Econ 352 - Business Cycle Models with Flexible Prices and Wages

(See Williamson Ch. 13)

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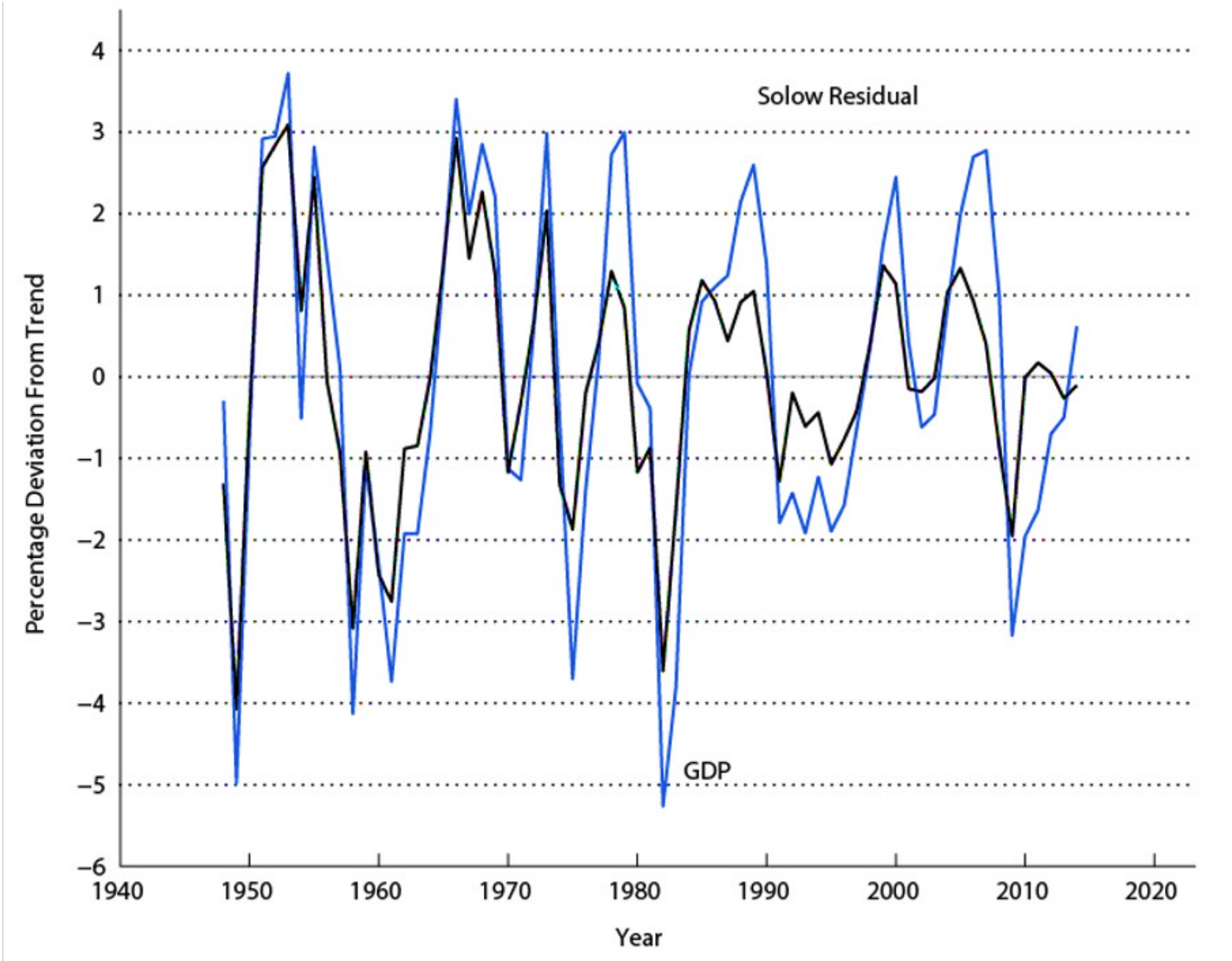
Introduction

- We have an intertemporal model with money
- We now want to see how it might explain the business cycle
- We'll see some successes, but some possible failures as well
- This will motivate adding some frictions

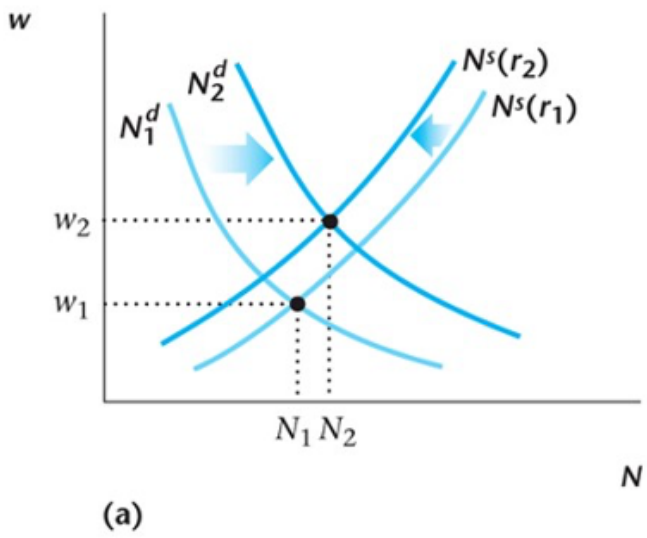
Real Shocks

- Can fluctuations in U.S. economic activity be reconciled with real shocks?
- Imagine that TFP, z is fluctuating around
- As we saw (and will see) z is persistent, so z and z' are correlated
- How does the economy react when z and z' increase?
- $z, z' \uparrow$, $MPL \uparrow$, so $N_1^d \uparrow$ and $N_2^d \uparrow$, and $Y_1^s \uparrow$ and $Y_2^s \uparrow$
- Because $MPK \uparrow$ and lifetime income $\uparrow$, Y_1^d and $Y_2^d \uparrow$
- We think r falls, as investment highly responsive due to income differences over time
- Money demand rises (r falls, Y rises) so P *falls*

"Productivity" Shocks are Correlated with GDP



Summary of Model Effects



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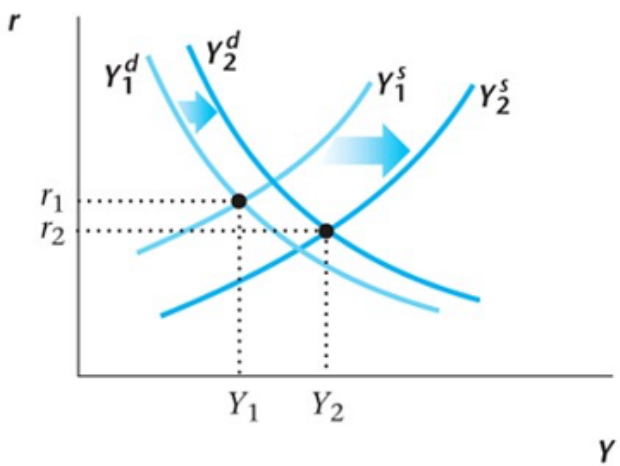

