Discussion of Hur, Kondo, and Perri:

Inflation, Debt, and Default

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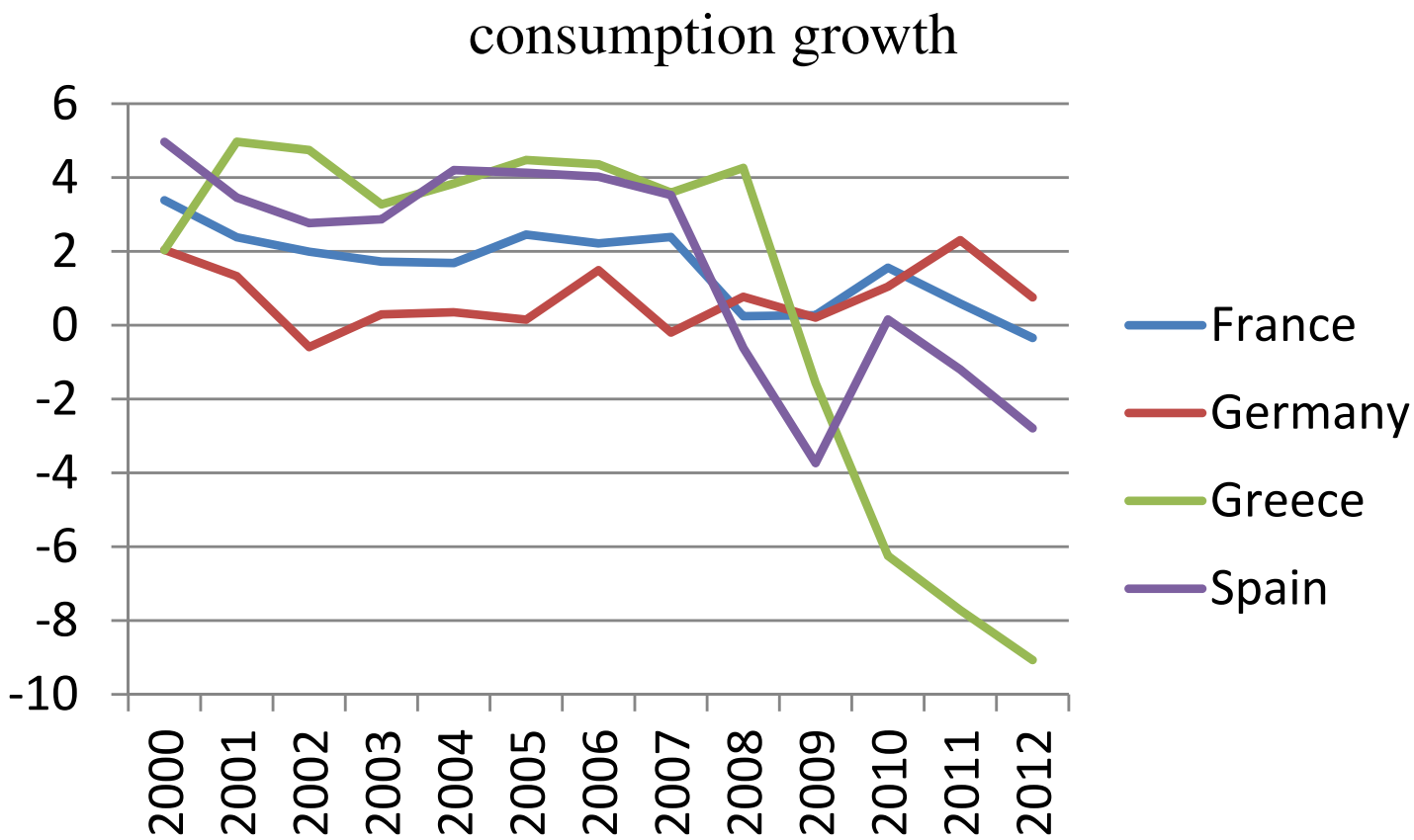
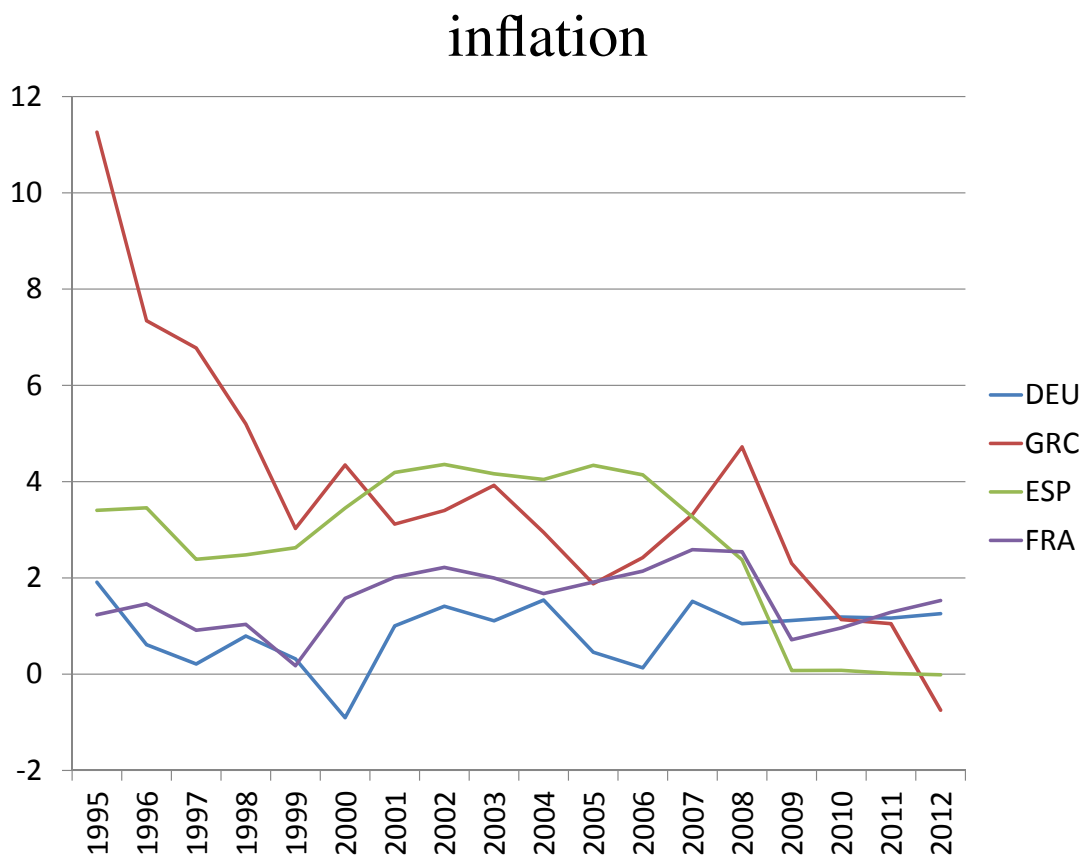
Consumption and inflation I



