Unemployment is particularly persistent – labor market frictions create more unemployment as labor is reallocated back toward productive entrepreneurs

Credit Shock Results



Credit Shock Labor Market Flows

Credit Shock vs. TFP Shock



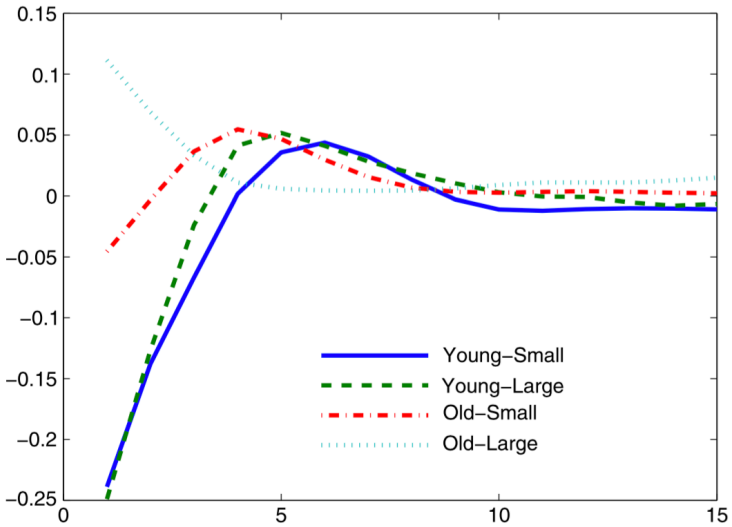
Credit Shock vs. TFP Shock

- Labor reallocation frictions creates unemployment and persistent output effects
- Sharper interest rate drop shifts wealth from constrained to unconstrained entrepreneurs

Firm-level Results

Properties of firm age-size distribution in steady state.

	Fraction not constrained	Share of total employment	Fraction of firms	Average TFP	Average wealth	Average rate of return	Net employment growth
Small-young	0.057	0.133	0.405	0.60	1.8	0.122	0.42
Large-young	0.111	0.045	0.004	1.15	42.5	0.074	0.25
Small-old	0.421	0.315	0.549	0.56	5.3	0.028	−0.07
Large-old	0.934	0.507	0.042	1.16	157.0	0.022	−0.09



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- Collateral constraint shock produces large amounts of reallocation
- Reallocation and frictional labor market generate unemployment
- Labor market frictions aren't internalized (no wage bargaining and each worker is indifferent)