Exploring the Economic Trinity of Money, Asset Prices and Inflation

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Main Results

- In a variation of the McCallum and Goodfriend (2007) model we consider the money, asset price, inflation nexus
- Financial spreads are determined by an interaction of asset prices, liquidity constrained consumers, the banking sector and policy rules
- Money is found to be a good indicator of spreads when financial shocks are dominant
- This feeds into demand via IS type relationships and so may overturn the Poole nostrum
- We illustrate the results in a stylised IS-LM-LR setting, DSGE simulations and impulse response analysis

Motivation

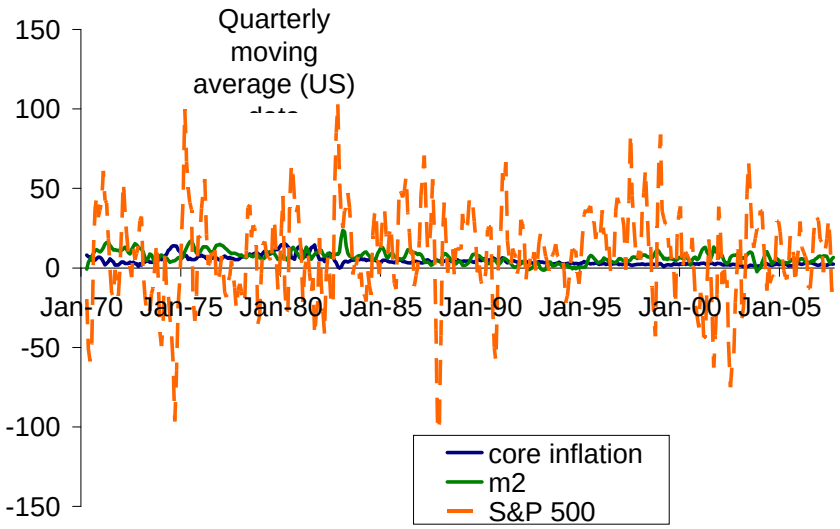
- Is money reducible/decomposable? In standard NK complete markets framework - yes (Woodford's defence)
- So we examine the money-interest rate nexus in a dynamic model with banking (Goodhart's critique)
- Banks produce loans from deposits on the basis of collateral and monitoring work
- Cash in advance - money tends to give us early warning on consumption
- Liquidity constrained agents may be better able to consumption smooth

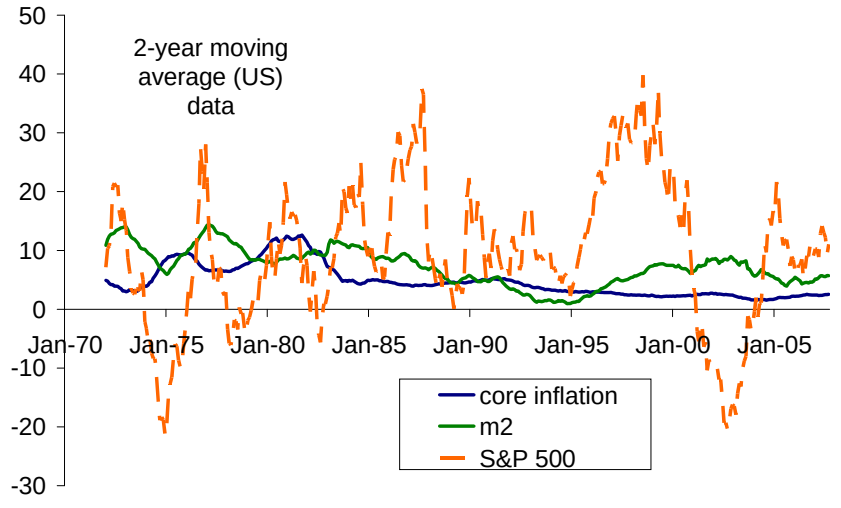
Evidence to Treasury Committee on 'MPC of the Bank of England: Ten Years On'

MONEY AND MACRO MODELS

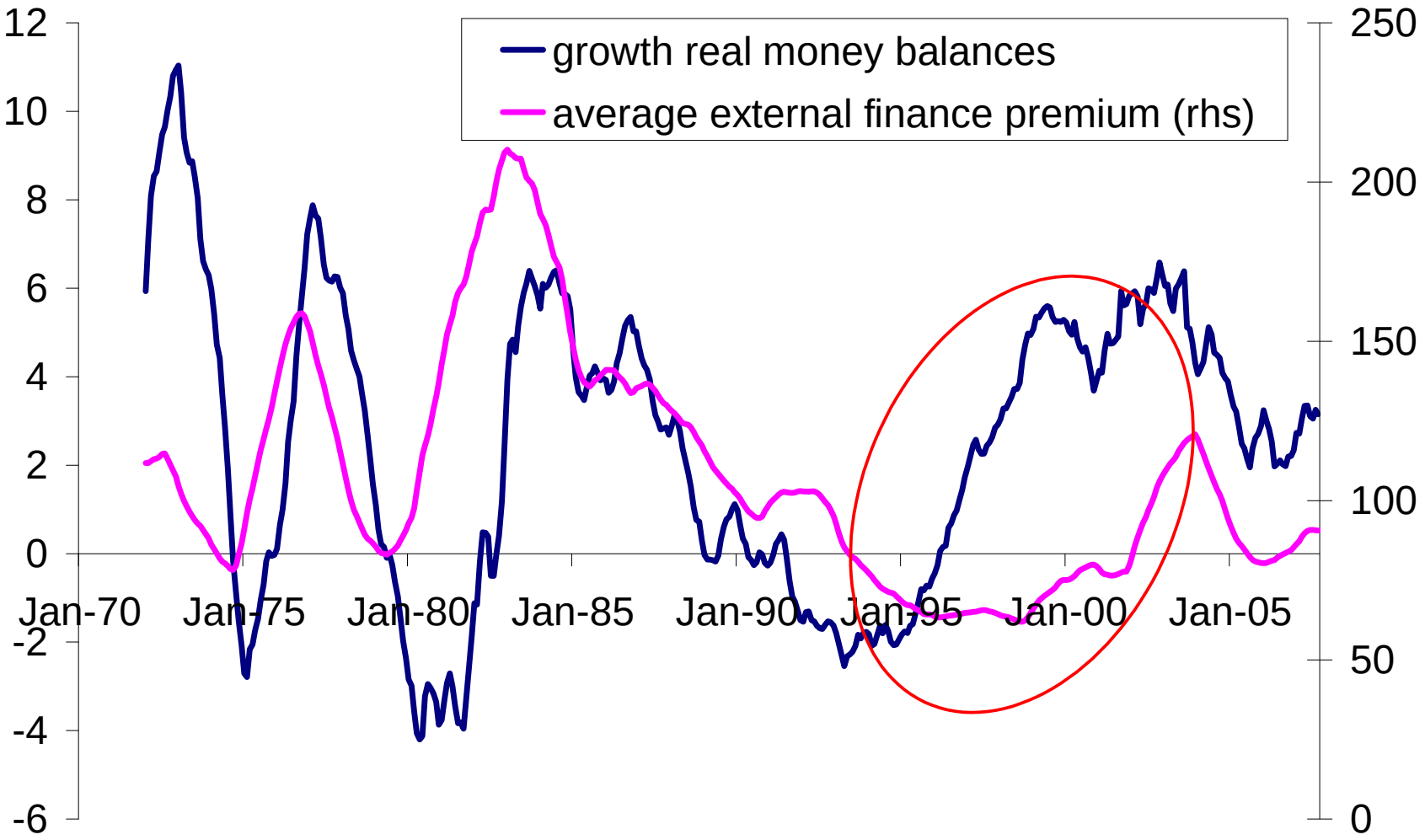
One ongoing concern is the absence of money or liquidity from the current generation of macroeconomic models. There is probably more agreement in practice over the use of money than it appears. As with a good trader, monetary policy makers should seek to exploit all available and robust correlations with the objects of primary interest. The trader will be concerned with the prices of assets on his or her book and the central banker with fluctuations in output and inflation. There are a number of reasons why a monetary policy maker should not, and in practice probably does not, ignore measures of monetary aggregates when setting monetary policy.