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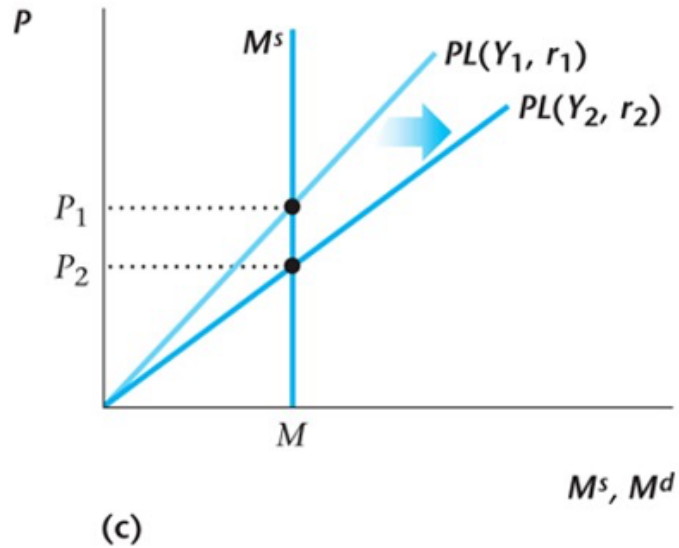

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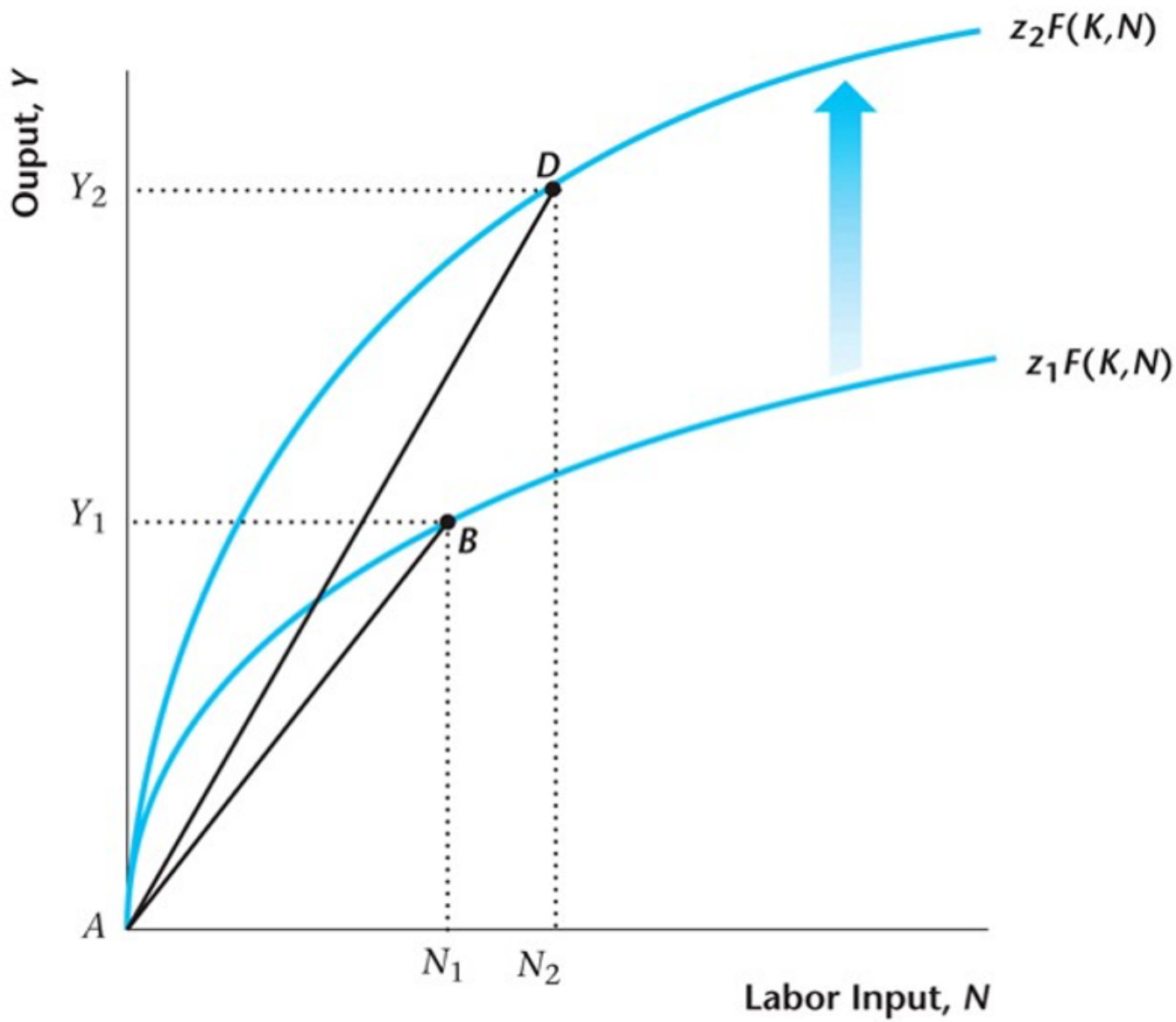
Effect on Average Productivity



Summary of the RBC Model Predictions

Variable	Data	Model
Consumption	Procyclical	Procylical
Investment	Procyclical	Procylical
Employment	Procyclical	Procylical
Real Wage	Procyclical	Procylical
Average Labor Productivity	Procyclical	Procylical
Price level	???	countercyclical(?)

RBC model does a pretty good job, generally! One reason why it has stuck around as the kernel of most other Macro models