Consumption and inflation II



This paper I

- Relationship between sovereign debt/default and inflation (monetary independence)?
- Propose mechanism.
- Corroborate it in the data.
- Assesses its implications.

The model

Gov/Hand-to-mouth consumers

$$V^o(B,y) = \max_{c,d} \left\{ V^c(B,y), V^d(y) \right\}$$

$$V^d(y) = u(y^{def}) + \beta_h \mathbf{E}_{y' \mid y} \left[\theta V^o(0,y') + (1-\theta) V^d(y') \right]$$

$$V^c(y) = \max_{B'} \left\{ u\left(y - q(B,y,B')B' + B\right) + \beta_h \mathbf{E}_{y' \mid y} \left[V^o\left(\frac{B'}{1+\pi(y,y')}, y' \right) \right] \right\}$$

Domestic savers

$$W(b;y,s,B) = \max_{b'} \left\{ u(c^\ell) + \beta_\ell \mathbf{E}_{y',s' \mid y,s} \left[W\left(\frac{b'}{1+\pi(y,y')}; y', s', \frac{B'}{1+\pi(y,y')} \right) \right] \right\}$$

$$\text{s.t.} \quad c^\ell = \begin{cases} \alpha y + b - q(B,y,B'(B,y))b' & \text{if } s = 0 \\ \alpha y^{def} & \text{if } s = 1 \end{cases}$$

- About half of gov debt held domestically.
- Seems important to account for domestic lenders.

Inflation I

- Outright default – govt's decision.
- Inflation process: given exogenously

$$\pi_t - \pi = \alpha(y_t - y)$$

- No *ex post* costs of inflation, but of an outright default.

Inflation II

$$\pi_t - \pi = \alpha(y_t - y)$$

- But then, particularly in CU, shouldn't this correlation depend on *source of shocks* and horizon we look at?
- Crises/defaults supply-driven or demand-driven?
- Does sovereign risk raise π (working capital), or reduce it (demand)?

Summary of results

	Positive co-movement ($\eta = +0.0010$)	Negative co-movement ($\eta = -0.0010$)
Default rate (percent)	2.52	3.04
Spreads (percent)	2.81	3.52
Debt (percent)	4.29	5.48

The mechanism and implications I

- Suppose default in deep recessions.
- Under sovereignty: policymakers can default on nominal debt denominated in domestic currency through inflation.
- Option to inflate makes debt risky in bad times $\Rightarrow$ inflation risk-premium.

The mechanism and implications II

- Effect of joining (E)MU or getting independent CB:
- Cannot inflate away debt unilaterally $\Rightarrow$ correlation of inflation and consumption growth reverses sign.
- Inflation risk-premium falls. Country can sustain higher debt.
- But then, cannot default through inflation $\Rightarrow$ c.p. raises prob of outright default, which is costly for both lenders and country's constituents. Affects volume borrowing negatively.

Squares with observations? I

- If default sufficiently costly in itself or no other flexible tax margins (abstracted from here):
- Prob of defaulting does not rise enough to eliminate above effect: $\Rightarrow$ risk premium falls, borrowing costs for the gov fall upon entering EMU/ upon CB independence.
- Looks like we may have observed this in EMU and in other places.

Squares with observations? II

- What is the evidence for a fall in volume of borrowing?

Squares with observations? III

- What happens if debt is high to start with, so that removing tax instrument affects govt's willingness (or, perhaps, ability) to repay $\Rightarrow$ borrowing costs may rise above those with cooperative CB.
- Is this what we observe now?

Squares with observations? IV

- In sum, non-linearity. CU/CB independence can be both curse or blessing.

Outline

- Another look at the pricing.
- Corroborate mechanism using excess returns.

"Determinants" of the return I

- Fundamental equation of asset pricing

$$1 = E_t\{m_{t,t+1} R^i_{t+1}\}$$

- Assume CRRA utility.
- Patient lenders price the assets (others are hand-to-mouth/at their (zero) borrowing constraint).
- Lenders price the debt: $m_{t,t+1} = \beta \left(\frac{c_{t+1}}{c_t}\right)^{-\gamma}$.

"Determinants" of the return II

- The real return here is

$$R^i_{t+1} = \frac{R_t}{1+\pi_{t+1}} I(\text{no default}).$$

- Assume default also has a random component
- Second-order approximation as a first pass (or assume conditional joint-normality; $\Delta \ln c$, $\ln \Pi$, $\ln p^{\text{no default}}_{t+1}$
- Then:

