Uninsurable Unemployment Risk as a Propagator of Aggregate Fluctutation

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The Financial Crisis

- Before the financial crisis macroeconomics was boring
  - Over-researched bizarre issues such as "risk sharing in village economies"
  - Guilty of this myself
- But what was there to do? Only 10 mundane observations
- The 11th, however, was violent and highlighted the weaknesses in market economies

The Financial Crisis

- Summer 2007 subprime crisis
- Auguest/September 2007 Lehman Brothers went belly-up
- Limited interbank lending
- Soaring unemployment and contracting GDP

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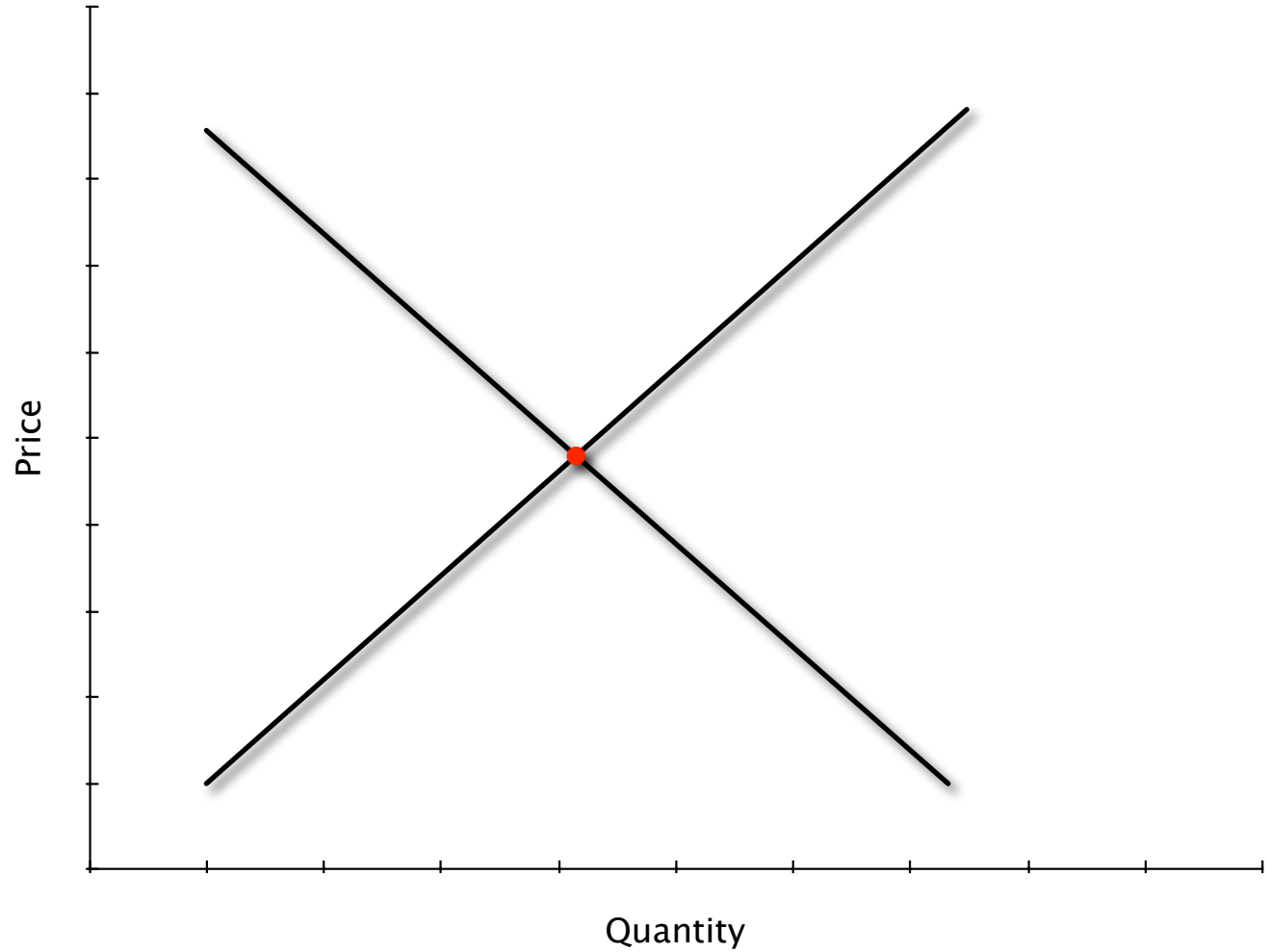
- Where are the shocks?

The Financial Crisis

- We see large gyrations in observables
- But we do not see shocks
- One hypothesis: Shocks are small or granular, but there is sizeable propagation
- What is propagation?

Propagation



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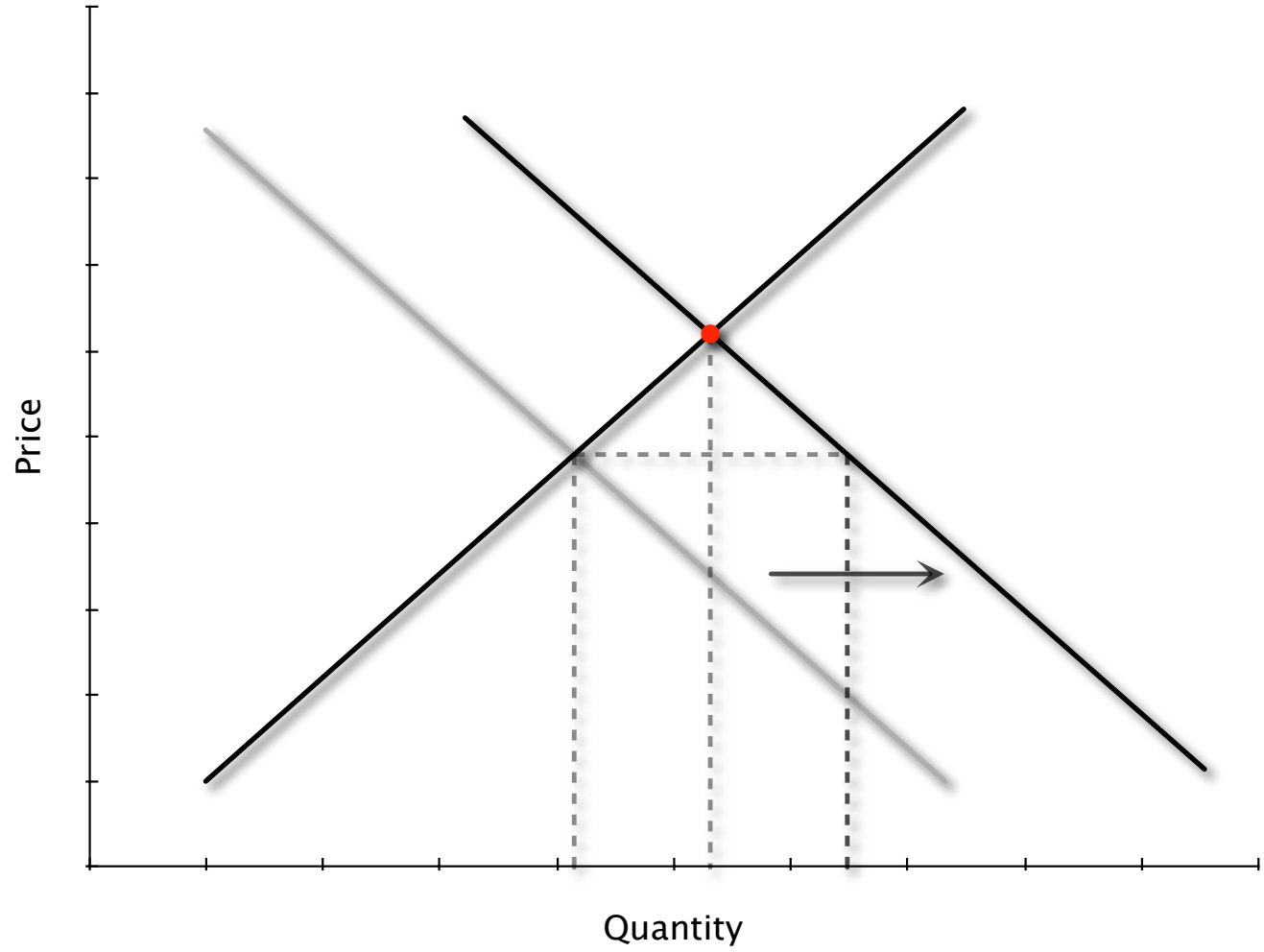

