

Working Capital in Macroeconomics

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Firm Financing

- Longer term:
 - It takes many years for purchase of new plant and equipment to pay for itself through increased revenues.
 - In mean time, firm must acquire financing (either internal or external).
- Short term:
 - Production requires time between the application of variable inputs (labor, fuel, etc.) and revenues.
 - Mismatch between timing of expenditures and receipts.
 - Requires financing (either internal or external).
 - This financing is called *working capital*.
- Short term finance is important:
 - Importance is *existential* - deadly to miss a wage payment!
 - A firm that has difficulty lining up financing for a big investment project, simply delays the project for a while.

Message

- Fundamental questions in monetary policy depend on how important working capital is:
 - Does inflation rise or fall in response to a central bank-engineered rise in interest rate?
 - Is the Taylor Principle the best strategy for implementing inflation targeting?
- Much work (model and data) is needed to assess importance of working capital channel.

Monetary Transmission Channels

- Conventional analysis ignores working capital, so there is only a *demand channel* for monetary policy.
- *Demand channel*
 - When central bank increases R , people cut back on current expenditures:
 - With high R , relative cost of current purchases is high.
 - People with variable rate mortgages have less disposable income.
 - Various ‘accelerator effects’ amplify drop in expenditures.
- Working capital creates a supply channel (see below).

Demand and Supply Side

- Demand side of the economy is pretty well understood.
 - basically summarized by IS-LM diagram.
- I will devote a little more effort to discussing the supply side.
 - first, without working capital (standard case).
 - then, with working capital.

Supply Side in Absence of Working Capital

- Production function:

$$Y = \underbrace{A}_{\text{technology}} \times \underbrace{N}_{\text{employment}}$$

- Resource constraint (simple model!): $C = Y$.
- Labor market perfectly flexible:

$$\underbrace{\frac{W}{P}}_{\text{real wage}} = \underbrace{C(N)}_{\text{labor supply}}^{\psi} = Y \left(\frac{Y}{A} \right)^{\psi}$$

- Real Marginal cost of production, s , usual calculation:

$$s = \frac{W}{AP} = \frac{1}{A} C(N)^{\psi} = \left(\frac{Y}{A} \right)^{1+\psi}.$$

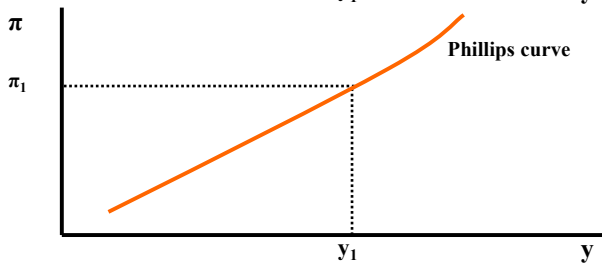
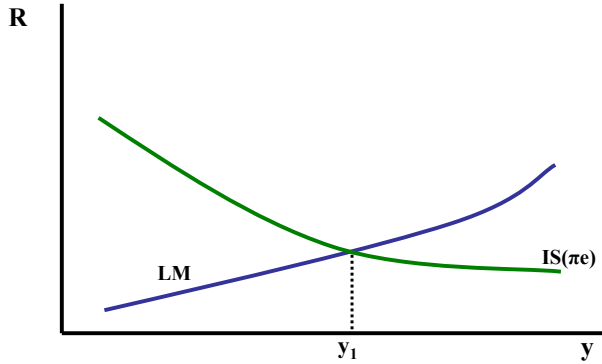
- Aggregate supply (Phillips) curve: $\pi = (Y/A)^{1+\psi}$.

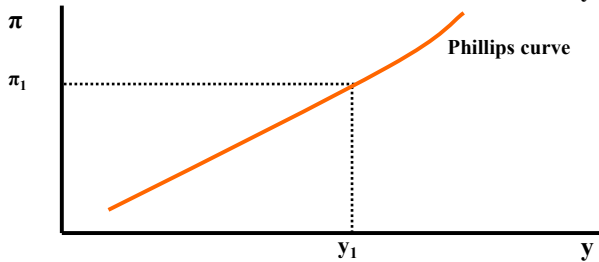
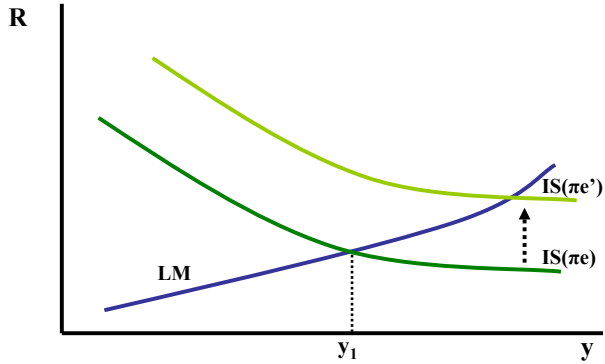
Inflation Targetting: Analysis in Absence of Working Capital

