Comments on "Quantifying the Forces Leading to the Collapse of GDP after the Financial Crisis" by Bob Hall

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This paper's contribution

The paper makes three main contributions

- Develop a simple dynamic model of the effects of a financially driven contraction in demand on unemployment and inflation, when monetary policy is disabled by a binding zero lower bound (ZLB)
- Measure two financial wedges - a household deleveraging wedge and a financial friction wedge - using actual and forecasted data on two key variables - unemployment and investment/GDP ratio - via a variant of the Chari, Kehoe and McGrattan (2007) accounting procedure
- Quantify the relative contribution and timing of the two financial forces in driving the initial rise in unemployment and its subsequent persistence after the financial crisis

This paper's results

- A dynamic model with a DMP labor market and nominal wage rigidities, along the lines of Gertler, Sala and Trigari (2008), seems promising to understand high unemployment and low inflation at the ZLB
- Household deleveraging and the consequent consumption drop account for the initial rise in unemployment after the crisis
  Financial frictions, possibly due to agency problems, account for most of the persistence of the unemployment hike

My discussion

- Review the paper's model, methodology and results
- Comments

Demand side of the model: consumers with borrowing constraints

- Euler equation for patient households (lenders)

$$\beta_P \left(\frac{C_{P,t+1}}{C_{P,t}} \right)^{-1/\sigma} (1 + r_t) = 1$$

- Euler equation for impatient households (borrowers)

$$\beta_I \left(\frac{C_{I,t+1}}{C_{I,t}} \right)^{-1/\sigma} (1 + r_t + \omega_t) = 1$$

  - ω_t raises with the difference btw household debt and some measure of borrowing conditions b_t ("safe" level of debt)
  - a credit tightening decreases b_t, raises ω_t, induces household deleveraging and reduces household expenditure
  - provides mechanism through which the economy hits the ZLB

Demand side of the model: firms facing financial frictions

- Euler equation for firms

$$1 + r_t = \frac{1}{q_t}\left\{\alpha \frac{y_t}{k_t} + (1-\delta)\, q_{t+1}\right\} - f_t$$

  - f_t: spread btw interest rate faced by lender (patient hh) and the return to capital faced by borrower (firm)
  - f_t: raises with depletion of borrower's net worth (or financial intermediaries' net worth) because of agency frictions
  - standard credit channel: firms facing difficulties in raising external funds (high f_t) are forced to cut on investment and hiring (similar mechanisms for residential investment and durable consumption)

Demand side of the model: monetary policy facing the ZLB

- Taylor rule where a binding ZLB makes the rule ineffective

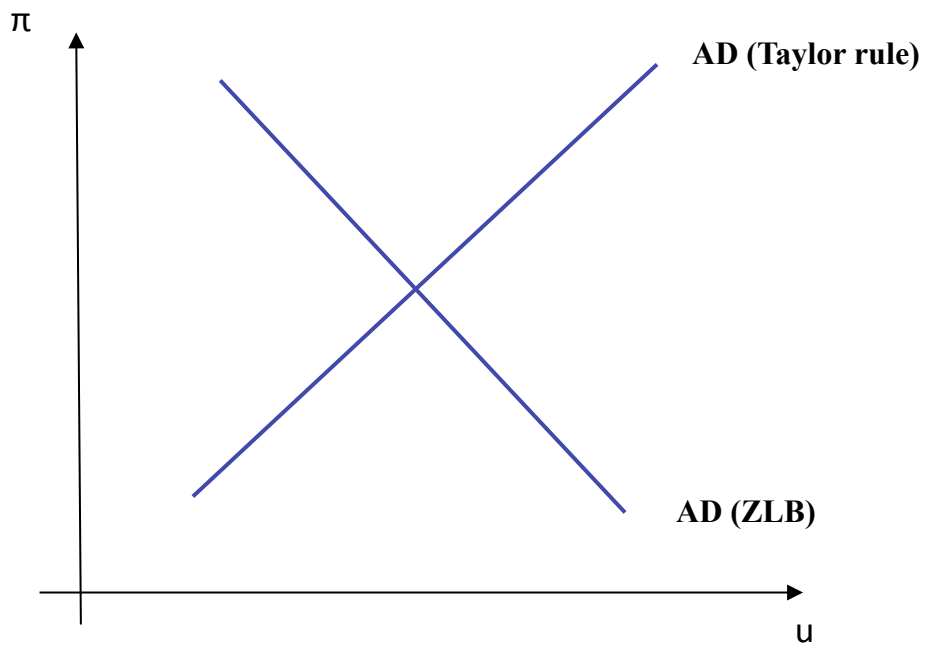
$$r_{N,t} = \max\left\{0, \tau_0 + \tau_\pi \pi_t - \tau_u u_t\right\}$$