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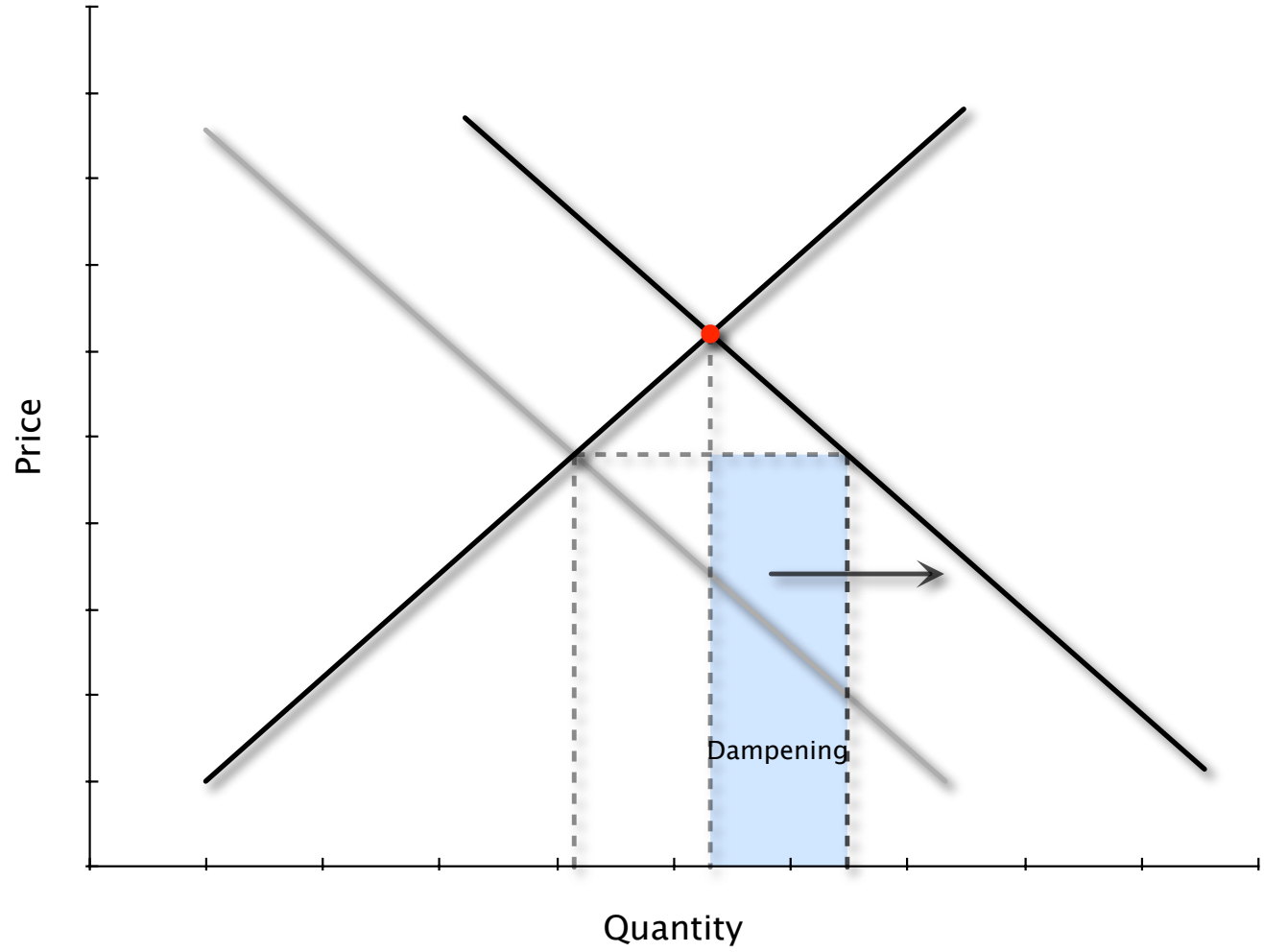

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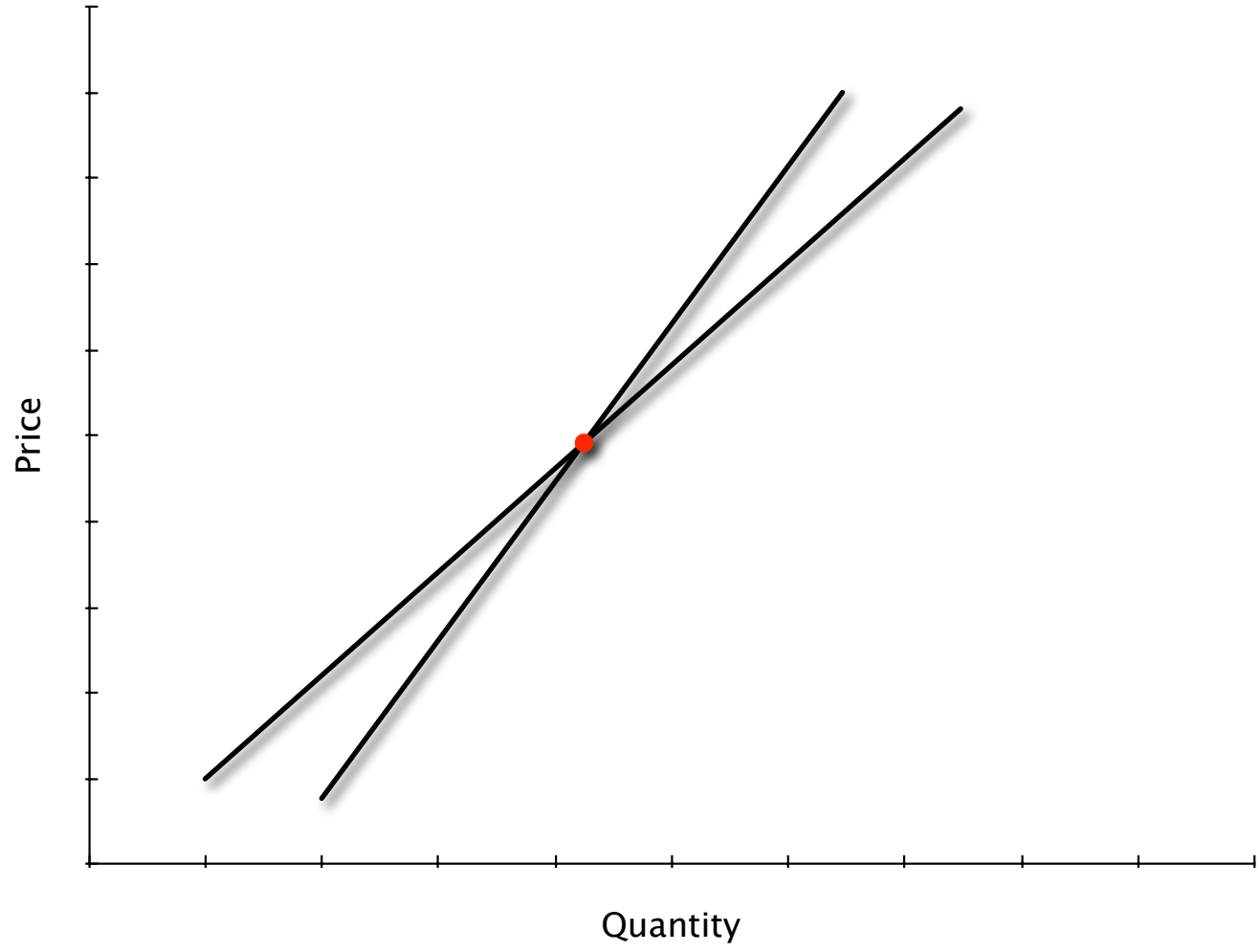

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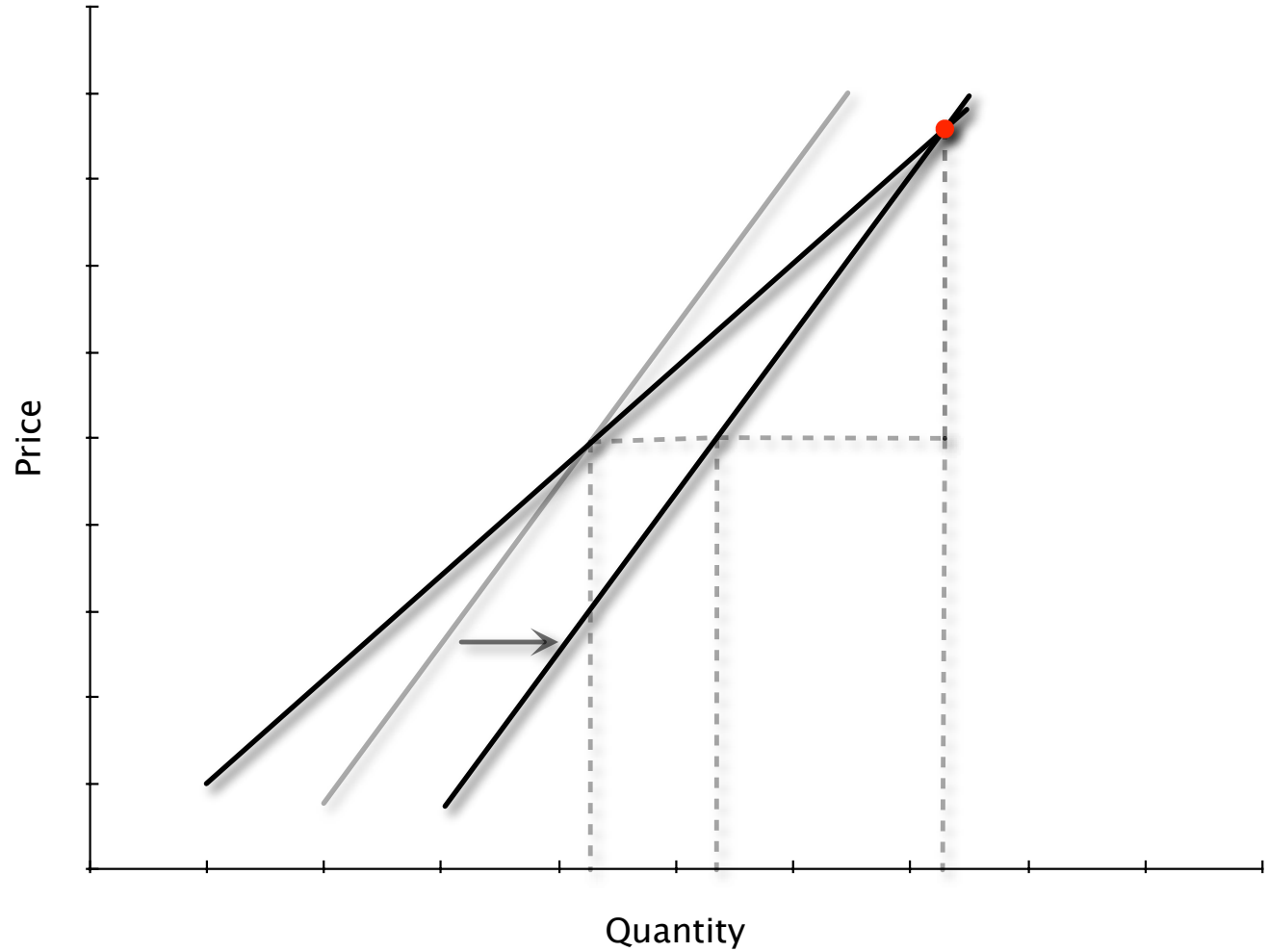
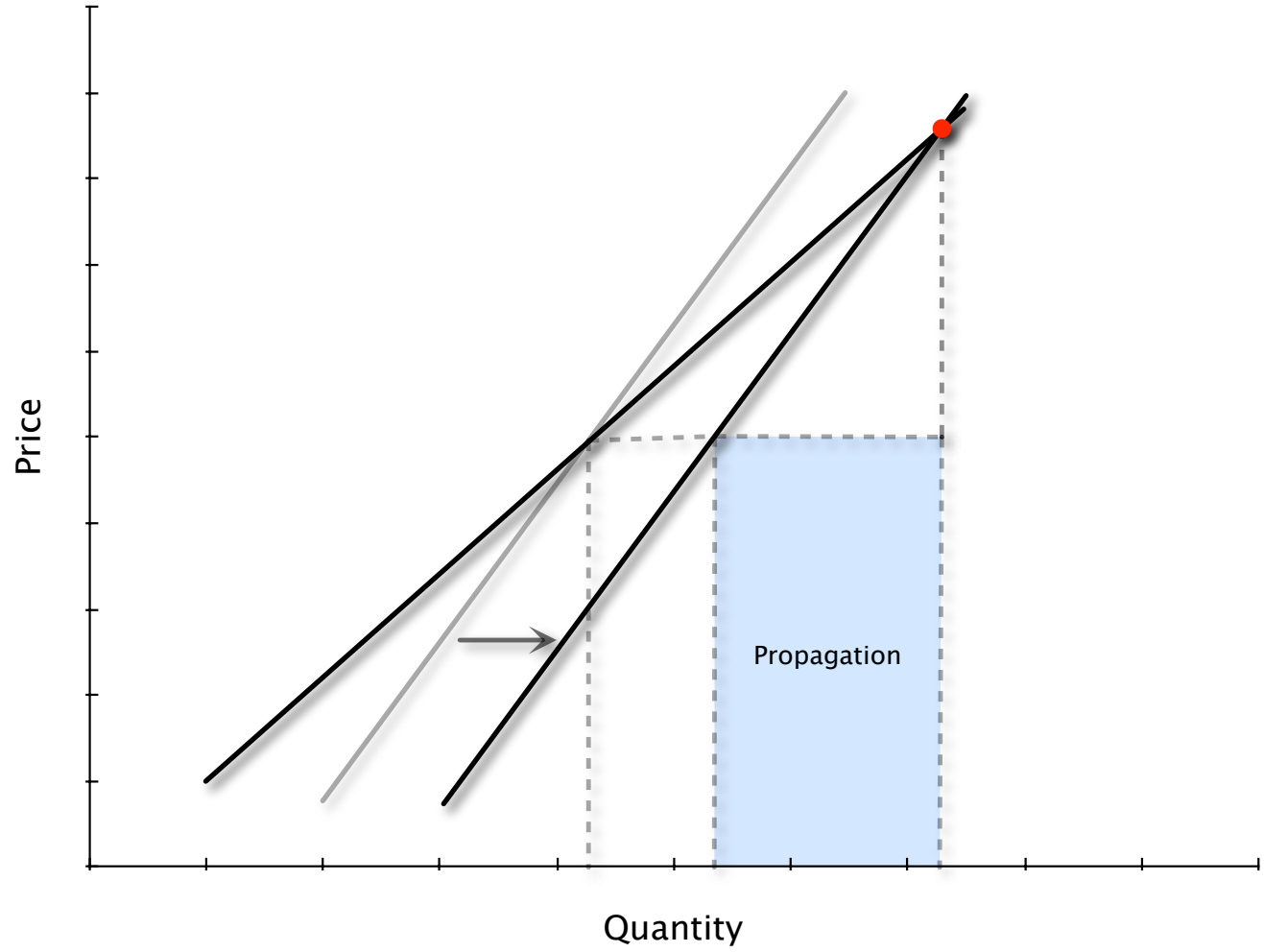


