Macroeconomic Effects of Financial Shocks

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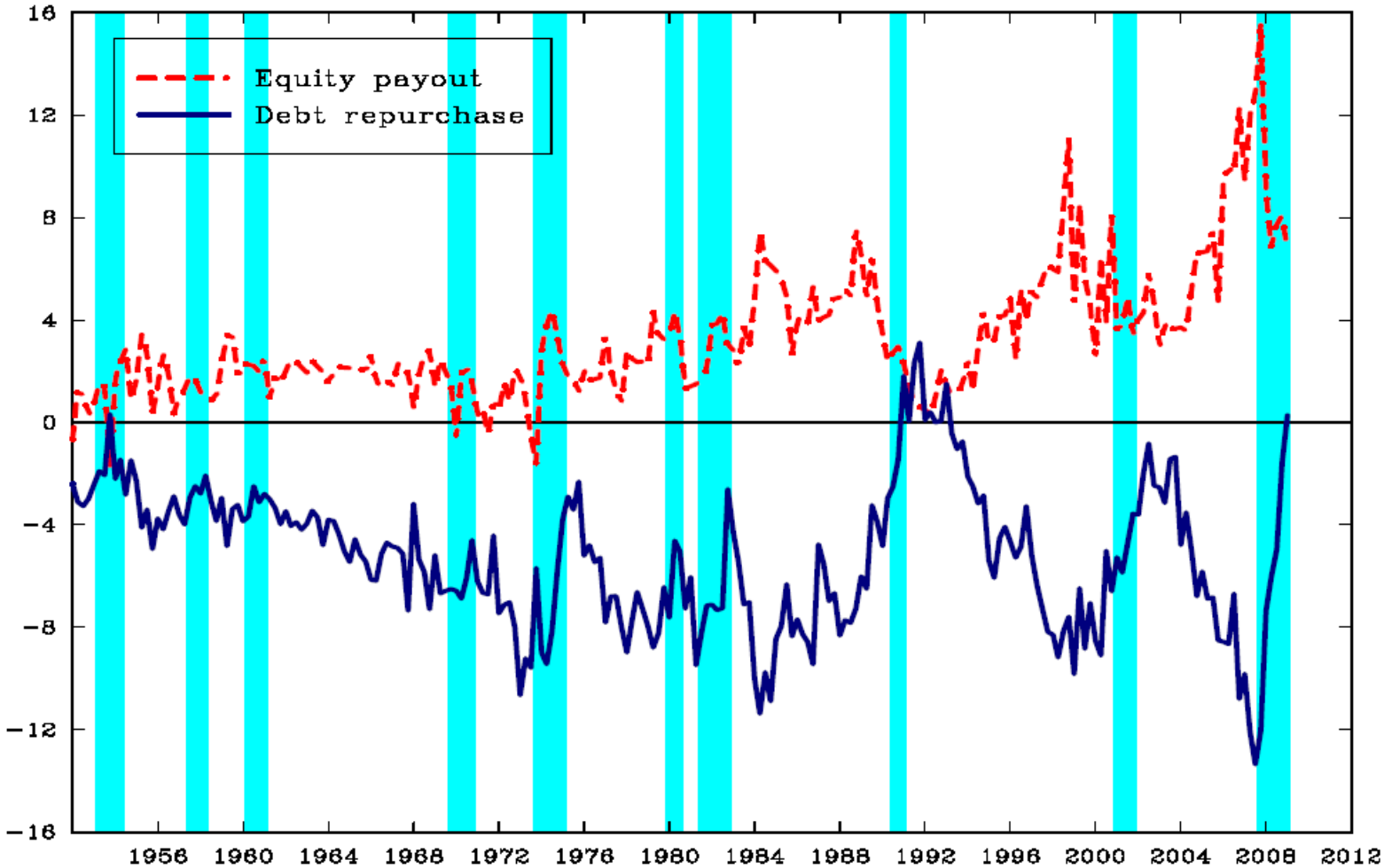
Equity payout and Debt repurchase (/ GDP)



Business cycle properties, 1984-2009:1

	Std(Variable)	Corr(Variable,GDP)
Macroeconomic variables		
GDP	0.84	
Consumption (N.D.& S.)	0.49	0.83
Investment	5.98	0.87
Hours	1.18	0.81
TFP	0.60	0.38
Financial variables		
EquPay/GDP	1.05	0.41
DebtRep/GDP	1.29	-0.61

All variables are detrended with a band-pass filter that preserves cycles of 1.5-8 years.

What do we do?

1. Extend the Real Business Cycle model: financial frictions and financial shocks
2. Construct series for 'financial shocks' and 'productivity shocks' from data using model restrictions
3. Evaluate the importance of financial (and productivity) shocks for macroeconomic fluctuations

What do we find?

