

# Idle Capacity

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

### Household

- Exact # service 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.  $1 - f(x)$

Share of time where workers are idle, waiting for customers

-  $f(x)$ , rate of utilization

output = TFP  $\times$  F(capital, labor)

↑ measured      ↑ residual      ↑ measured

output = utilization  $\times$  productive capacity

( $y$ )      ( $f(x)$ )      ( $z$ )

[function of capital & labor]

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

Properties of  $f(x)$   $f(x) = [1 + x^{-r}]^{-1/r}$

$$f(0) = 0$$

$$f(+\infty) = 1$$

$$f'(x) > 0$$

$$f(x) \text{ is concave b/c } f''(x) < 0$$

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

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

$$= [x^r + x^{-r}]^{-\frac{r+1}{r}}$$

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

$q$  is decreasing in  $x \Rightarrow f'(x)$  is decreasing in  $x$

