

Ben Friedman: The Central Bank as an Army with Only a Signal Corps?

- Apology: words, not models. What course is about though - - models formalize words. Words come first. Does no good to write CIA model if does not address facts at all. Need to build new models around many of the words here.
- How does this paper fit in the big picture?
 1. How can the Fed affect y , p , r as Milton Friedman, CEE, RR says it does? Maybe it can't (anymore) when you look at mechanism.
 2. "Decoupling" as my stories about chewing gum suggest. Ms. Md go to \$1.
 3. Financial innovation makes our economy much different from the money vs. bonds abstraction.
- Fact background. Open mouth operation story in NZ-Meeting with the Governor. p. 322 quotes on "public utterances" and "familiar fictions".
- Ben Friedman notes that reserves and OM are trivial relative to bond supply, so how can small purchases/sales of bonds affect interest rates. See numbers p. 324. What would Milton say about this analysis?

A: It's the M side that matters not the B side. $M(r) = M_s$ determines r . See bottom of p. 325 for "money view". The Fed is the "monopoly supplier" of reserves. p. 325. Reserves control M1 via controlling checking accounts, so small size doesn't matter.
- What are reserves?

A: Bank account at the Fed + vault cash. Pays no interest. Fed account can be used to settle transactions across banks.
- BF notes reserves are a *tiny* fraction of transactions. But Small vs. Delinked are not necessarily the same thing. The steering wheel is a small part of the car, but still controls it. This is a lot of what he had to write a second paper to clear up. JC: Small might mean that we can easily accomplish our transactions with 1/2 the amount of reserves if the Fed tried to squeeze. (small costs suggests delinked)
- Describe the "interest rate" and "credit" channels. What's the point here?
 1. 326: Fed raises short rates, this raises long rates, people "spend" less.
 2. Fed lowers reserves, banks must have less deposits, hence less loans.
 3. If the Fed affects the economy through the "interest rate" or "credit channel" it still can only control anything as "monopoly supplier of reserves." (326)
 4. Note: to get to the price level, both of these must operate through some sort of philips curve, $M \rightarrow y \rightarrow \pi$

- 327 It's vital that 1) banks need reserves for M 2) we need M for transactions. But...
- Why does Friedman say the demand for bank money is eroding?
A: 327. Credit cards, debit cards, alternative means of payment, liquid nonreservable accounts. JC adds: banks need less reserves too. Netting, intraday overdrafts, sweep accounts reduce required reserves.
- Why does Friedman think that central banks' influence on rates survives all this?
P. 328-329. We still *settle* with reserves. BF goes on about ways to avoid this, settling with subway rights or securities. ("Private moneys" = banknotes, and were used in 1700 Scotland, 1800 US.) But I disagree that this matters. First, there are lots of ways to settle with out reserves: netting (one big intrabank netting program can eliminate use of reserves!) , daylight overdrafts, nighttime overdrafts. Second, more importantly, I think this is off base. What's key is the need to hold an *inventory* of reserves. If you can always buy, settle in 10^{-6} seconds and the receiver sells again, the fact that we *settle* with reserves is irrelevant to a *demand* for reserves. One \$ bill in the whole economy will do. With little required reserves, the fact that the Fed assess penalties for overnight or intraday overdrafts is the only (tenuous) reason people hold reserves.
- The \$50 b in reserves used to be almost all required reserves. Now, sweep accounts and other innovations mean that most of reserves are in fact voluntary, held for use in settlement balances. (Taylor reports required reserves are \$4 billion out of \$50 total) How does this matter for Fed control?
A: JC: It might be easier for them to do a little tighter cash management and do without voluntary reserves.
- Why is the increasing amount of non-bank lending important? For example, mortgages are now securitized and car loans are given by finance arms of the manufacturers
A: 330 Eliminates credit channel. 331 too. JC: in addition, it's much easier for firms now to finance with equity, commercial paper, etc. all of which are out of the Fed's reach.
- How is currency "passively supplied?" (p. 330) I went and asked and they wouldn't give me any
A: In return for treasury bills. You can do your own OM operation if you want cash (not reserves) (I'm not totally sure how this works)
- 333. Alternatives to clearing via the Fed. Apparently European banks do not use ECB accounts to settle. (What do they use? "Bilateral transfers" of what?) Possible to all agree on a single private bank too.
- 333. Bottom line, reserve velocity can rise near ∞ . Hence, it can become unstable.

