Skill Requirements, Search Frictions and Wage Inequality

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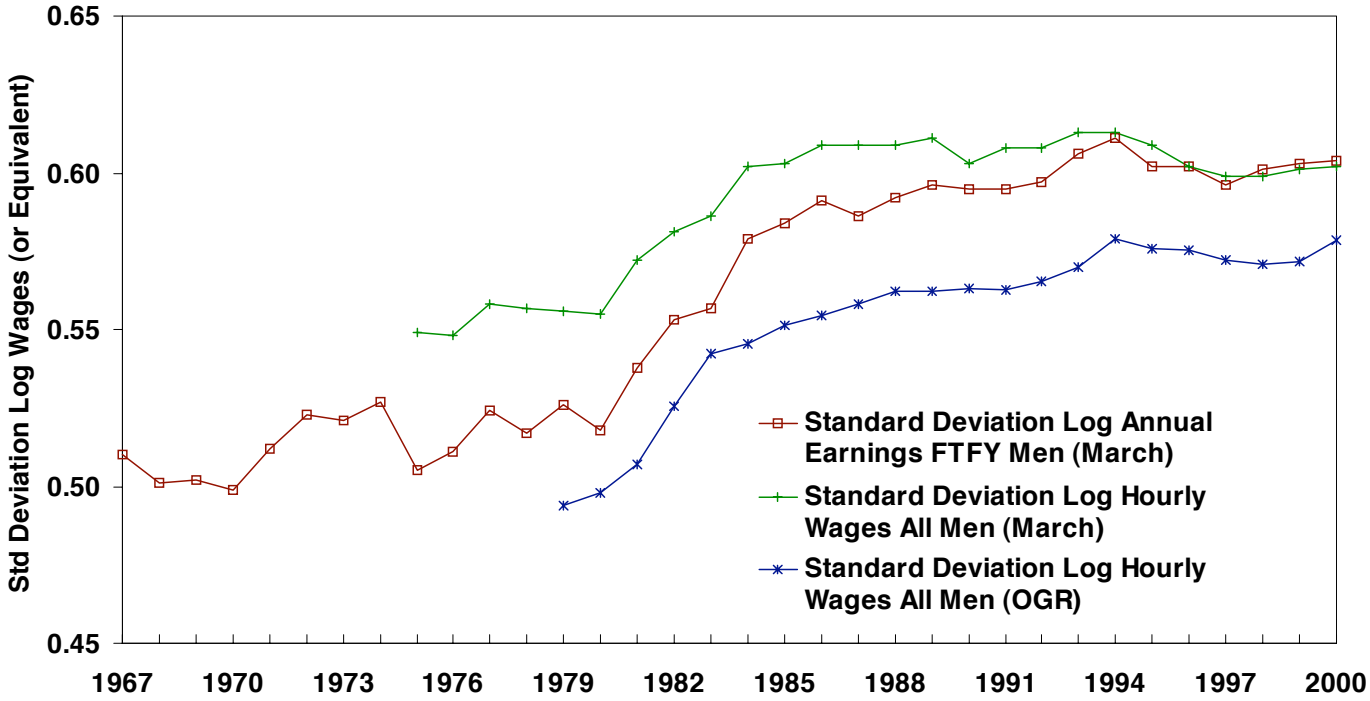
Figure 3: Alternative Measures of Wage Inequality for Male Workers



Why Did US Wage Inequality Increase?

- Most common explanations of rising inequality
  1. Skill-biased technical change - computers and information technology
  2. International trade - Stolper-Samuelson Theorem
  3. Institutional changes - unions and minimum wages
- Any explanation must be consistent with particular patterns in between- and within-group inequality
- This paper explains how skill-biased technical change explains these patterns

Theoretical Contribution

- Existing theories
  1. Human Capital: Differences in skills
  2. Frictional Wage Dispersion: Differences in luck
  3. Compensating Differentials: Differences in job quality
- Contribution of this paper: Develop a quantitive theoretical model that includes skill and luck

Theoretical Contribution

- Empirical literature on wage inequality
  1. Between-group inequality: price of observed skills
  2. Within-group inequality: price or distribution of unobserved skills
- Understanding of within-group wage inequality
  1. Within-group inequality exists also due to luck

Why is this interesting to a central banker?

