Asymmetric Fiscal Multiplier

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Motivation

- Does the response of aggregate employment to changes in labor income tax rates depend on the state of the business cycle?

- **Fact**: for small changes in tax rates, IR are state independent. For a significant tax cut, the response of aggregate labor is bigger in a recession.

- Similar question as in Ferraro (2017), different history.

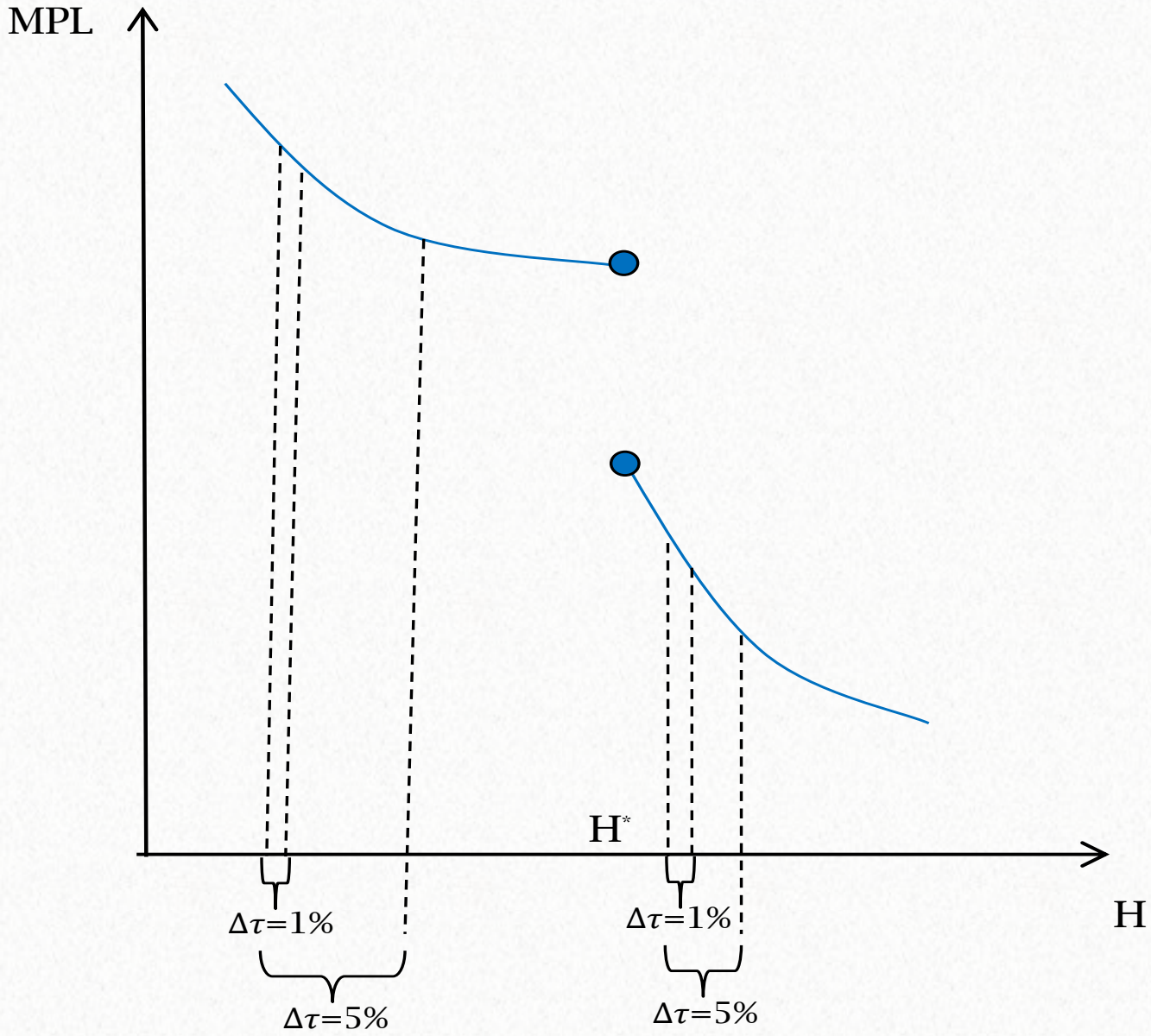
- Search and Matching vs. idle plant capacity

- To match the non-linearity we may need occasionally binding constraints.

