Implementation of Monetary Policy: How Do Central Banks Set Interest Rates?

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Making monetary policy means setting a short-term interest rate

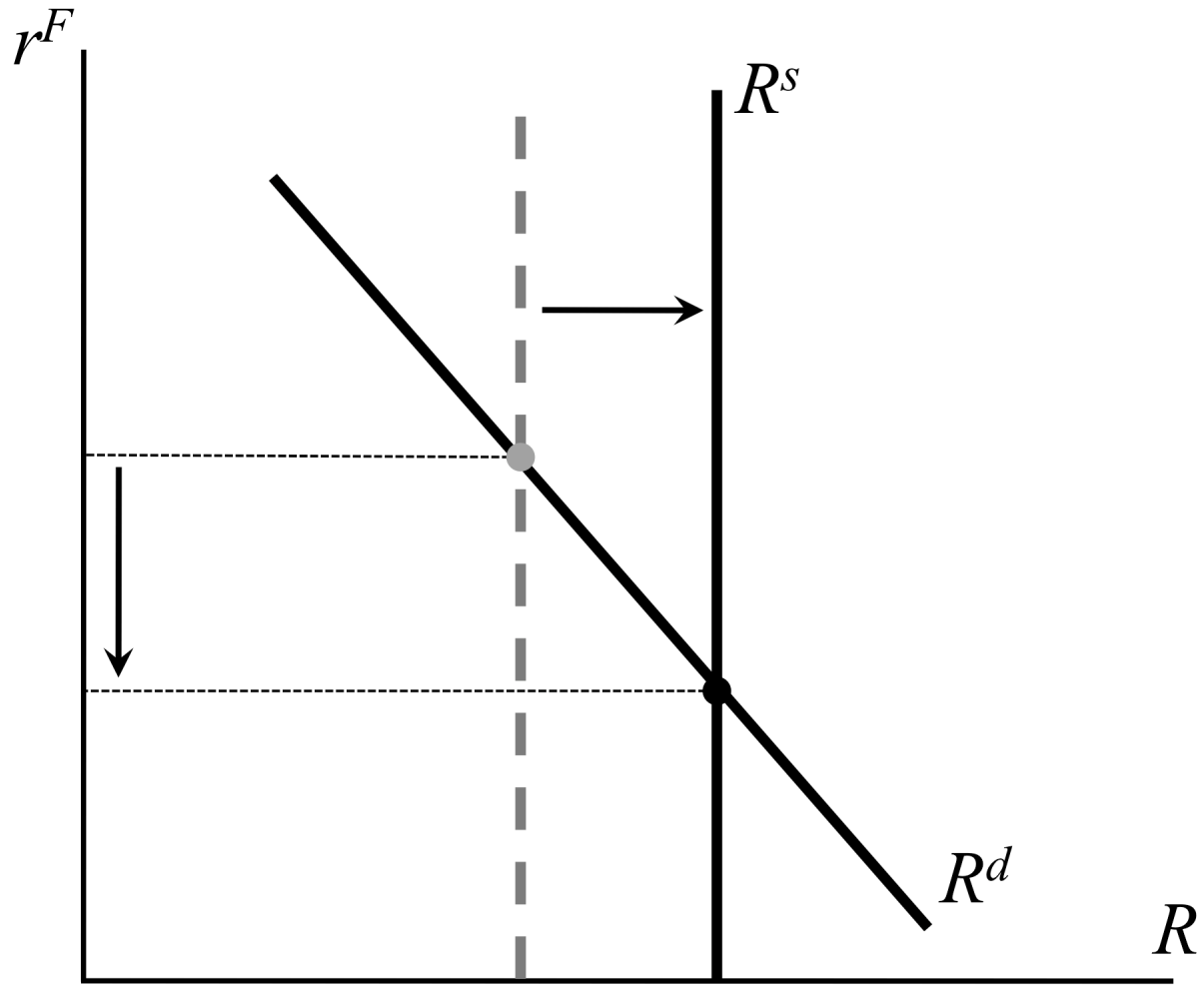
- For the most part it always did
- This is more explicit now that most central banks have eliminated, or subordinated, their M "targets"
  - the standard model (e.g., CGG) doesn't even include an M quantity variable
  - monetary policy modeled, if at all, by a Taylor rule for r
- The question this presents: *How do they do that?*
  - central bank portfolios are (normally) small, and central bank transactions (normally) even smaller
  - the markets being influenced are often very large