- Understanding the labour market is a key role of the central bank
- Potentially, may be helpful in understanding the Polish experience:
  1. Evolution of inequality after the fall of communism
  2. Changes in inequality due to large migrations
- From a theoretical perspective, model can be used to explain price dispersion

Related Literature

- Burdett and Mortensen (1998)
  1. Model of wage (price) dispersion - why similar workers are paid differently?
  2. Tradeoff between attracting workers and match surplus
  3. Homogeneity in worker type makes inappropriate to deal with inequality
- Large empirical literature on wage inequality

The Model: Agents

- Heterogeneity
  1. Worker type defined as v distributed uniformly $[0, 1]$
  2. Firm type defined as p distributed uniformly $[0, 1]$
- Skill requirements and productivity
  1. Workers able to work for firm if $v > p$
  2. Productivity of firm defined as $R(p)$ which is monotonic

Economic Decisionmaking

- Workers make decisions to accept or reject wage offers
  1. Optimising behaviour implies maximise present discounted future value of utility
- Firms post wages prior to meeting workers
  1. Profit maximising
  2. Tradeoff in setting wages between attracting workers and profit per worker hired
- Solution to model requires finding distribution of wage offers

The Model: Matching Environment

- Matching rate of worker normalised to one and assumed independent of employment status
  1. Implies workers accept jobs that offer higher wages
- Type of firm a worker meets is randomly drawn from distribution of firm types
- Focus upon equilibrium that are monotone
- Exogenous job destruction rate, δ

Distribution of workers across firms

- Allows description of transition of workers between firms
- Define $T_v(p)$ the CDF of workers of type v across firms of type p

$$\dot{T}_v(p) = (1 - T_v(p))\delta - T_v(p)(v - p)$$

Defines a steady-state distribution of workers across firm types.

The Model: Steady State Equilibrium

- Equilibrium Concept
  1. Distribution of workers unchanging over time
  2. Workers making optimal transitions
  3. Firms offering profit-maximising wages
- Equilibrium Characterisation
  1. Distribution of workers across different wages
  2. Wages offered by profit-maximising firms

Profit Function of a Firm

$$\pi(p, \hat{p}) = (R(p) - w(\hat{p}))M(p, \hat{p}),$$

- $\pi(p, \hat{p})$ is expected profit for type p firm offering wage of $\hat{p}$
- $M(p, \hat{p})$ is expected labour supply for type p firm offering wage of $\hat{p}$
- Analogous to monopolist and technically similar to auction