Money, Asset Prices and Inflation





Money and External Finance Premium



Households

$$U_t = \sum_{t=0}^{\infty} \beta^t \left[\begin{array}{l} \phi \log c_t + \\ (1-\phi)\log(1-m_t-n_t) \end{array} \right]$$

$+\lambda_t$ BudgetConstraint

- Aggregate Demand
- Supply of Labour *n*
- Supply of Monitoring Work *m*

Demand Deposits

$$D_t = c_t + p_t - V_t$$

Cash in Advance

Production

$$y_t^s = K_t^{\eta} (a1_t n_t)^{1-\eta}$$

a1: productivity shock

Assumptions:

- Monopolistic competition
- Calvo pricing
- Aggregate Supply
- Demand for Labour *n*

Banking Sector

$$L_t^s = F(b_t + a3_t q_t)^{\alpha} (a2_t m_t)^{1-\alpha}$$

a2 and *a3*: shocks to collateral *q* and monitoring work *m*

- Supply Loans (depends on *q* and *m*)
- Demand for Monitoring Work m

Monetary Policy

$$\Delta h_t = \rho \Delta h_{t-1} + e_t$$
$$h_t = \log(H_t)$$

Money

$$R_t^{IB} = \gamma(\beta_1 \pi_t + \beta_2 mc_t) + (1-\gamma) R_{t-1}^{IB}$$

Interest Rates

Three Possible Rules

1) Money
2) Interest Rate Rule with Inflation Only and No-Smoothing
3) Interest Rate Rule Smoothing