"Determinants" of the return III

$$
\begin{aligned}
& \ln R_t + \frac{1}{2} V_t(\Delta \ln p_{t+1}^{\text{no def}}) + \frac{1}{2} V_t(\Delta \ln \Pi_{t+1}) \\
= \quad & -\ln \beta - E_t \ln p_{t+1}^{\text{no def}} + E_t \pi_{t+1} \\
& \\
& +\gamma E_t \Delta \ln c_{t+1} \\
& -\frac{1}{2}\gamma^2 V_t(\Delta \ln c_{t+1}) \\
& \\
& +\gamma Cov_t(\Delta \ln c_{t+1}, \ln p_{t+1}^{\text{no def}}) \\
& -\gamma Cov_t(\Delta \ln c_{t+1}, \pi_{t+1}) \\
& +Cov_t(\ln p_{t+1}^{\text{no def}}, \ln \Pi_{t+1})
\end{aligned}
$$

"Determinants" of the return IV

$$\begin{aligned}
\ln R_t &= -\ln\beta - E_t \ln p_{t+1}^{\text{no def}} + E_t \ln \Pi_{t+1} \\
&\quad + \gamma E_t \Delta \ln c_{t+1} \\
&\quad - \frac{1}{2}\gamma V_t(\Delta \ln c_{t+1}) + \ldots
\end{aligned}$$

"Determinants" of the return V

$$\ln R_t = \ldots$$

$$+ \gamma Cov_t(\Delta \ln c_{t+1}, \ln p_{t+1}^{\text{no def}})$$

> 0 if default in bad times (low c, low p)

$$- \gamma Cov_t(\Delta \ln c_{t+1}, \pi_{t+1})$$

> 0 if π high in bad times

$$+ Cov_t(\ln p_{t+1}^{\text{no def}}, \pi_{t+1})$$

> 0 if default when asset pays most, that is, when inflation low

Effect of CU on yields I

$$\begin{aligned} \ln R_t &= \ldots \\ &\quad - \gamma Cov_t(\Delta \ln c_{t+1}, \pi_{t+1}) \\ &\quad > 0 \text{ if } \pi \text{ high in bad times} \\ &\quad \ldots \end{aligned}$$

- Currency union/mon pol may change covariance of c and π, since countries can no longer unilaterally inflate away debt in recession $\Rightarrow$ risk-premium falls.

Effect of CU on yields II

- Will depend on whether shock (or transmission of it) is common or area-wide.
- CU may also change $E_t\pi_{t+1}$, of course $\Rightarrow$ look at excess returns.

