

Discussion of  
Automation, Globalization and Vanishing Jobs:  
A Labor Market Sorting View

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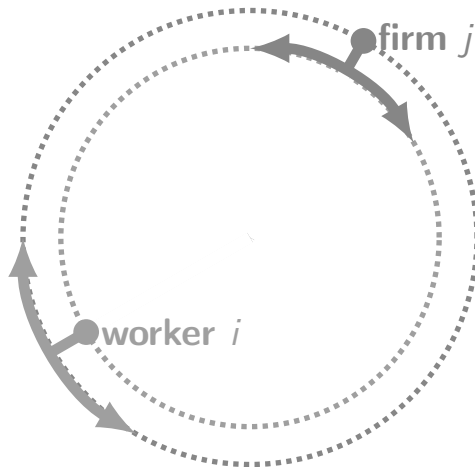


# Quick Summary

- ▶ Horizontal sorting model with search & matching frictions
- ▶ Firms and workers search for their “ideal” types
- ▶ Suppose TFP is log-submodular with distance from ideal type:
  - Then a rise in TFP will
    1. Make firms and workers more selective
    2. Reduce **steady-state** employment
- ▶ Empirical analysis confirms that across industries,
  1. High RTI occupations became more concentrated
  2. Offshorable occupations became less concentrated (why?)
  3. More concentrated occupations shrunk



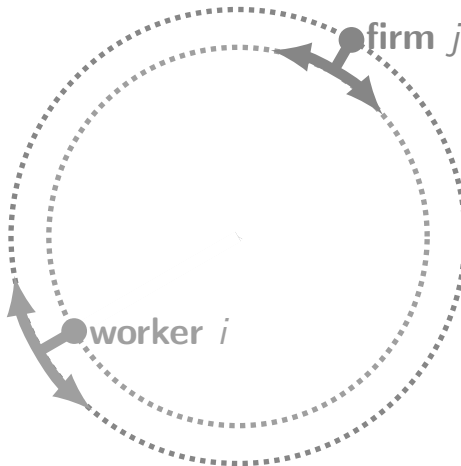
# Model in Simple Graphs



## 1. Initial Allocation



## Model in Simple Graphs



2. Uniform increase in  $A$   
 $\Rightarrow$  **more selective, less employment**



# Discussion Summary

- ▶ Cool model - I really enjoyed it!
  
- ▶ But model implications are **steady state** comparisons
  1. No time-derivative in the value function representation?
  2. Are 1995 and 2010 steady states?
    - Upon impact, employment would increase by firm entry?
  
- ▶ Model-to-data connection is unclear:
  - In the data,
    1. What are skills and tasks, and by implication, selectivity?
    2. What is technological change?



# Model-to-Data Inconsistencies

## 1. Technological change

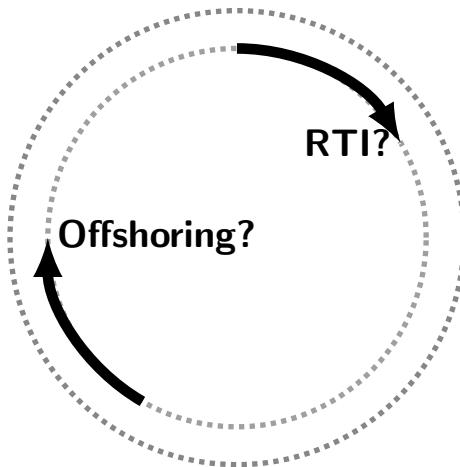
- ▶ Model: Aggregate TFP change (hits all occ/ind)
- ▶ Data: RBTC (hits high RTI occupations) or offshorability

