Idle Capacity

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Each service is sold w/ proba $f(x)$

Household.

- Exact # services sold by household has Binomial distribution w/ parameters $f(x)$ [proba of success] and h [# of tries]
- Expected # services sold $f(x)h$
- To simplify $f(x)h$ services sold, no randomness
- Workers are
  - busy: fraction $f(x)$ of time
  - idle fraction $1-f(x)$ of time
- Rate of idleness in economy. $\boxed{1-f(x)}$

Share of time where workers are idle, waiting for customers

- $f(x)$, rate of utilization

$$\underset{\underset{\text{measured}}{\uparrow}}{\text{output}} = \underset{\underset{\text{residual}}{\uparrow}}{\text{TFP}} \times \overset{\text{production function}}{F}(\underbrace{\text{capital}, \text{labor}}_{\text{measured}})$$

$$\underset{(y)}{\text{output}} = \underset{(f(x))}{\text{utilization}} \times \underset{(k)}{\overset{\text{productive}}{\text{capacity}}}$$

[function of capital & labor]

Changes in capacity utilization look like changes in measured TFP/ productivity

Properties of $f(x)$

$$f(x) = [1 + x^{-\gamma}]^{-1/\gamma}$$

- $f(0) = 0$
- $f(+\infty) = 1$
- $f'(x) > 0$
- $f(x)$ is concave b/c $f''(x) < 0$

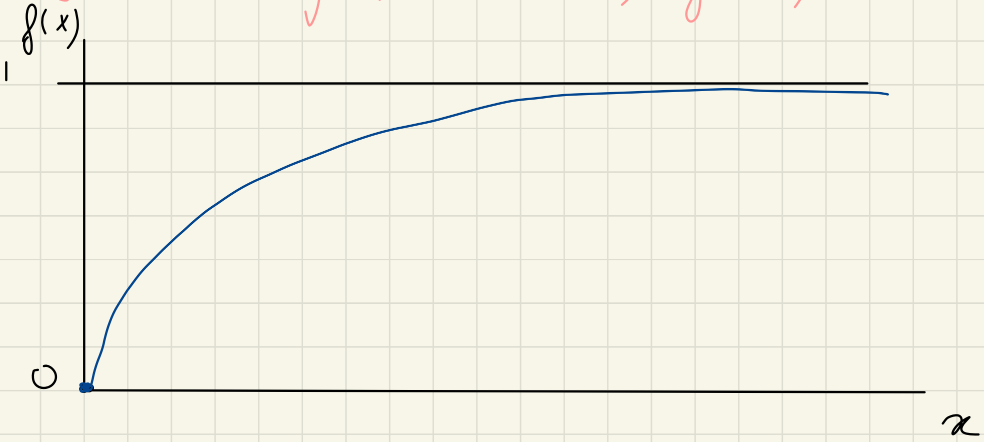
$$f'(x) = -\cancel{\frac{1}{\gamma}} [1 + x^{-\gamma}]^{-\frac{1}{\gamma}-1} * [-\cancel{\gamma}\ x^{-\gamma-1}]$$

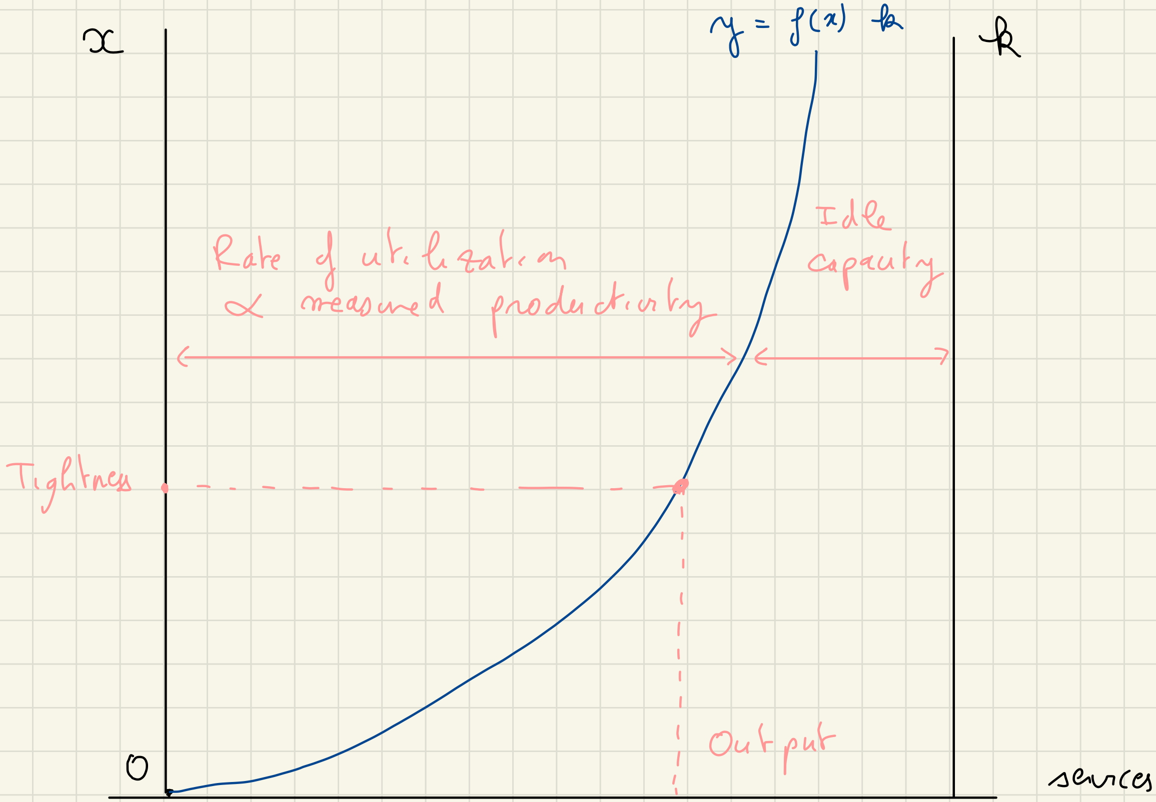
$$= x^{-(\gamma+1)} [1 + x^{-\gamma}]^{-\frac{(\gamma+1)}{\gamma}}$$

$$= [x^{\gamma} + \cancel{x^{\gamma}} * \cancel{x^{-\gamma}}\ 1]^{-\frac{1+\gamma}{\gamma}}$$

$$= \left\{[1 + x^{\gamma}]^{-\frac{1}{\gamma}}\right\}^{1+\gamma} = g(x)^{1+\gamma}$$

g is decreasing in x ⇒ $f'(x)$ is decreasing in x




x
y = f(x) k
k
Rate of utilization
∝ measured productivity
Idle capacity
Tightness
Output
O
services