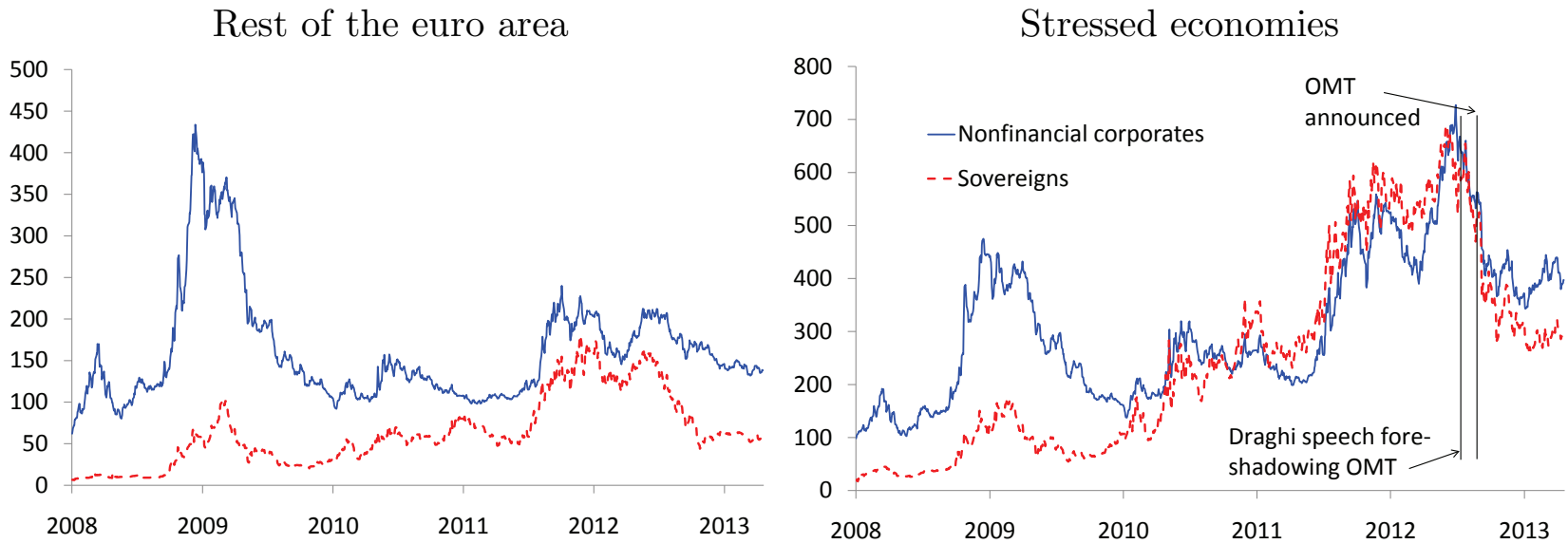
Assume a permanent currency union I

- Look at excess returns.
- The relevant consumption growth and inflation rate are the same for investing in German and Greek bonds (depends on location of consumer, not location of originator) $\Rightarrow$ all terms involving only these (or a combination of the two) drop out.
- The excess return then is:

$$\begin{aligned} \ln R_t^H - \ln R_t^L + \ldots \quad &= \quad -E_t \ln p_{t+1}^{\text{no def}} \\ &\quad +\gamma Cov_t(\Delta \ln c_{t+1}, \ln p_{t+1}^{\text{no def}}) \\ &\quad +Cov_t(\ln p_{t+1}^{\text{no def}}, \ln \Pi_{t+1}) \end{aligned}$$

Guesstimates of the covariance terms I

Figure 1: Sovereign and nonfinancial corporate CDS spreads



Guesstimates of the covariance terms II

- CDS spreads "core"-"periphery" rose from close to zero to 500 bps (annualized) $\Rightarrow$ 125 bps.
- CDS spreads, not yields
- 5-yr CDS, so a bit unfair.

Guesstimates of the covariance terms III

- $\ln R_t^H - \ln R_t^L = 0.0125$.
- $\gamma\, Cov_t(x,y) = \gamma\, Corr_t(x,y) std_t(x) std_t(y)$.
- $std_t(\Delta \ln c) \leq 0.02$,
- $std_t(\ln p_{t+1}) \leq .1$ (prob of repaying drops by of 10 pp. within 1 std band)
- $-1 \leq Corr \leq 1$; pick 1
- Set $\gamma = 2$.

Guesstimates of the covariance terms IV

- So, contribution of

$$+\gamma Cov_t(\Delta \ln c_{t+1}, \ln p_{t+1}^{\text{no def}}) \leq 2 \cdot 1 \cdot 0.02 \cdot 0.1 \leq 0.004$$

- Assume: in normal times corr = 0 $\Rightarrow$ contributes 40 bps to rise in spread $\Rightarrow$ 1/3.

Guesstimates of the covariance terms V

$+Cov_t(\ln p_{t+1}^{\text{no def}}, \ln \Pi_{t+1})$?

- set $corr_t = 1$.
- Set $std_t(\pi) \leq 0.01$. Set $std_t(\ln p) \leq 0.1$

$\Rightarrow$

$$+Cov_t(\ln p_{t+1}^{\text{no def}}, \ln \Pi_{t+1}) \leq 2 \cdot 1 \cdot 0.01 \cdot 0.1 = 0.002$$

or 20 bps, 1/6 of the rise in spreads.

Guesstimates of the covariance terms VI

- Mechanism gets about half of rise in spread.
- Rest: strong increase in the prob of default has to be the key. Model?