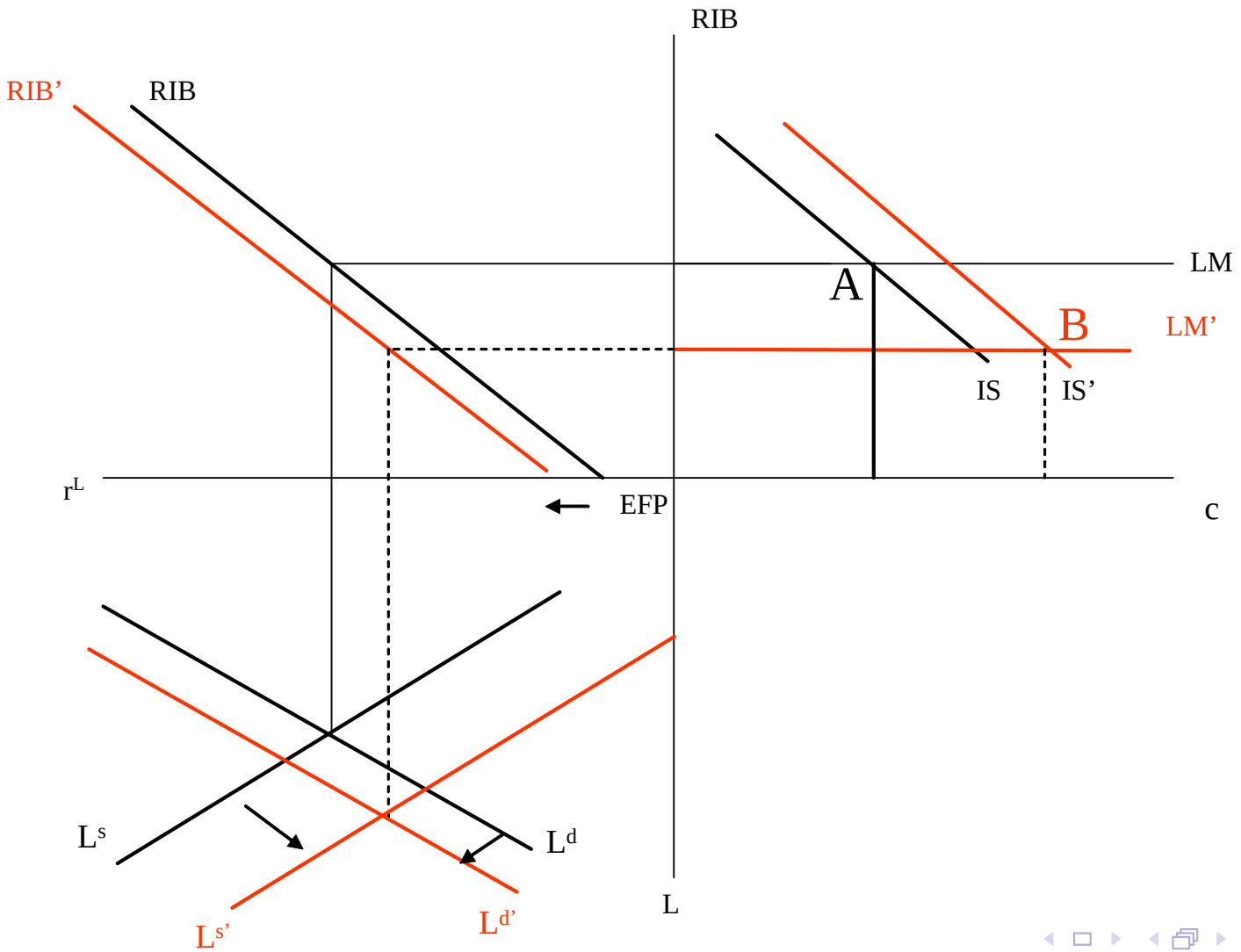
$$D_t + H_t = L_t$$

Interest Rate	Description	Equation
R^T	Benchmark rate	$E_t(\lambda_t - \lambda_{t+1}) + E_t(\Delta p_{t+1})$
R^B	Yield on government bonds	$R^T - \left(\frac{\phi}{c_t \lambda_t} - 1\right) \Omega_t$
R^{IB}	Interbank (and policy) rate	$R^T - \left[\frac{V w_t m_t}{(1-\alpha)(1-rr)c_t}\right]$
R^L	Interest rates on loans	$R^{IB} + \left[\frac{V w_t m_t}{(1-rr)c_t}\right]$
R^D	Deposit rate	$R^{IB}(1-rr)$

EFP

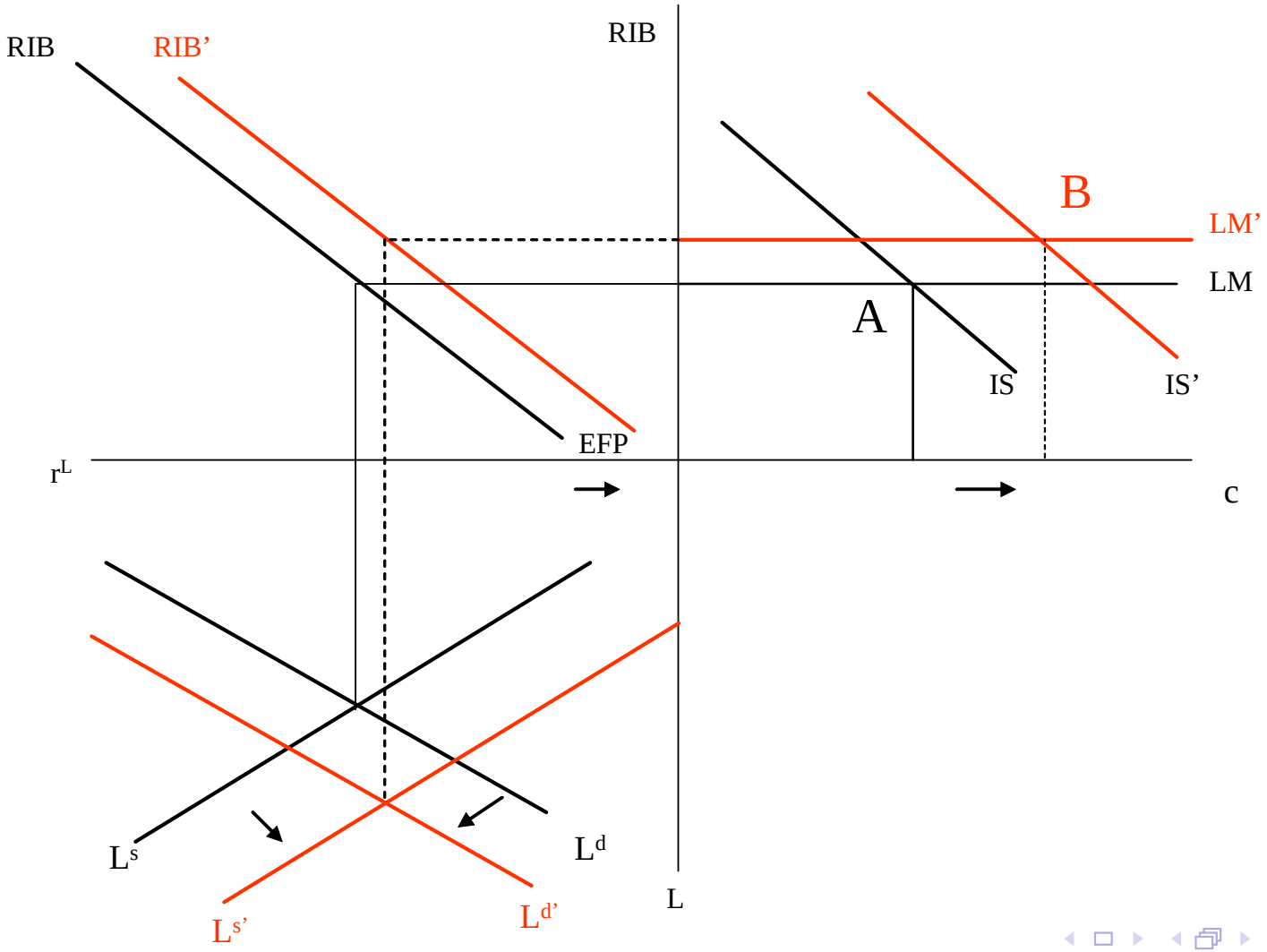
Productivity Shock: An IS-LM-LR Perspective