- Fisher' equation

$$1 + r_t = \frac{1 + r_{N,t}}{1 + \pi_t}$$

- Assume $E_t\left(\pi_{t+1}\right) = \pi_t$ (stable inflation outlook)
  Furthermore, assume the CB has no control over expected inflation, ie., cannot raise $E_t\left(\pi_{t+1}\right)$ (lack of commitment, risk of credibility loss)

AD at the ZLB describes a negative relation between inflation and unemployment



• At the ZLB, a decrease in inflation, or expected inflation, causes no reaction from CB who cannot reduce nominal rate below 0; the real rate raises, which reduces demand (and raises unemployment)

• Under a conventional Taylor rule, in response to higher inflation CB lowers the nominal rate enough to lower the real rate, thus raising demand (and lowering unemployment)

Sketch of the supply side of the model: baseline DMP

- Zero profit condition (job creation, labor demand)

$$q(u)J(a-w)=\kappa$$

  - $q(u)$: recruiting probability, increasing function of u
  - J: job value, PDV of productivity, a, net of wages, w
  - κ the cost of recruiting

- Wage equation from Nash bargaining (labor supply)

$$w=w(a,u,z)$$

  - z: catchall variable (for ex., unemployment benefits)
  - higher u reduces w (lowers worker outside option)

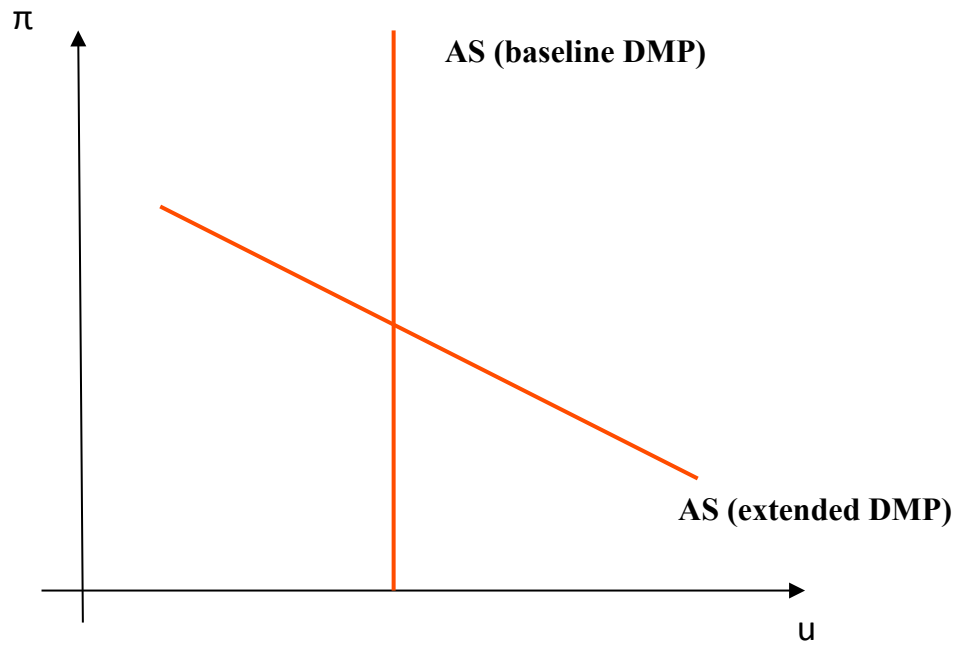
- u essentially determined by a, no role for π or nominal forces