Associated First Order Condition

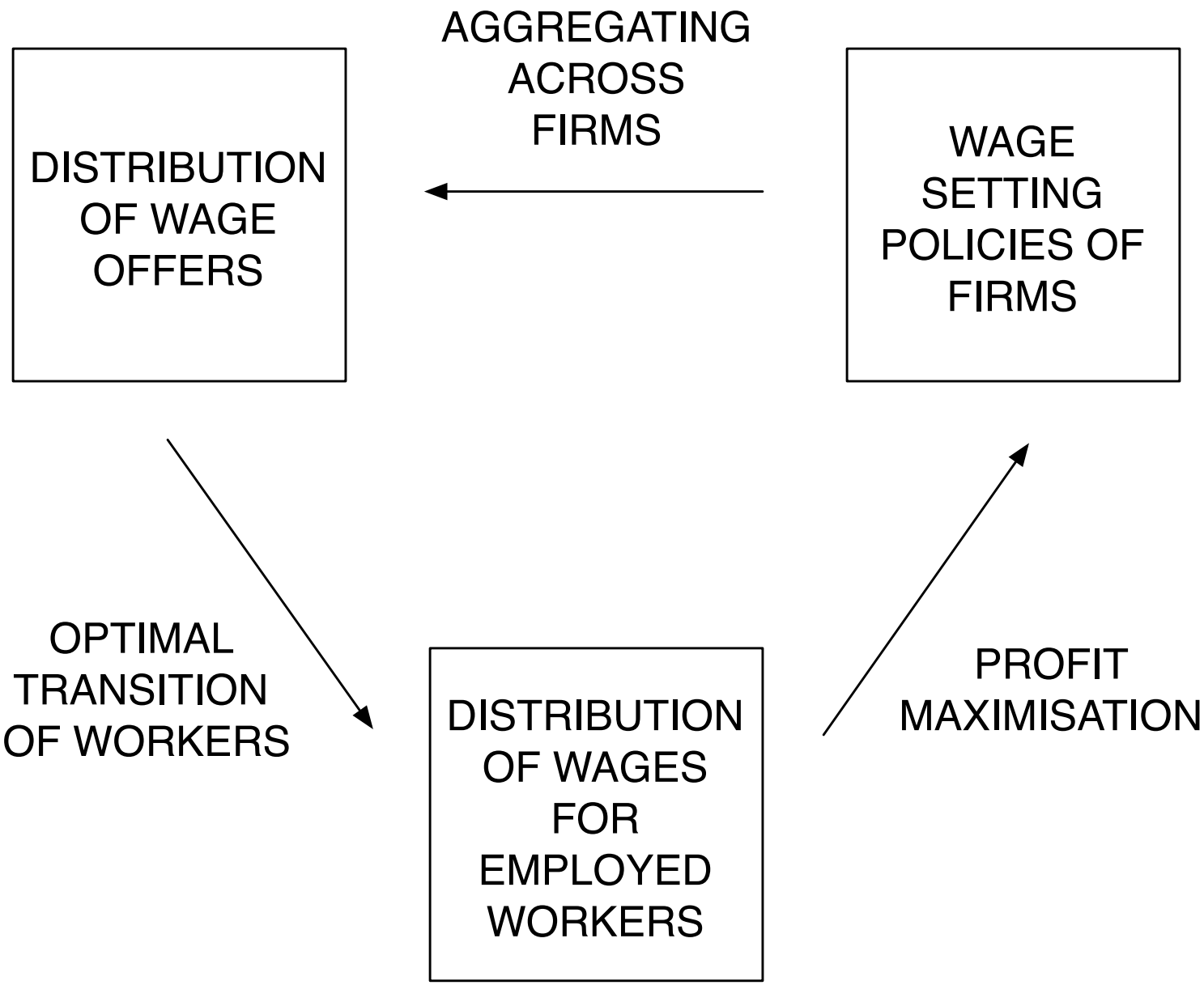
$$\pi^{(2)}(p, \hat{p}) = (R(p) - w(\hat{p}))M^{(2)}(p, \hat{p}) - w'(\hat{p})M(p, \hat{p}) = 0$$

- Provides differential equation describing $w(p)$
- Associated boundary condition is $w(\underline{p}) = 0$
- Allows solution of $w(p)$

Characterisation of Equilibrium

- Distribution of workers across firm types defined by the steady state equation
- Wages offered by firms depends upon the solution to differential equation
- Combining these objects characterises distribution of workers across wages

Summary


DISTRIBUTION OF WAGE OFFERS
AGGREGATING ACROSS FIRMS
WAGE SETTING POLICIES OF FIRMS
OPTIMAL TRANSITION OF WORKERS
DISTRIBUTION OF WAGES FOR EMPLOYED WORKERS
PROFIT MAXIMISATION