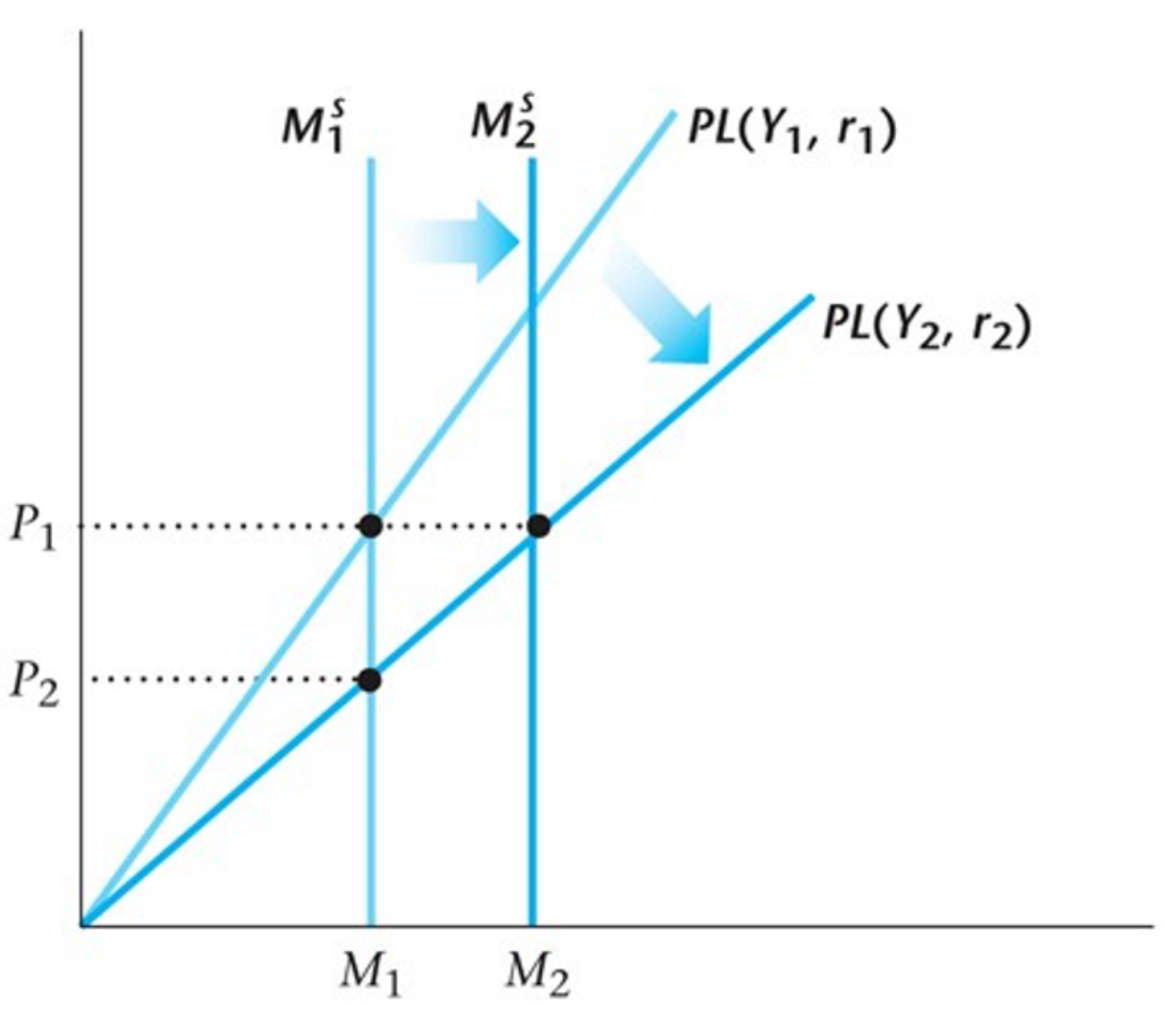
Thinking a little more about money

- In our RBC model, the price level is countercyclical (if monetary policy passive)
- But, empirically (and historically):
  - Nominal money supply is procyclical (higher GDP, more money printed)
  - Nominal money supply leads GDP
- How can we reconcile with the model?
- We assumed monetary policy is passive (and exogenous)–but if money is endogenous perhaps not

Reconciling Prices and the RBC Model

- Let's say that fluctuations are actually caused by TFP shocks, z
- Banking sector activity higher (pH higher in limited commitment, investment higher, etc.)
- So banking deposits $M1$, $M2$ rise
- So, with an increase in TFP, and decrease in the interest rate, causes prices to fall
- But if P is held constant, then central bank should increase M
- This is consistent with the fact that M is procyclical
- But still an issue! M leads Y, so isn't it causal?

Effect on Average Productivity



Issue: M leads Y

- If M leads Y, it's a stronger case that it causes Y
- But not always, particularly with humans: hit the brakes before the light turns red, but hitting the brakes doesn't cause the light to turn red!
- But if z affects bank activity, which affects $M1$, $M2$
- Central bank knows prices are going to fall, adjusts M before productivity shocks affect Y (for instance)
- This might help us explain both prices falling, but more importantly M leading

Implications of Real Business Cycle Theory

- In many ways, it seems RBC fits the data well!
- What are the implications for government policy?
- Monetary policy should have little stimulative effect
- Need for stimulus, even during a recession, not good: system is efficient
- Most policy comes from fixing distortions–still real distortions that can be fixed

Criticisms of RBC

- What is the Solow Residual?
- Are productivity drops just mismeasurement of *used* capital?

$$A^{Measured} = \frac{A(K^{True})^{\alpha} L^{1-\alpha}}{AK^{Measured^{\alpha}} L^{1-\alpha}} = A^{True} \frac{K^{True}}{K^{Measured}}$$

- So if true, used capital falls, but measured capital doesn't, then measured A will fall
- Similarly, if we keep workers on payrolls (aka "labor hoarding," because matching is hard) but true working workers is lower, then what looks like a productivity drop will really be a labor drop
- Let's go through an example

Labor Hoarding Example

- Say that:

$$Y = zK^{0.3}L^{0.7}$$

- Inititally, $z = 1$, $K = 100$, and $N = 50$, so $Y = 61.6$.
- Then, a recession hits: we keep all capital $K = 100$, but use only 95% of it, and labor effort falls by 10% (even as measured labor stays same)
- Even though z didn't fall, $K = 95$ and $N = 45$ (what's actually used) means $Y = 56.3$ and:

$$\hat{z} = \frac{56.3}{100^{0.3}50^{0.7}} = 0.915$$

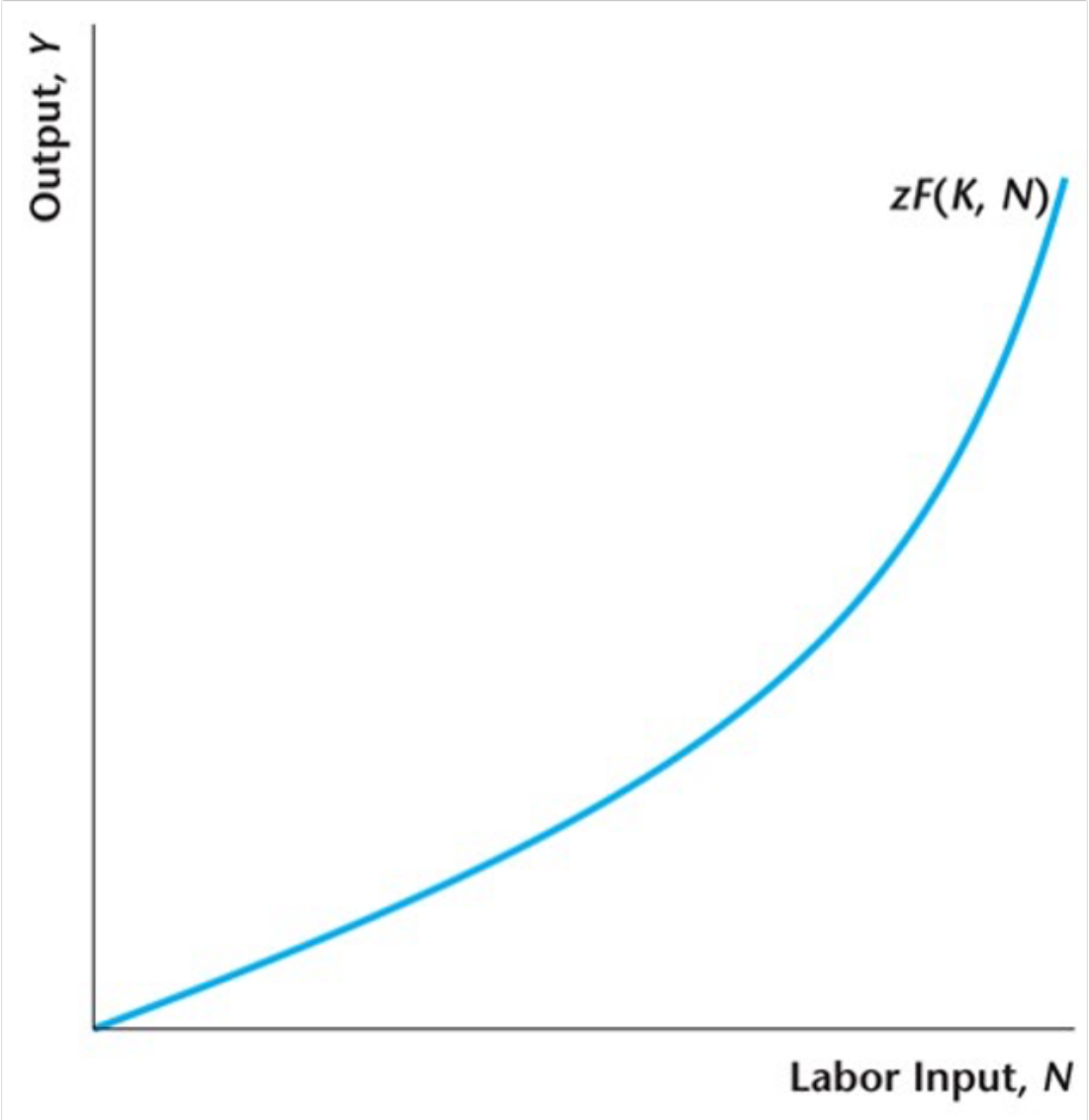
- We measure a 8.5% drop in TFP even though it didn't drop at all!

- This difference between what is measured and what is actually used makes cyclicality of TFP a harder concept to hang our hat on!

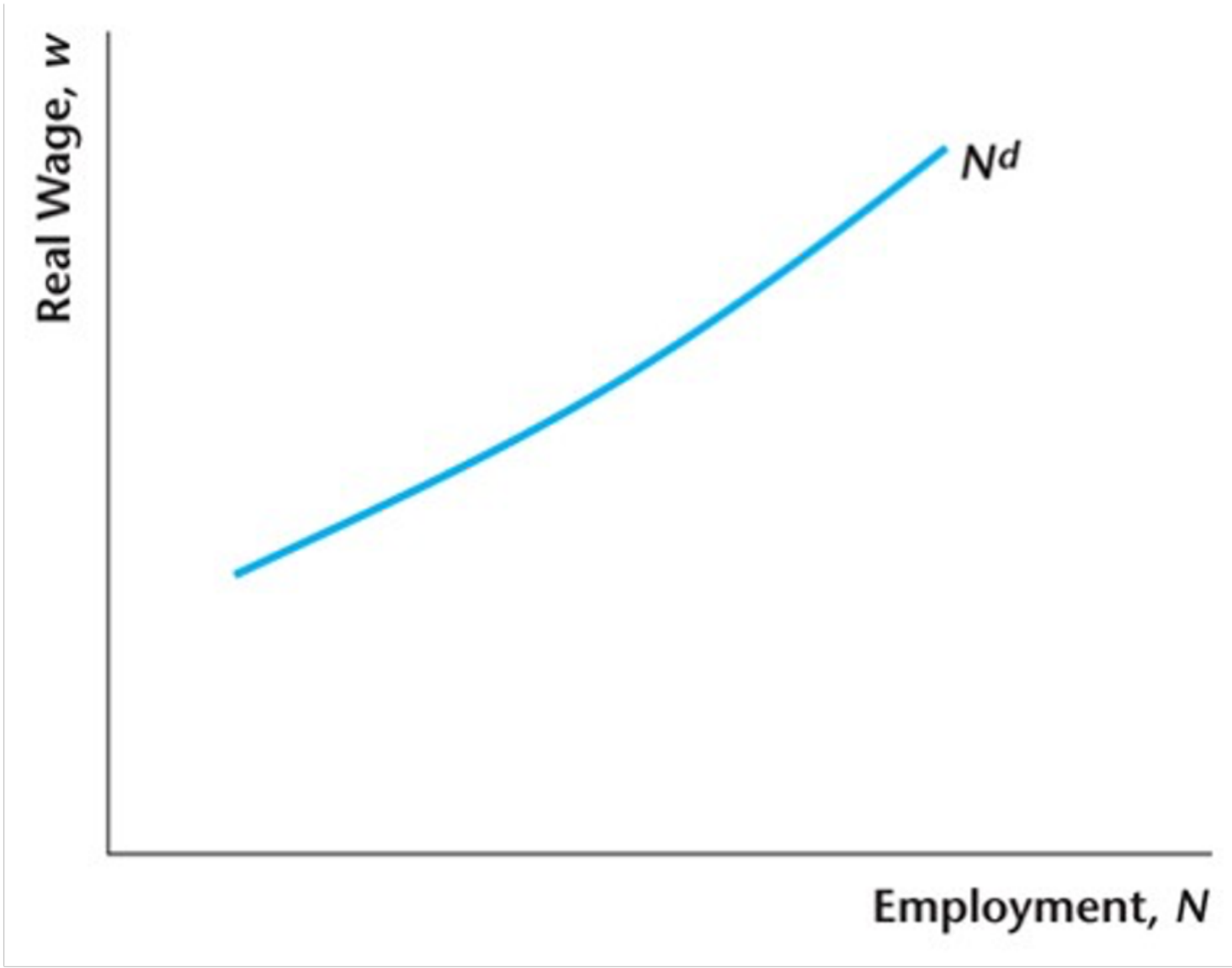
Keynesian Coordination Failure

- So far, no need for government
- Introduce a "coordination failure"
- Your action affects my incentives, mine affects yours (like going to a party)
- Produce computers $\iff$ produce software
- Short-run increasing returns in production