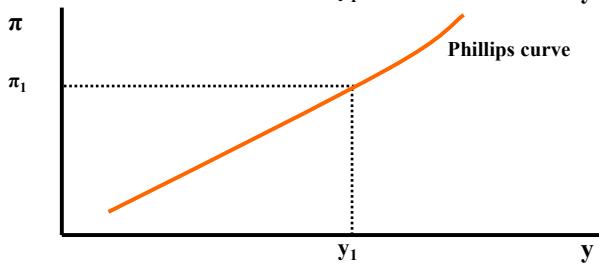
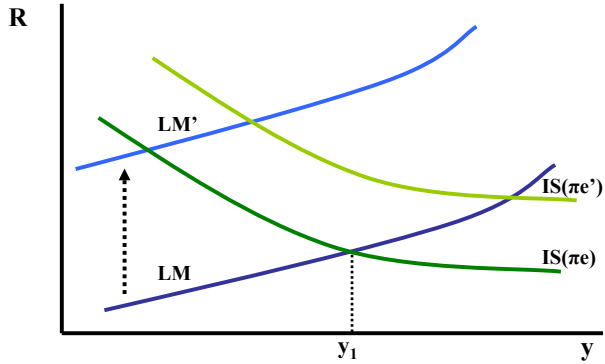
- An important task for inflation targetting is inflation expectations management.
 - ‘Once the inflation genie is out of the bottle, the fight against inflation is lost.’
- Taylor principle: when inflation expectations are high then increase R vigorously:

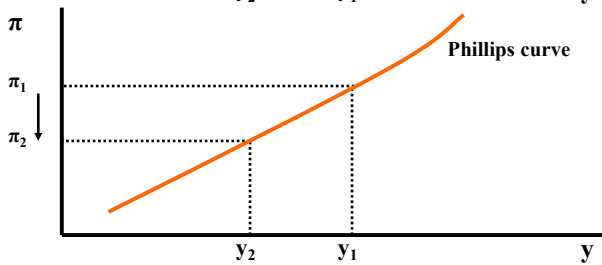
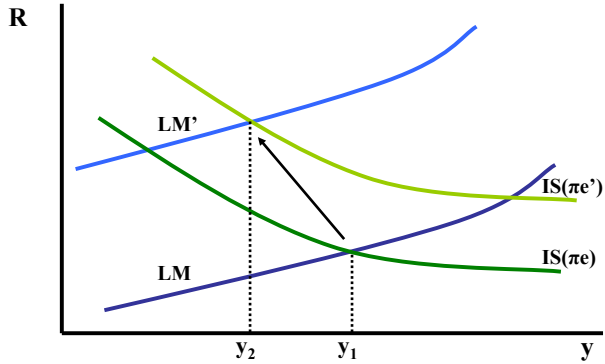
$$R = \alpha + \beta\pi^e, \quad \overbrace{\beta > 1}^{\text{Taylor principle}} .$$

- Logic:
 - If inflation expectations rise, Taylor principle requires raising R and this (supposedly) brings π^e back into line.









Message of Conventional Analysis

- If inflation is high, bring it down by raising interest rate.
- Taylor principle likely to be effective at keeping inflation expectations bottled up.
- Next, consider the introduction of working capital.

Supply Side With Working Capital

- Production function, resource constraint and labor market:

$$Y = AN, C = Y, \frac{W}{P} = Y \left(\frac{Y}{A} \right)^\psi .$$

- Assume it takes one period between allocation of labor and earning revenues.
 - Pay W at time labor works, borrow W from bank (or, reduce assets by that amount).
 - When revenues come in at the end of the period, cost of labor is RW , R is gross nominal rate of interest.
 - So, real marginal cost is:

$$s = \frac{RW}{AP} = R \left(\frac{Y}{A} \right)^{1+\psi} .$$

- Aggregate supply (Phillips) curve:

$$\pi = R (Y/A)^{1+\psi} .$$

Supply Side With Working Capital

- Aggregate supply (Phillips) curve:

$$\pi = R (Y/A)^{1+\psi} .$$

- Increase in R has same effect as a negative technology shock
 - By increasing costs, higher R directly contributes to higher π
- Called the *Wright Patman Effect*.
 - Wright Patman, powerful Chairman of US House Banking Committee until 1975.