Propagation



Propagation

- Propagation is the name for a mechanism that amplifies shocks
- The outcome is normally very inefficient
- Large scope for policy interventions
  - But only if we know the sources of propagation

Risk and propagation

- In partial equilibrium it has been known for long that (uninsurable) risk gives rise to precautionary savings
  - Risk $\uparrow \rightarrow S \uparrow$ and $C \downarrow$
- So in general equilibrium $C \downarrow \rightarrow Y \downarrow$, right?

Risk and propagation

- In partial equilibrium it has been known for long that (uninsurable) risk gives rise to precautionary savings
  - Risk $\uparrow \rightarrow S \uparrow$ and $C \downarrow$
- So in general equilibrium $C \downarrow \rightarrow Y \downarrow$, right?
- Wrong. In G.E. $S = I$ and $Y = C + I + G$ etc
- And with forward looking agents $I \uparrow$ is a good thing!
  - In general equilibrium risk is a stabilizer!

Price rigidities and propagation

- A negative supply shock contracts output and raises prices
- With rigid prices/wages, higher price offsets the negative impact of the shock
- Price stickiness gives rise to a positive output gap
  - In general equilibrium price rigidity is a stabilizer!

Price rigidities, risk, and propagation

- Together, however, uninsurable risk and price rigidities generate a lot of propagation
- Why? As before, risk encourages agents to save more
- If there are two saving vehicles – money and equity – then a demand for saving will add to demand for *both* assets
- If money is in limited supply, its relative price must increase (price level declines)

Price rigidities, risk, and propagation

- If nominal wages are sticky, falling prices means higher real wages
- This reduces the value of equity, which contracts its demand (lower investment)
- So risk causes a rise in desired saving which does not lead to a matched rise in investment $\rightarrow$ contraction in output

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- More risk $\rightarrow$ less output

Unemployment risk

- A frictional labor market adds an additional spin to this story
- With less investment there is less job creation
- Less job creation leads to more unemployment and higher risk
- This aggravates the situation further

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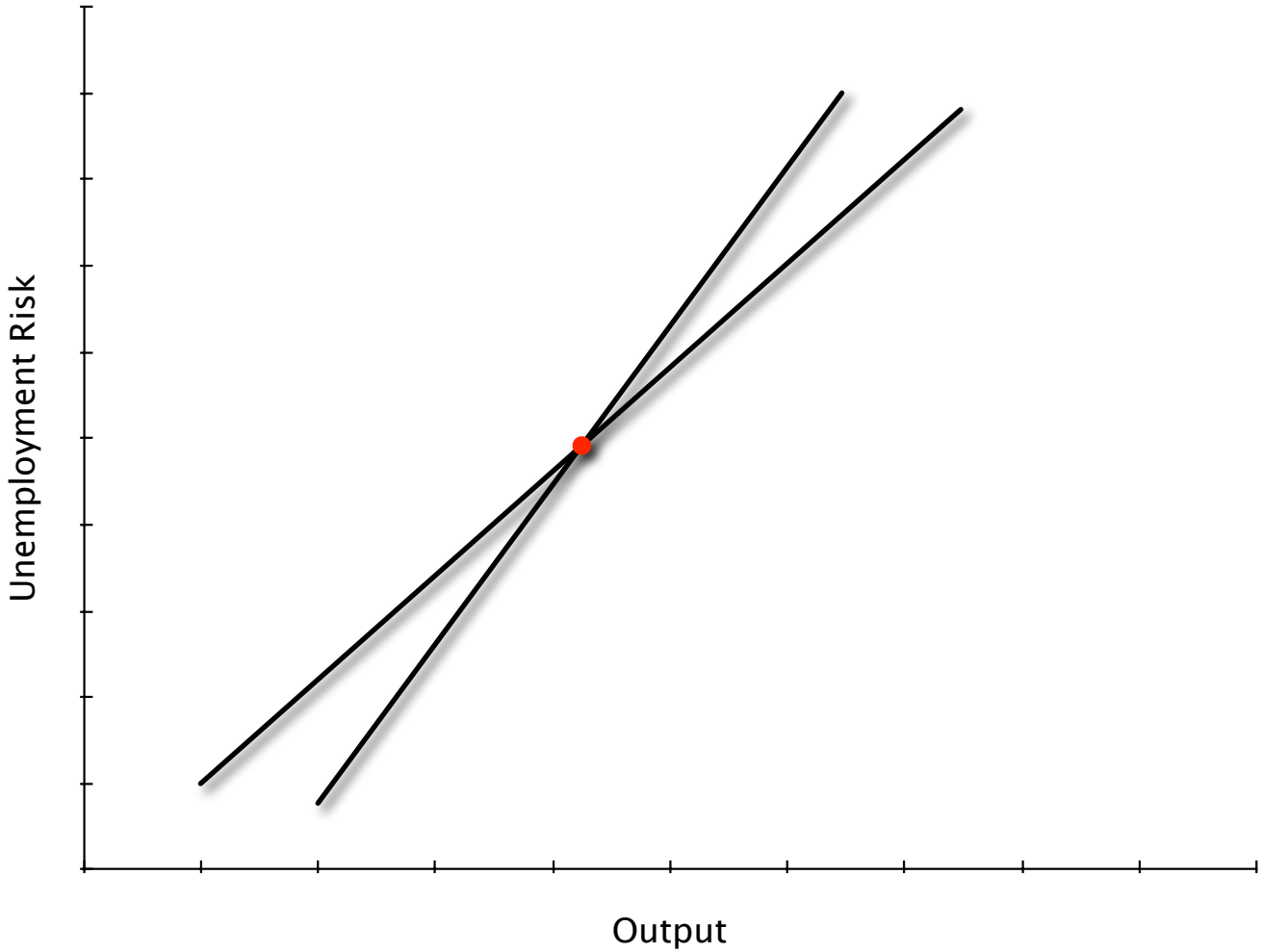
Propagation