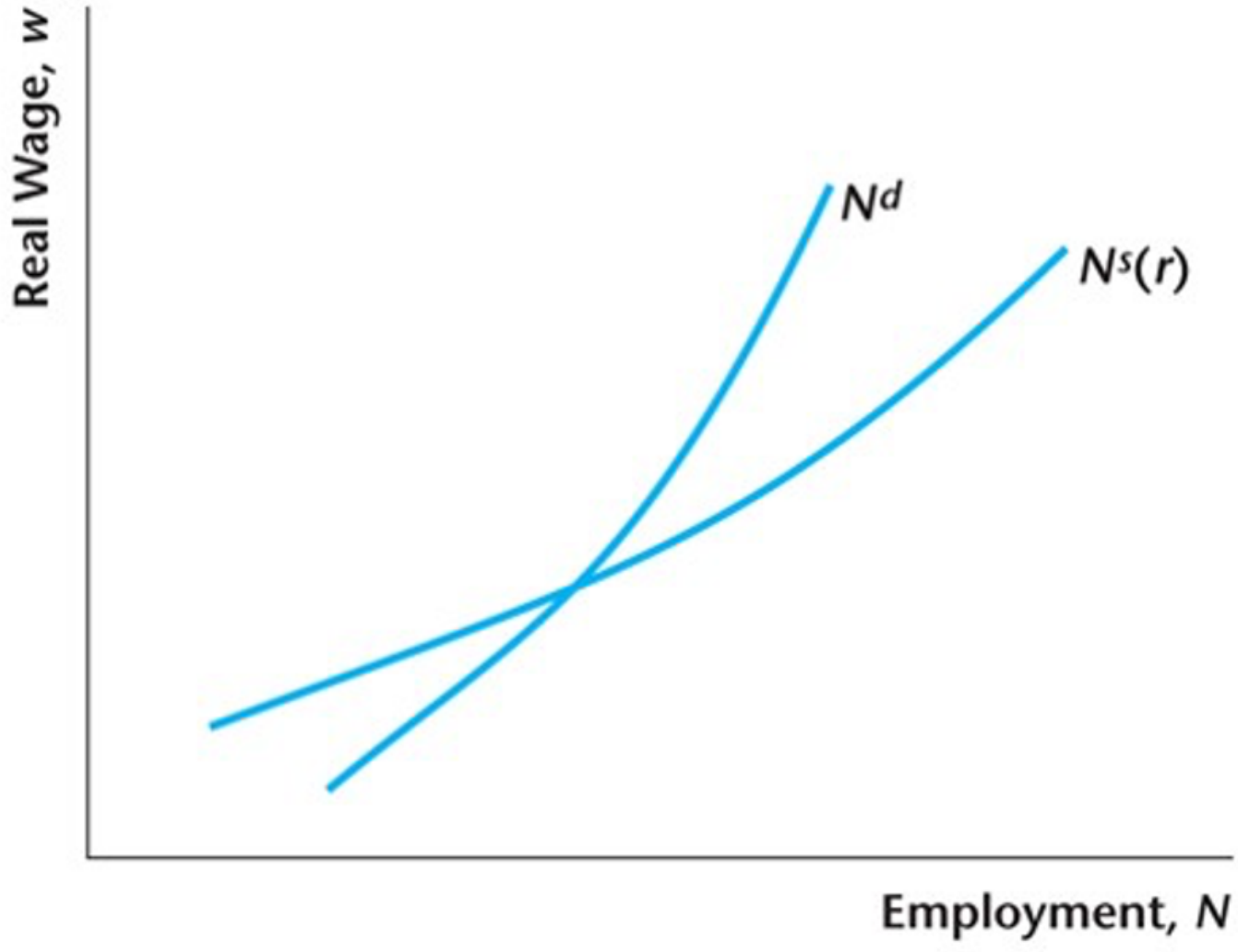
Increasing Returns to Scale



Labor Demand is...upward sloping?

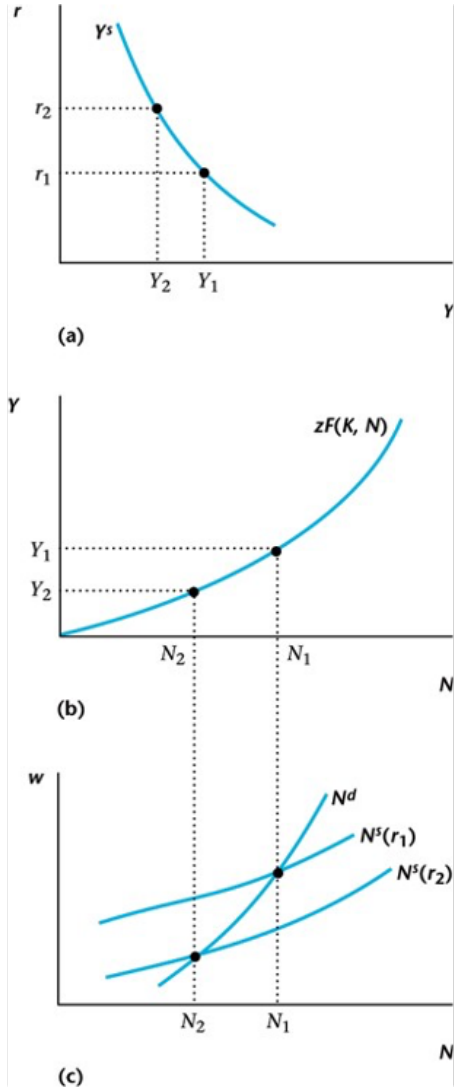


Labor demand steeper than labor supply?



Things can be a little upside-down now!

Supply Curve in Coordination Failure Model



When interest rate rises now, labor supply increases, *reducing*(!) output (output supply is downward sloping)

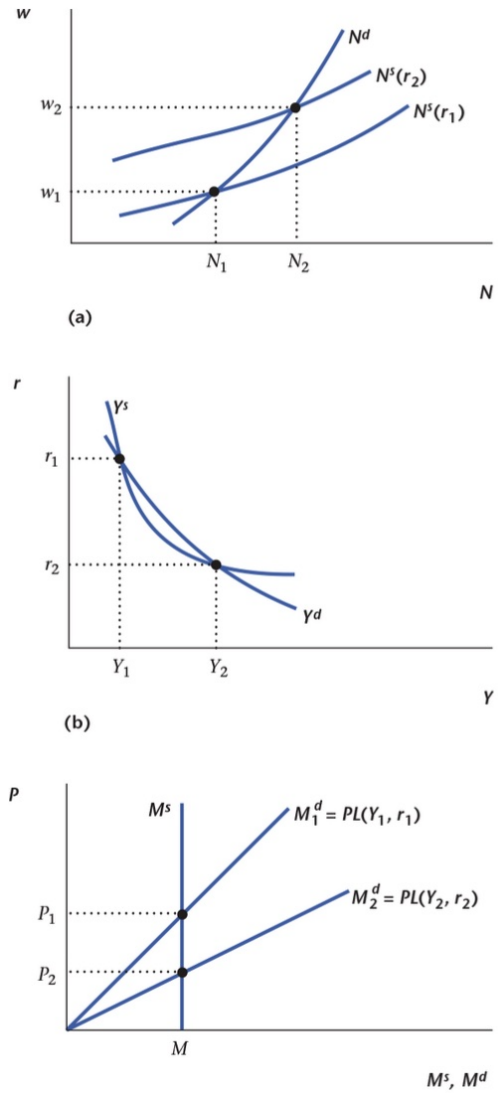
So what's the idea here?