The traditional explanation

- The central bank as a monopolist over the *supply* of its own liabilities
- Private *demand* for central bank liabilities (reserves)
  - reserve requirements
  - settlement of interbank transactions (including contractual balances held in exchange for central bank provision of payments services)
  - need to satisfy customers' demand for currency
  - risk avoidance (if central bank liabilities are not dominated as a risk-free asset)

- Each of these rationales => reserve demand is negatively interest elastic
- Hence control over reserve supply is control (in a stochastic world, influence) over some interest rate
- The resulting model: *movements along* a reserve demand schedule

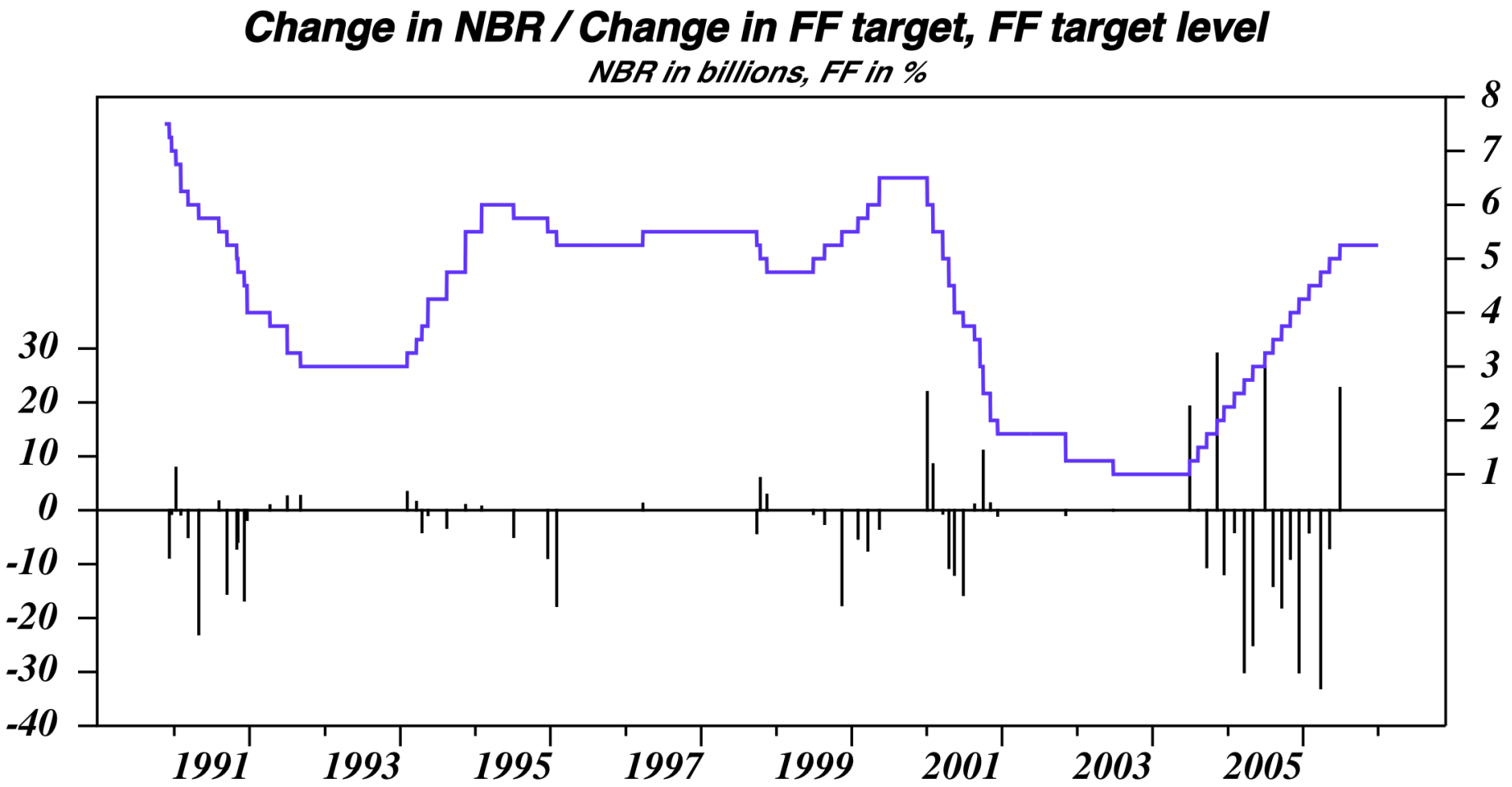
Supply-induced target rate changes



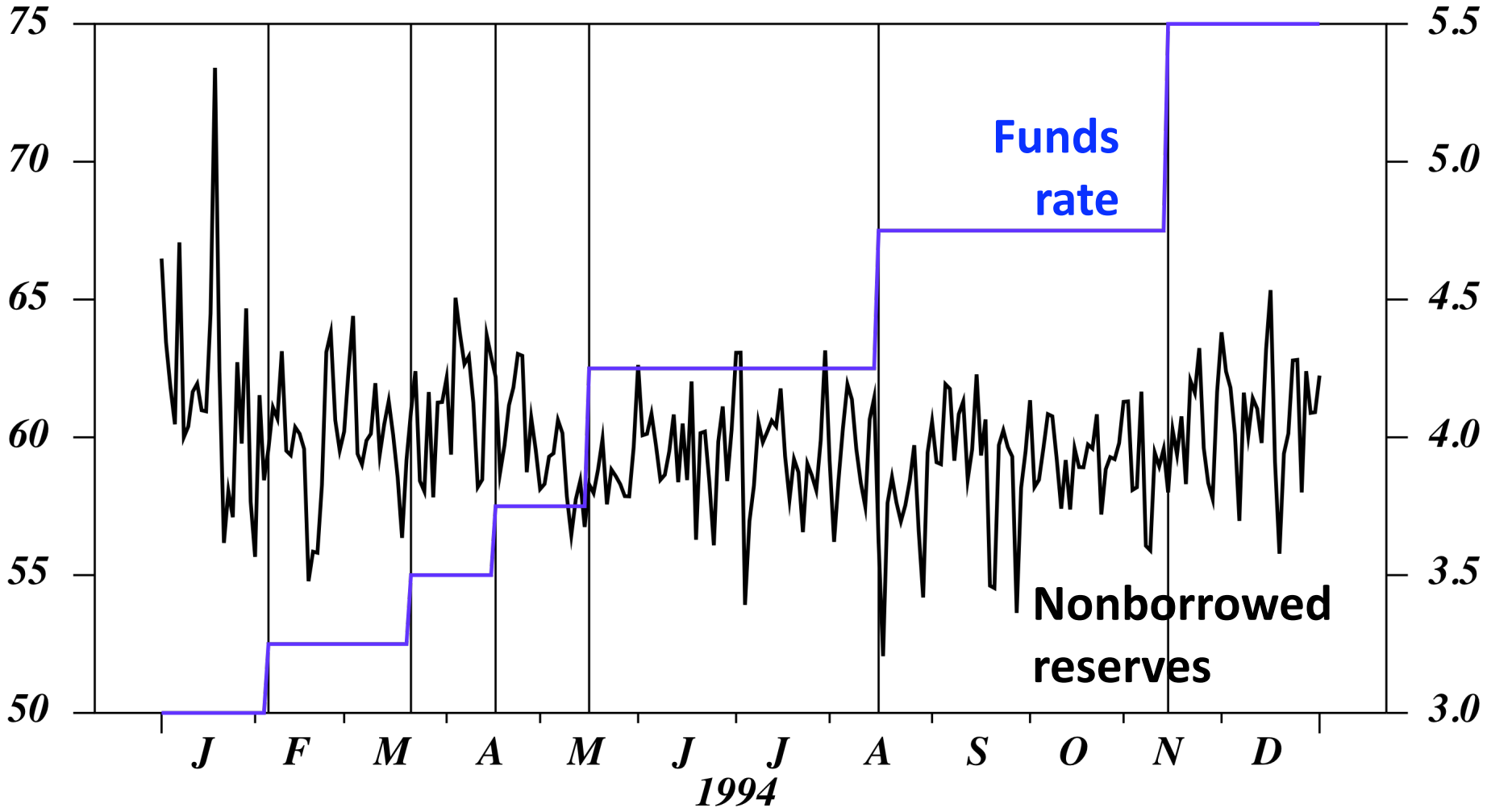
Why do we need some different story?