A Productivity Shock – Inflation Targeting



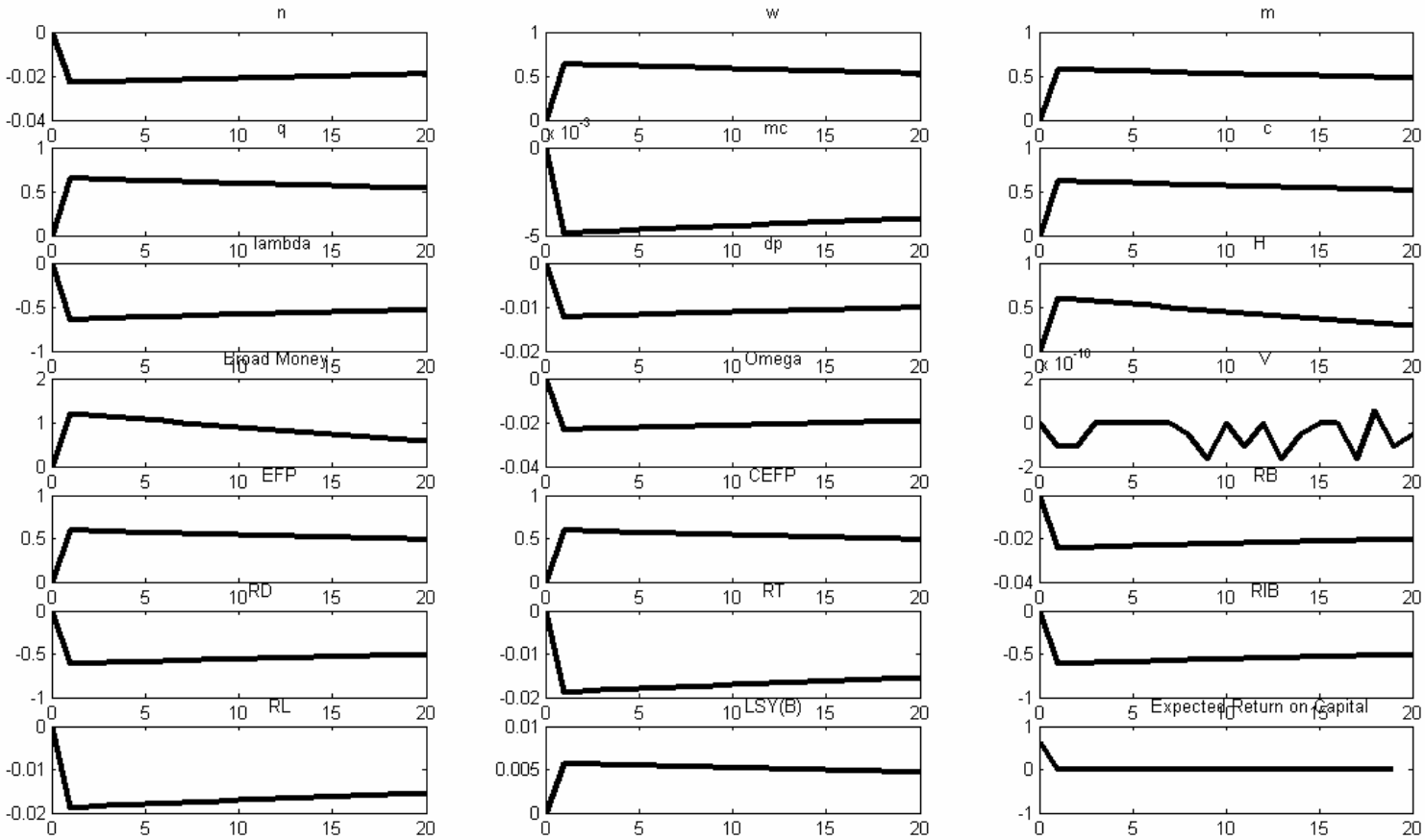
Monitoring Shock: An IS-LM-LR Perspective