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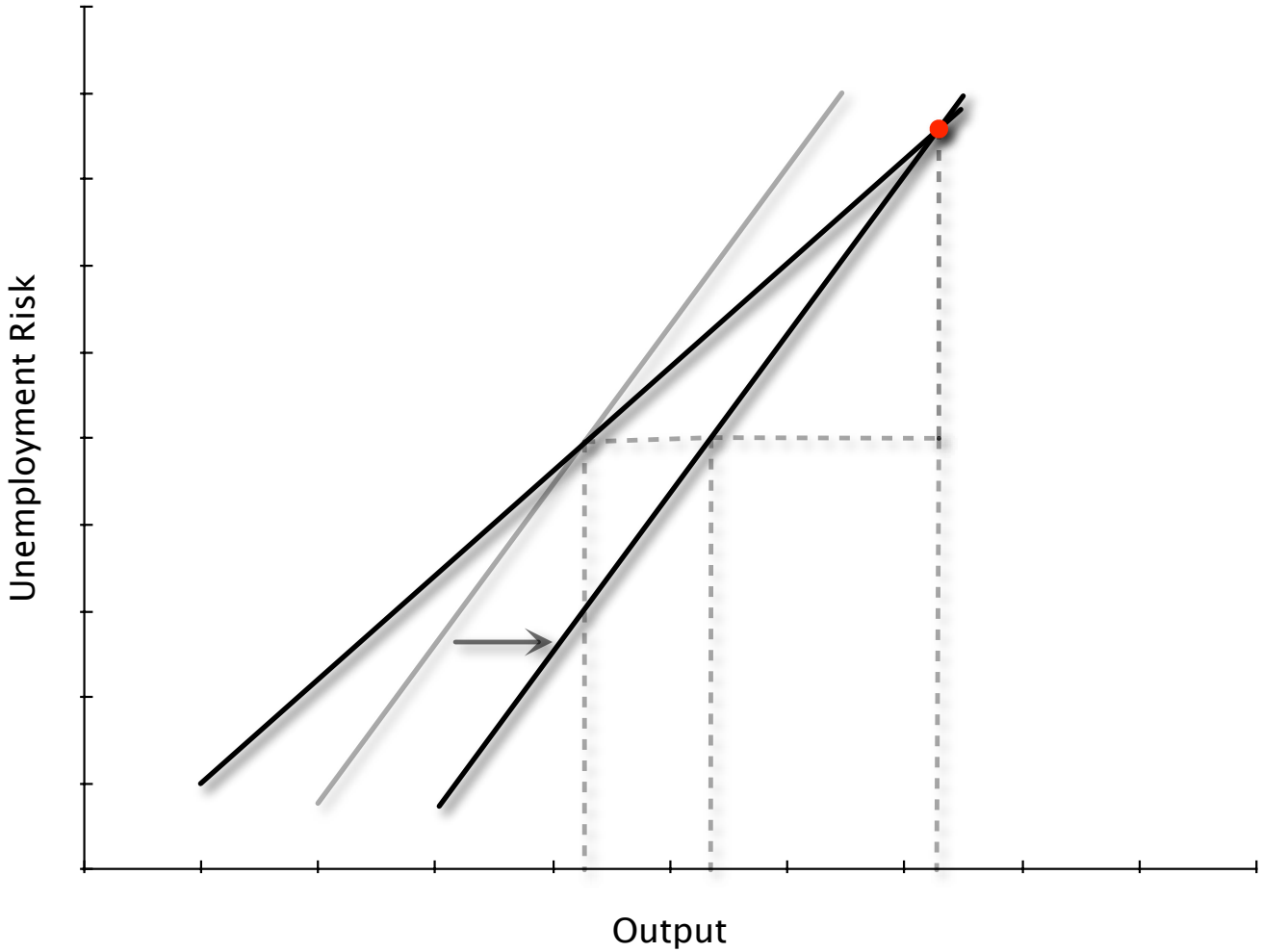
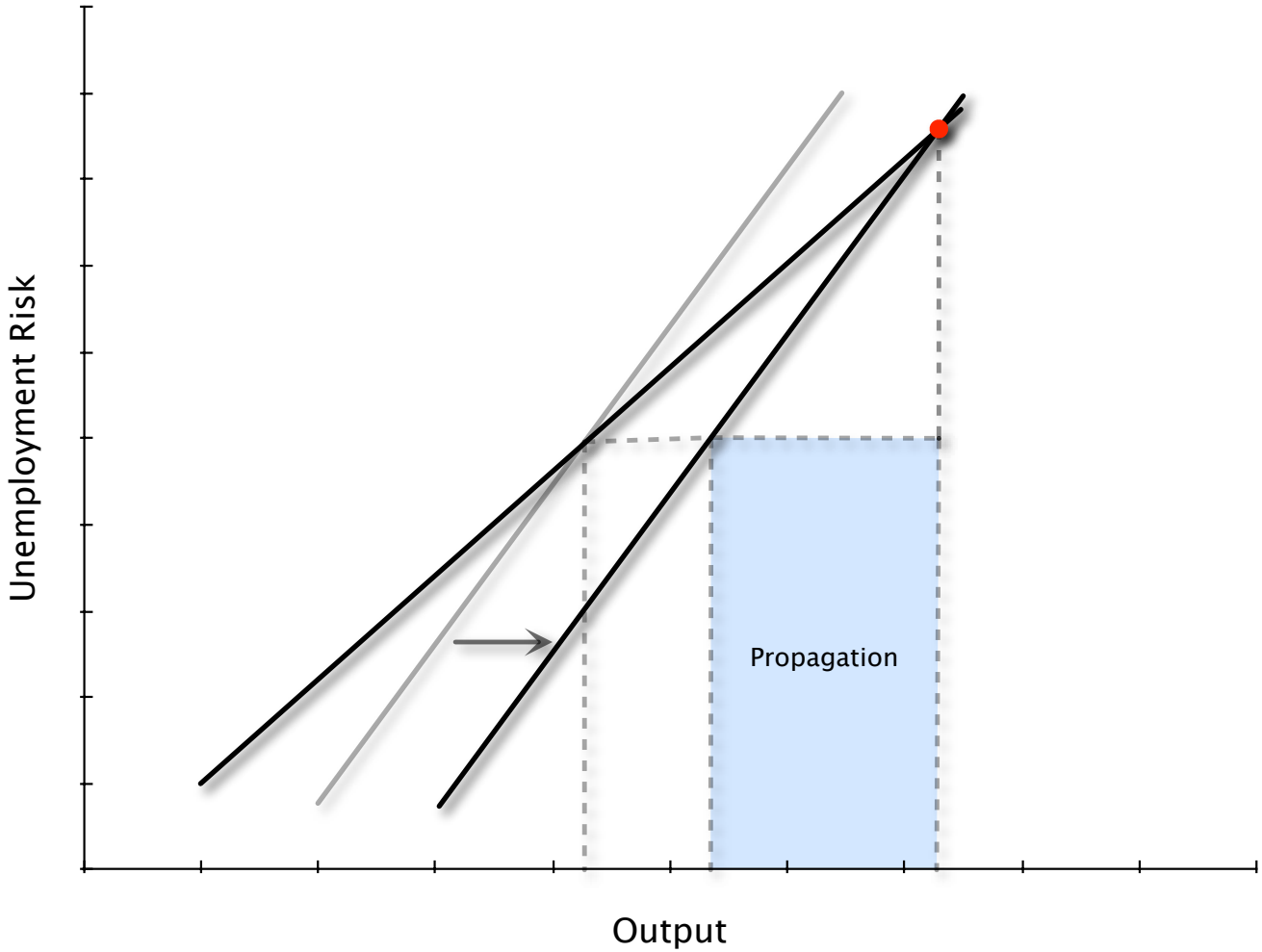


Propagation



Unemployment (fears) and deflationary spirals

1. Incomplete markets together with sticky wages amplify shocks, but on their own they repress shocks.
   - Policy solution: "Flexify" wages? Germany, Sweden etc.
   - Policy solution: Complete the markets? UI.

Unemployment (fears) and deflationary spirals

1. Incomplete markets together with sticky wages amplify shocks, but on their own they repress shocks.
   - Policy solution: "Flexify" wages? Germany, Sweden etc.
   - Policy solution: Complete the markets? UI.
2. Increase **unemployment insurance** from 50 percent to 55 gives rise to nontrivial welfare gains for all agents in the economy.
   - Not true for the economy without aggregate risk.

Model: Overview

1. Incomplete insurance markets for idiosyncratic employment risk.
2. Search frictions in the labor market.
3. Nominal wages do not respond one-for-one with changes in the price level.
4. $\#$ jobs $=$ $\#$ firms $=$ $\#$ shares

Model: Active firms

- One worker, one firm.
- Generate nominal profits (quasi-rents)

$$D_t = P_t z_t - W_t,$$

$$W_t = \omega_0 \left(\frac{z_t}{\bar{z}}\right)^{\omega_z} \bar{z} \left(\frac{P_t}{\bar{P}}\right)^{\omega_P} \bar{P}$$

- Key assumption: $\omega_P < 1$.
- *Wage rule does not violate bilateral efficiency*
- Active firms take no decisions.

Households I

- If employed: earn nominal wage $W_t(1-\tau)$.
- If unemployed: collect nominal unemployment benefits $\mu W_t(1-\tau)$, and search for a job.
- Idiosyncratic risk:
  - Exogenous separation rate, δ.
  - Endogenous job-finding rate.
- Consume $C_{i,t}$, and invest in
  - Unproductive asset: Money, $M_{i,t}$ (MiU)
  - Productive asset: Equity, $q_{i,t} \geq 0$

Model: Households II

$$\max \mathbb{E}_t \left[\sum_{j=0}^{\infty} \beta^j \left(\frac{c_{i,t+j}^{1-\gamma} - 1}{1-\gamma} + \chi \frac{\left(\frac{M_{i,t+1+j}}{P_{t+j}} \right)^{1-\zeta} - 1}{1-\zeta} \right) \right],$$

subject to

$$\begin{aligned} & P_t c_{i,t} + J_t q_{i,t+1} + M_{i,t+1} \\ &= (1-\tau_t) W_t (e_{i,t} + \mu(1-e_{i,t})) + (D_t + J_t(1-\delta)) q_{i,t} + M_{i,t}, \end{aligned}$$

$$q_{i,t} \geq 0.$$

Model: Equity market I

- Measure of firms created: $h_t = \psi v_t^{\eta} u_t^{1-\eta}$, where v_t denotes the aggregate *real* amount invested in firm creation.
- The cost of creating one additional firm is therefore v_t/h_t.
- The benefit of creating one additional firms is J_t/P_t.
  - Thus, $\frac{v_t}{h_t} = \frac{J_t}{P_t}$
- Combining gives

$$h_t = \psi^{1/(1-\eta)} \left(\frac{J_t}{P_t} \right)^{\eta/(1-\eta)} u_t$$

Model: Equity market II

Equilibrium

$$\underbrace{h_t}_{\text{Equity creation}} + \int_{i \in \mathscr{A}_-} \underbrace{\left((1-\delta) q_i - q\left(e_i, q_i, M_i; s_t\right) \right)}_{\text{Equity sold}} dF_t\left(e_i, q_i, M_i\right)$$

$$= \int_{i \in \mathscr{A}_+} \underbrace{\left(q\left(e_i, q_i, M_i; s_t\right) - (1-\delta) q_i \right)}_{\text{Equity bought}} dF_t\left(e_i, q_i, M_i\right),$$

with

$$\mathscr{A}_- = \{ i : q(e_i, q_i, M_i; s_t) - (1-\delta) q_i \leq 0 \},$$
$$\mathscr{A}_+ = \{ i : q(e_i, q_i, M_i; s_t) - (1-\delta) q_i \geq 0 \},$$

Model: Equity market III

- Or

$$h_t = \int_{i \in \mathscr{A}} \left(q\left(e_i, q_i, M_i; s_t\right) - (1-\delta)\, q_i \right) dF_t\left(e_i, q_i, M_i\right),$$
$$= q_{t+1} - (1-\delta) q_t.$$

  with $\mathscr{A} = \{\mathscr{A}_+ \cup \mathscr{A}_-\}$.