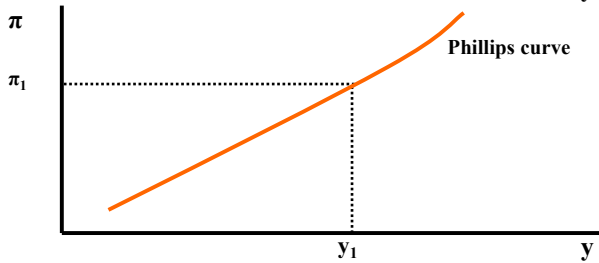
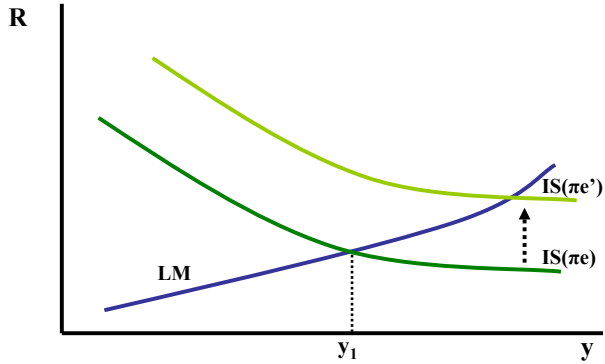
Patman, Godfather to Working Capital

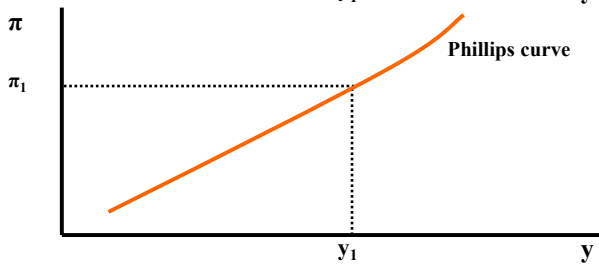
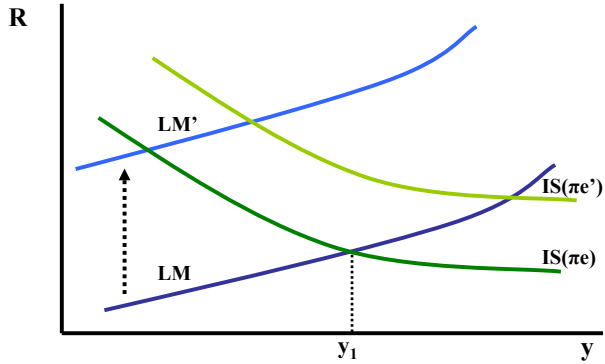
- Patman pointed out (in March, 1970):
 - **"...the senselessness of trying to fight inflation by raising interest rates. Throwing gasoline on fire to put out the flames would be as logical."**

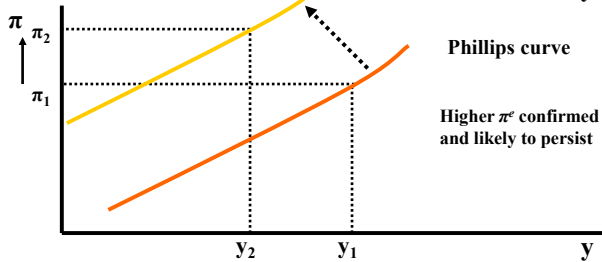
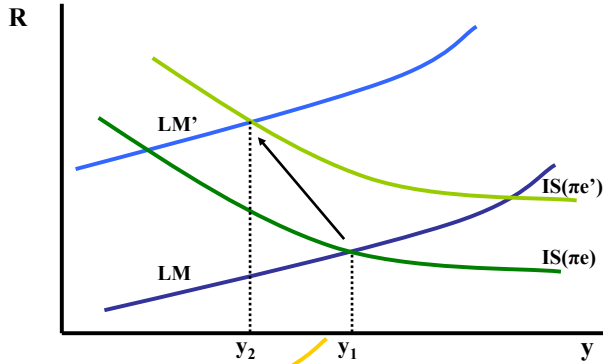
(U.S. Congress, Joint Economic Committee. Report on the January 1970 Economic Report of the President (Washington, D.C.: U.S. Government Printing Office, 1970).)

Patman, Godfather to Working Capital

- Patman fought bitterly with Fed Chairman Arthur Burns over what to do about US inflation of 1970s.
- The essence of the battle was over whether higher interest rates drive inflation up (Patman's view) or down (Burns' view).
- Patnam threatened that if Burns raised interest rates to slow inflation, Patman would see to it that interest rates were put under the wage-price control board. (Time Magazine, The Lasting, Multiple Hassles of Topic A, April 9, 1973).
- During a committee meeting in which Fed Chair Burns was testifying, Patman **"snarl[ed] at ... Arthur Burns [and asked him], 'Can you give me any reason why you should not be in the penitentiary?'"** (Reported in Wikipedia entry, *Wright Patman.*)







Message of Previous Slides

- The Taylor Principle could destabilize inflation, for the reason Wright Patman gave:
 - Higher interest rates, by raising costs, raise inflation.
 - Working capital channel must be strong enough.
- Patman and others conclude that the only way to defeat inflation is wage and price controls.

