

# Quantitative Easing (QE) versus *Laissez Faire* in a Low Interest Rate World

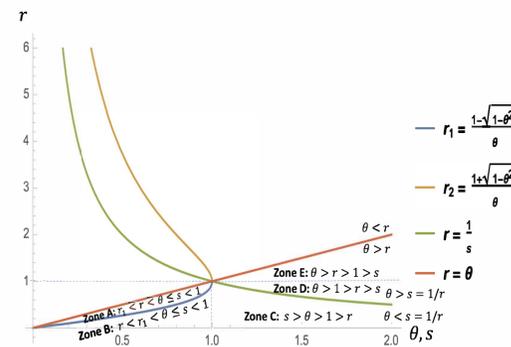
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## In a Nutshell

- In a liquidity trap with firms' high hurdle rates, neither an improved net investment return nor a lower real interest rate alone warrants increased investment.
- For a given real interest rate, there is a threshold for low investment return that bifurcates the interest-rate sensitivity of investment and thus produces a kink in the aggregate demand curve (Figs. 1 and 2).
- If investment return is below its threshold, QE helps stimulate investment by reducing financial frictions and raising inflation expectations (Fig. 3).
- If investment return exceeds its threshold, QE could backfire as a further lower real interest rate tends to reduce firms' propensity to invest (Fig. 4); in contrast, it is *laissez faire* that can stimulate investment via falling inflation rate and improved investment return (Figs. 5 and 6).

Figure 1. The  $\theta$ - $r$  Boundary That Bifurcates the AD Curve and the Interest-Rate Sensitivity of Investment



## The Kinked AD Curve and Asymmetric Effectiveness of QE

Figure 3. QE is Expansory When Investment Return is below Its Threshold

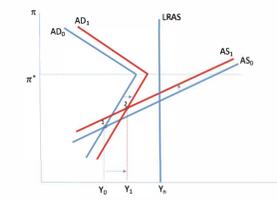
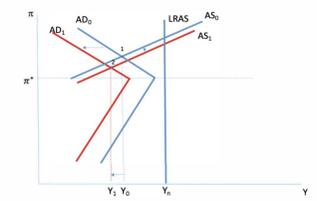


Figure 4. QE is Contractory When Investment Return Exceeds Its Threshold



## Research Questions

- Does a lower real interest rate necessarily increase corporate physical capital investment?
- Would the aggregate demand curve necessarily be upward sloping at the zero lower bound of interest rate so that QE is the only cure of deflationary spiral?
- In a liquidity trap, what condition determines the relative effectiveness of QE versus *laissez faire* in stimulating capital investment and aggregate demand?

## The AD-AS Model

$$AD \begin{cases} IS: Y = \bar{C} + c(Y - T) + [\bar{I} + b \left( \frac{\theta - r}{s - r} \right)] \\ MP: r = -\pi + f \end{cases}$$

$$AS: \pi = \pi^e + \lambda(Y - Y_n)$$

## *Laissez Faire* is Expansory When Investment Return Exceeds Its Threshold

Figure 5. Impact of Lower Inflation Only

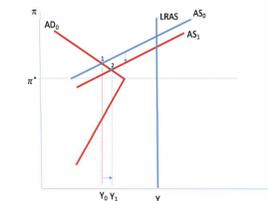
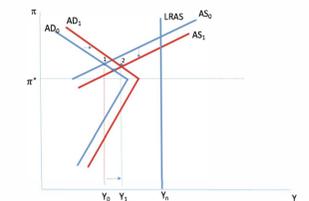


Figure 6. Impacts of Lower Inflation and Higher Investment Return

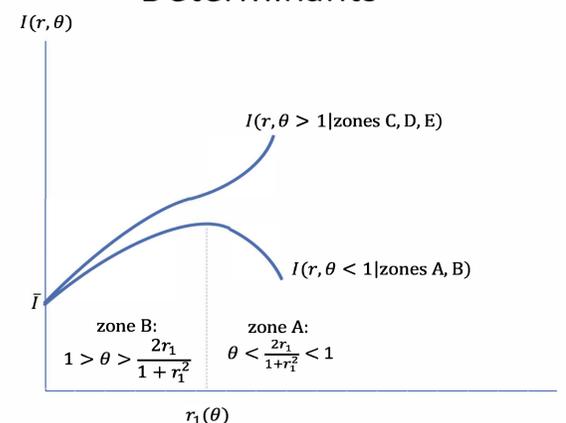


## A Firm's Investment Problem

- Take a risky physical investment project that promises the firm an expected rate of return ( $\theta$ ) versus its certainty equivalent financial investment that warrants a return per unit of capital  $s(r)$ , ( $s' < 0$ ).
- Need to lever either project by borrowing a unit of capital at the market real interest rate,  $r$ .
- The relative investment return  $\frac{\theta - r}{s(r) - r}$  plus risk preference ( $b_k$ ) determine a firm's marginal propensity to invest in physical capital:

$$i'(r) = b_k \left( \frac{\theta r^2 - 2r + \theta}{(r^2 - 1)^2} \right) \begin{cases} > 0, & \text{if } \theta > 1 \text{ (zones C, D, E); or if } r < r_1(\theta) \text{ when } \theta \leq 1 \text{ (zone B);} \\ < 0, & \text{if } r > r_1(\theta) \text{ when } \theta \leq 1 \text{ (zone A).} \end{cases}$$

Figure 2. Aggregate Investment and Its Two Determinants



## Conclusions

- In a liquidity trap, corporate investment depends on firms' expected net investment return relative to its "certainty equivalent".
- Neither an improved net investment return nor a lower real interest rate alone warrants increased investment if a risk-averse firm's hurdle rate is sufficiently high.
  - In particular, a lower real interest rate is neither sufficient nor necessary condition for investment.
- It is the increasing boundary for real interest and low investment return that bifurcates the interest-rate sensitivity of investment and produces a kink in the aggregate demand curve.
  - AD curve is not necessarily upward sloping at the zero lower bound of interest rate.
- While QE can be effectively expansionary when investment return is below its boundary value and thus the AD curve is upward sloping, QE could backfire under the opposite condition; in this case, it is *laissez faire* instead that is conducive to higher real interest rate and investment return that take firms out of their "safe haven" and stimulate investment.