Is the effect really there – empirical part

- Sample 1970Q1 through 2012Q4.
- Real consumption: public plus private.
- Inflation: measured as using GDP deflator.
- Government debt/GDP ratios.
- 21 advanced OECD countries.

Bivariate VAR- country by country

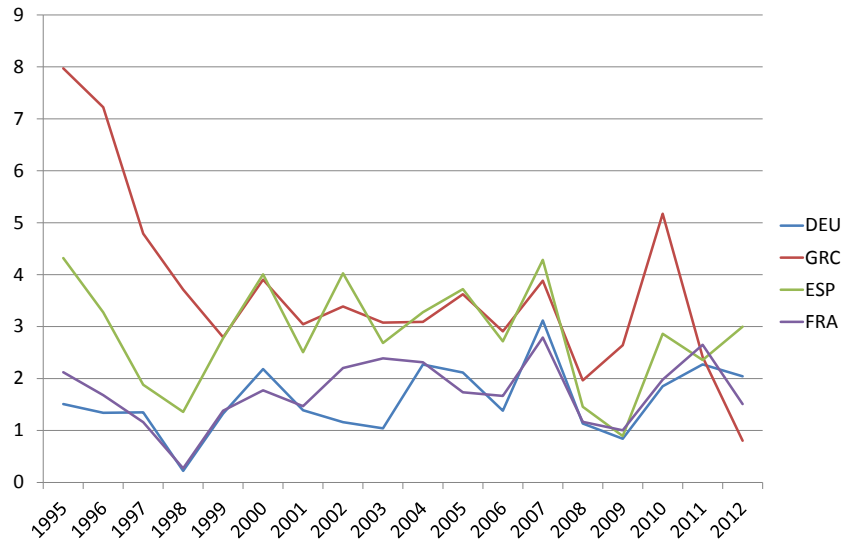
$$\begin{bmatrix} \pi_t \\ \Delta \ln c_t \end{bmatrix} = A \begin{bmatrix} \pi_{t-1} \\ \Delta \ln c_{t-1} \end{bmatrix} + \begin{bmatrix} \epsilon_{\pi,t} \\ \epsilon_{c,t} \end{bmatrix}$$

- Pricing based for one-period debt based on $Cov_{\mathbf{t}}$
- Homo-skedasticity?
- Parameters in A constant over time?
- Also: multiperiod debt, then A matters as much as Σ.

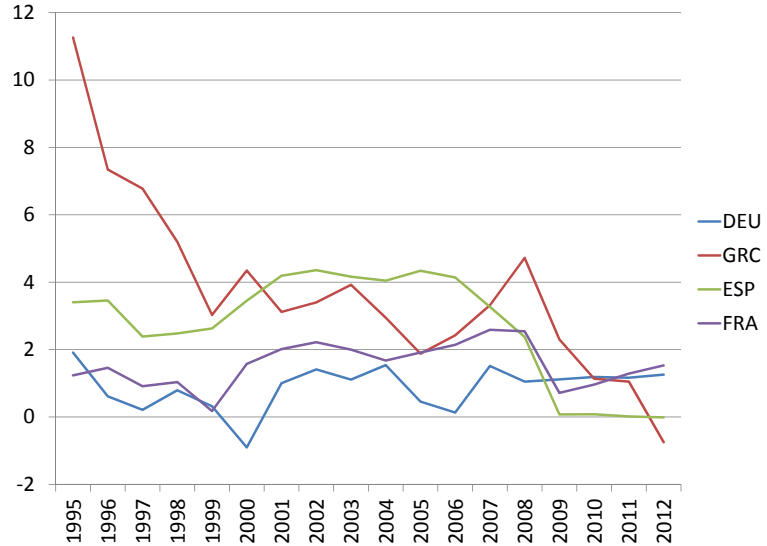
Questions I

- What's the right π measure?