Supply side of the model: extended DMP model

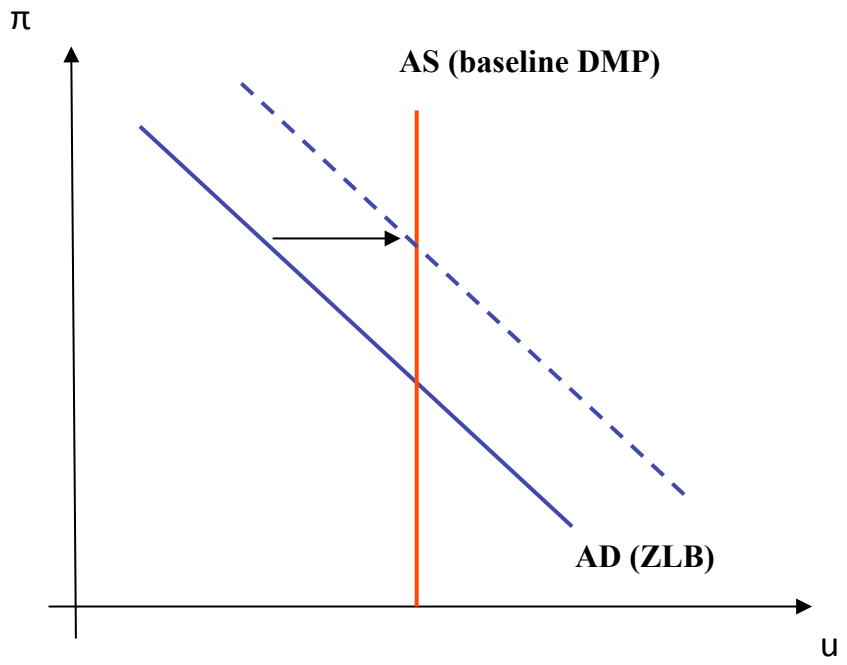
- Staggered Nash bargaining from Gertler and Trigari (2009)
- GST: firm and workers bargain over nominal wages (with partial indexing to inflation) at random intervals; workers hired in between bargaining times receive prevailing firm nominal wage
- Higher inflation since last bargain raises job value to the firm; more hiring less unemployment
- Source of movements in job value is nominal
- This paper captures this relation with a reduced-form Phillips curve fitted on recent crisis data:

$$u_t = \phi_0 - \phi_1 \pi_t$$

AS from extended DMP model with nominal wage rigidities describes a negative relation between inflation and unemployment