## 2. Employment

- ▶ Model: change in aggregate employment
- ▶ Data: change by occupation



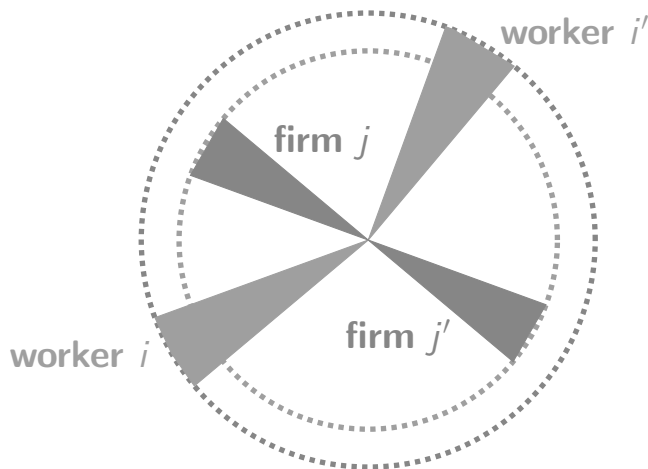
# What is A?



Data: Heterogeneity in RTI or Offshorability



## Model Implies Symmetric Effects



for both tech and emp change, also between ind-occ



# Model-to-Data Inconsistencies

## 1. Technological change

- ▶ Model: Aggregate TFP change (hits all occ/ind)
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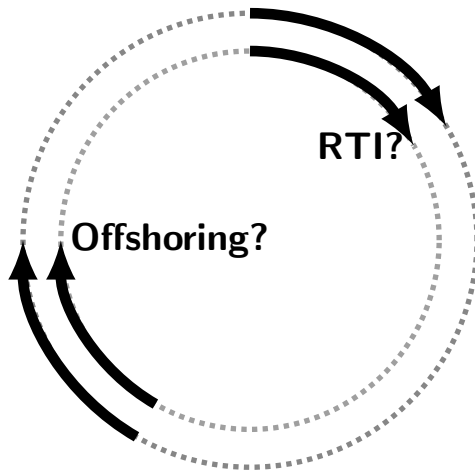
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- ▶ Model: change in aggregate employment
- ▶ Data: change by occupation

## 3. Even if we were to take aggregate implications to occupations, model implies we should have same implication for industries



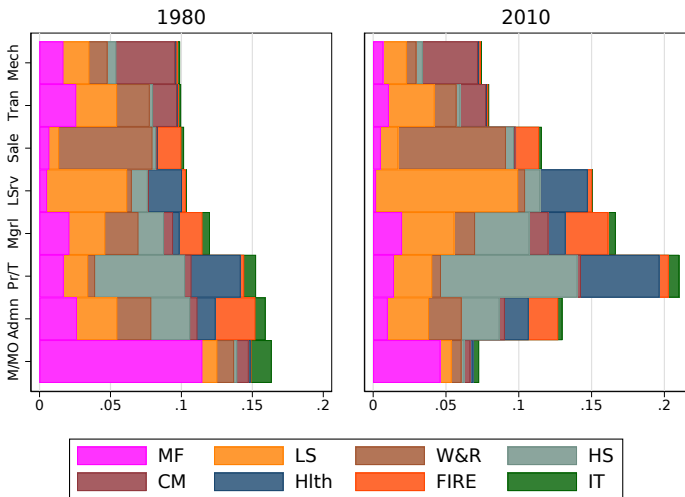
# Symmetry Between Firms and Workers



Tech change symmetric for workers and firms?



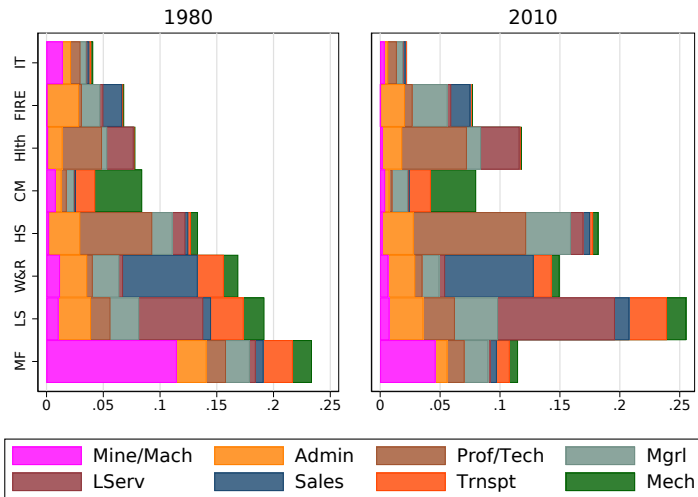
# U.S. Occupations



- High RTI occupations (bottom 2) become more specialized?