- If output supply is downward sloping, we can have it intersect with output demand multiple times (twice, for instance)

- Two equilibria:
  1. "Bad" equilibria: low labor, low production/consumption, higher wages

  2. "Good" equilibria: high labor, high production/consumption, lower wages
- "No" reason to be in one vs the other

Coordination Failure Model



Because Y^s downward sloping, two equilibrium Y^*'s

Summary of the Coordination Failure Model Predictions

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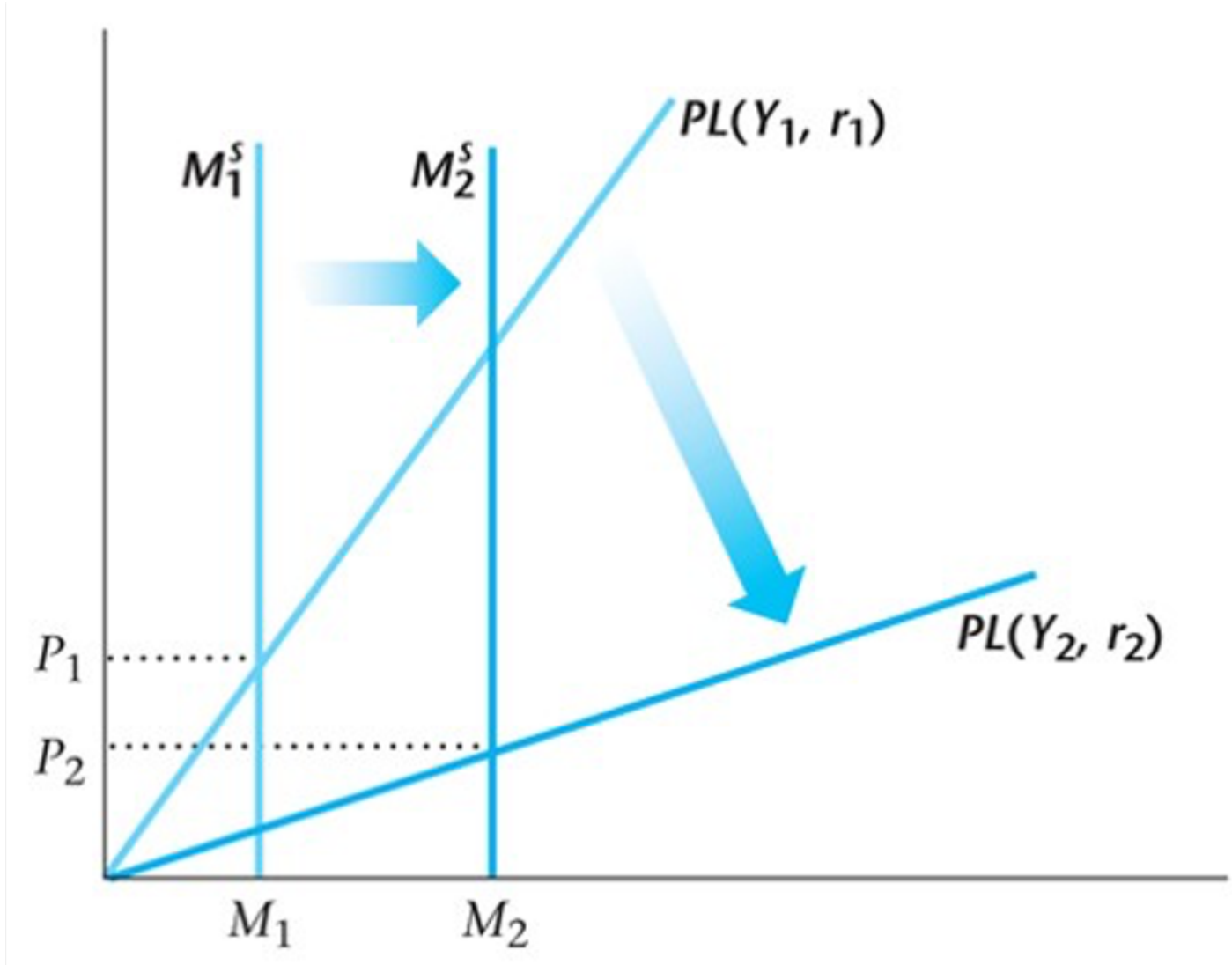
Claim: just like our real business cycle model, which had success in explaining the joint co-movements of variables, coordination failure model has the right set of joint movements! (A competitior!)

Money in Coordination Failure

- Money is neutral in this model
- But if everyone *believes* money has an effect, then it would act as a coordiation mechanism
- Then could get money "causing" business cycles