- Weak evidence for the associated "liquidity effect"
  - estimated effects that are too small to matter
  - difficulty of establishing even these small effects
- The magnitude imbalance: very small transactions moving the rates of return in very large markets
- In recent years, the disappearance of much systematic relationship to transactions altogether
  - pre-2000 (U.S.): often no transactions at all
  - post-2000 (U.S.): larger transactions, but often in the wrong direction

The reserves/funds rate disconnect

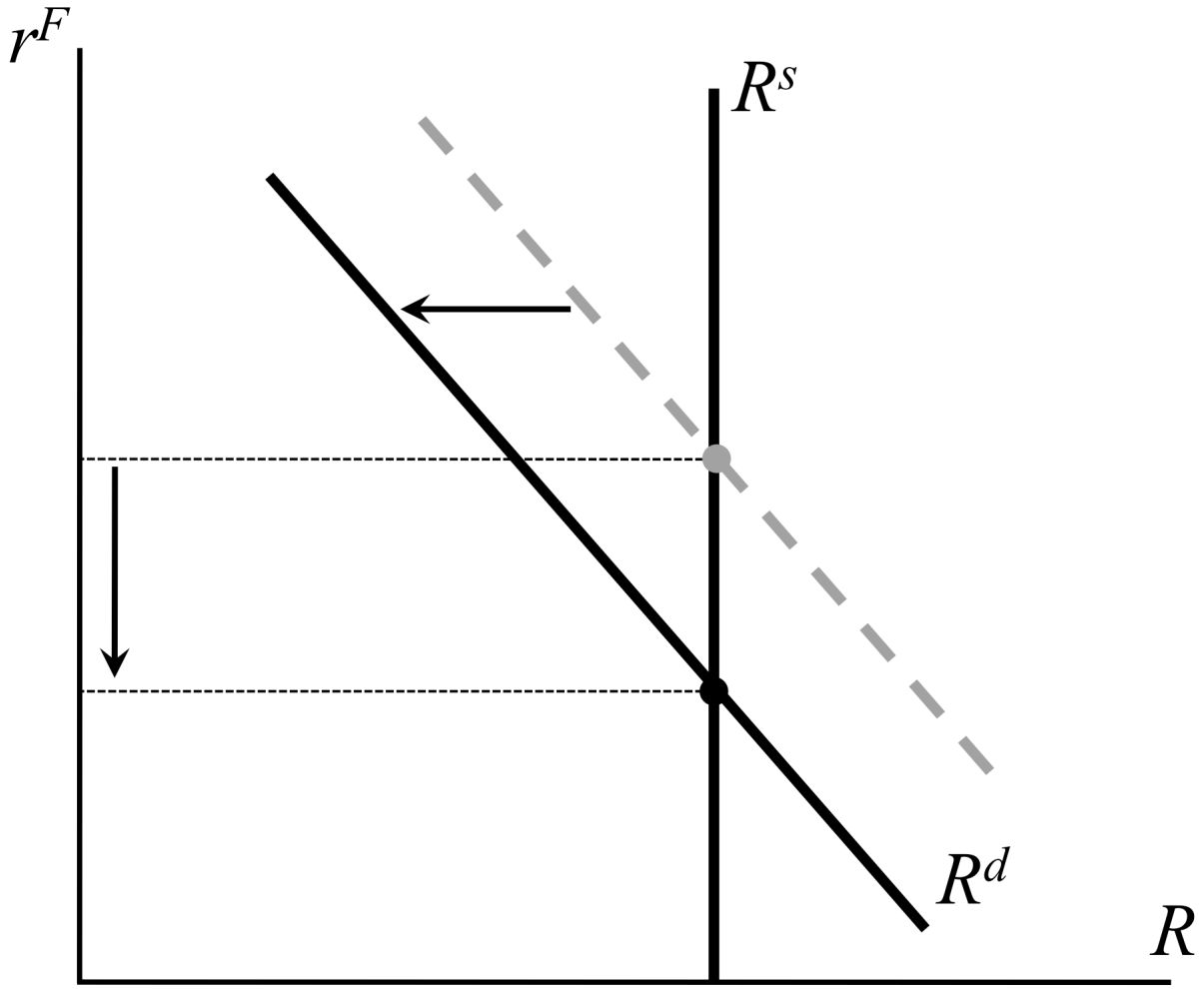


Where are the reserve changes?



- Absence of much apparent readjustment of bank portfolios in response to changes in the policy interest rate when they do occur
  - how, then, are other interest rates adjusting?
  - one could imagine that they don't – this would be the "decoupling" story – but in fact they do
- If not a movement along the reserve demand schedule, then what?
- Answer: a *shift of* the reserve demand schedule

Demand-induced target rate changes



But how does the central bank do *that*?

- Expectations stories; *but*:
  - limited opportunities for term-structure-like effects in the influence of expected future rates on today's one-day rate
  - where, then, do the expectations come from? (is the idea circular?)
- Indeterminacy stories
  - absence of any anchor for private beliefs about future nominal rates (*but*: is the overnight policy interest rate really just a nominal rate?)
  - change in the expected structure of real asset returns (*but*: is this plausible in such large markets, ultimately tied to fundamental factors of thrift and productivity)