- Since $n_t = q_t$ we have

$$n_{t+1} = h_t + (1-\delta) n_t.$$

Model: Market for liquid asset

- Equilibrium

$$\int_{i\in\mathscr{B}_-} \underbrace{\left(M_i - M\left(e_i, q_i, M_i; s_t\right)\right)}_{\text{Money sold}} dF_t\left(e_i, q_i, M_i\right)$$
$$= \int_{i\in\mathscr{B}_+} \underbrace{\left(M\left(e_i, q_i, M_i; s_t\right) - M_i\right)}_{\text{Money bought}} dF_t\left(e_i, q_i, M_i\right),$$

- Money supply, $\overline{M}$, is constant in the benchmark economy.

Government

- Taxes and administrates the UI system

$$\tau_t q_t W_t = (1 - q_t)\mu(1 - \tau_t)W_t.$$

- Thus,

$$\tau_t = \mu \frac{1 - q_t}{q_t + \mu\,(1 - q_t)}.$$

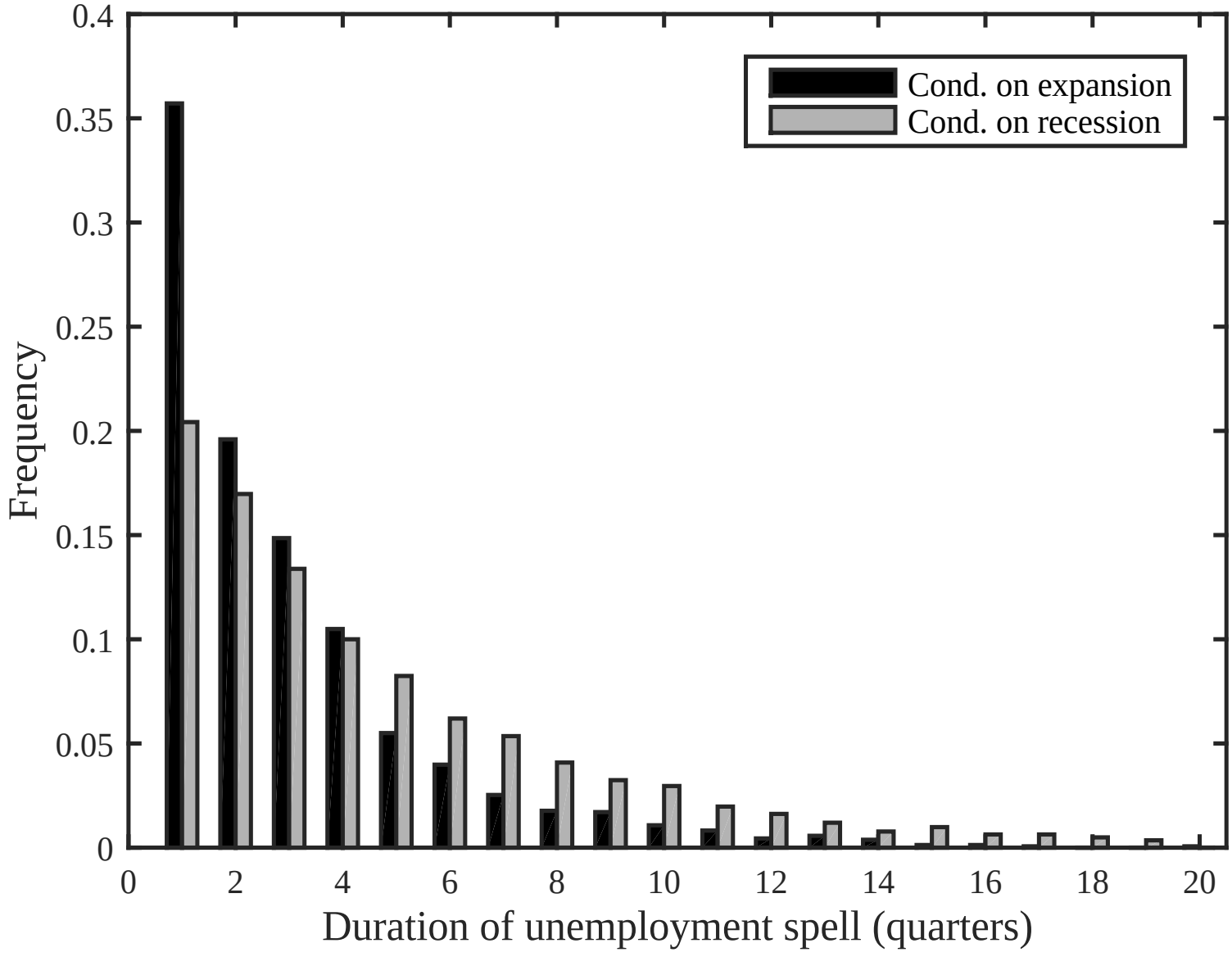
Key aspects of calibration

- Target Eurozone.
- ω_P will be either 0.7 (baseline) or 1.

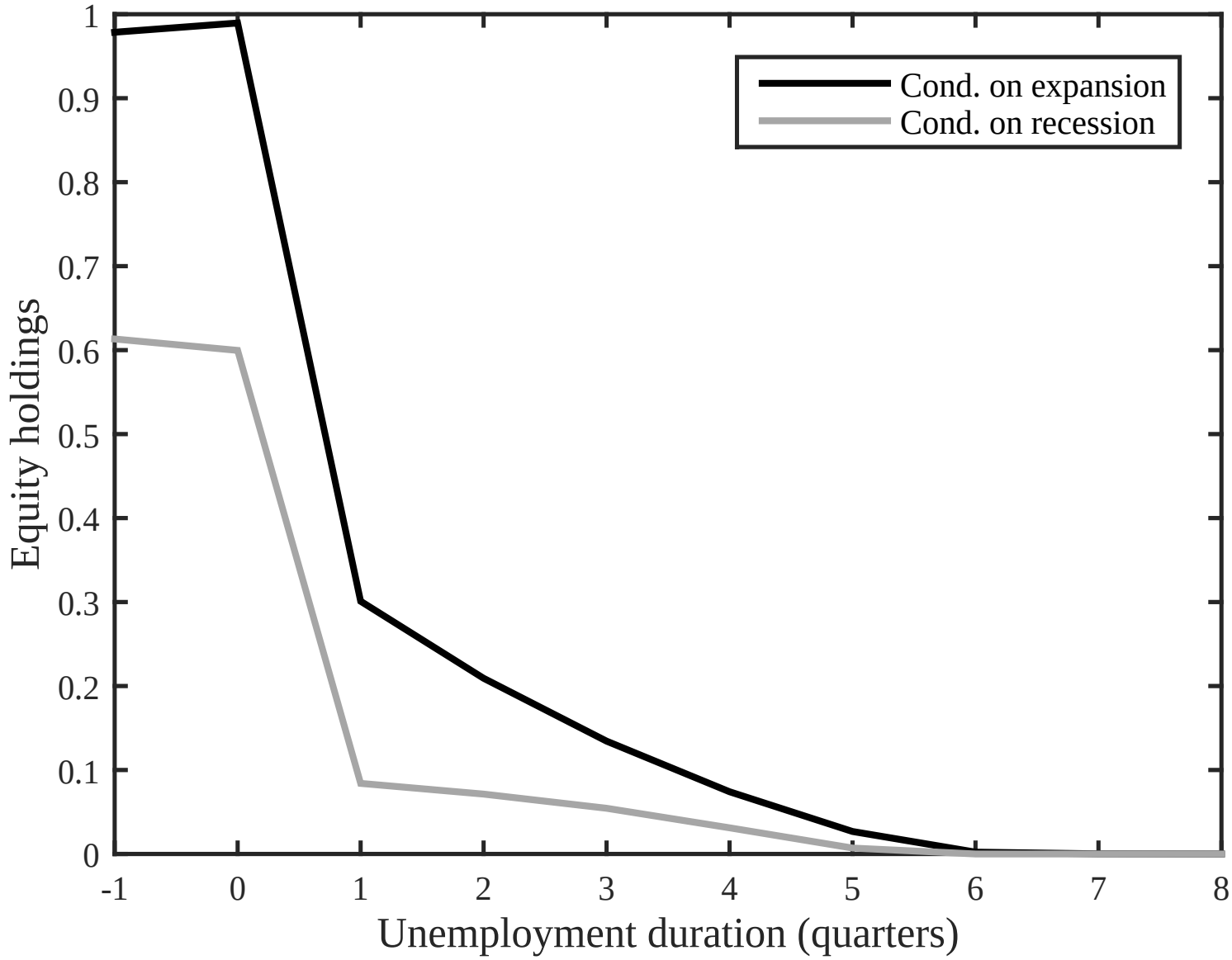
$$W_t = \omega_0 \left(\frac{z_t}{\bar{z}}\right)^{\omega_z} \bar{z} \left(\frac{P_t}{\bar{P}}\right)^{\omega_P} \bar{P}$$

- Drop in consumption one year post displacement: 24 percent.
- Expected unemployment duration: 3.57 quarters.