- For financial flows we need financial shocks
- Financial shocks improve the model's performance for real macroeconomic variables
- Financial shocks have played a central role in all recent recessions: 1991, 2001, and 2008

The Model

Continuum of firms with revenue function

$$F\left(z_t, k_t, l_t\right) = e^{z_t} k_t^{\theta} l_t^{1-\theta}$$

z_t is an exogenous productivity shock

Financial structure

- Firms raise funds with debt and equity. The cost of borrowing is:

$$R_t = 1 + r_t (1 - \tau)$$

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- Issuing/repurchasing shares and paying dividends are costly:

$$\text{Cost of payout} : \varphi(d_t) = d_t + \kappa \cdot (d_t - \overline{d})^2$$

Recursive problem

$$V(\mathbf{s}; k, b) = \max_{d,l,k',b'} \left\{ d + Em' V(\mathbf{s}'; k', b') \right\}$$

subject to

$$\begin{aligned} F(z, k, l) + (1-\delta) k_t - wl + \frac{b'}{R} &= b + \varphi(d) + k' \\ \xi Em' V(\mathbf{s}'; k', b') &\geq F(z, k, l) \end{aligned}$$

Household sector

- There is a representative consumer with standard preferences:

$$E_0 \sum_{t=0}^{\infty} \beta^t U(c_t, l_t), \text{ with } U(.) = \ln(c) + \alpha \ln(1-l)$$

- Budget constraint:

$$w_t l_t + b_t + s_t(d_t + q_t) = \frac{b_{t+1}}{1+r_t} + s_{t+1} q_t + c_t + T_t$$

- Firms are owned by households, so that

$$m_{t+j} = \beta^j U_c(c_{t+j}, l_{t+j}) / U_c(c_t, l_t)$$

Calibration

- Some parameters are standard:
  $\beta = 0.9825, \alpha = 1.8991, \theta = 0.36, \delta = 0.025$
- Others are not standard but can be calibrated using steady state targets: $\tau = 0.35$, $\overline{\zeta} = 0.1965$
- Payout cost parameter $\kappa = 0.246$ to match standard deviation of empirical equity payout

Constructing the shocks

- Productivity shocks are standard Solow residuals

$$\hat{z}_t = \hat{y}_t - \theta\,\hat{k}_t - (1-\theta)\,\hat{l}_t$$

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$$\xi_t \overline{V}_t = y_t$$

$$\hat{\xi}_t = c_z \widehat{z}_t + c_y \widehat{y}_t + c_k \widehat{k}_{t+1} + c_b \widehat{b}^r_{t+1}$$

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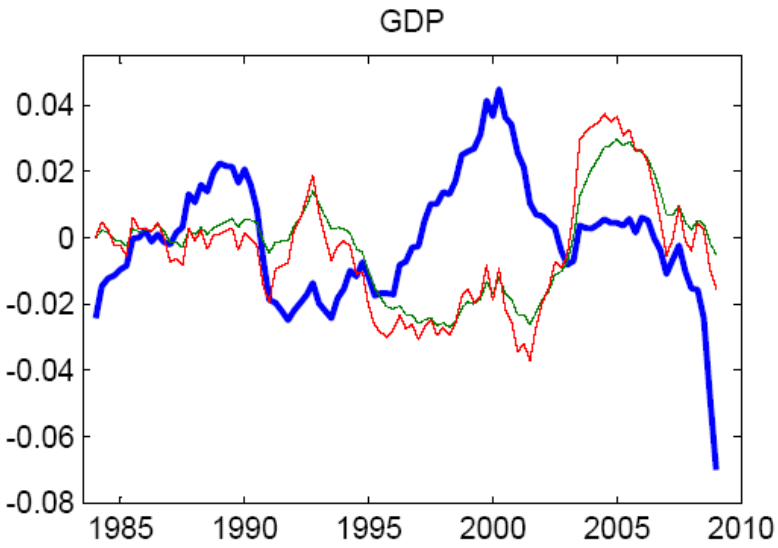
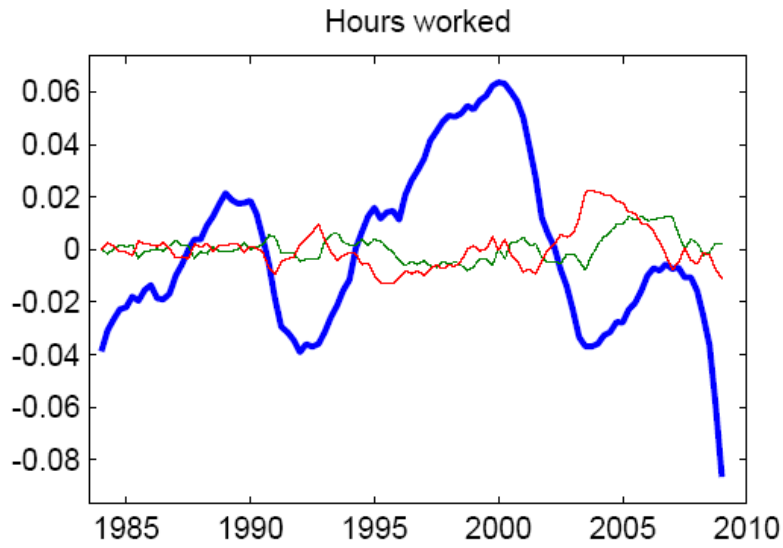
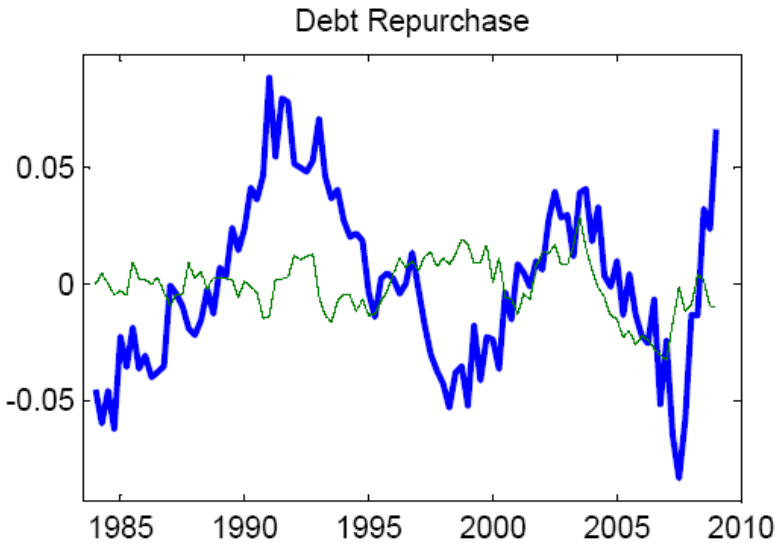
- Based on constructed time series (1984-2009.1) we estimate