A Monitoring Shock – Inflation Targeting



Productivity Shock in the MG Model

Productivity Shock - Inflation Targeting



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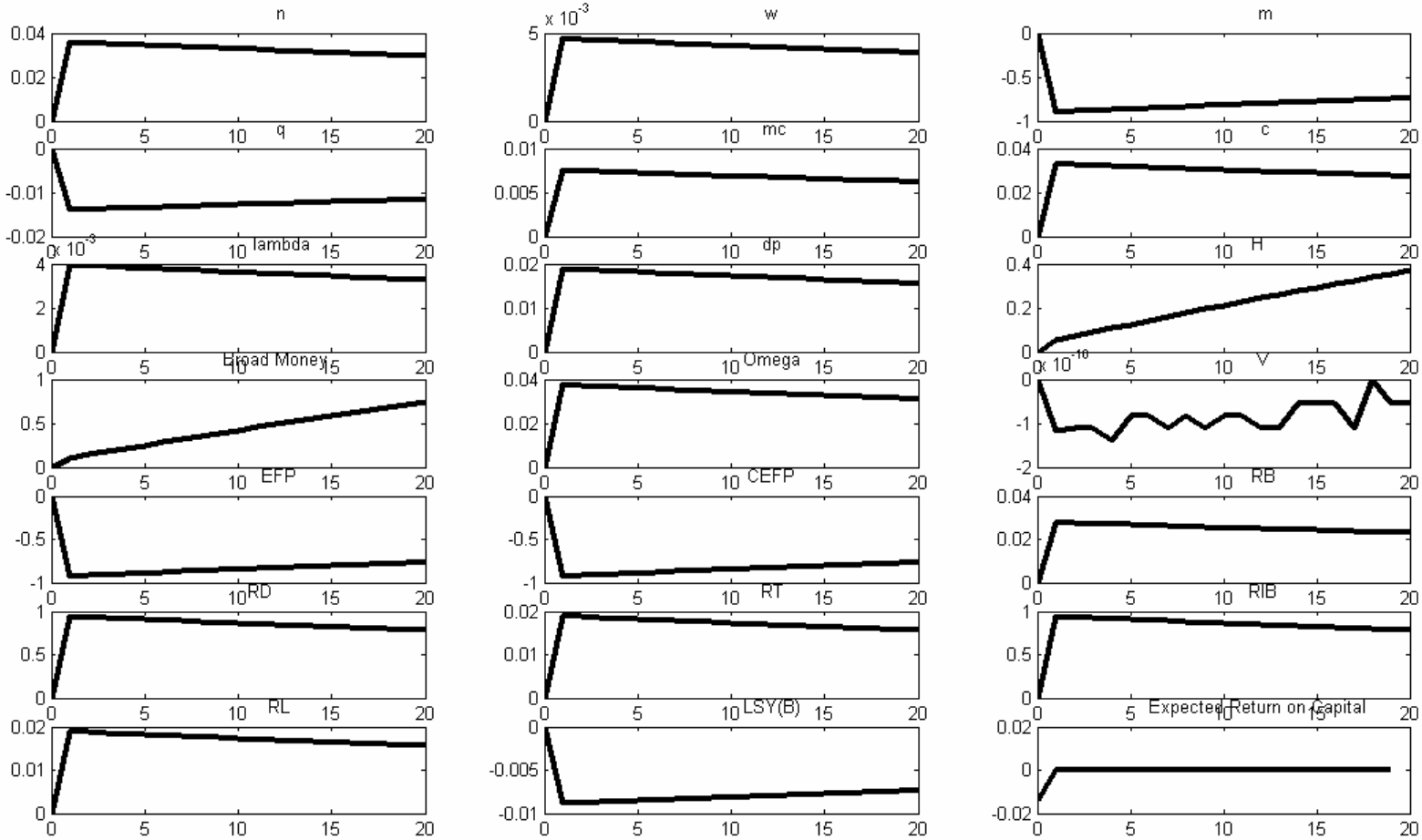
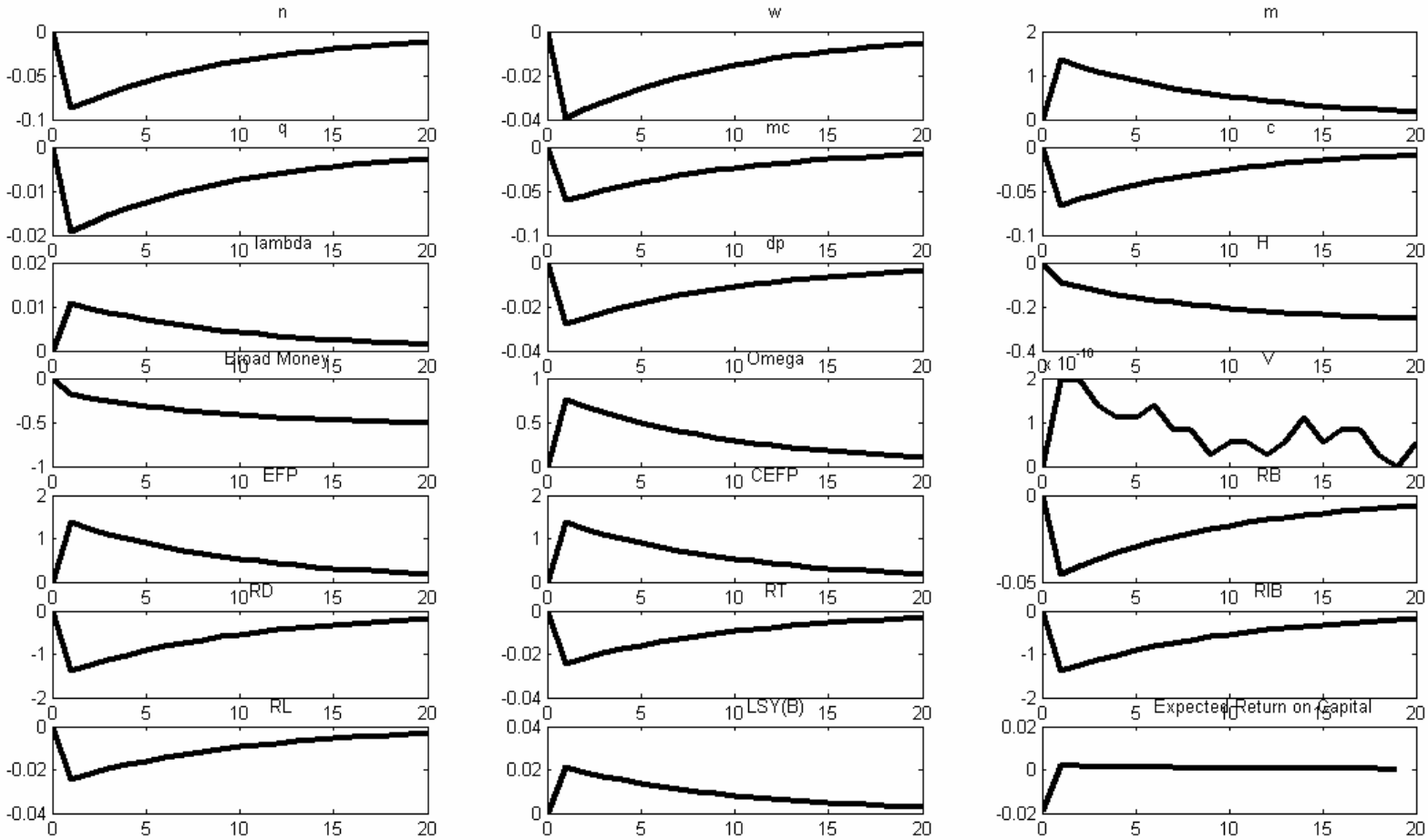


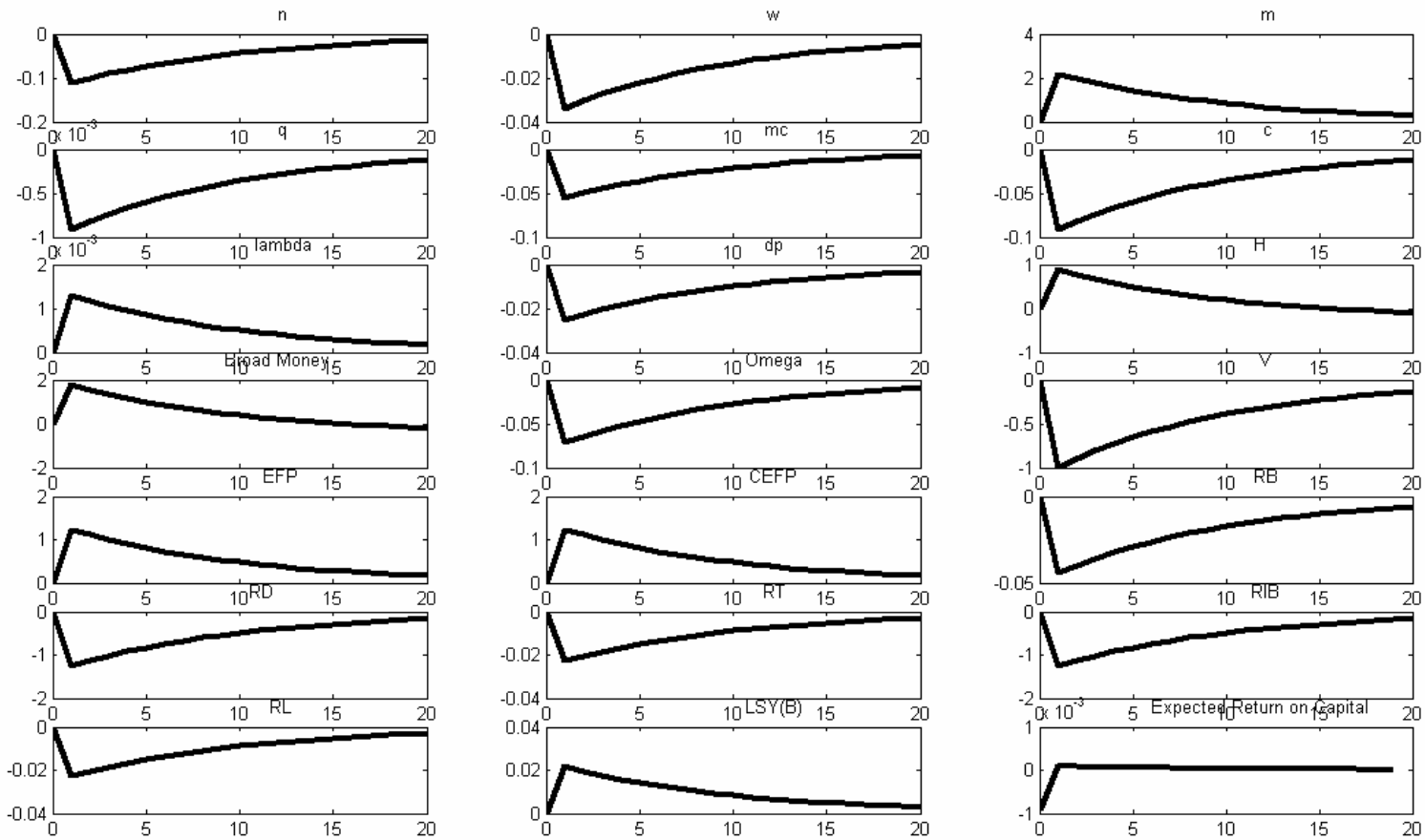
Negative Collateral Shock in the MG Model