- Channel system stories: potential central bank willingness to engage in very large transactions, obviated by the working of the channel system; *but*
  - not all countries have (or have had) such a system
  - why wouldn't the result be a decoupling of the policy rate from other interest rates and asset returns?

Outline of the chapter

- How central banks got to today's focus on *r*-setting
- Theoretical implications of *r*-setting
- Empirical verification
  - liquidity effect
  - anticipation (announcement) effect
  - relationships to other interest rates and asset returns
  - relationships to banks' portfolio reallocations
  - empirical work for the U.S., Euro area, Japan
- Implications for shifts in the reserve demand schedule
- What's been different in the crisis?

A stylized model of asset demand

- Three assets: reserves, fed funds and securities/loans
- Key implications:
  - Interest inelastic reserve demand => the central bank only needs to announce a new reserve supply schedule
  - Other interest rates will be affected so long as the cross-rate elasticities are nonzero

A stylized model of asset demand

$$\begin{pmatrix} R \\ F \\ T \end{pmatrix}_t^d = \alpha + \mathbf{Br} = \begin{pmatrix} \alpha^R \\ \alpha^F \\ \alpha^T \end{pmatrix} + \begin{pmatrix} \beta^{RR} & -\beta^{RF} & -\beta^{RT} \\ -\beta^{FR} & \beta^{FF} & -\beta^{FT} \\ -\beta^{TR} & -\beta^{TF} & \beta^{TT} \end{pmatrix} \begin{pmatrix} r^R \\ r^F \\ r^T \end{pmatrix}_t$$

$$R_t^d = \alpha^R - \beta^{RF} r_t^F - \beta^{RT} r_t^T + e_t^R$$ Reserve demand