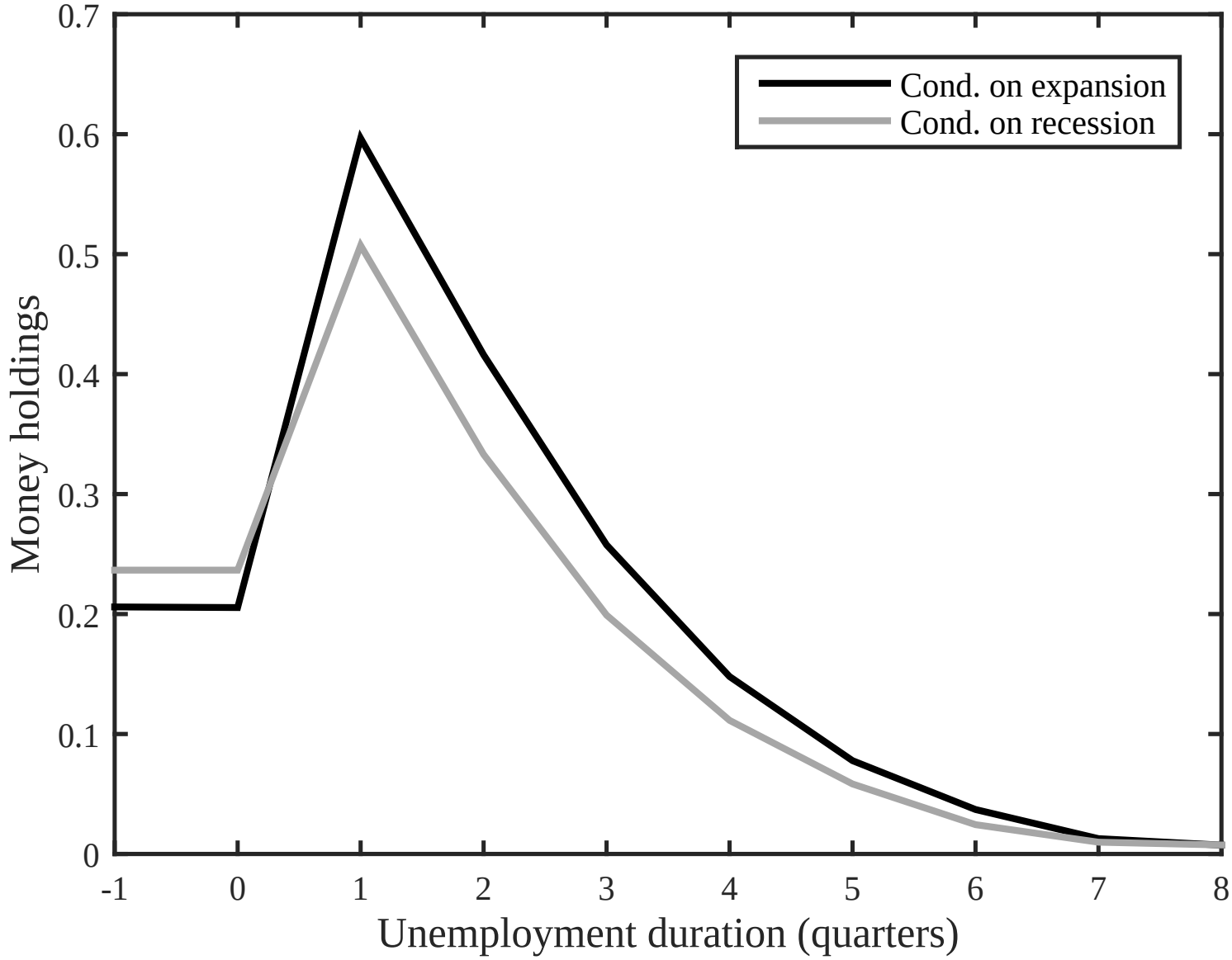
Endogenous unemployment duration



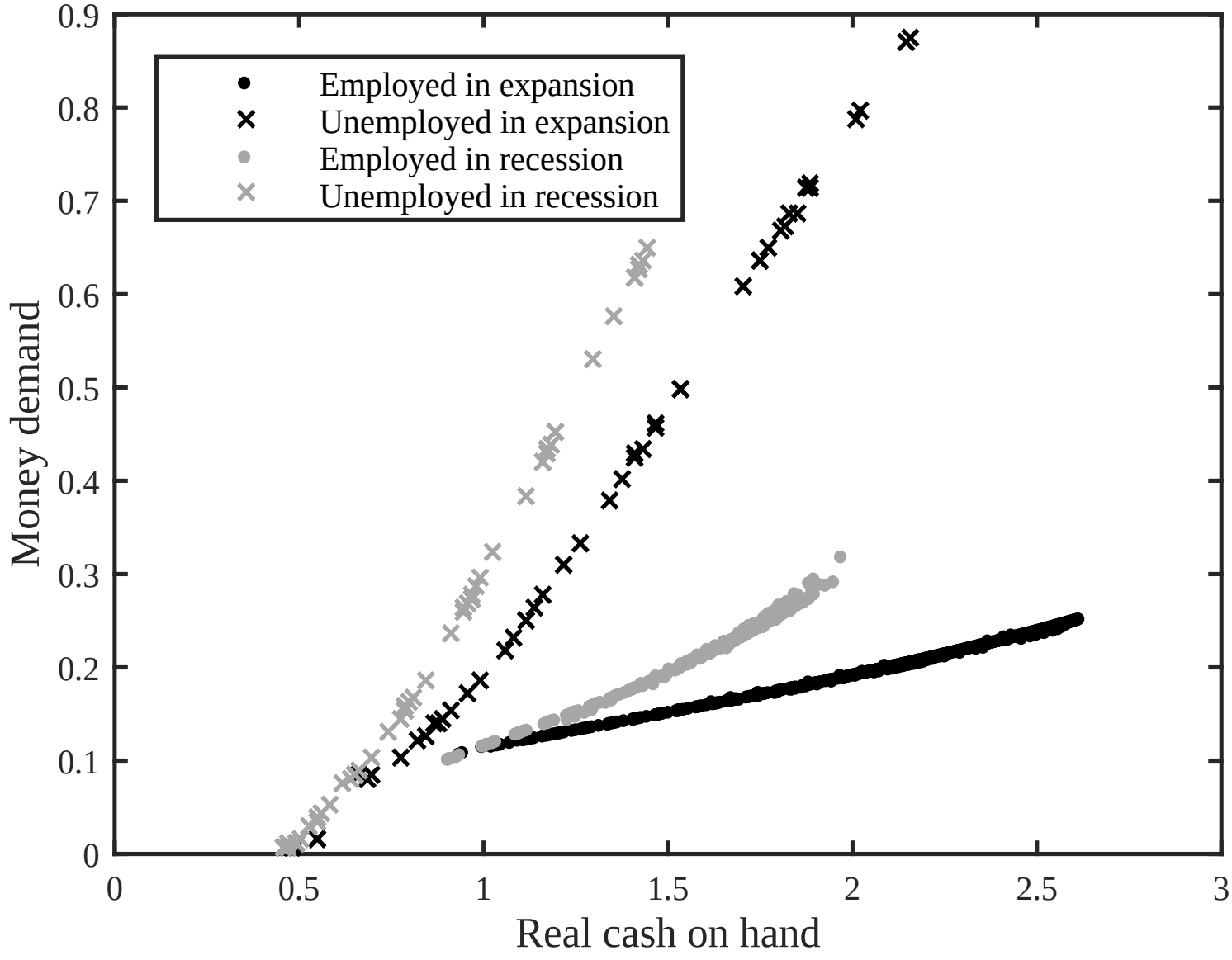
Equity holdings upon displacement



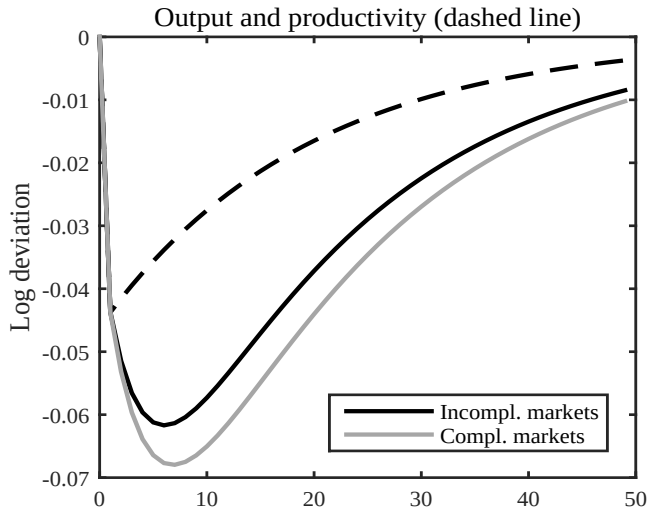
Money holdings upon displacement

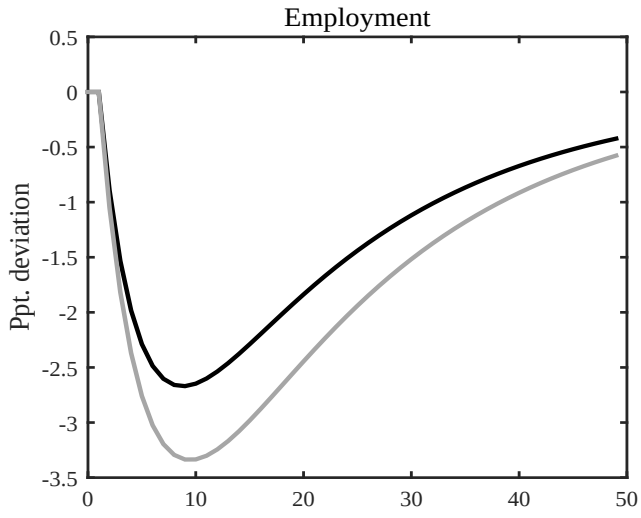


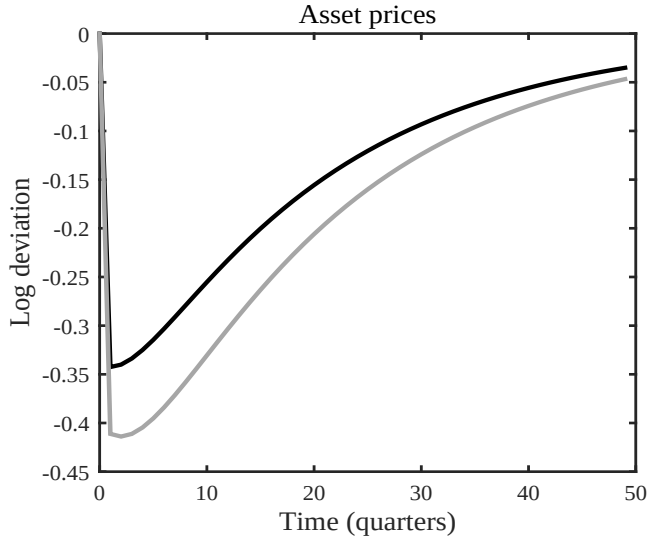
Portfolio choice: Amount in liquid asset