Negative Collateral Shock – Inflation targeting



Negative Velocity Shock in the MG Model

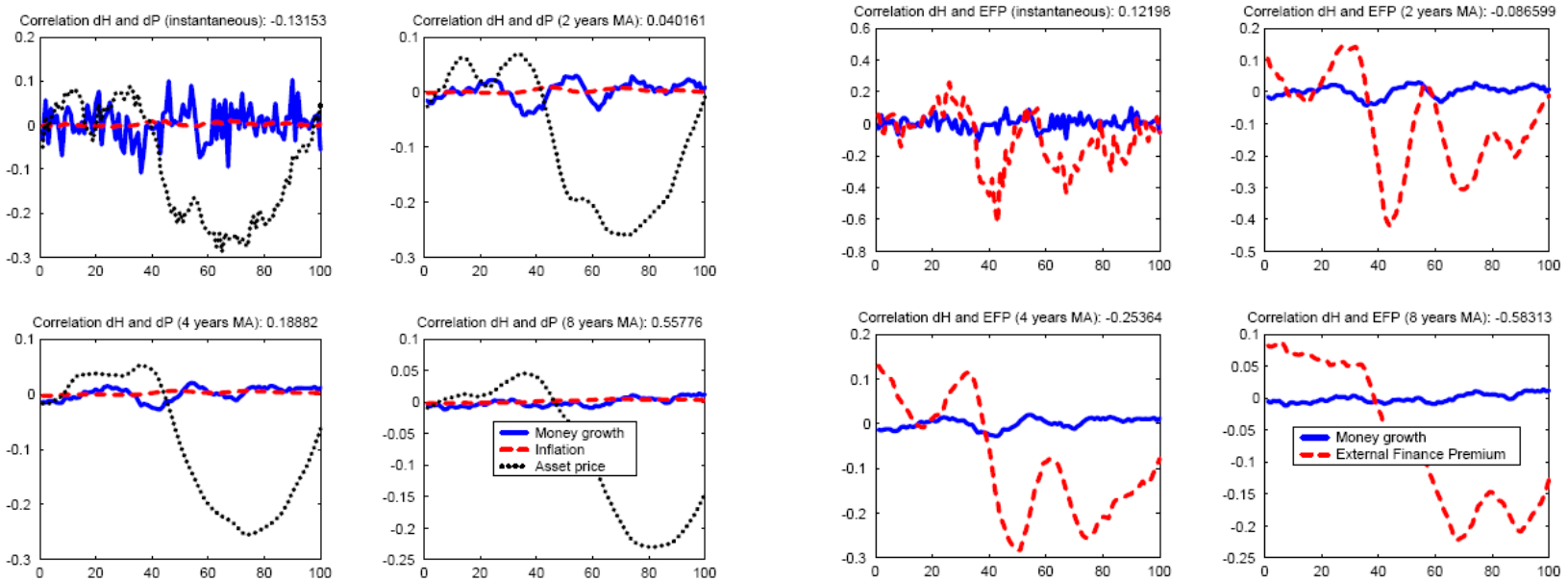
Negative Velocity Shock – Inflation targeting



Information from Money for EFP

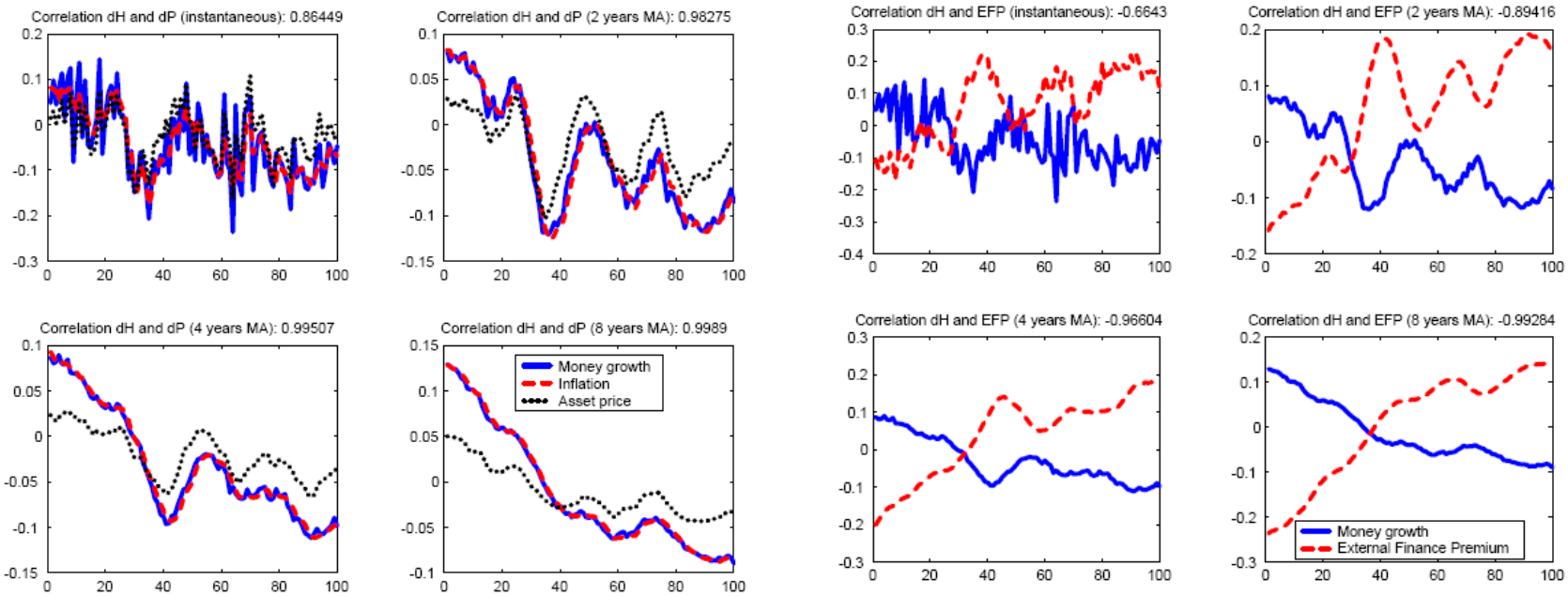
Shock	Sign Shock	H_t	EFP_t	Info
Productivity	+	+	+	×
Monitoring	+	+	−	√
Collateral	−	−	+	√
Velocity	−	+	+	×