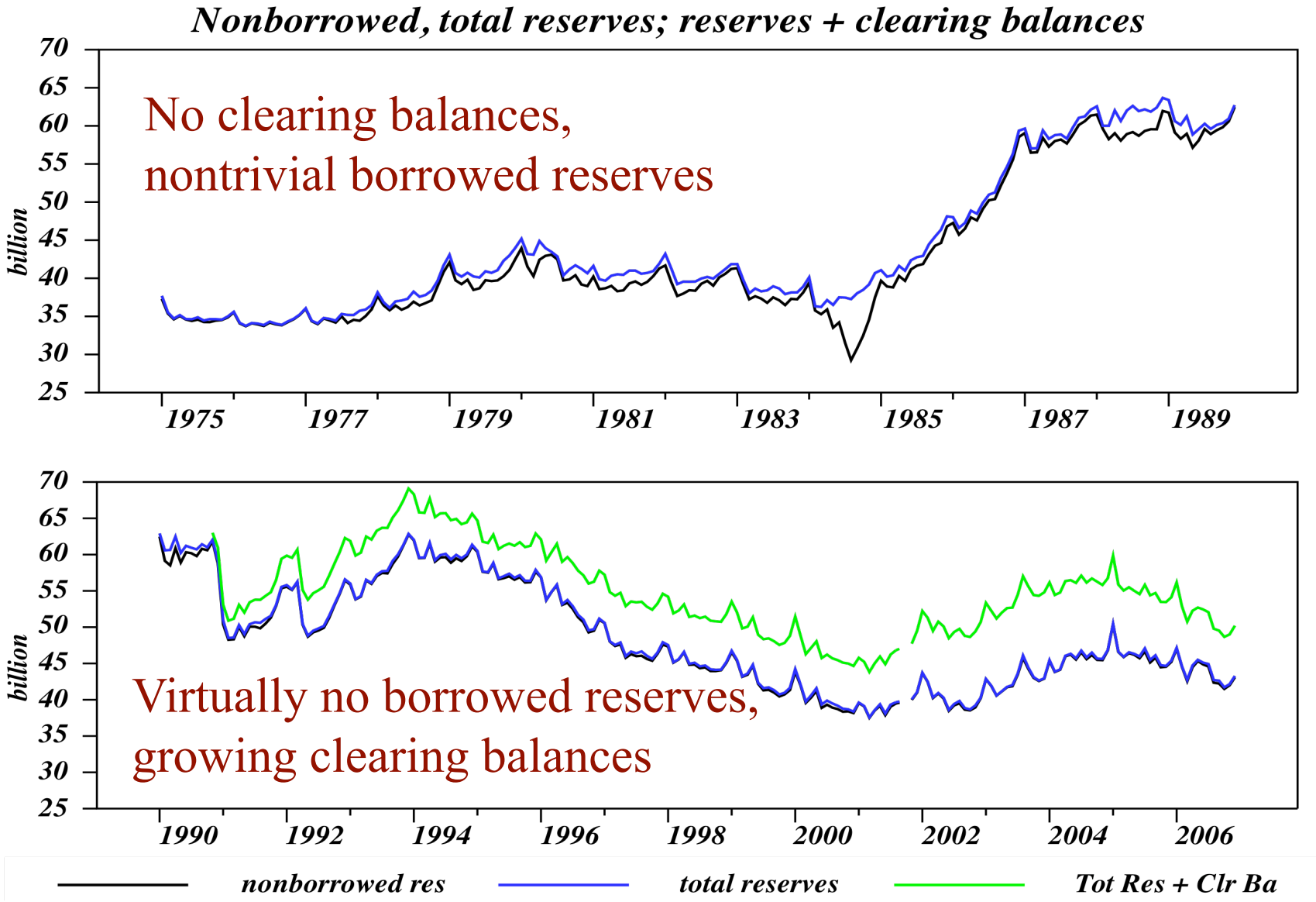
$$F_t^d = \alpha^F + \beta^{FF} r_t^F - \beta^{FT} r_t^T$$ Fed funds demand (zero net supply)

$$R_t^s = R^* + \Theta(r_t^F - \bar{r}^F)$$ Reserve supply

Is reserve demand interest elastic?