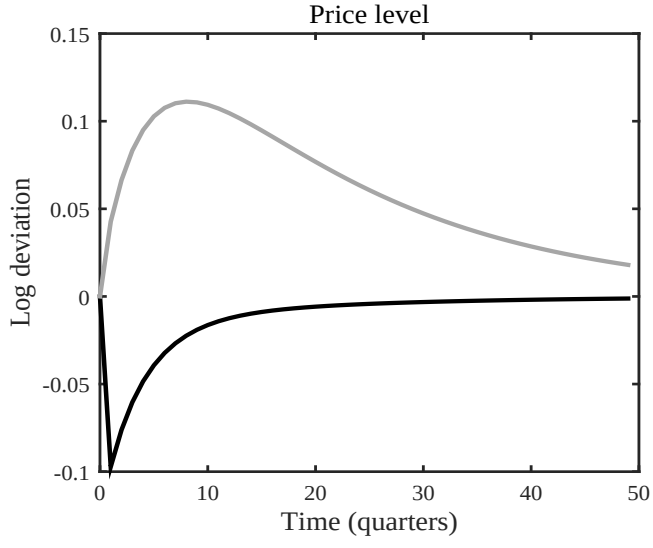


IRF, $\omega_P = 1$

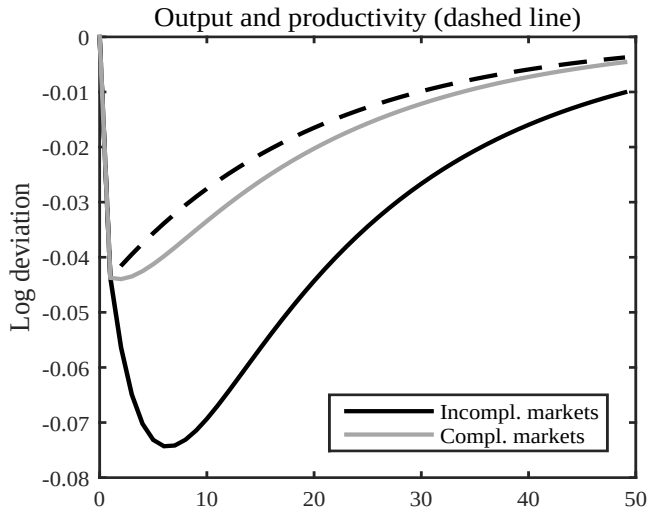

Output and productivity (dashed line)
Log deviation
0
-0.01
-0.02
-0.03
-0.04
-0.05
-0.06
-0.07
0
10
20
30
40
50
Incompl. markets
Compl. markets

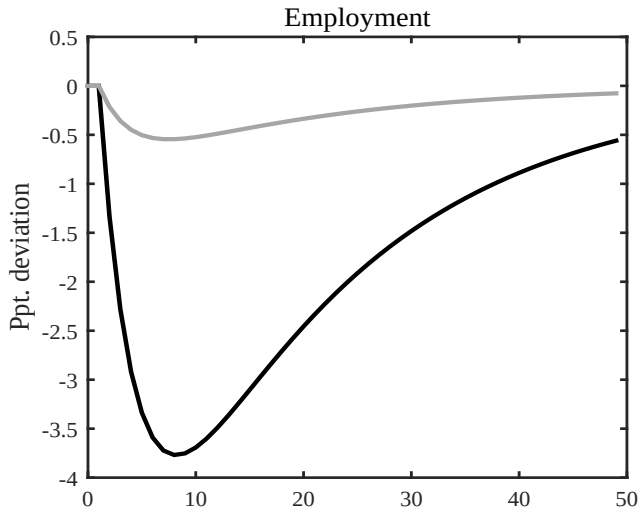

Employment
Ppt. deviation
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
0
10
20
30
40
50

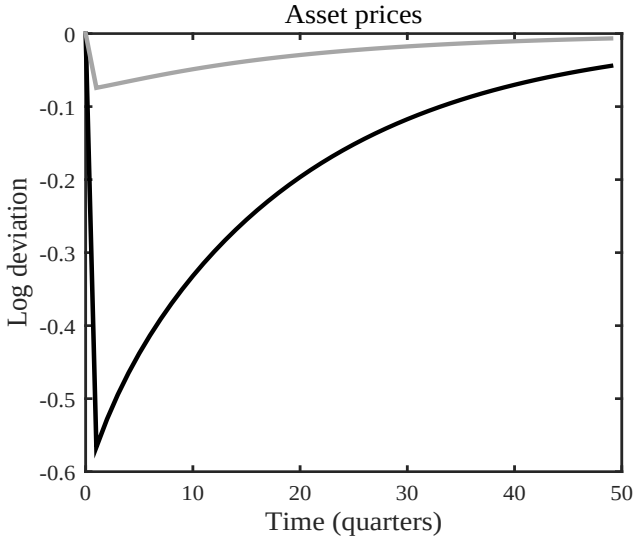

Asset prices
Log deviation
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
-0.35
-0.4
-0.45
0
10
20
30
40
50
Time (quarters)

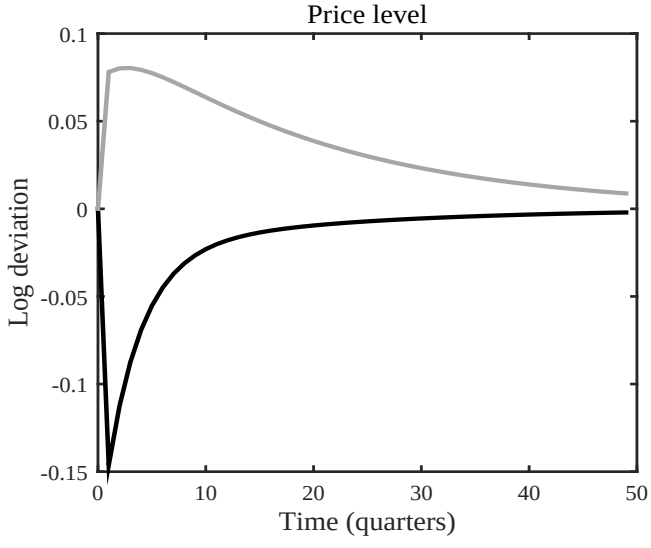

Price level
Log deviation
0.15
0.1
0.05
0
-0.05
-0.1
0
10
20
30
40
50
Time (quarters)

IRF, $\omega_P = 0.7$









Unemployment Insurance

Two unemployment insurance experiments

1. Compare model properties of economies with different replacement rates.
2. Unexpectedly change the replacement rate taking into account the transition.

Conventional wisdom

Unemployment Insurance No Good

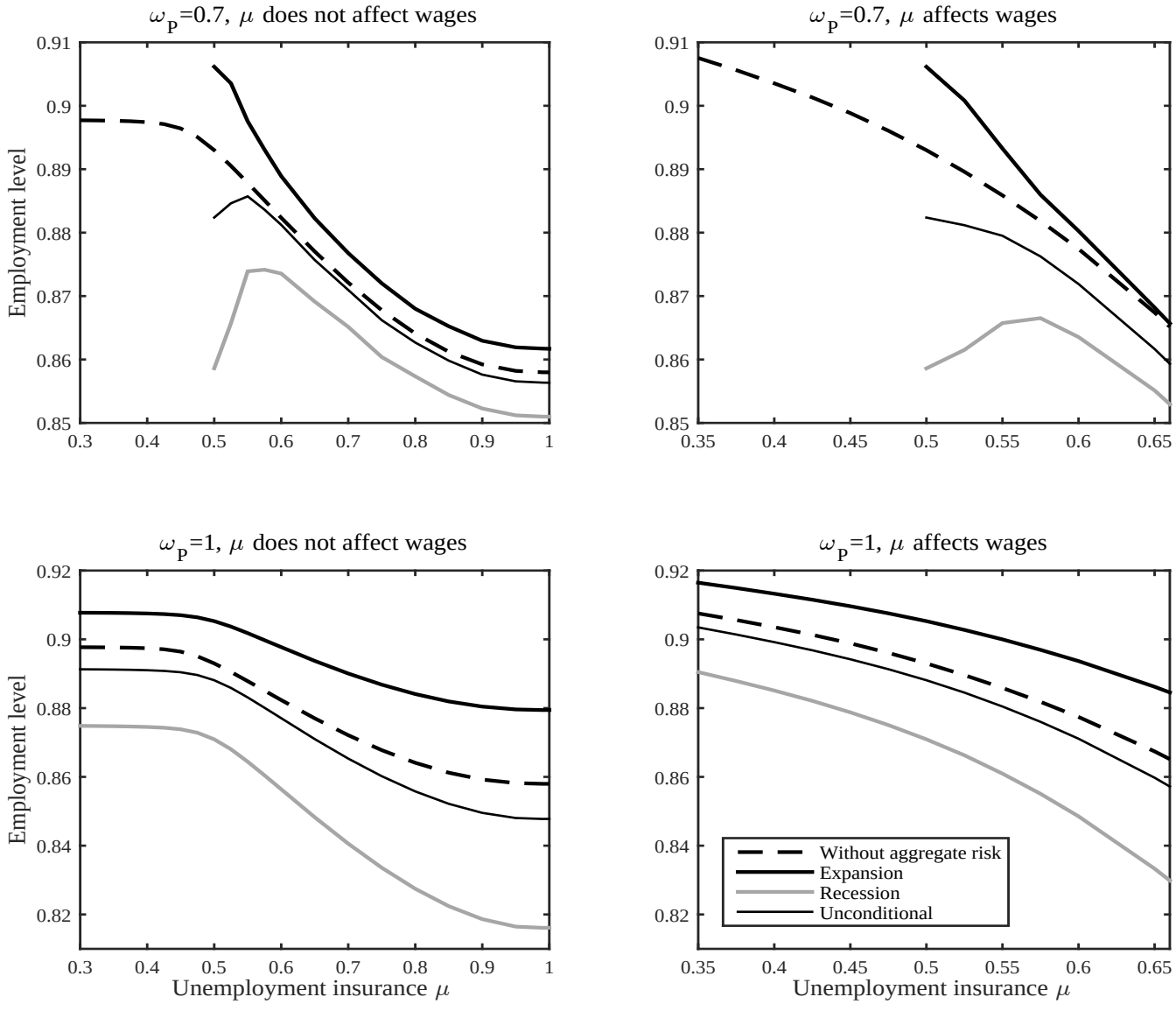
1. Raises the level of unemployment
   - Higher benefits increases the bargaining power of workers
   - Reduces precautionary equity (i.e. jobs)
2. Raises the volatility of unemployment
   - Bargaining power $\uparrow$, volatility of firm profits $\downarrow$
   - In recessions a strong precautionary motive is often a good thing

