# *Technological Change and the Evolution of Finance*

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# Question and Contribution

- Ties together three trends as result of technological innovation
  - Promotes intangible capital investment with less need for external financing
  - Lowers interest rates and raises land prices
  - Raises the skill premium and leads to larger mortgages and defaults
- Introduces costly foreclosures and suggests LTV limits (even in the absence of this social cost)

# Comments

1. Efficiency of the competitive equilibrium
2. Nature of default risk and public policy
3. Debt backed by collateral (Land or Capital)

# Model

- Rents decomposition: $Y = (H^{\alpha} h^{1-\alpha})^{\eta} (K^{\alpha} l^{1-\alpha})^{1-\eta}$
- FOC: $p_t = \frac{1}{r_t}[v'(L) + p_{t+1} - p_t] \Rightarrow p = \frac{v'(L)}{f'(K)}$
- Credit market clearing: $(1-\alpha)Y = pL + K$

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- Rents decomposition: $Y = (H^{\alpha} h^{1-\alpha})^{\eta} (K^{\alpha} l^{1-\alpha})^{1-\eta}$

$$\text{Skill premium} \quad \begin{cases} (1-\alpha)\eta & \text{Skilled share} \\ (1-\alpha)(1-\eta) & \text{Unskilled share} \end{cases}$$

$$\text{External finance} \quad \begin{cases} \alpha\eta & \text{Entrep share} \\ \alpha(1-\eta) & \text{Capital share} \end{cases}$$

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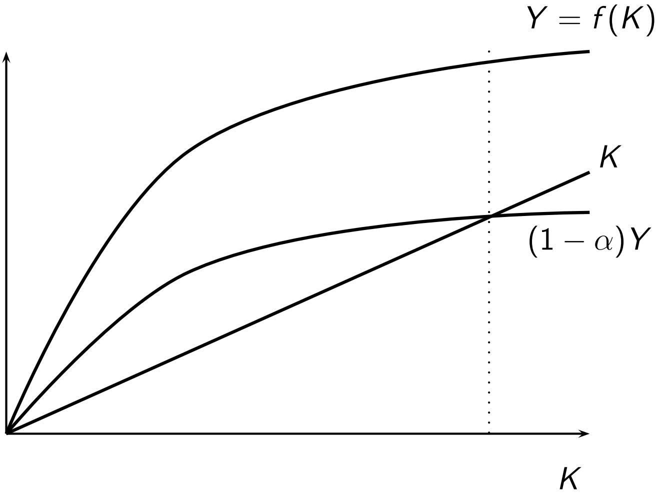
- Credit market clearing: $(1-\alpha)Y = pL + K$

# Comments: Efficient allocation

Recall $Y = f(H, h, K, l)$



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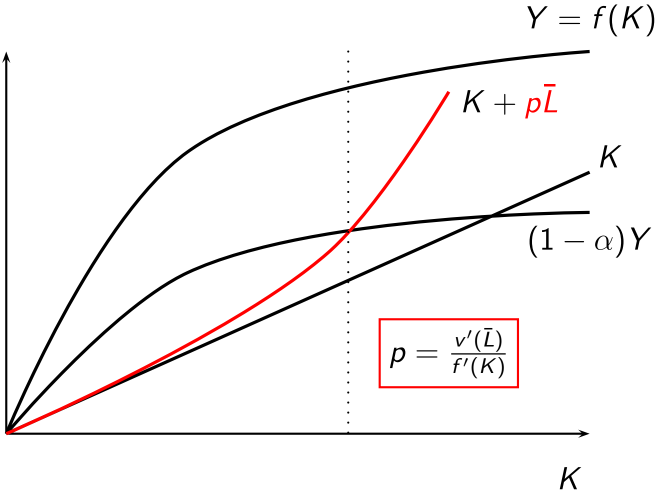