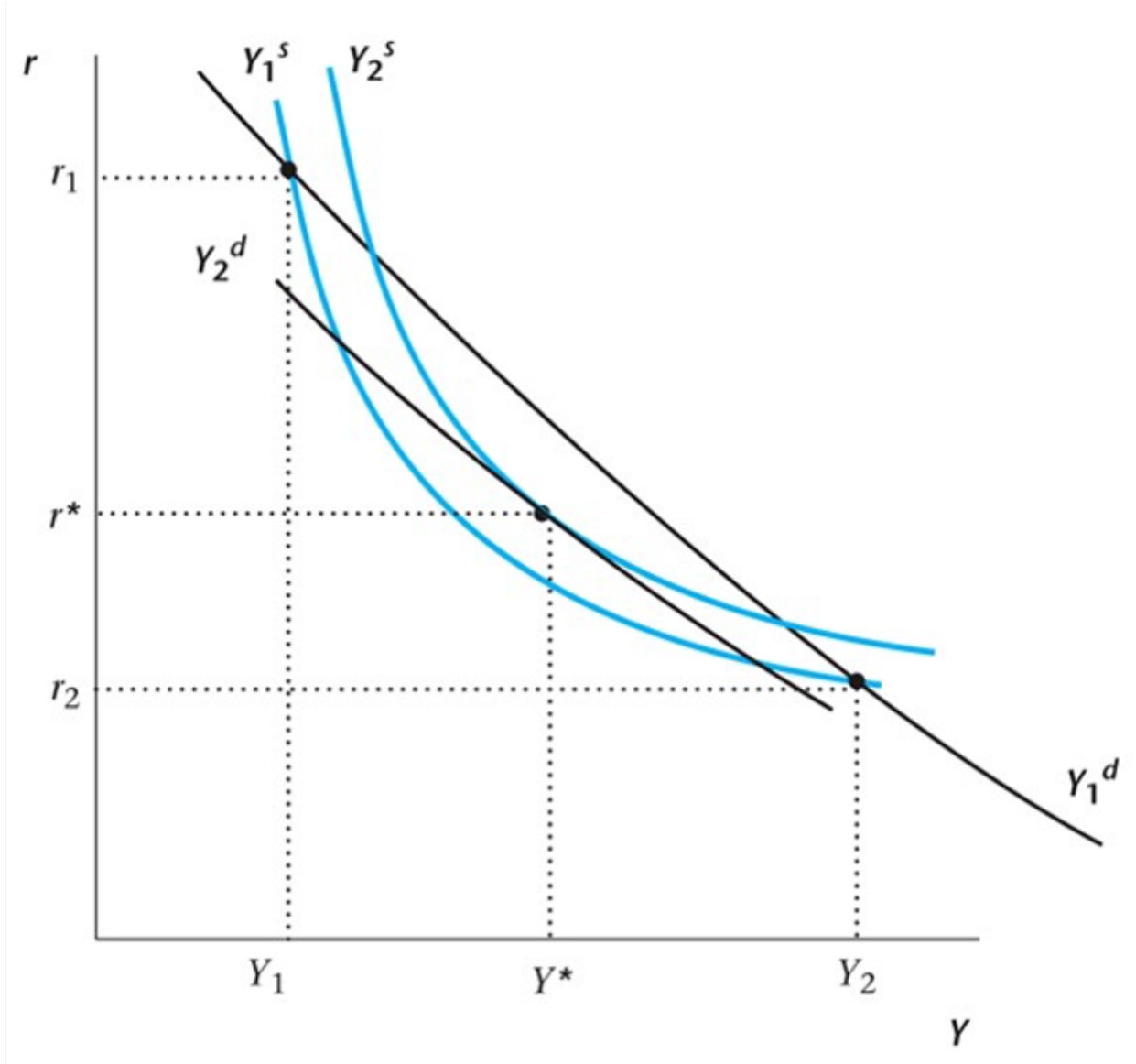
Coordination Failure Model



Implications of Coordiation Failure Theory

- Essentially identical in predictions to RBC
- However, "stabilization policy" could have an effect: eliminate two equilibria to be one