$$\begin{pmatrix} \hat{z}_{t+1} \\ \hat{\zeta}_{t+1} \end{pmatrix} = A \begin{pmatrix} \hat{z}_t \\ \hat{\zeta}_t \end{pmatrix} + \begin{pmatrix} \varepsilon_{z,t+1} \\ \varepsilon_{\zeta,t+1} \end{pmatrix}$$

Fig 3: Productivity Shocks only: Data (thick line), No Financial Frictions (-), Financial Frictions (--)







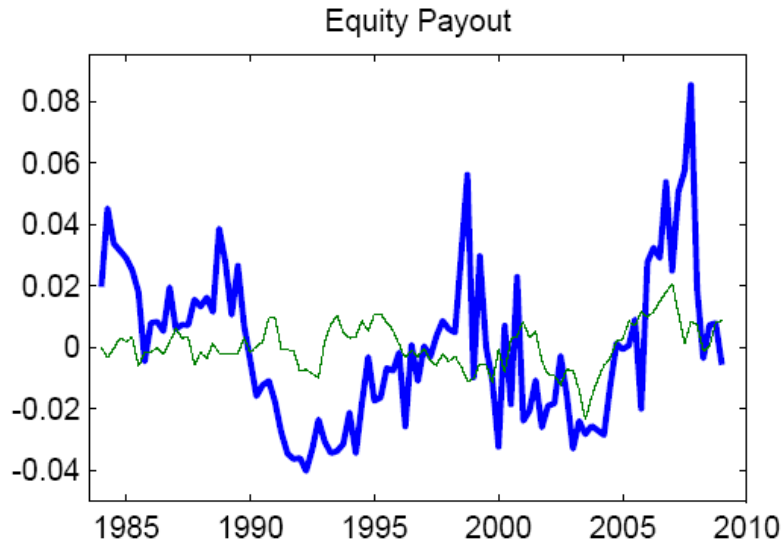


Fig 6: Impulse Responses to Productivity Shock

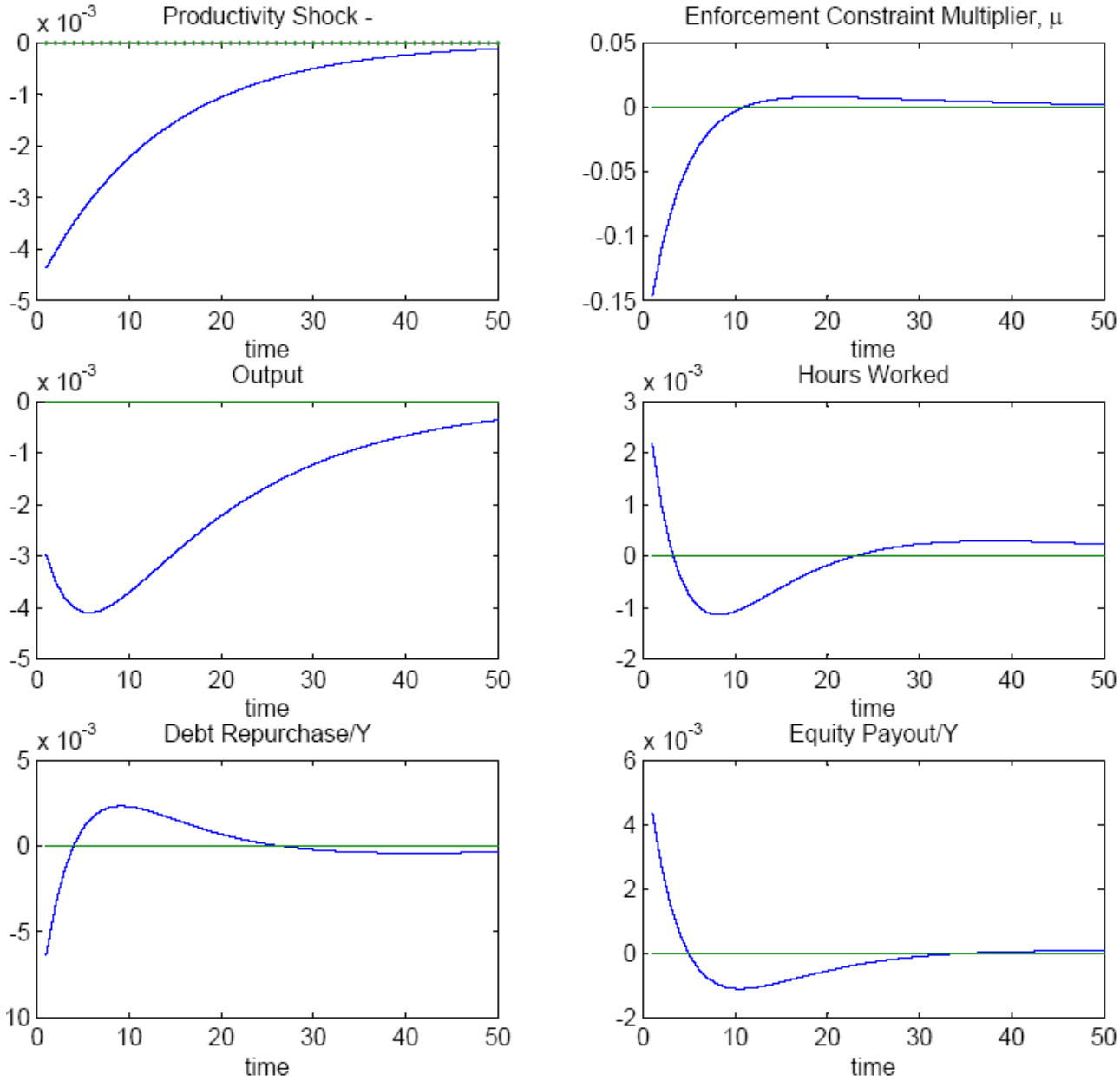


Fig 4: Model with Financial Shocks versus Data (thick line)