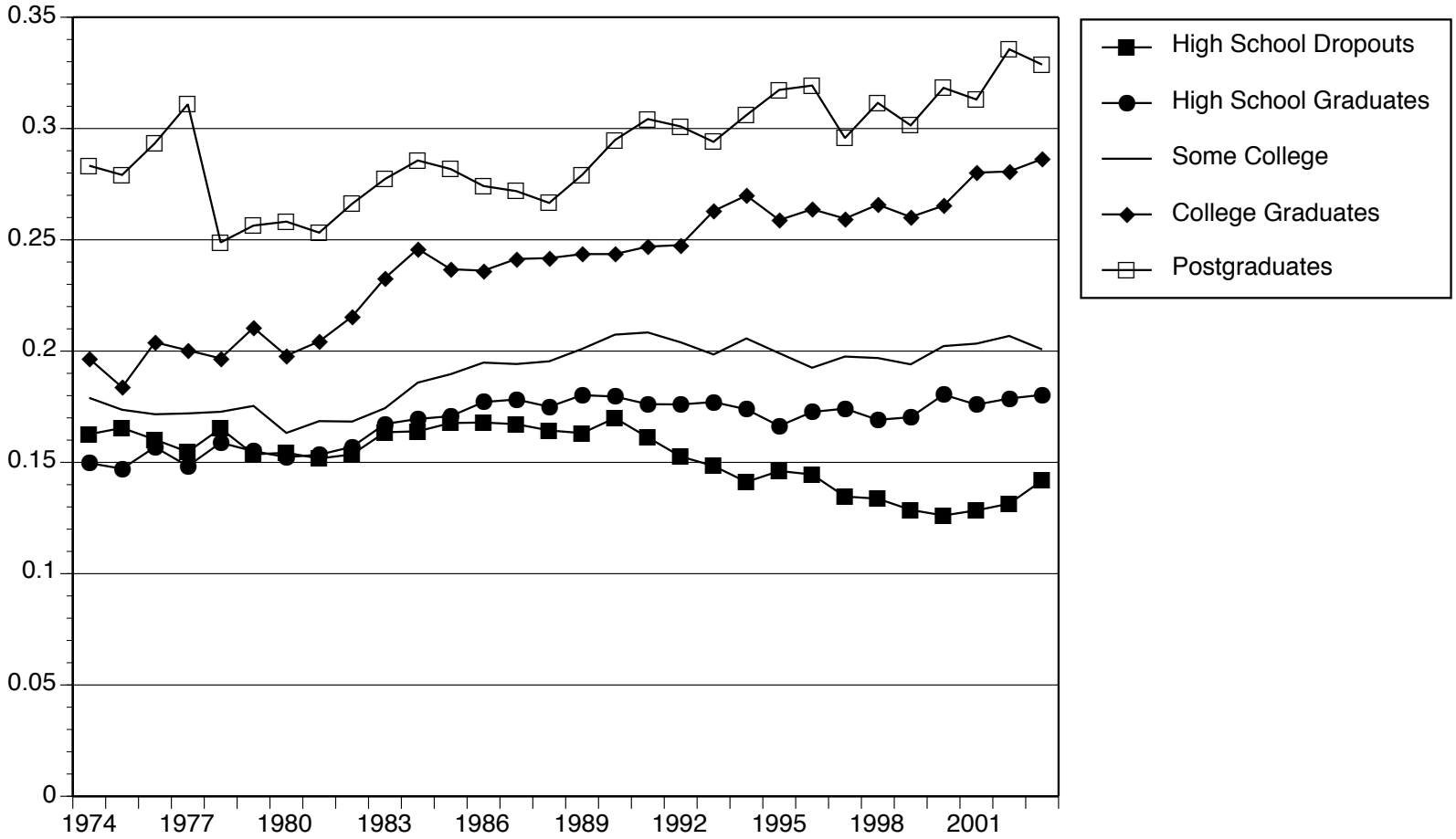
Some Theoretical Results

- Monotone equilibrium may not exist
- Sufficient conditions for existence of equilibrium
  1. Convexity of $R(p)$
  2. Intuitively implies large enough differences in productivity between firm types

Skill-biased Technical Change

- Recent debate on changes in U.S. wage inequality
- Some authors emphasise role of skill-biased technical change (Katz and Autor)
- Other authors find it unconvincing (Card and Dinardo, Lemieux)