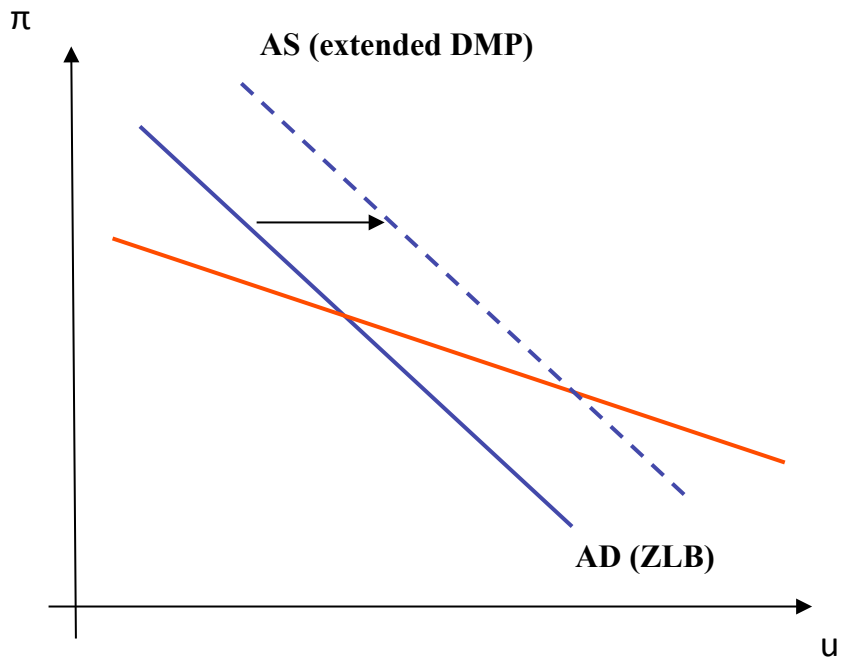


Explaining the effect of a reduction in demand on inflation and unemployment



- Unemployment constant
- Inflation raises
- Both counterfactual

Explaining the effect of a reduction in demand on inflation and unemployment



- Unemployment raises
- Inflation decreases
- Both consistent with the facts

The lower the slope of the AS curve, the lower the elasticity of inflation to unemployment, the easier to explain the mild reduction in inflation associated with the large increase in unemployment

The empirical exercise

- Use actual data from 2007 to 2011 and CBO forecasts (updated January 2012) for 2012 through 2022 on unemployment and investment/GDP ratio
- Feed data into the model, solve the model backward under perfect foresight, and back up the two driving forces f_t and ω_t
- Plot the unemployment rate conditional on only the financial friction to evaluate each frictions' contribution
- Household deleveraging explains the impact raise in unemployment, while the financial friction explains its persistence

The contribution of the two frictions to investment

- Borrowing constraints distorting consumer Euler combined with financial frictions distorting firm Euler:

$$1 = \beta_I \left(\frac{C_{I,t+1}}{C_{I,t}} \right)^{-1/\sigma} \left\{ \frac{1}{q_t} \left[\alpha \frac{y_t}{k_t} + (1-\delta)\, q_{t+1} \right] - (f_t - \omega_t) \right\}$$

- Overall wedge $f_t - \omega_t$ closer to investment wedge in CKM (2007); one difference, consumption of impatient agent in place of consumption of representative agent
- Two points:
  - Coexistence in the model of patient (life-cycle consumers) and impatient (hand-to-mouth consumers) allows to separately identify each distortion
  - Tighter credit ω_t for constrained household acts as a reduction in the wedge. Model without financial friction may have counterfactual implications for investment. What is the contribution of each financial driving force to investment?

What mechanism behind the financial friction wedge?

- Data show importance of financial frictions to explain persistence in unemployment
- Can we interpret the wedge as financial frictions modeled by a typical credit channel?
- High liquidity poses some doubts that wedge can be interpreted as a standard credit channel where firms with difficulties in raising external funds are forced to cut on investment and hiring
- Alternative/additional mechanisms for sluggish recovery:
  - Uncertainty (Schaal, 2012, and Guerrieri and Lorenzoni, 2011)
  - Structural mismatch (Elsby, Hobijn and Sahin, 2010 and Kocherlakota, 2010)
  - Low leverage and debt raises bargained wages (Monacelli, Quadrini and Trigari, 2011): firms not willing to hire at times in which their bargaining position is unfavorable