Coordination Failure: Smoothing



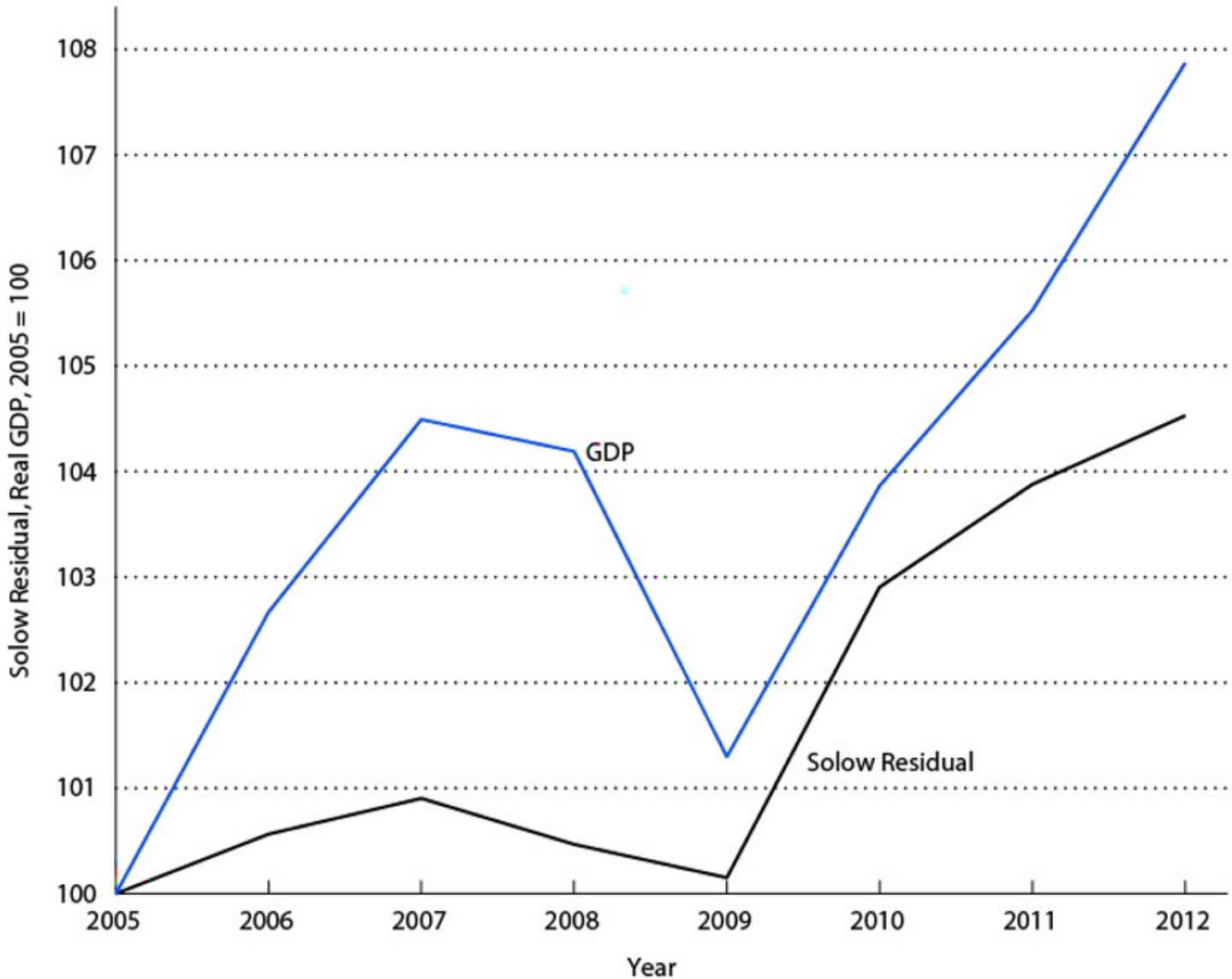
Criticisms of Coordination Fialure

- Where are the increasing returns? Hard to find evidence

Business Cycle Theories and the Great Recession

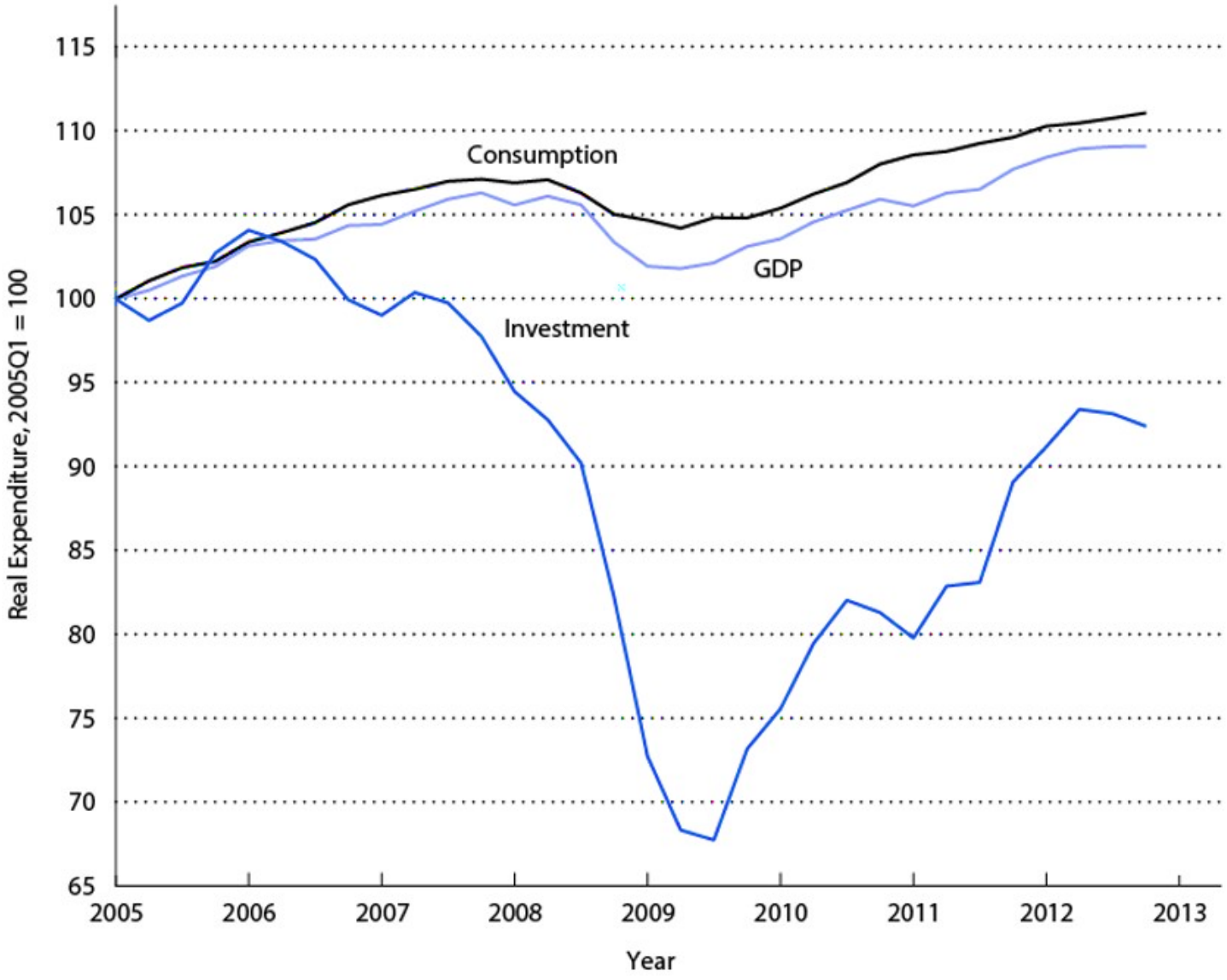
- Can our models explain the Great Recession (2008-2009)?
- First, extract Solow residual (with the caveats we gave above) and compare to GDP
- Then, see if consumption, investment is consistent with our models
- Then, see if price level, average productivity, real GDP consistent

Great Recession TFP



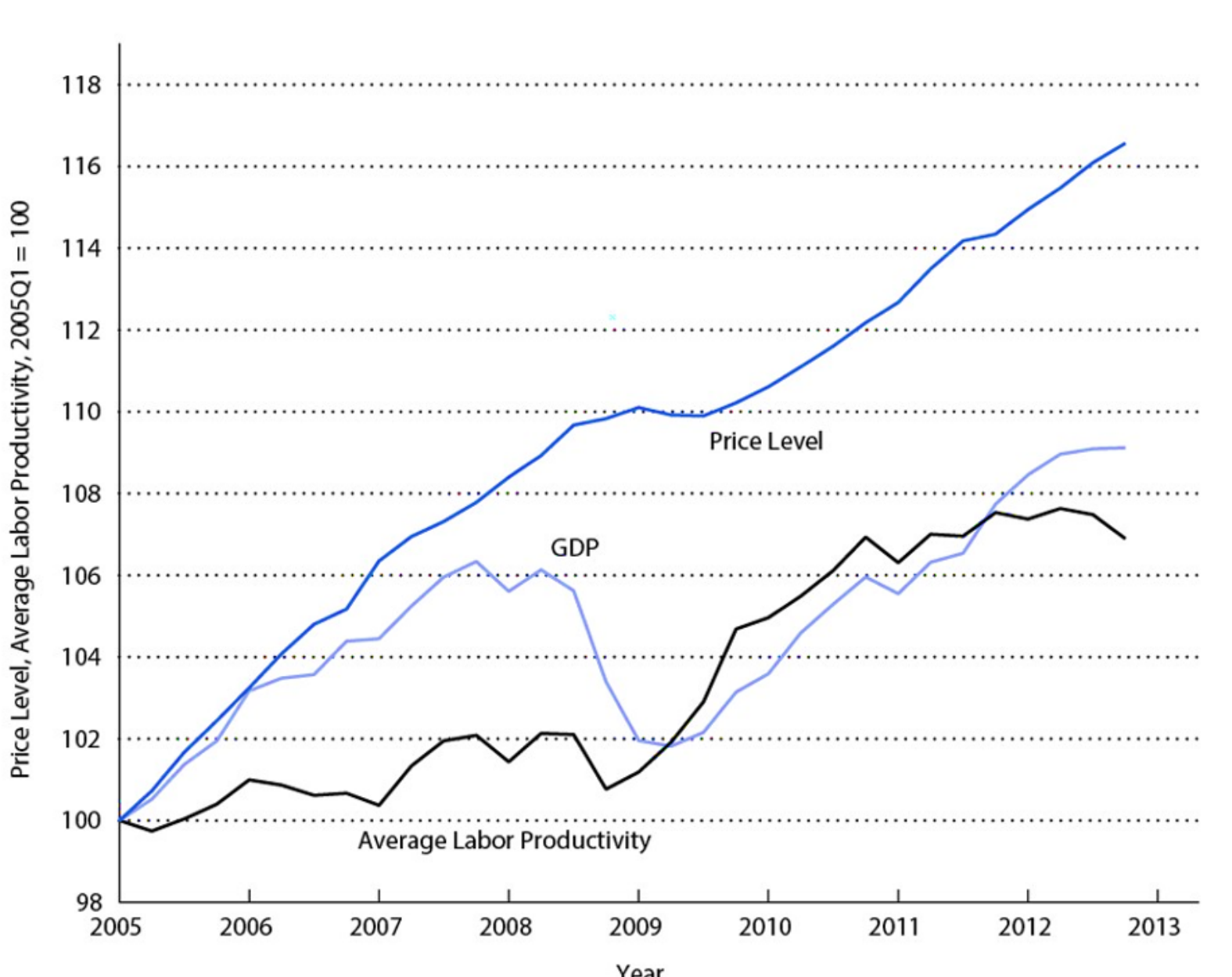
There is a TFP decline, but it's too small to explain everything

Great Recession Consumption & Investment



Consistent with our model (GDP falls, I more volatile, C smoother)

Great Recession price level and average labor productivity



Great Recession

- Our model is consistent with some of the Great Recession, such as:
  - Some movements in TFP and GDP (but not enough)
  - Qualitative consumption and investment movements
- But doesn't look great on:
  - Fall in price level
  - Qualitative consumption and investment movements
- Work to be done!

- Next Chapter, we start the New Keynesian model