Within-Group Inequality Changes



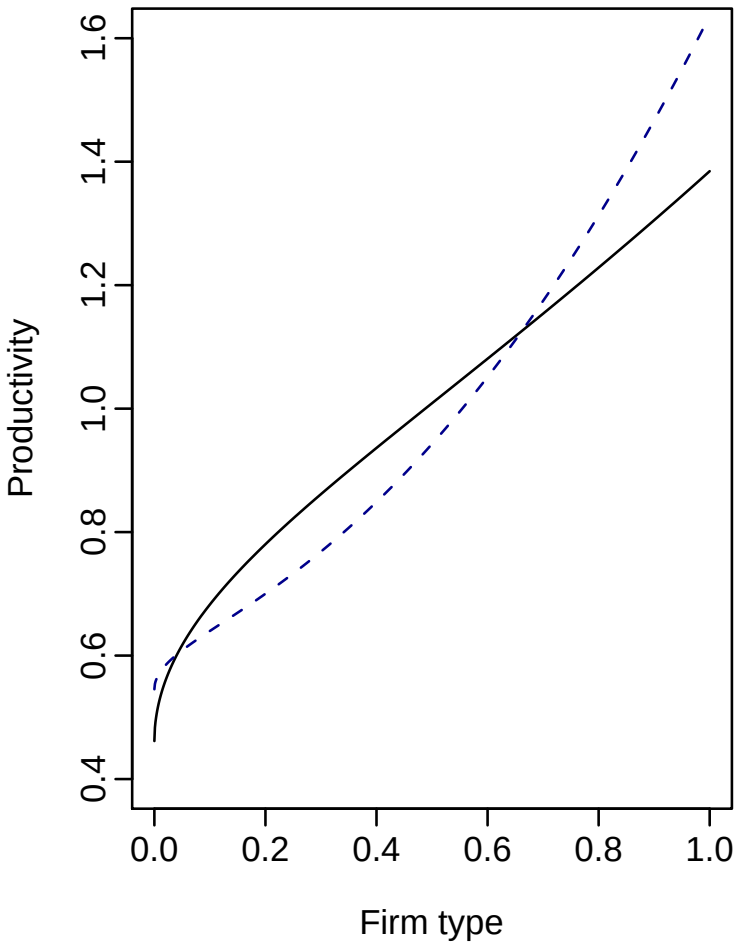
Skill-biased Technical Change

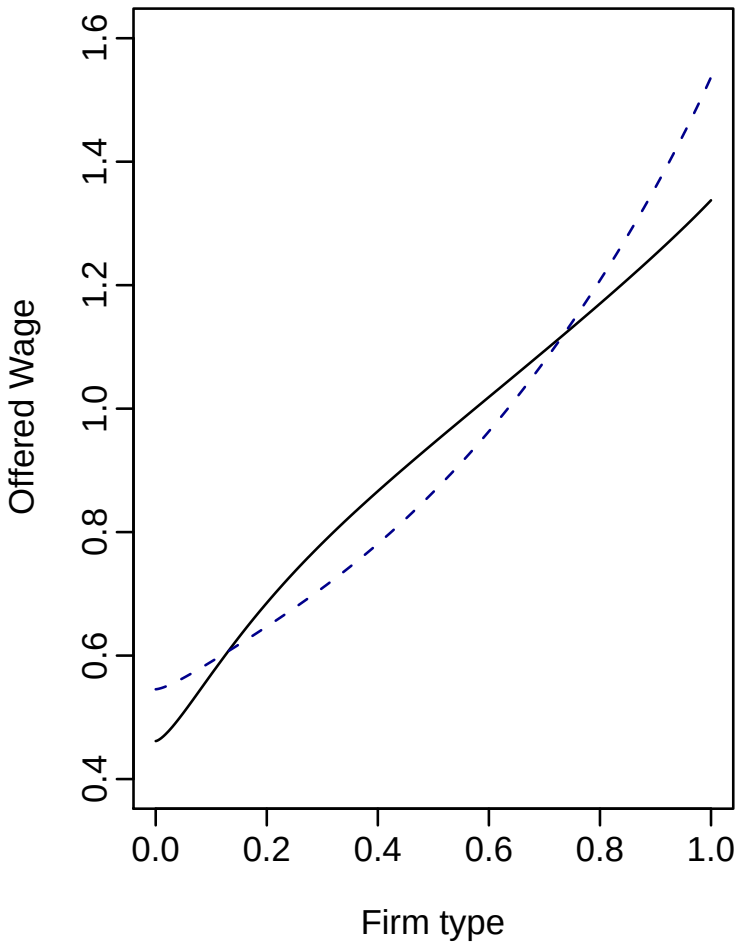
- Can think of it as $R(p)$ becoming more convex
- Difficult to derive general results, so focus upon a specific example

$$R(p) = \frac{1 + (1-\alpha)p^{1/2} + (1+\alpha)p^2}{\int_0^1 (1 + (1-\alpha)p^{1/2} + (1+\alpha)p^2)\, dp} \tag{1}$$

- As α increases, there is more weight placed upon convex portion.
- Skill-biased technical change is consistent with an increase in α
- Qualitatively consistent with recent interpretations of effect of technology on productivity