CPI inflation



GDP deflator

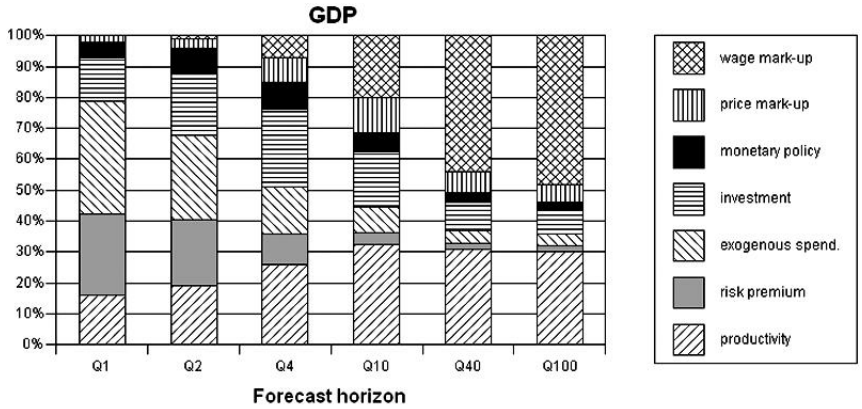


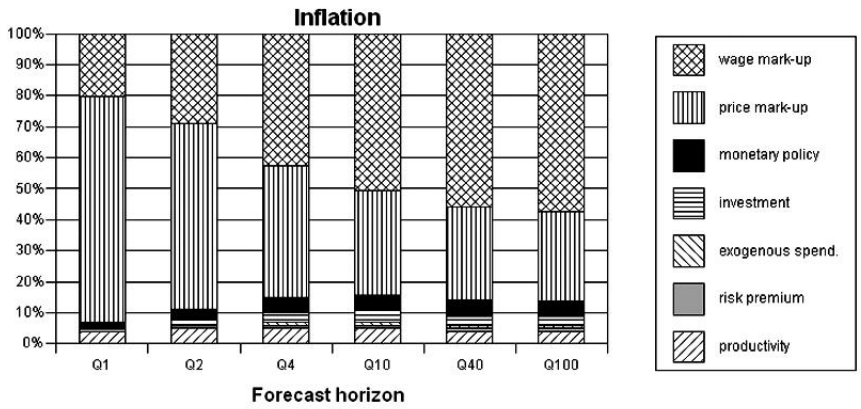
- Headline? administered prices? Swiss prices (for the rich)?
- Shouldn't we account for other taxes (Correia et al)?

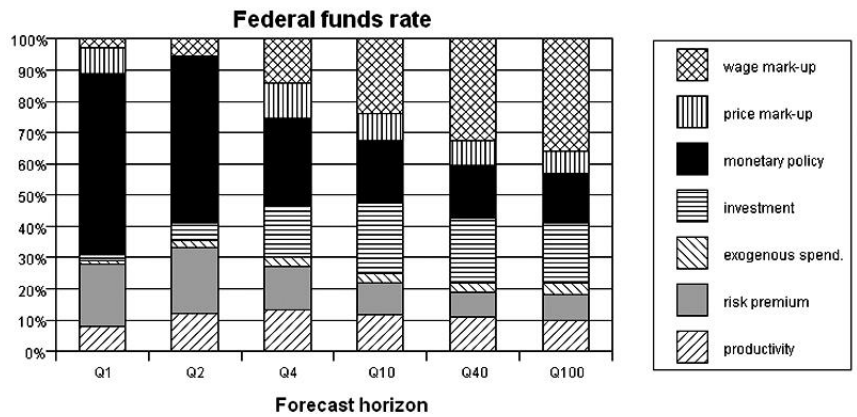
Questions II

- Increases in sovereign risk caused by demand shocks or supply shocks?
- Maturity structure?
- Inflation/comovements over which horizon?

Questions III







Source: Smets, Wouters (2007)

Summarizing:

- Great paper.
- Partial support for the mechanism in the data.
- Take the link data/model still more serious.