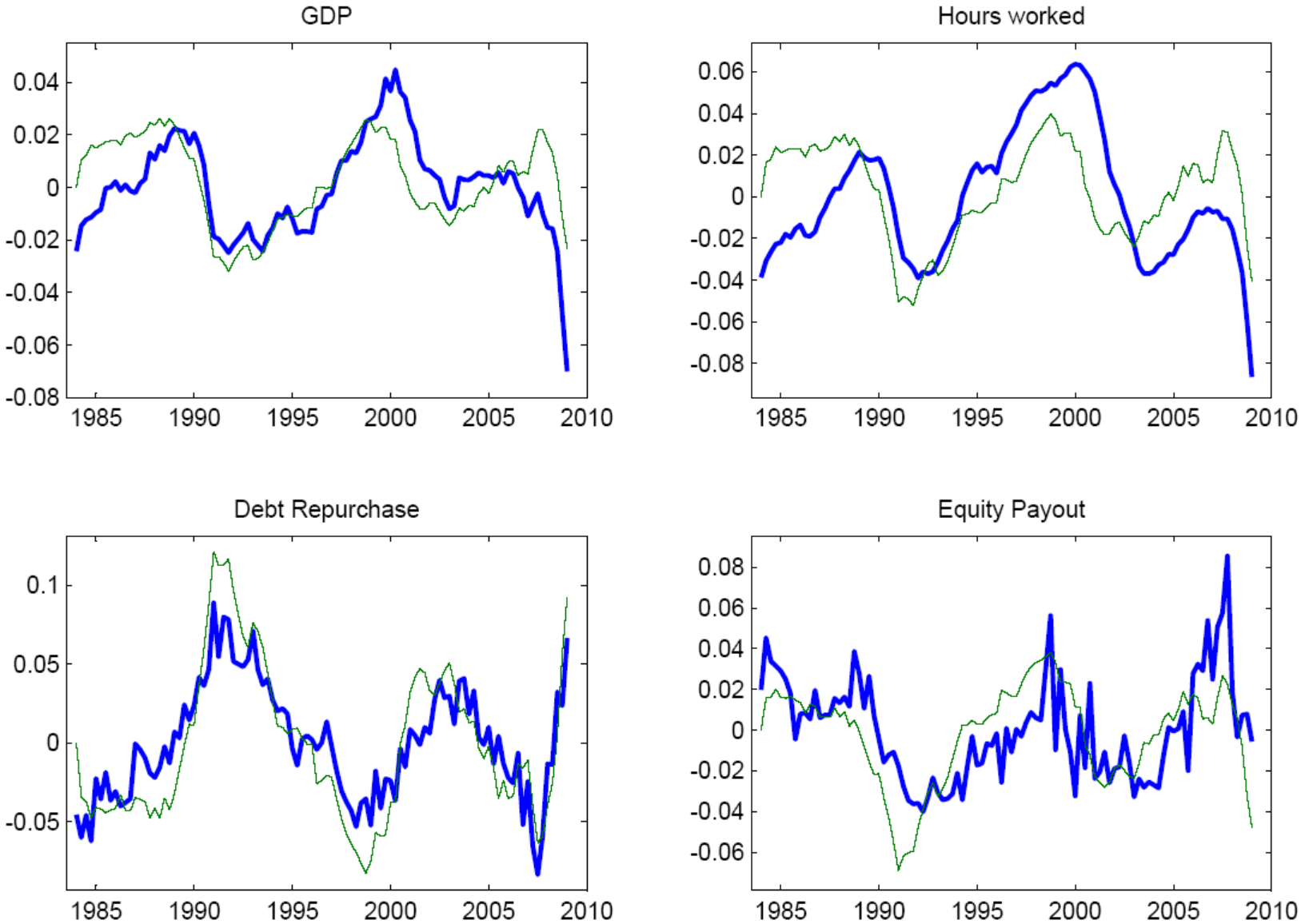