Motivation

- Recursive equilibria in this framework may not be well defined due to a **non-smooth** price function
- In Minimal state space recursive equilibria, this fact may generate a bias in the numerical simulations (Frevenza, Martinez and Pierri, 2019)
- Broader recursive equilibrium notions (Feng, et. al. 2015) also affected by the non-smoothness of the price function.
- This paper: **directly computes the sequential equilibrium using a broader equilibrium definition.**
- Main contribution: **idle capacity implies that the aggregate production function is less concave in a recession** which **generate the observed responsiveness in GDP**

Labor Demand



Labor Demand Over the Business Cycle

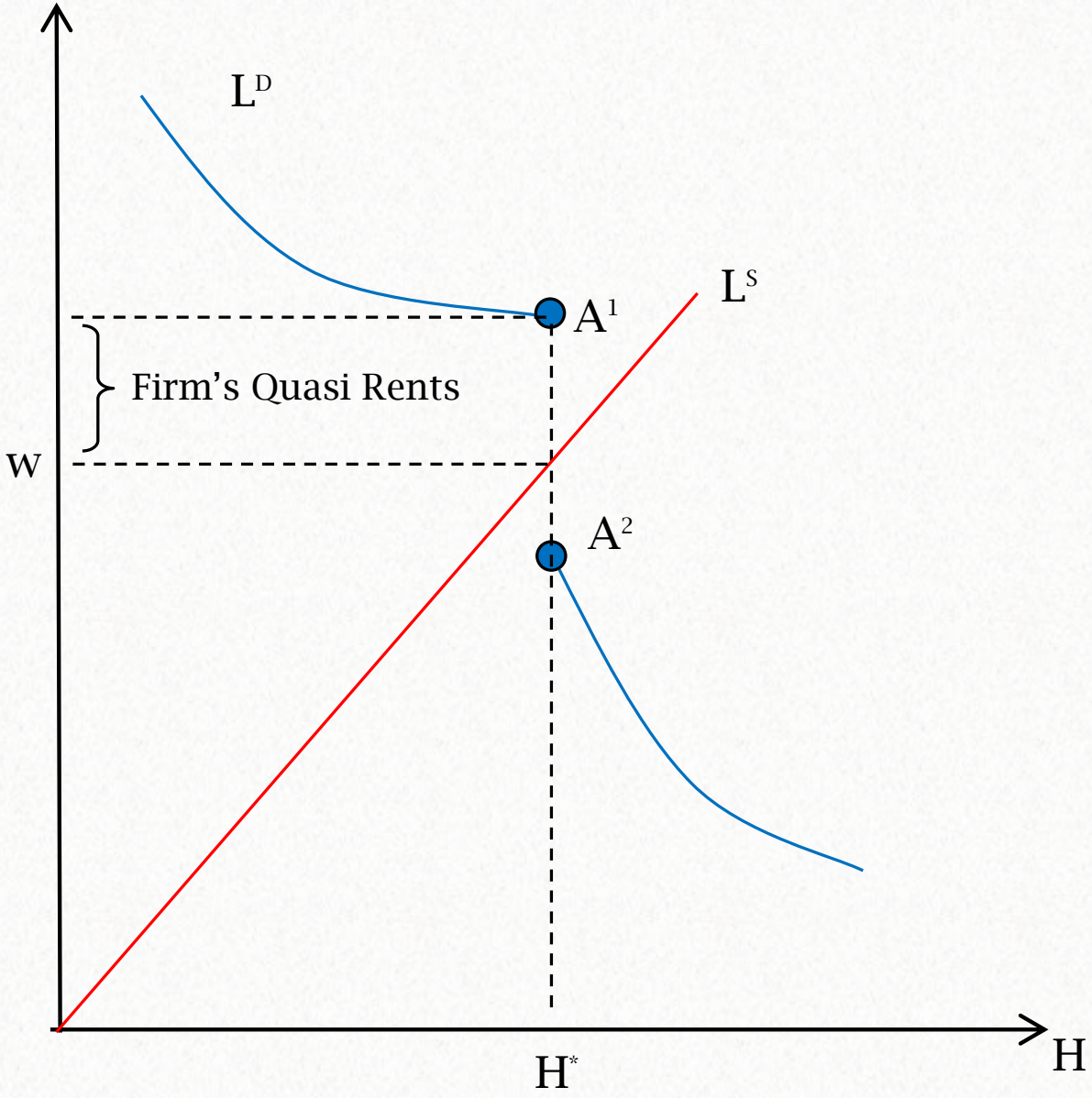
- H^* is the minimum number of hours with zero idle capacity
- For $H < H^*$ there is idle capacity
- For $H < H^*$ the aggregate production function is less concave
- For small shocks, employment changes are similar in a boom and in a recession
- **As observed in data,** for big fiscal policy shocks, the multiplier is bigger in a recession
- Why?

Labor Demand Over the Business Cycle

- Intuitively
  - Fiscal policy **activate plants** in a recession
  - Each plant has a minimum hourly requirement
  - Induces a non-convexity in the choice set
  - Generates the observed asymmetry as in a "good times" hours can change smoothly due to full plant capacity

- Technically
  - For small shocks, we numerically replicate the tangent of the production function
  - The effect of idle plants is not strong enough to generate asymmetries locally
  - For big shocks, we are outside some neighborhood
  - This implies that the curvature is relevant as there is an increasing difference between the tangent at a point and the graph of the function