Simulation of Time Series from MG with all shocks



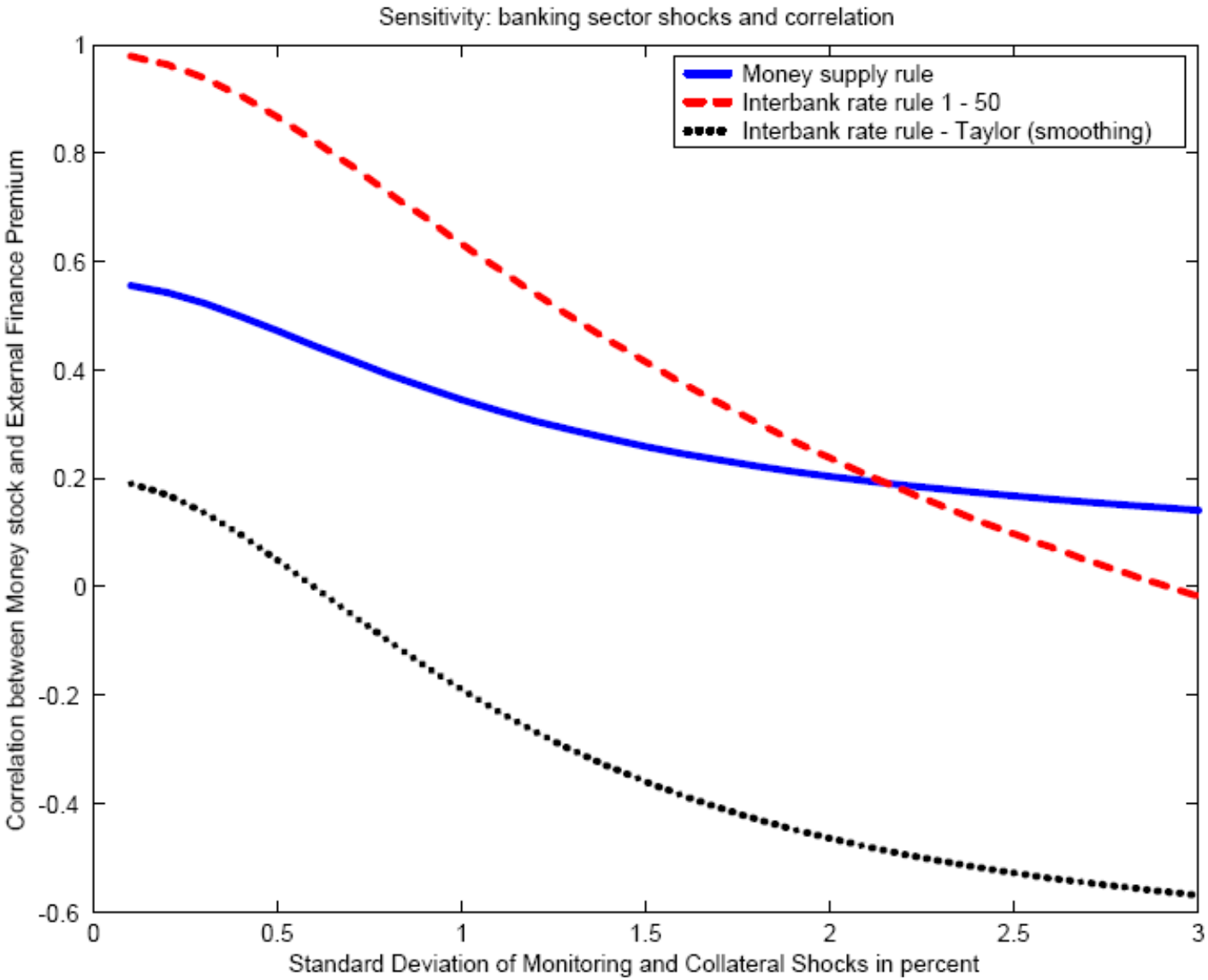
- Money, Asset Prices and Inflation for all shocks (lhs)
- Money and EFP for all shocks (rhs)