- 334. Pegging an exchange rate is just like affecting an interest rate. Cool analogy. Will US 6%, Euro 3% lead to swamped US, as defending pegs are swamped? In a sense, the story of the 50s peg is the same – tried to hold 1% interest rate, needed larger and larger OM to do so. Why do firm pegs lead to crashes, but our moving pegs lead to open-mouth operations with no quantities?
- p. 334-335. I disagree about the “irrationality” of the Asian crash, but we’ll get to that.
- p. 335, Fed is monopoly supplier of *dollar* reserves, but international competition reduces the value of that too.
- p. 337. Another cool idea: Lender of last resort may be the mechanism for fiscal transfers underlying currency unions.
- 337 "economic theory provides no clear answer to what would determines an economy’s price level if what its inhabitants used as money depended entirely on their own ability and willingness to innovate” *no* The fiscal theory to the rescue.
- Bottom line: the value of being “monopoly supplier of reserves” is eroding fast. Why is it there now? Substitutes: do transactions with less reserves (or other countries reserves).

Comments:

- You can see Friedman struggling, especially on *size* vs. *decoupling* issue. Akerlof gives a model where money is decoupled (SR) though large.
- Also confused on needing to *use money for transactions settlement*, vs. *need to hold money*. You can have one without the other! The *unit of account*, and *medium of exchange*, and *temporary liquid store of value* need not be the same object.
- Puzzle: 1) Fed seems able to control R. 2) ff does seem coupled to longer term treasuries (Cochrane Piazzesi) 3) Quantity stories completely inadequate to explain why
- Details. What matters? What if we pay interest on reserves? What if we require reserves? Set interest rates rather than reserve quantities? All of these are absent (NZ) still seem to control.

Friedman Decoupling at the margin

- What’s the big point of this paper
A: That fed operations may become “decoupled” from the rest of the economy so Fed loses control.

- Summary of critics. 1) Money is and still will be used for *clearing* 2) Money demand will still be there (drug dealers, etc.) 3) The Fed can control interest rates even absent 1 and 2 by just announcing it's willing to lend and borrow at a set rate.
- Friedman critics point out that demand for currency and reserves are still strong. These will never drop to *zero*. $M^d(P, Y, r) = M^s$ can still determine P, Y , and r . since it won't be *zero*. How does Friedman respond?
 1. A: p.262 "Decoupling" is not the same thing as size or use in transactions. See long list of things that it's *not* about. These were criticisms, and here he's responding.
 2. p. 263. It's about whether changes in reserves propagate, or are simply absorbed a la Akerlof.
 3. The "one last drug dealer using \$100 bills" reason for money control starts to sound a lot like Peanut Butter or Chewing Gum at O'Hare.
- Friedman refers to "corner solutions" What's he talking about? What's the corner?

A: means price not = mrs. I don't see the constraints and I'm not sure is useful. I think he means small costs a la Akerlof.
- Does Friedman think pure open mouth operations are possible?

A: no. In both papers a threat must be backed up by om to raise short rates. p.265, and esp p. 271 of this paper. You have to be able to back up your threats.
- Why does Friedman ignore currency? Surely there will always be a lot of money demand by drug dealers and Russian mattresses (\$600/capita at last count, almost all \$100 bills)

A: Currency is "passively supplied" Bring a T bill and they give you currency, do your own open market operations. If M is passively supplied, there is no control. Also these demands are "decoupled." (The latter important since the Fed *could* start controlling currency).
- How does Friedman answer Woodford's view: All the Fed needs to do is to control an interest rate. It *can* control this rate – as it does in New Zealand – by offering to borrow or lend arbitrary amounts at this rate. Even if there is nothing special about bank reserves! How does Friedman respond?
 1. A: "rates that matter" not "corner solutions in isolated decoupled markets" . p. 268. Chewing gum example again. Segmented markets again
 2. A: BF: yes, if you're willing to borrow and lend huge quantities (JC like a bank defending a peg). But in practice tiny quantities do it. Horizontal supply should mean huge quantities.
 3. Woodford response: maybe there is no equilibrium no "inherent rate" . JC: I can't make any sense of this. some sort of indeterminacy. Is Woodford assuming super neutrality so the Fed just picks the inflation rate?