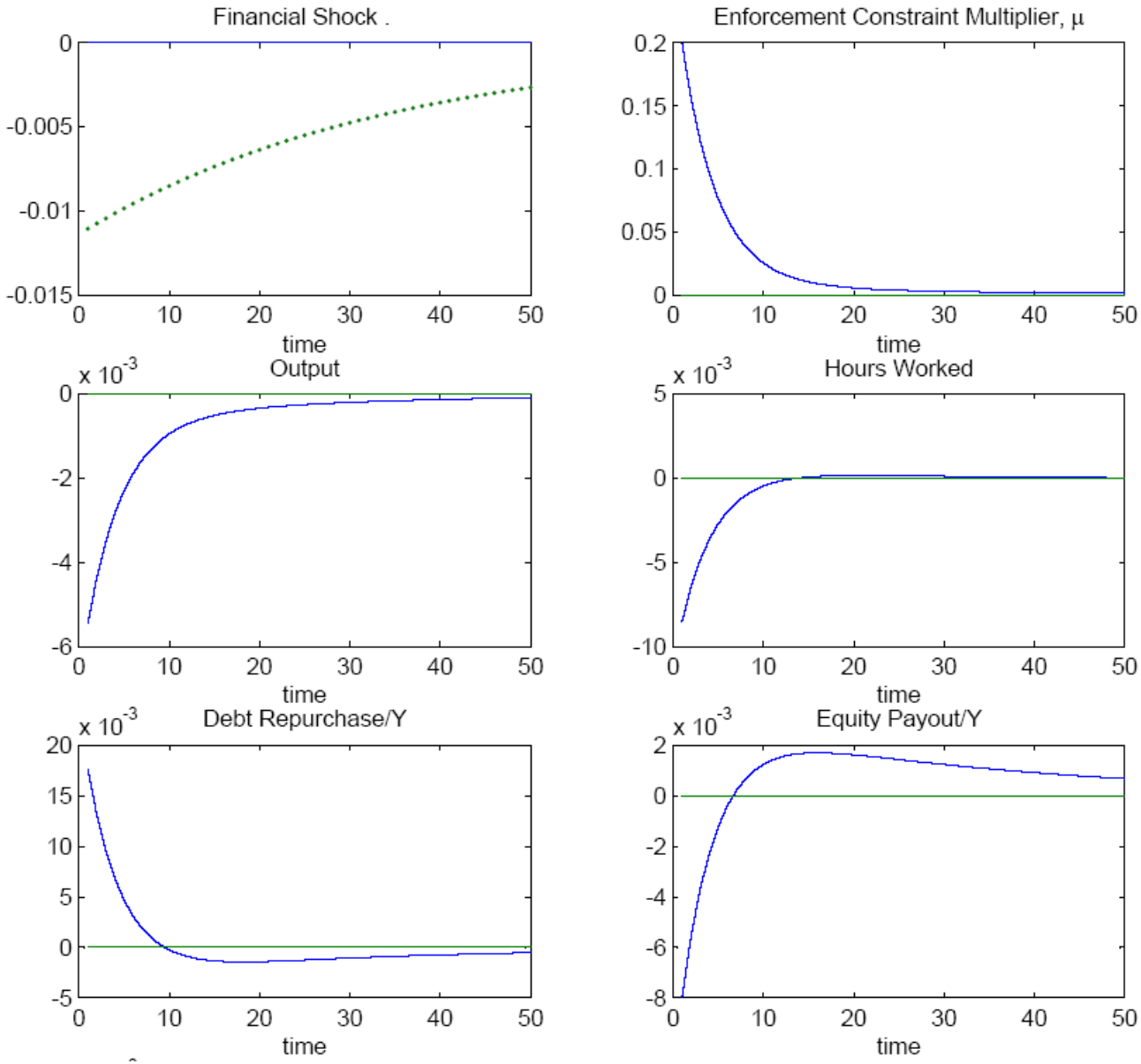