- *Which* reserve measure?
- Pre-1994 Fed: borrowed reserves and the "borrowing function"
- Post 1994…
  - Nonborrowed?
  - Total?
  - Excess?
  - *Required clearing balances?*

Trends in reserve balances

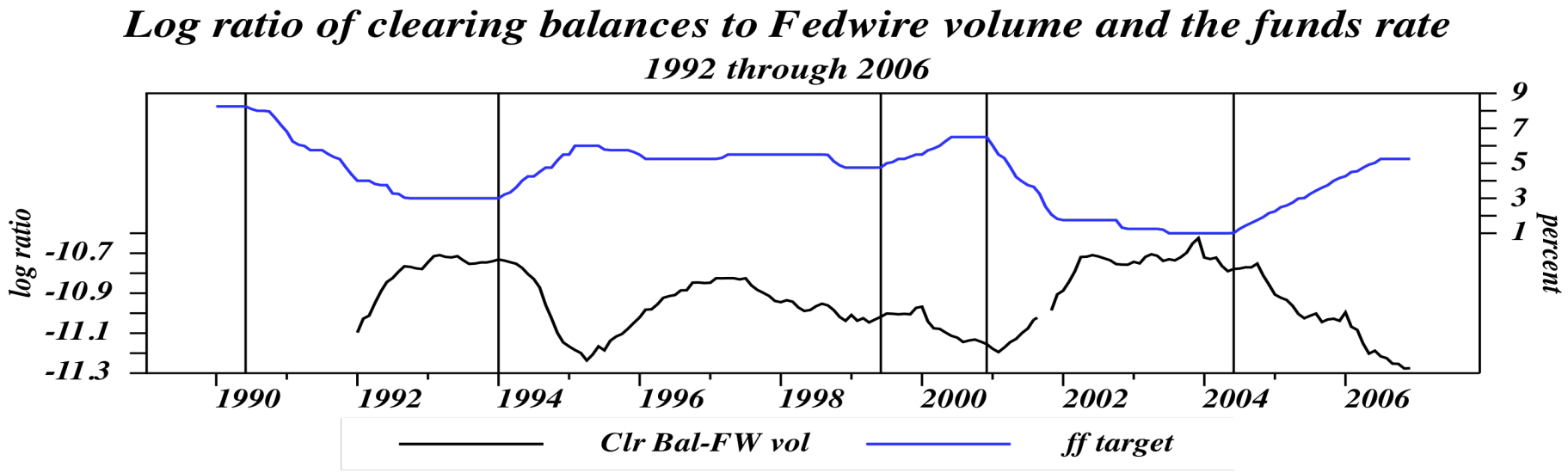


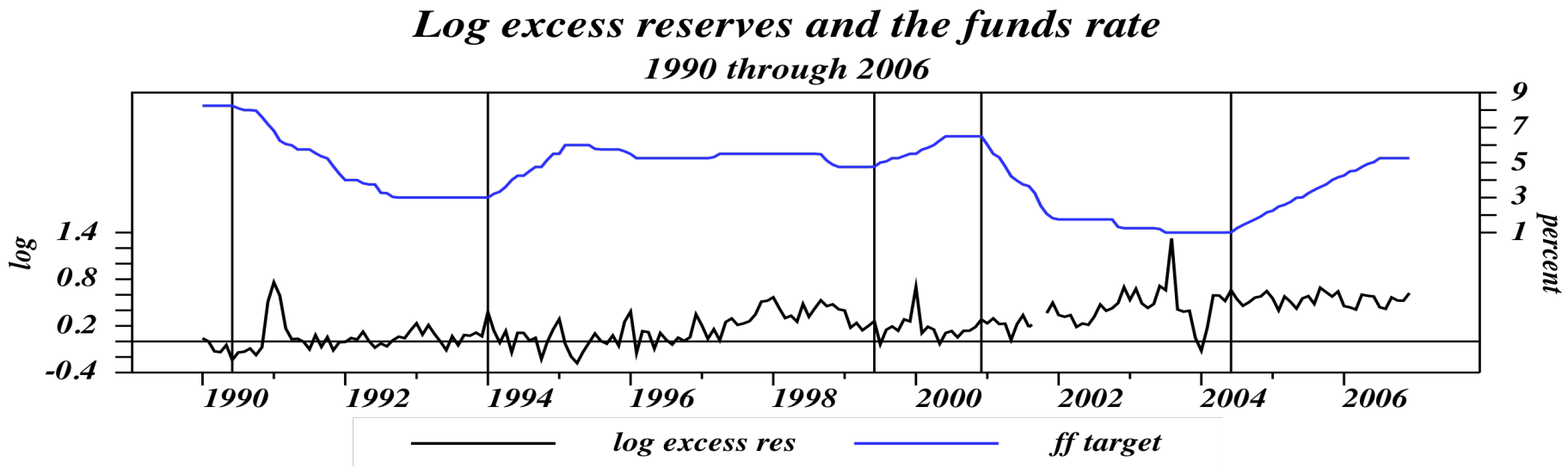
Is reserve demand interest elastic?