Empirical evidence on new hires wage rigidity

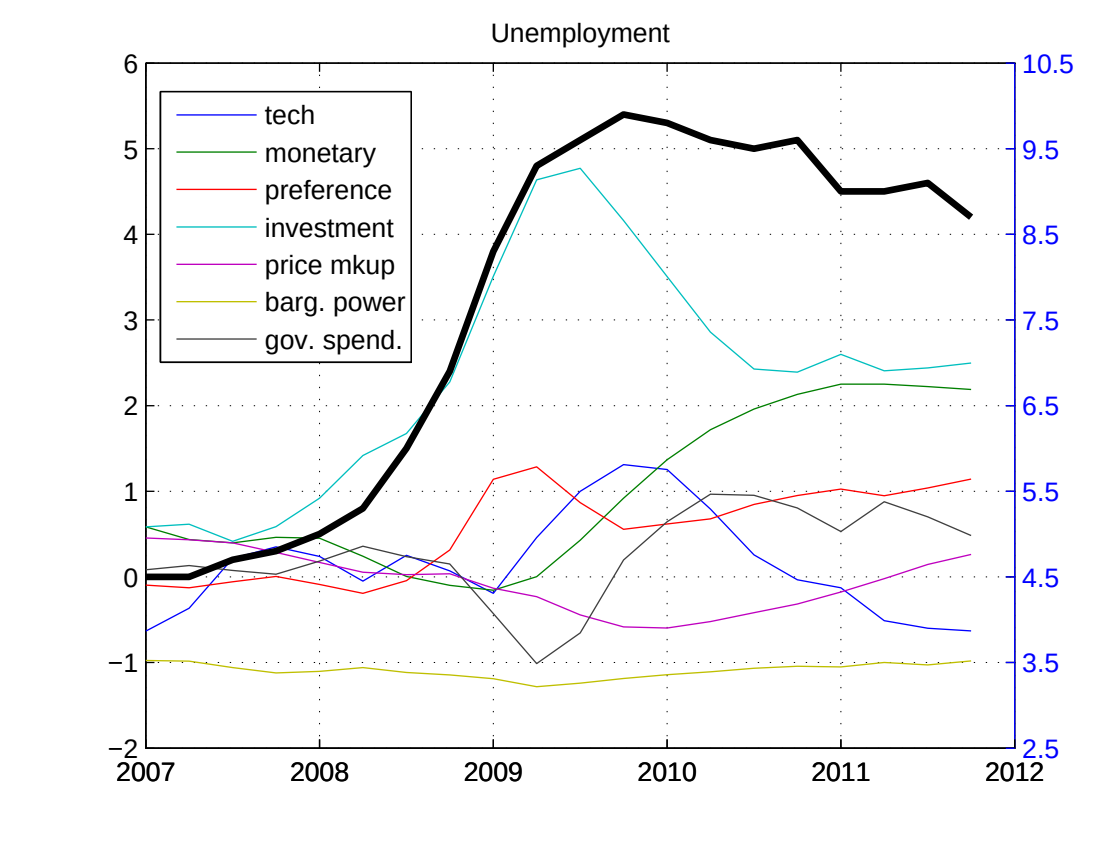
- Only wage rigidity in new hires matters to the hiring decision

  Present discounted value of wages matters to firms'hiring decision; timing of wage payments is irrelevant

- Based on some existing and new evidence on micro wage data, some authors question wage rigidity for new hires
  - Pissarides (2009), Haefke et al. (2008): flexible wages for new hires; rigid wages for existing workers
  - Solon et al.(2010): flexible wages for all
- Gertler, Huckfeldt and Trigari (in progress) argue that rigid wages for new hires is consistent with existing evidence and propose a cyclical composition interpretation of the evidence

Unemployment in the Great Recession according to GST

- Model estimated on 1960Q1 to 2005Q1 sample using 7 quarterly series (output, consumption, investment, hours, real wages, inflation and federal funds rate), and allowing for 7 shocks (technology, preference, investment, price markup, bargaining power, government, monetary)
- Model simulated from 2007Q1 to 2011Q4 (no distortions from nonlinearities due to ZLB)
- Plot decomposition by driving forces of unemployment during the Great Recession and subsequent recovery (preliminary)
- Work in progress: add labor market variables in estimation; extend sample, look at subsamples; allow for risk premium, match efficiency, separation (and hh deleveraging?) shocks


Unemployment
tech
monetary
preference
investment
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barg. power
gov. spend.
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2.5
2007
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2009
2010
2011
2012

Conclusions

- Paper makes progress in understanding relative contribution of financial driving forces that led to the Great Recession and subsequent sluggish recovery
- Makes room for future research on classes of models in which frictions show up as household deleveraging and financial friction wedges
- Clarifies the role of nominal wage rigidities in a DMP framework and suggests this is a promising modelling strategy