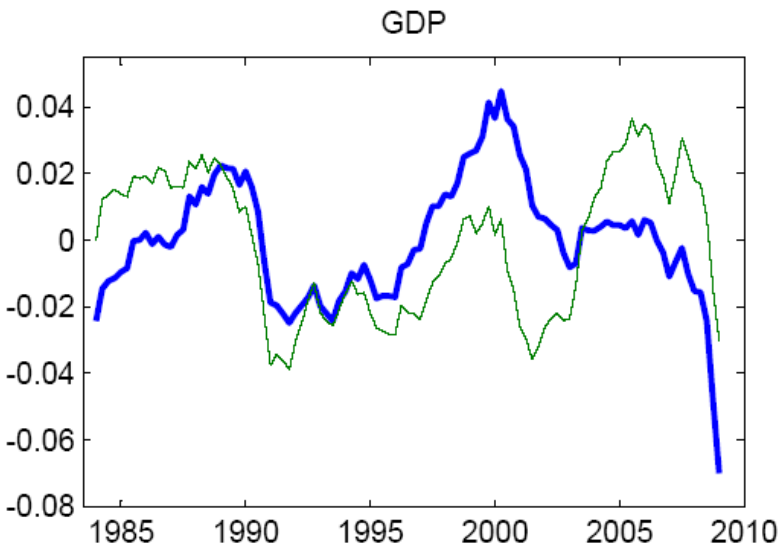
Fig 7: Impulse Responses to Financial Shock

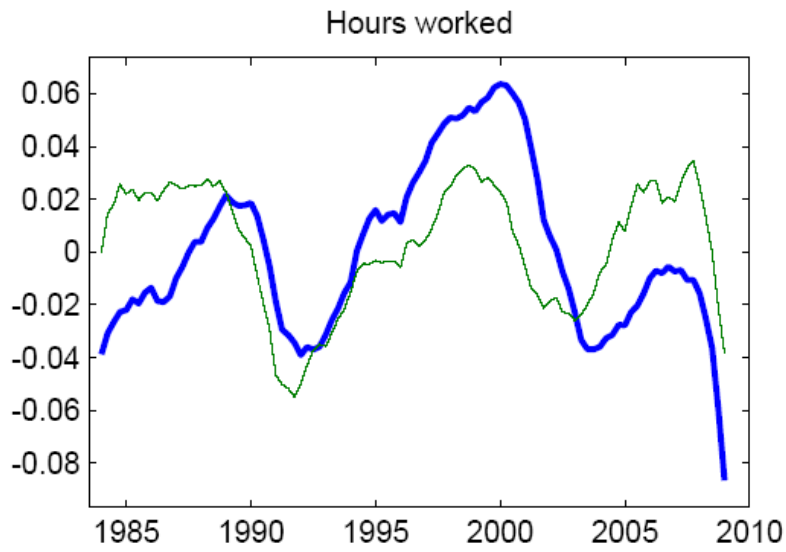


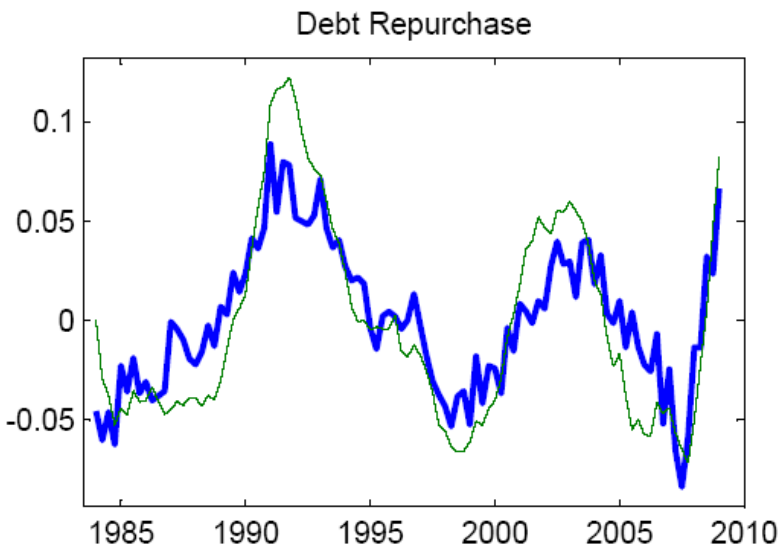
First-order condition for labor

$$F_l(z, k, l) = w \cdot \left(\frac{1}{1 - \mu \varphi_d(d)} \right)$$

Fig 5: Model with both Shocks and Data (thick line)