- How does Friedman think New Zealand is controlling its interest rate, with announced rates but zero volume, if not by “open mouth” operations?

A: by a threat to intervene – a threat which it may soon not be able to make good on.

- A big bottom line. We’re all confused about size vs. decoupling; the need to use money to make settlements and the need to hold money as an inventory. We can get by with one \$ if only the former!

Taylor, expectations open market operations and changes in the Federal Funds rate:

The purpose of the paper is to give some insight into the realities of how the Fed (tries to?) sets interest rates, a subject of great mystery in Friedman's analysis, and to explore a model that generates "open mouth" operations.

Taylor questions

- When did the Fed start announcing the funds rate target? When did it start giving information about future funds rate "direction"
- Explain lagged reserve accounting. How much reserves do you have to have when, to cover how much M1 when?
- What has the effect of sweep accounts been on required reserves and why?
- What is the purpose of the model in this paper?
- What are fed funds and what does the fed funds rate mean?
- If you have too many Fed balances, why lend them out rather than, say simply buy a T bill? If you have too few, why borrow them rather than sell a t bill or, better, yet, repo a t-bill? (Repo: sell a t bill, promise to buy it back the next day. It's just like borrowing with T bill as collateral)
- Why keep (non-interest paying) balances at the Fed at all? If a check comes in, then send money to the Fed to cover it, or borrow from the Fed.
- What exchange are Federal funds traded on?
- When does the Fed do Open Market operations? What does it actually do – does it borrow/lend fed funds or what?
- How can the Federal funds rate be *any* different than the target?
- The flow in FF market is more than 10 times the stock of Fed balances. (150 b / day) Why might a bank borrow 4 billion in FF on a day when its FF balances are only 100 million?
- Does every transaction take place at the same rate?
- What's the point of Figure 1?
- Are deviations of ff from the target persistent, iid, or somewhere in between?
- At the turn of the century, does it look like banks demands for reserves surprised the Fed, or does it seem that the Fed pumped in a lot of reserves, temporarily not worrying about the target?

- What's the point of figure 4?
- Explain the intuition of (2)

$$b_t = b_{t-1} + \beta(r_{t-1} - \rho_{t-1})$$

- What is the slope of the balance supply curve in (2)? How is this different from classic money supply stories?
- Why might the fed funds rate be a random walk (hint: inside a maintenance period.)

$$r_t = E_t r_{t+1}?$$

- Explain Figure 5.
- Does Taylor's model give a pure open mouth operation, with no open market operations
- What do you think happens in the Taylor model if the market *expects* the rise in the funds target.
- What's the point of Figure 6?
- Why does the Fed fix the quantity of reserves, rather than simply announcing an interest rate and letting banks have all they want at that rate (effectively, open the discount window)?

Taylor questions and answers.

- When did the Fed start announcing the funds rate target? When did it start giving information about future funds rate “direction”

33: Announcements are a new thing since 94. 33 Dec 99 Direction as well as target announced.

- Explain lagged reserve accounting. How much reserves do you have to have when, to cover how much M1 when?

33: Lagged reserve accounting. “Two week reserve maintenance period begins 17 days after the end of the two week reserve computation period” It means we can get more reserves next week to balance m today. Note you have to keep reserves *on average* over reserve period to match M1 on previous period. Games about *when*. (Clearly, reserves are no longer about having enough around at any moment to cash 10% of your outstanding deposits!)

- What has the effect of sweep accounts been on required reserves and why?

33 sweeps: at 4:59 pm you trade a checking (reserves) for a savings (no reserves) account, then back at 9:01 AM. Required reserves down from \$30 b to \$5-6b. Most reserves are now “voluntary” settlement balances. *JC, BF: this destroys the traditional link between reserves and M1 from required reserves!*

Show Orphanides Figure 1

- What is the purpose of the model in this paper?

34. Model: how a change in the target rate can happen with no open market operations.

- What are fed funds and what does the fed funds rate mean?

34: Fed funds are not loans to/from Fed (that’s the discount rate). Fed funds are loans of Fed account balances between banks. Phone market.

- If you have too many Fed balances, why lend them out rather than, say simply buy a T bill? If you have too few, why borrow them rather than sell a t bill or, better, yet, repo a t-bill? (Repo: sell a t bill, promise to buy it back the next day. It’s just like borrowing with T bill as collateral)

A: Tiny transactions costs. Moral: this is a pretty fragile market.