Our paper

Unemployment Insurance (locally) Good

1. Raises the level of employment
   - Reduces the deflationary spiral and makes equity less risky $\rightarrow E[J] \uparrow$
   - Reduces $std(J_t)$. With concave job-filling rate this gives higher θ.
2. Reduces the volatility of unemployment
   - Reduces the deflationary spiral

Employment vs. replacement rate



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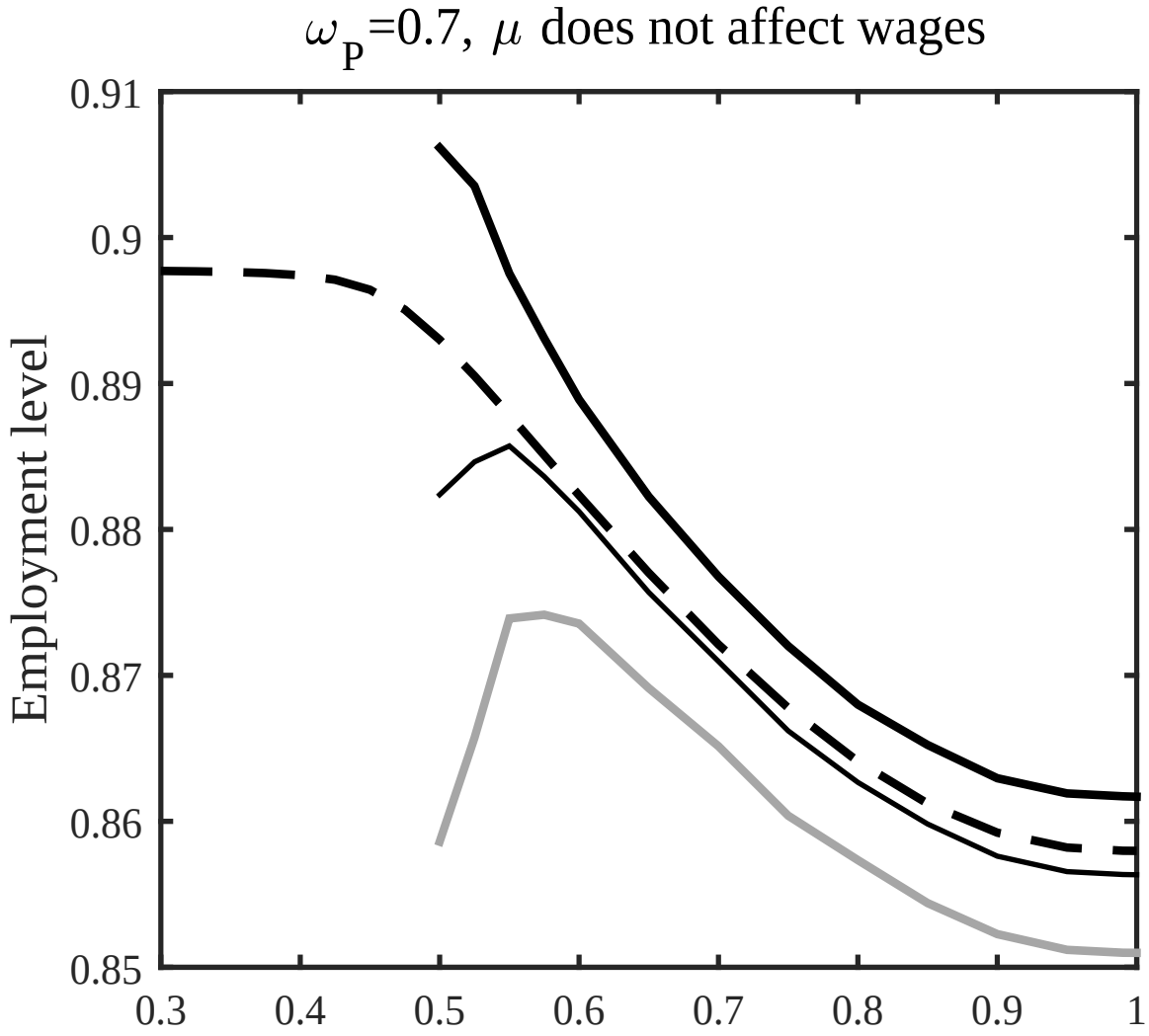
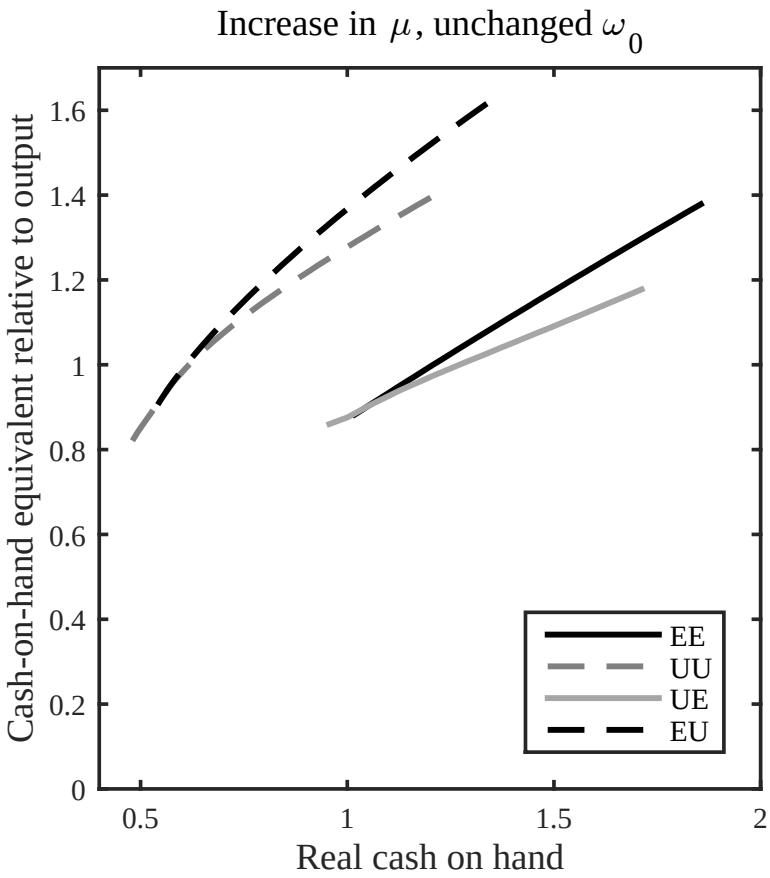


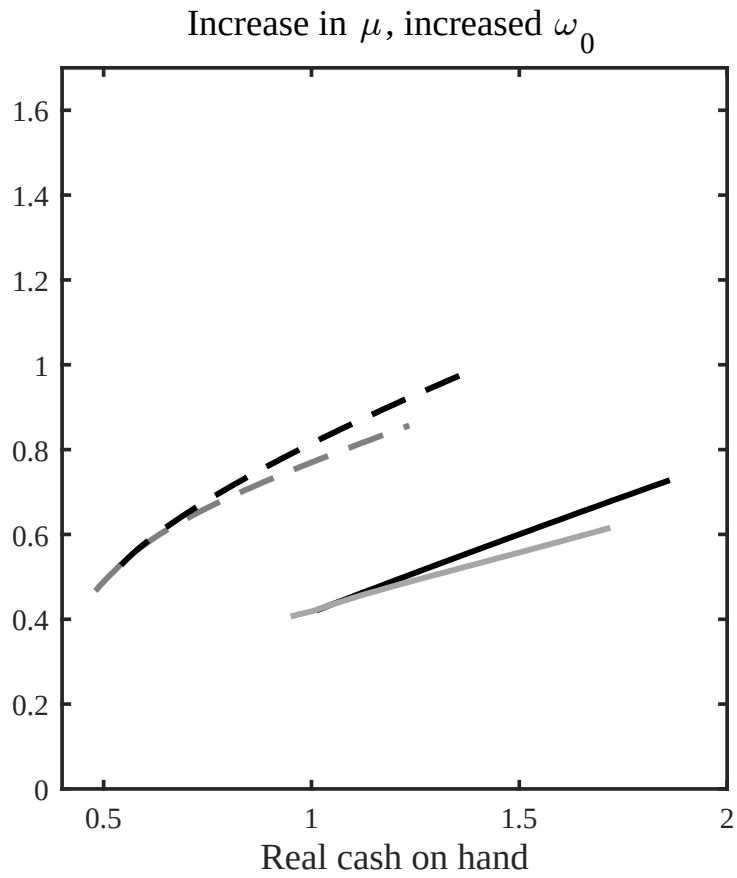
Who likes $\mu = 0.55$?

Experiment

1. Change the replacement rate from 0.5 to 0.55
2. The change in policy is unanticipated and permanent.
3. Take into account transition.
4. What are the distributional welfare consequences?

Who likes $\mu = 0.55$?





Concluding comments

- Heterogeneity and risk can both propagate shocks and lead to novel policy implication
- Results are in line with gut feeling, but it is not trivial how to get there
  - For us it was quite surprising how two frictions that on their own dampen responses to shocks, can interact to magnify them
- Apart from risk distributional issues can be addressed – e.g. policies that target the asset-poor (high MPC), etc.