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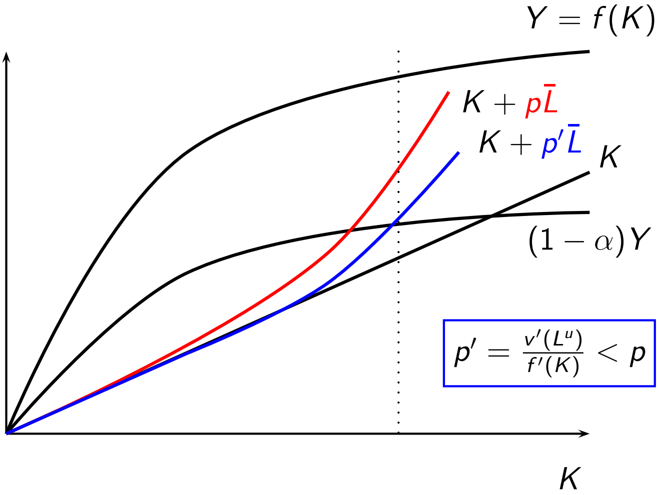


# Comments: Efficient allocation

- Land crowds out investment in capital and reduces the gains from technological innovation
- Intangible capital is in fixed supply and cannot be externally financed - cannot absorb savings.
- Regardless of defaults, policies which reduce the price of land and channel more savings to capital investment increases consumption and keeps utility from land holdings constant

# Comments: Default risk

- Credit market clearing: $(1-\alpha)Y = pL + K$

$$1-\alpha = \frac{pL}{Y} + \frac{K}{Y}$$

$$\begin{array}{llcl} \textit{Skilled} & \eta(1-\alpha) & > & \frac{pL}{Y}\phi(1-\epsilon) \\ \textit{Unskilled} & (1-\eta)(1-\alpha) & < & \frac{pL}{Y}(1-\phi) \\ \textit{Entrep} & 0 & < & \frac{pL}{Y}\phi\epsilon \\ \textit{Firm} & 0 & < & \frac{K}{Y} \end{array}$$

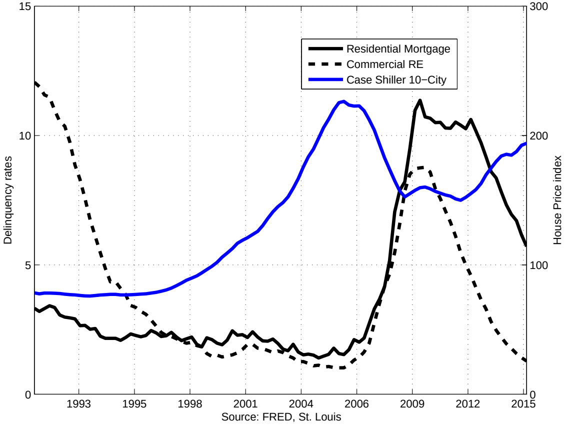
# Comments: Default risk

Nature of risk: idiosyncratic weather shock has no aggregate effect other than social utility loss.

- Perfect scenario for diversification: Pool all loans or lease the houses instead - essentially ex-post subsidies financed by tax on land purhcases (home insurance)
- Prediction: as house prices and mortgages go up, default rates also rise.

# Comments: Default risk

We might need an aggregate shock



# Comments: Collateralized debt

Debt is *backed* by Land or Capital

- Consider entrepreneurs: $(1 + r_t)(p_t L_t^i - y_t^i) \leq p_{t+1} L_t^i$
- Let the Firm hire all skilled workers and pay them $q_t$, trasform some $h_t$ into $H_t$ and retain earnings to pay for the additional skilled labor rents.

# Other things

- Notion of technological progress - not your typical SBTC model
- Under default, collateral constraint evaluated in the case of repayment - a higher loan rate implies a different allocation
- Tax and spend does not seem to do much, perhaps tax and invest can do better

# Overall

- Important message: technological innovation as a simple mechanism that delivers these aggregate trends
- Tighten the motivation for policy intervention, role of collateral, and nature of default risk
- Tie up a few loose ends

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$$
\begin{aligned}
Y &= (Y_{Hh})^{\eta}(Y_{Kl})^{1-\eta} \\
\frac{\partial Y}{\partial \eta} &= Y\left[log(\frac{Y_{Hh}}{Y_{Kl}}) + (1-\eta)\frac{\alpha}{K}\frac{\partial K}{\partial \eta}\right]
\end{aligned}
$$

- A model with steady state growth:

$$
\begin{aligned}
Y_t &= [\eta(A_t H_t^{\alpha} h_t^{1-\alpha})^{\rho} + (1-\eta)(K_t^{\alpha} l_t^{1-\alpha})^{\rho}]^{\frac{1}{\rho}} \\
\frac{\Delta A_t}{A_t} &= g > 0
\end{aligned}
$$

Return