- 35. Typically small banks have too much, lend to large banks. Like Ebay, end of day chaos.

- Why keep (non-interest paying) balances at the Fed at all? If a check comes in, then send money to the Fed to cover it, or borrow from the Fed.

A: You can! It's an "intraday overdraft" But nighttime overdraft costs ff rate plus 4% (annual basis) (35) so it's expensive. You can borrow at the "discount window" but the Fed discourages it. These details are vital to amount of fed balances.

- JC explain netting, intraday overdrafts. Numbers: Fed balances \$20-30b. Fedwire \$2 trillion / day (p. 43), each one of which leads to a deposit/withdrawal from fed balances. Intraday overdrafts are OK, but Overnight over drafts lead to a 400 bp penalty plus Fed mad at you. Good cash management! The next fed funds model should be a model of settlement balances, optimally held to balance lost interest vs. avoiding overnight overdraft penalties.

- What exchange are Federal funds traded on?

It's not. 35 a Broker, telephone market

- When does the Fed do Open Market operations? What does it actually do – does it borrow/lend fed funds or what?

35. Trading desk. 9:30 plus dice time of intervention. The Fed does repurchases for open market operations. The Fed is not in the ff market directly; it is trying to influence ff rate by affecting the overall quantity of reserves. It could instead lend reserves directly at a stated price, but does not do things this way, for reasons that are a mystery to me.

- How can the Federal funds rate be *any* different than the target?

A: Fed sets Q at 9:30 AM. Then day goes wild. Other central banks offer to borrow/lend at fixed prices, and nail their rates.

- 35 Much of what they do is to *offset* other influences on reserves, e.g. why is a treasury auction different from open market operation. "Offset increases in currency" Banks can trade currency for reserves anytime they want. Then the Fed will do OM to adjust reserves.

- The flow in FF market is more than 10 times the stock of Fed balances. (150 b / day) Why might a bank borrow 4 billion in FF on a day when its FF balances are only 100 million?

A: 36 Many loans are channeled through Fed funds market. Borrow 4 billion in FF, keep 100 b for reserves, use the rest for loans. (Need to refinance daily though!) This could easily work through overnight repos or other mechanisms though .

- Does every transaction take place at the same rate?

36 Each transaction is bilateral, can be at a different price. It's a dealer market. The 'effective rate' average is reported. Note we quote annual rates, but these are daily loans. $1\% \text{ of } \$1\text{m} = \$10,000/360 = \$27.78$ so you actually pay \$27.78 for each percent.

- What's the point of Figure 1?

The Fed is good at keeping ff near the target . But there *are* deviations, such as Dec 31 1999. Why are there any deviations? Again, the Fed sets Q not P.

- Are deviations of ff from the target persistent, iid, or somewhere in between?

F2: Deviations revert quickly (Fed responds the next day!) Equation (1), a daily AR(1) of 0.422.

- 37 Settlement Wednesday is less important. (Used to be the end of reserve maintenance period; time to catch up! There were often big spikes when a few banks were desperate to make up the last bit of required reserves.)

- At the turn of the century, does it look like banks demands for reserves surprised the Fed, or does it seem that the Fed pumped in a lot of reserves, temporarily not worrying about the target?

38 Century change story. See Figure 3. It looks like just the Fed just pumped lots of reserves in for the last week, just to make sure, and the heck with the target. (Supply, not demand. A plot of quantity would help!)

- What's the point of figure 4?

The funds rate often moves before or coincident with the target change, even though there will be no OM until the next morning.

- 41 model, designed to replicate “open mouth”.)

- Explain the intuition of (2)

$$b_t = b_{t-1} + \beta(r_{t-1} - \rho_{t-1})$$

Fed increases balances in response to yesterday's deviation from target. Important features: no level term. *Changes* in b to hit target only. Expectations of this future response will matter. Also, the lag – it's not $E_{t-1}(r_t - \rho_t)$ on the right hand side. (That's much more plausible. What if it were? Good problem to work out! See Orphanides discussion of this paper.)

- What is the slope of the balance supply curve in (2)? How is this different from classic money supply stories?