Simulation of Time Series from MG with Monitoring and Collateral Shocks

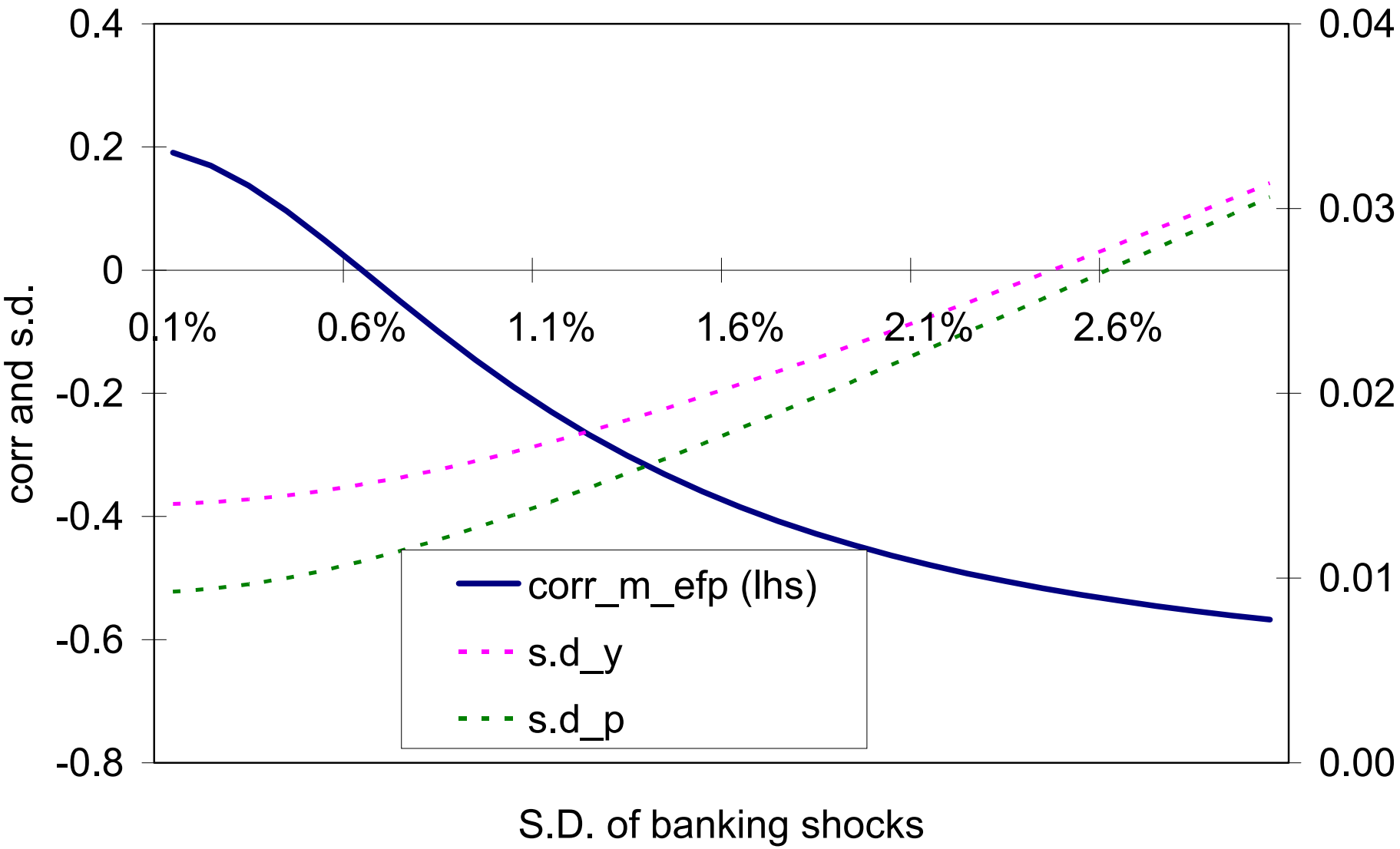


- Money, Asset Prices and Inflation for banking shocks (lhs)
- Money and EFP for for banking shocks (rhs)

Sensitivity of Money-EFP to Banking Sector Shocks



Impact on Welfare



Concluding Remarks

- Unlike NK consensus, models with banking sector allow
  a. Range of interest rate spreads
  b. Allowing a further propagation mechanism
  c. Determined by the interaction between liquidity constrained consumers and a banking sector which makes collateralised loans
- Financial conditions matter when setting monetary policy
- Under some conditions money has good information content for financial conditions

$$\Phi_m : \frac{\varpi_1 \sigma^2_{mon} + \varpi_2 \sigma^2_{\text{col}}}{\varpi_3 \sigma^2_{prod} + \varpi_4 \sigma^2_{vel}} > \Phi^c_m$$

- Systematically the dominance of productivity shocks militates against money as information...but under certain episodes money may resuscitate!

Annex I: Variables

The variables

c :	Real consumption, or GDP when investment and government channels are neglected
n :	Labour input
m :	Labour input for loan monitoring, or 'banking employment'
w :	Real wage
q :	Price of capital goods
P :	Price level
Δp :	Inflation
mc :	Marginal cost
H :	Base money
b :	Bond holding level (%), real bond holding over real GDP
Ω :	Marginal value of collateral
$UEFP$:	Uncollateralised External Finance Premium (R^T - R^{IB})
$CEFP$	Collateralised External Finance Premium (R^L - R^{IB})
LSY^B	Liquidity Service on Bonds
LSY^{KB}	Liquidity Service on Capital ($kLSY^B$)
$E(dq_t)$	Expected Retrun on Capital ($Eq_{t+1} - q_t$)
R^T :	Benchmark riskfree rate
R^B :	Interest rate for bond
R^{IB} :	Interbank rate
R^L :	Loan rate
R^D :	Deposit rate
λ :	Lagrangine for budget constraint (shadow value of consumption)
ξ :	Lagrangine for production constraint
T :	Transfer level (%), real transfer (government spending minus tax revenue) over real GDP

Annex II: Calibration

Calibration

parameter	Description	value
β	Discount factor	0.99
κ	Coefficient in Philips curve	0.05
n	Steady state of labour input	0.3195
m	Steady state of banking employment	0.0063
α	Collateral share of loan production	0.65
ϕ	Consumption weight in utility	0.4
η	Capital share of firm production	0.36
δ	Depreciation rate of capital	0.025
γ	Trend growth rate	0.005
rr	Reserve ratio	0.005
V	Constant velocity	0.31
F	Production coefficient of loan	9
k	Inferiority coefficient of capital as collateral	0.2
R^T	Steady state of benchmark riskfree rate	0.015
R^{IB}	Steady state of interbank rate	0.0021
R^L	Steady state of loan rate	0.0066
R^B	Steady state of bond rate	0.0052
b	Steady state of bond holding level	0.56
c	Steady state of consumption	0.8409
w	Steady state of real wage	1.9494
λ	Steady state of shadow value of consumption	0.457
Ω	Steady state of marginal value of collateral	0.237
K	Steady state of Capital	9.19
θ	Elasticity of substitution of differentiated goods	11

Parametrisation can be changed in gmsys.m. Steady state of transfer level, lagrangine of production constraint and base money depend on above parameters. Steady state marginal cost is $mc = \frac{\theta-1}{\theta}$.