	Clearing balances + excess	**Excess**	**Total**	**Non-borrowed**
Short run elasticity	–0.044*	–0.118	–0.002	–0.011***
Long run elasticity	**–0.095*** **	**–0.025**	**0.001**	**–0.002***
Lagged reserves	0.78***	0.34***	0.35***	0.02

Only for clearing balances

Reserves and the funds rate





High frequency reserve demand

- Reserve demand depends largely (entirely?) on the difference between today's effective rate and the expected future (but within maintenance period) rate.
- This gives rise to *anticipation effects:*
  - The equilibrium rate changes before the target.
- …and possibly *announcement effects:*
  - The target announcement is self-fulfilling.

Empirical objectives

- Corroborate existing results on the liquidity and anticipation effects
- Assess the elasticity of reserve demand to the *level* of the funds rate
- Characterize the Fed's reserve *supply* decision

Estimating the liquidity effect

$$r_t^F - \bar{r}_t^F = \text{dummy terms} - \theta_2 m_t - \theta_3 R_t^X - \sum_{j=1}^{9} \varphi_j \Delta^e \bar{r}_{t+j}^F + \tilde{e}_t^R$$

WLS using excess reserves:

θ_2	θ_3	φ_1	φ_2	φ_3
-0.73^{***}	-0.57^{***}	0.48^{***}	0.32^{**}	0.14^{*}

- Strong anticipation effects out to 3 days
- Liquidity effect: $1 billion => (only) 0.73 bp

Estimating the interest elasticity

$$r_t^F - \bar{r}_t^F = \text{dummies} - \theta_1 \bar{r}_t^F - \theta_2 R_t - \theta_3 R_t^X - \sum_{j=1}^{9} \varphi_j \Delta^e \bar{r}_{t+1}^F + \tilde{e}_t^R$$

WLS using excess reserves:

θ_1	θ_2	θ_3	*LRA dummy*
0.04	–0.87***	–0.67***	–2.02**

- Virtually no response to rate level
- Lagged reserve accounting reduced reserve demand

Estimating reserve supply

$$R_t^s - m_t = \psi_0 + \psi_1 R_{t-1}^X + \psi_2 \Delta \bar{r}_t^F + \psi_3 \Delta \bar{r}_{t-s}^F + \psi_4 \bar{r}_t^F + \psi_5 (E_{t-1} r_t^F - \bar{r}_t^F) + \tilde{u}_t^R$$

2SLS using excess reserves:

Ψ_1	Ψ_2	Ψ_3	Ψ_4	Ψ_5
–0.06	0.03	–0.02**	–0.06**	0.10***

- The Desk partly offsets expected rate deviations
- No discernable change on rage change days,
- Drains or adds later in the maintenance period

Summary of results so far

- The traditional view is obsolete.
- Reserve demand is highly inelastic in the near term; the Fed responds to deviations.
- The announcement effect predominates in the very short run.
- Clearing balances eventually adjust.