A: infinite. It's yesterdays rate. Note this ignores the discount window – at a high enough interest rate, banks will start to borrow at the fixed discount window rate, expanding reserves supply. A Thus the classic story is an upward sloping supply. This is an approximation. The vertical supply reacts to rates out of line on the day before, and to lagged r since the fed intervenes at beginning of day when there is little trading.

- Why might the fed funds rate be a random walk (hint: inside a maintenance period.)

$$r_t = E_t r_{t+1}?$$

If reserves are held for required reserves, today is as good as tomorrow.

- 43 Demand.

$$b_t = (b_0) - \alpha(r_t - \gamma E_t r_{t+1}) + \varepsilon_t$$

Intertemporal due to maintenance period (for required reserves). Reserves today are as good as reserves tomorrow. If banks are risk neutral, the interest rate should follow a random walk. Some slope to the demand curve gives (3) “less than full arbitrage” since $\gamma < 1$ and $\alpha < \infty$. Taylor is vague on (3) for non required reserves, which most are, and this is central! 43 “disagreement about intertemporal effect.”

- Explain Figure 5.

44 Effect of target change. ff rises at t even though no OM at t at all. Solution: we’ll do it on a problem set.

- Does Taylor’s model give a pure open mouth operation, with no open market operations

45 No. An “open mouth operation” has no reserve changes. This still has some (small) reserve changes in future periods. It’s important though that there is a forward-looking demand curve with a γ near 1. This is a “Mysterious” effect. The Fed *does* reduce balances at t+1. There is a “multiplier” but not infinite – the threat must be made good. (Can we get infinite with $\gamma = 1$? Let’s try it on the problem set!)

- What do you think happens in the Taylor model if the market *expects* the rise in the funds target.

p. 45 – An *expected* funds rate change will lead to ff rises *before* the target range which we don’t see.

- What’s the point of Figure 6?

Quick response to balance demand shocks. This is an important calibration of the model. I suspect you could get more open mouth behavior, but it would also imply more delayed responses here.

- Bottom line: a model of “open mouth operations.” Good points

1. No OM at date t, and ff rises at date t.
2. Small OM at later dates.

- Shortcomings
 1. Overpredicts response to expected ff changes. The $\gamma \approx 1$ effect means we should see ff rising weeks ahead of the meeting. See Orphanides figure 3.
 2. $\gamma \approx 1$ makes sense for a reserve maintenance period, required reserves. Why should it hold for settlement balances? The phenomenon seems more general than that.
- What are the facts of “open mouth” operations? Are there really *no* underlying market operations? Guthrie Wright.
- Why does the Fed fix the quantity of reserves, rather than simply announcing an interest rate and letting banks have all they want at that rate (effectively, open the discount window)?

A: beats me! There are some stories that high *prices* are not that effective in getting banks to reduce reserves. But that doesn't make much sense since the FF rate is the price any individual bank can use to get more reserves.

Guthrie/Wright

Open mouth – seem an observation totally at odds with MF view of the world.

496. Targets 3 month rate not ff, with inflation target in mind.

Guthrie/Wright questions

1. 1. In their introduction, do G/W advertise a model that requires small open market operations to make good on threats, as in Taylor or Friedman, or can the central bank move rates with no open market operations?

A: 490. Intro says no OM operations at all are required. An off-equilibrium threat kind of argument.

2. In G/Ws view would central bank open market operations work if they used them?

A: Yes, they believe in a liquidity effect 490.

3. 2. New Zealand pays interest on settlement balances and allows banks to borrow from the discount window. How are these rates set?

A: in response to market rates, by fixed formula. 497. Thus, these follow, rather than set rates.

4. 3. Does New Zealand have reserve requirements?

A: No. 497.

5. 4. Has New Zealand ever had to make some quantity response to move an interest rate?

A: Almost. Cash target to zero in 93. p.496. 0??

6. 5. What interest rate does the central bank of New Zealand target

A: 3 month, not ff 496.

7. 18. Why not pay interest on reserves? Does everything fall apart if we do? Why does the Fed fix the quantity of reserves, rather than simply announcing an interest rate and letting banks have all they want at that rate (effectively, open the discount window)?

8. Why not pay interest on reserves? Does everything fall apart if we do?

Settlement balance target. Also borrow/lend at a fixed rate but “follows market rates” with a fixed formula. Threat to move settlement balance target if market rates don’t go where they want.