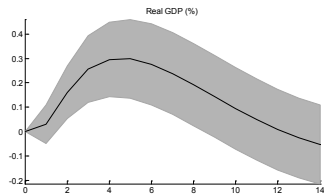
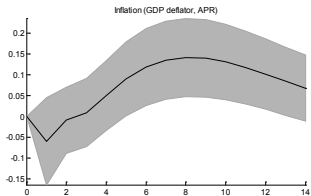
What Evidence is there for the Working Capital (Wright-Patman) Effect?

- There is a great deal of short term debt, but not clear that it is for financing working capital.
 - More direct evidence could be examined.
 - Could compare industries in which time from inputs to outputs is shorter...for them, the supply side effect of a monetary policy shock should be smaller.
- To date, the primary source of evidence on working capital effect is indirect.
 - Estimated Vector Autoregressions and Dynamic, Stochastic, General Equilibrium Models.

Current Views

- Most popular view: can ignore working capital effects altogether (Smets and Wouters, AER2007).
 - Seems to reflect desire for model simplicity, not fundamental evidence.
- Intermediate view: Christiano, Eichenbaum and Evans (JPE2005).
 - The effects that Wright Patman worried about exist, but they are short-term and transient (the *modest working capital view*).
 - Modest view is appealing because it helps to understand the 'Price Puzzle' encountered in estimated VARs.
- Under the Modest Working Capital view, high interest rates are needed to get rid of inflation, but in the initial phases inflation briefly goes in the 'wrong' direction.

Inflation and Output Response to a Monetary policy Drop in R



Responses to a one-standard deviation shock to monetary policy

source: Christiano, Trabandt and Walentin, 2010, DSGE Models for Monetary Policy Analysis, in Friedman and Woodford, editors, Handbook of Monetary Economics

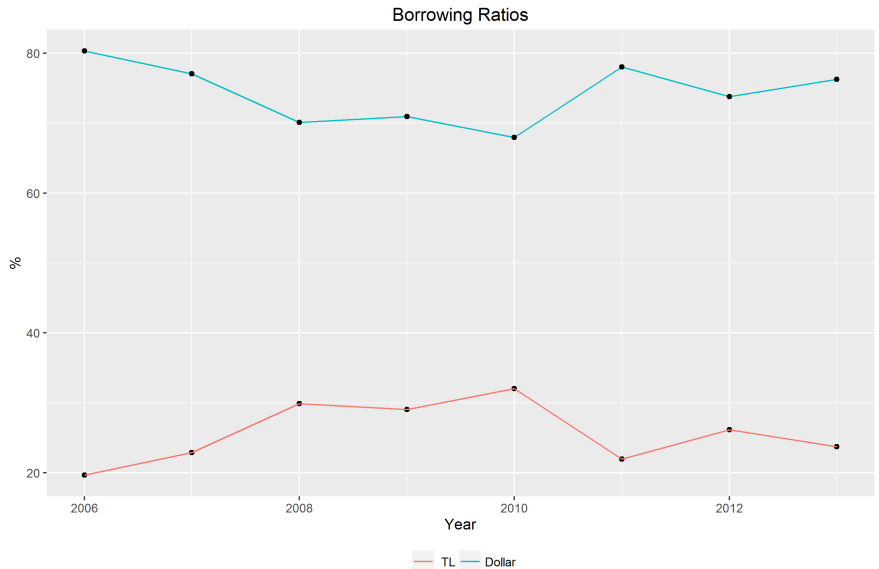
Current Views

- *Radical working capital view*: Christiano, Trabandt and Walentin (*Handbook of Monetary Economics*, 2011). See also my discussion of Acemoglu et al in NBER Macro Annual, 2015.
- Under the radical working capital view, Wright Patman basically got it right.
 - CEE reached the modest working capital view because of an implicit, counterfactual, assumption that they adopted (along with most of the rest of the literature!).
- The counterfactual assumption in CEE: 100% of a firm's output is sold to final users.
 - In reality, the typical firm sells only one-half of its output to final users, rest to other firms (Basu, AER).
 - Doubles the potential amount of borrowing in the economy.
 - Now, the working capital channel can be as strong as Wright Patman thought it is.

Is the Working Capital Channel Likely to be Important in Turkey?

- In Turkey, a lot of intermediation appears to be denominated in terms of Dollar interest rates (Husnu Dalgic and Gazi Kabas).
- If firm working capital borrowing is denominated in dollars, then the working capital channel in terms of the variable controlled by the central bank may not be so great in a country like Turkey.
 - But, this should be given more careful thought.

Dollar Borrowing in Turkey



Conclusion

- Fundamental questions about monetary policy turn on whether the working capital channel is important or not.
- Finding out the answer is an important topic of research.