Sequential Equilibrium



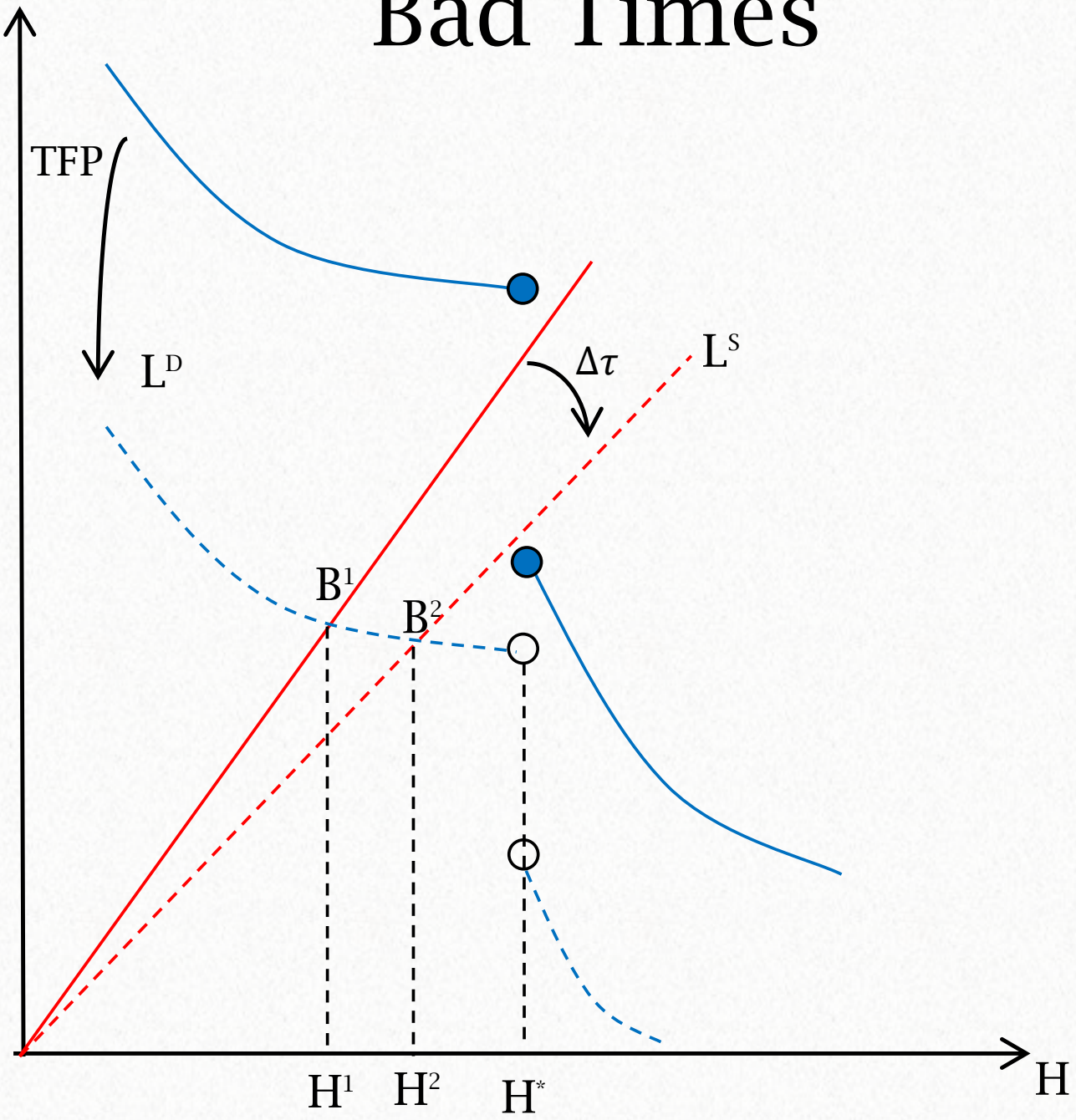
Sequential Equilibrium

- There are decreasing returns to scale.
- Insure the difference in the degree of concavity in "good times" and "bad times".
- Generate positive profits π even when MPL=L^S.

- At the minimum level of labor with zero idle capacity
  - The firms hires H^* hours of labor at wage w
  - At point A^1 profits are greater than π
  - At point A^2 profits are smaller than π

- Firm's optimal strategy for $H=H^*$
  - Pay w and compensate the Mg dis-utility of labor
  - Produce at A^1
  - Transfer π + QR to the household

Bad Times



Bad Times

- A Negative TFP shock lowers labor demand.
- Takes the economy to the flat region of labor demand
- We move to B^1 and employment lowers from H^* to H^1, where there is idle capacity
- The tax cut moves labor supply across a “flat” labor demand
- Aggregate elasticity is greater in this region because it activates plants

Computation

- We must compute the sequential equilibrium
- We impose a strong restriction on preferences as in Sargent, 2016 (QJE).
- Beyond GHH (no income effect on labor), we use quasi-linear preferences (linear consumption)
- Allow us to keep track of the lagrange multipliers
- We can compute capital tomorrow using a tractable euler equation which depends only on the interest rate as:
    - $K_{t+1}(z^t)$ is given as uncertainty reveals "early"
    - $r_{t+1}(z^t z_{t+1})$ is determined by the intra-temporal optimization problem of the firm