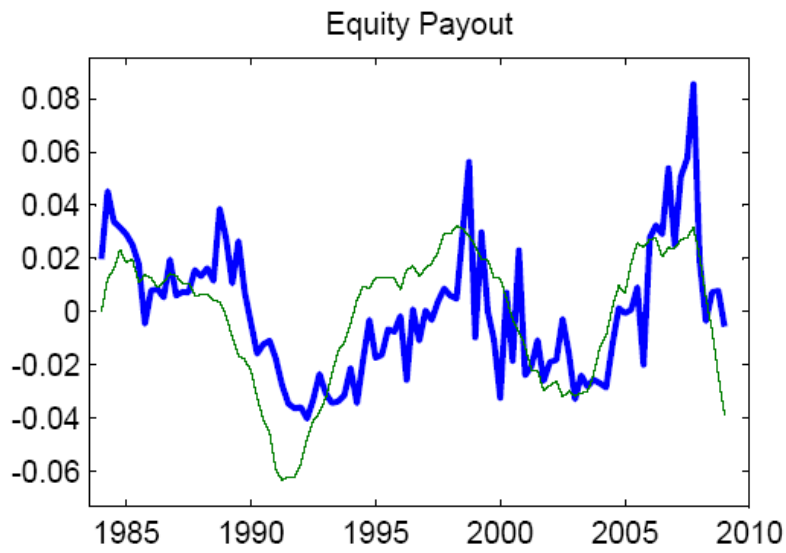
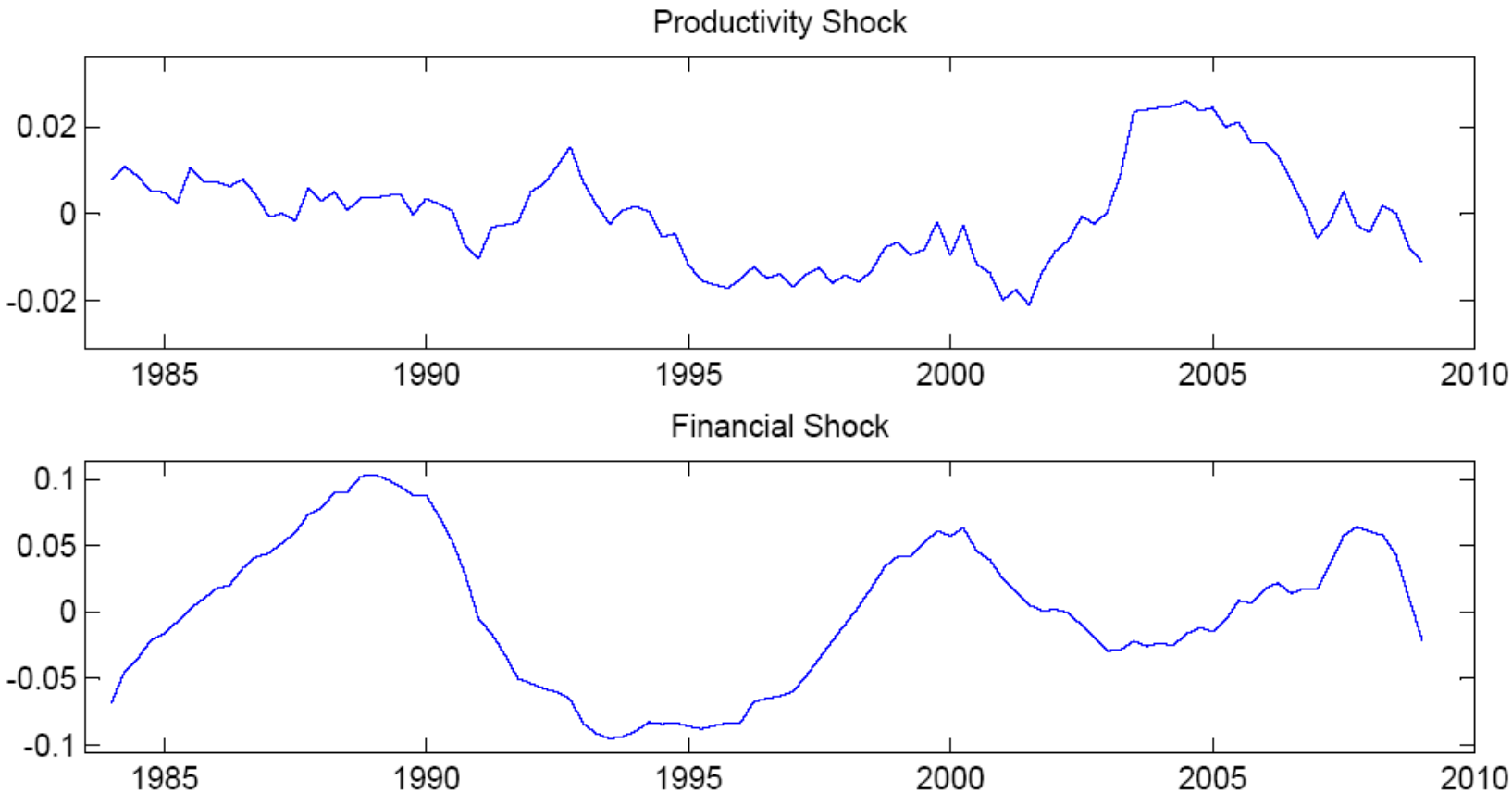


Fig 2: Productivity Shocks and Financial Shocks



New project

- Our financial frictions in a model like Smets and Wouters (2007)
- Sticky prices, sticky wages, investment adjustment cost, variable capital utilization, and Taylor rule
- 8 shocks, including our financial shock ξ