Impact of Technological Change





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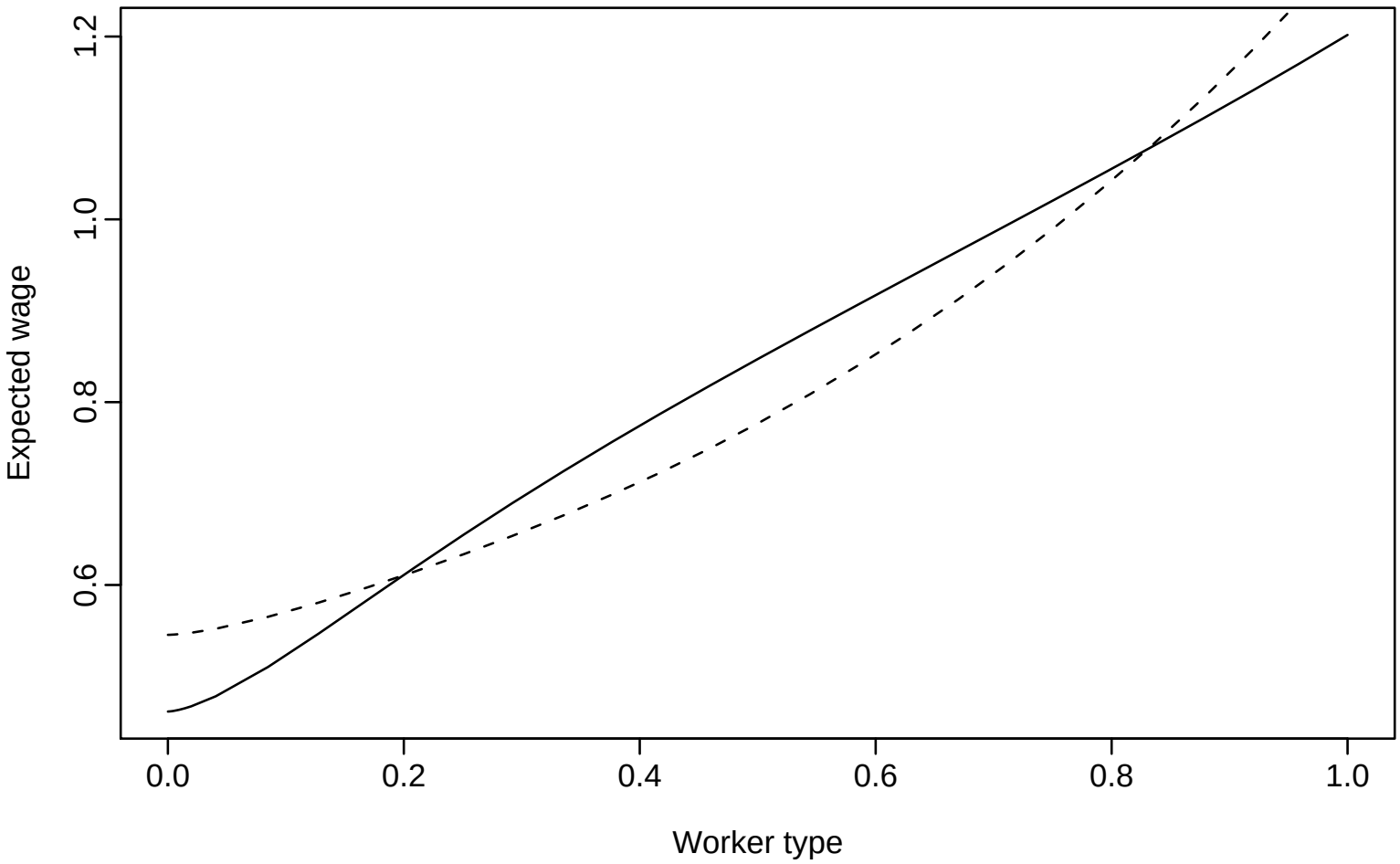

