Discussion of “Achieving Price Stability ...” by R. Hall and R. Reis

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Two Comments

• Interesting and provocative paper.

• I have two comments:

1. What is the mechanism?

2. Reserves are perpetuities - and why that might matter
WHAT IS THE MECHANISM?
A Mysterious Mechanism

• Somehow, the existence of an arbitrage opportunity in the asset market forces the price level to change in the goods market.

• How does this work exactly?

• In my view, the authors need to provide more clarity on this point.
My Understanding of the Mechanism

- Assume that, in equilibrium, there exist households:
  - with positive consumption in period $t$ and period $(t + 1)$
  - who are unconstrained in their holdings of some financial asset with nominal gross return $R_{t+1}$ from period $t$ to period $(t + 1)$.
  - hold a positive amount of reserves (electronic dollars)

- Note: the nominal gross return is potentially random from the point of view of period $t$. 
Marginal Indifference in Equilibrium

• Given these assumptions ...

• The relevant households are marginally indifferent in period \( t \) between current consumption and the financial asset.

• This means, in turn, that they are marginally indifferent between:

  – period \( t \) consumption

  – a (possibly random) period \((t + 1)\) consumption payoff \( \frac{R_{t+1}P_t}{P_{t+1}} \).

• Here, \( P_{t+s} \) is the price level in period \( t + s, s = 0, 1 \).
The Payoffs to Reserves

• The central bank makes the following commitment.

• The holder of a dollar of reserves at the end of period $t$ receives $\frac{R_{t+1}P_t}{P_t^*}$ of reserves to take into period $(t + 1)$.
  
  – $P_t^*$ is the desired price level in period $t$
  
  – As in Hall-Reis, reserves are one-period assets.
How Hall-Reis Price Level Targeting Works (I Think)

• Suppose $P_t > P_{t^*}$.

• Consider a trade of consumption for reserves.

  $-$ $\epsilon$ units of period $t$ consumption $\Rightarrow \epsilon P_t$ dollars of period $t$ reserves

  $\Rightarrow \epsilon P_t R_{t+1} \frac{P_t}{P_{t^*}}$ dollars of reserves in period $(t + 1)$.

  $\Rightarrow \epsilon \frac{P_t R_{t+1} P_t}{P_{t+1} P_{t^*}^*}$ units of consumption in period $(t + 1)$

  $-$ which is greater than $\epsilon \frac{R_{t+1} P_t}{P_{t+1}}$ units of consumption in period $(t + 1)$.
• Remember: households were marginally indifferent between period $t$ consumption and $\frac{R_{t+1}P_t}{P_{t+1}}$ units of period $(t+1)$ consumption.

• So, if $P_t > P_t^*$, they are made strictly better off by giving up consumption for reserves.
  
  – That demand for reserves drives down the price level $P_t$.

• Conversely, if $P_t < P_t^*$, they are made better off by buying consumption with reserves.

  – That demand for goods drives up the price level $P_t$.

  **Equilibrium:** $P_t = P_t^*$. 
Lingering Concerns

• **Concern 1**: I assumed that in equilibrium, some households were unconstrained in their holdings of reserves and in their holdings of some other financial asset.

• **Concern 2**: Implicitly, I assumed that both the nominal financial asset and reserves have positive value (so that $0 < R_t < \infty$) in equilibrium.

• Are these assumptions necessarily valid, given Hall-Reis mechanism?
• (Related) **Concern 3:** My analysis was pretty vague.

• It would be better to have a more explicit model of goods/asset exchange to clarify what happens when $P_t$ differs from $P_t^*$.

• This analysis would be most compelling if, a la Bassetto 2002, it broke free of the black box of Walrasian exchange.

• Of course: this is a comment about much of the literature about indeterminacy/determinacy in macroeconomics.
RESERVES ARE PERPETUITIES
Reserves Last Forever

- In Hall/Reis, reserves are extinguished at the end of a period.

- This isn’t true in reality.

- Much as in Hall (1997), bank reserves are actually perpetual bonds with adjustable coupon payments.

  – along with option to exchange for currency ... but let’s ignore that.
Hall-Reis with Perpetual Reserves

- Suppose a dollar reserve held at end of period \( t \) makes an interest payment of:

\[
rtP_{t+1}/P^* + (P^*_{t+1}/P^*) - 1
\]

dollar reserves at the end of period \((t + 1)\).

- Here, \( rt \) is the real yield (known in period \( t \)) on a TIPS bond from period \( t \) to period \((t + 1)\).

- \( P^*_{t+s} \) is the desired price level in period \((t + s)\), \( s = 0, 1 \).

- \( P_{t+1} \) is the actual price level in period \((t + 1)\).
• The arbitrage-free goods price $\xi_t$ of this consol satisfies the linear diff eq’n:

$$\xi_t = V_t \left( \frac{r_t}{P_t^*} + \frac{\xi_{t+1} P_{t+1}^*}{P_t^*} \right)$$

where $V_t$ is valuation operator.

• Suppose it is common knowledge at date $t$ that $\xi_{t+1} = 1/P_{t+1}^*$ with probability one.

• Then: $\xi_t = V_t \left( \frac{r_t}{P_t^*} + \frac{1}{P_t^*} \right) = V_t \left( \frac{1 + r_t}{P_t^*} \right) = 1/P_t^*$.

• We have a recursive application of Hall-Reis argument.
More Subtleties Emerge

• In some sense, we can extend Hall-Reis argument to the more realistic case in which reserves are perpetual bonds.

• But the argument now:
  – hinges on the credibility of the future price level target.
  – relies on banks demanding similar one-year holding period returns on a short-term TIPs and a perpetual real floating-rate bond.

• These seem like more delicate foundations.
Recommended Responses to My Two Comments

- Response 1: The paper should be a lot clearer about the nature of the mechanism that rules out equilibria in which $P_t$ does not equal $P_t^*$.  
  
  – at a bare minimum, it needs some intuitive discussion of this issue along the lines that I describe.

- Response 2: Model reserves (more realistically) as perpetual instruments and discuss how one might deal with the resultant subtleties.