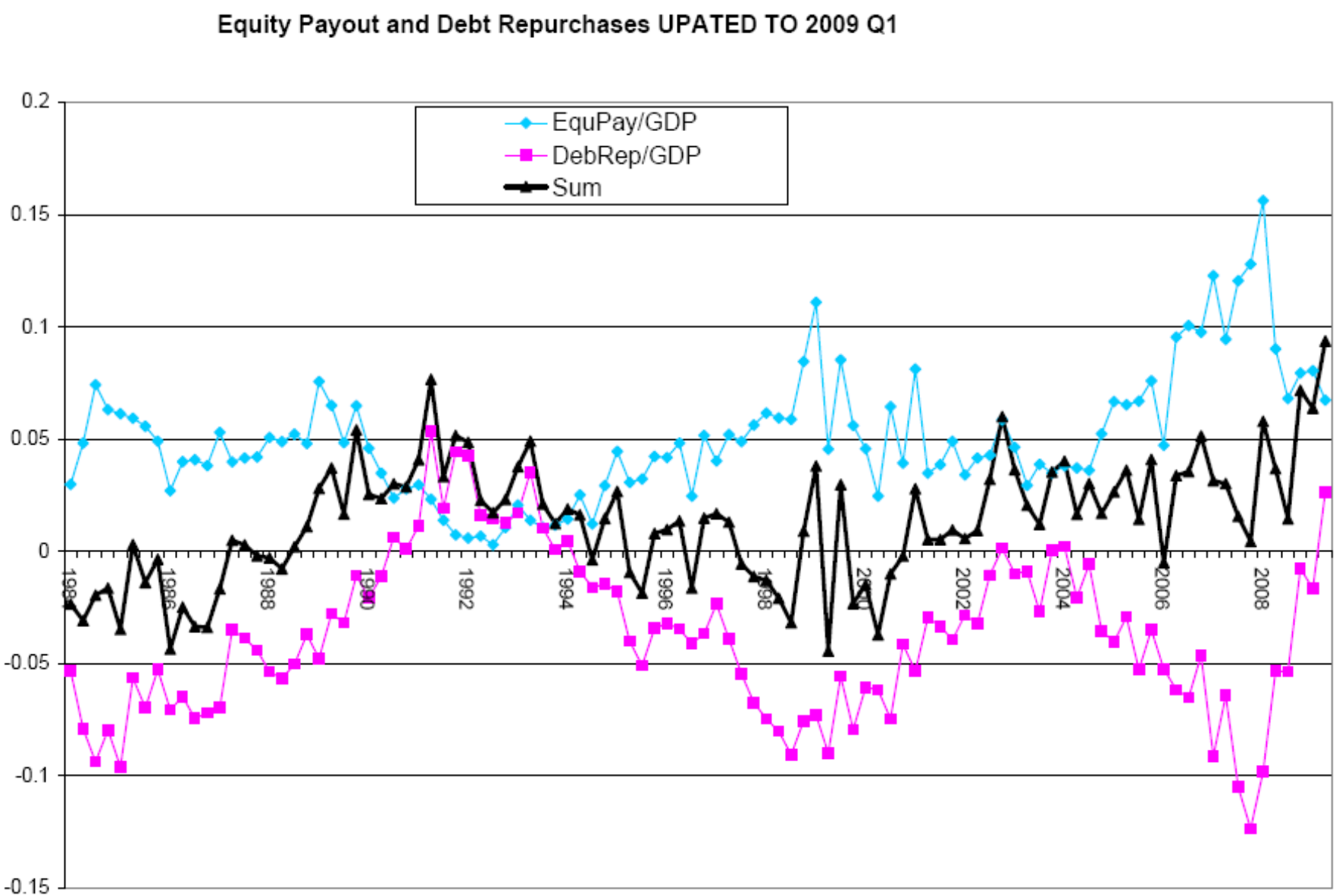
Preliminary findings

Variance decomposition

	TFP shock	Investment shock	Intertemp shock	Price MK shock	Wage MK shock	Monetary shock	Government shock	**Financial shock**
GDP	4.1%	20.4%	3.5%	16.4%	10.9%	2.5%	0.2%	**42.0%**
Consumption	8.5%	25.4%	39.1%	2.7%	17.0%	0.1%	6.4%	**0.9%**
Investment	1.9%	13.9%	13.2%	15.9%	5.6%	2.6%	4.4%	**42.6%**
FF rate	1.0%	30.7%	0.4%	27.4%	3.6%	10.5%	0.8%	**25.7%**
Hours	1.9%	19.8%	3.9%	16.7%	11.5%	2.7%	0.3%	**43.4%**
Wages	3.8%	36.7%	9.3%	8.2%	25.0%	0.9%	2.8%	**13.4%**
DebtPay	0.7%	16.3%	0.1%	57.4%	0.6%	7.7%	0.8%	**16.5%**
Inflation	1.2%	19.4%	1.6%	8.6%	2.9%	63.8%	1.0%	**1.6%**

Conclusion

- The model with financial shocks (and productivity shocks) replicates business cycles for real variables and financial flows reasonably well
- The simulated model displays significant financial tightening in the recessions of 1991, 2001 and 2008, suggesting an important role for financial shocks in these downturns


Equity Payout and Debt Repurchases UPATED TO 2009 Q1
EquPay/GDP
DebRep/GDP
Sum
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
1986
1988
1990
1992
1994
1996
2002
2004
2006
2008