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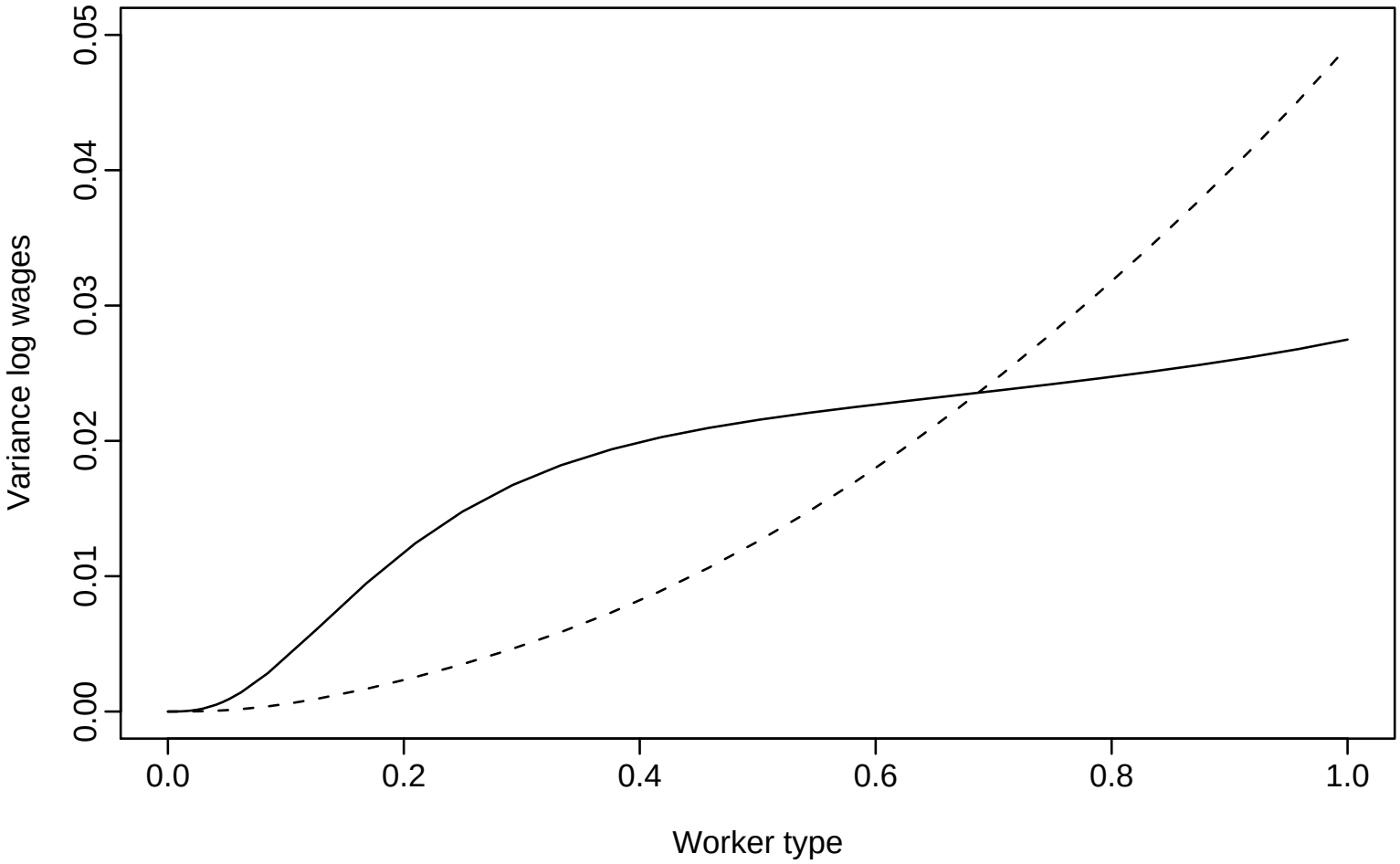

Impact of Technological Change

- Increases between-group inequality depending upon definition of group
- Increases within-group inequality of skilled workers
- Decreases within-group inequality of less skilled workers
- Intuition behind this result:
  1. Skill-biased technical change reduces dispersion of low skilled wage offers
  2. But, increases dispersion of high skilled wage offers

Conclusion

- Model to help understand wage inequality
  1. Extend Burdett and Mortensen to two-sided heterogeneity
  2. Examines role of luck in within-group inequality
- Examine skill biased technical change
  1. Increase in capital-skill complementarity consistent with patterns of within-group inequality