# U.S. Industries



► High RTI industries (manufacturing) became more specialized?



# Model-to-Data Inconsistencies

## 1. Technological change

- ▶ Model: Aggregate TFP change (hits all occ/ind)
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## 2. Employment

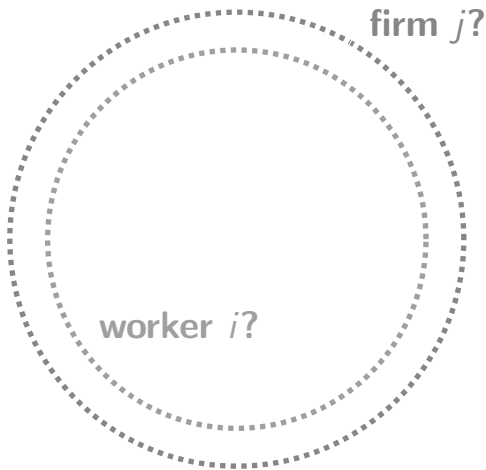
- ▶ Model: change in aggregate employment
- ▶ Data: change by occupation

## 3. Even if we were to take aggregate implications to occupations, model implies we should have same implication for industries

- ▶ Is a skill an occupation?
- ▶ Is a task an industry?



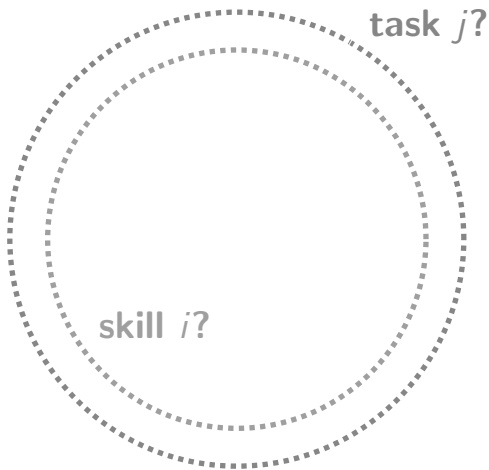
# What is Being Matched?



## 1. Workers to Firms?



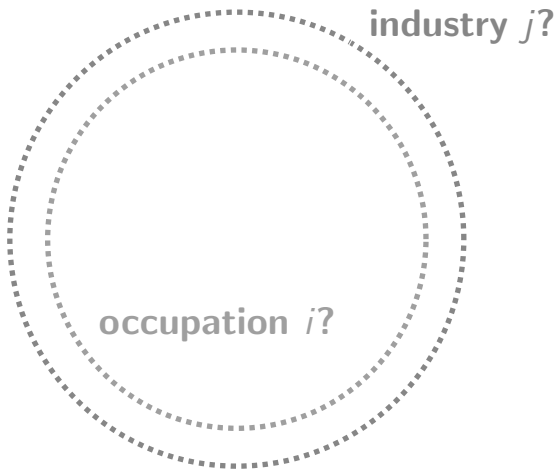
# What is Being Matched?



## 2. Skills to Tasks?



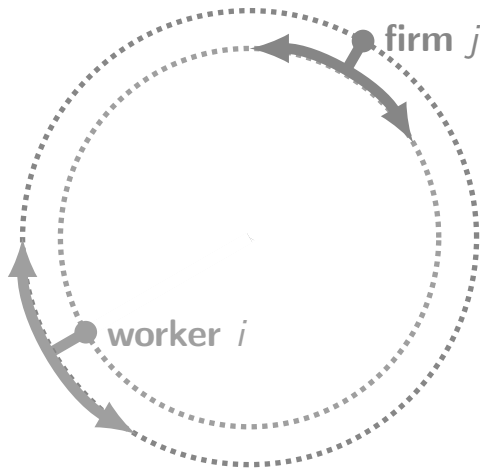
# What is Being Matched?



## 3. Occupations to Industries?



## Workers to Jobs seems most Reasonable



**Within** occupation  $\times$  industry



# Suggestions

- ▶ Model is more suitable for within ind-occ selectivity
  1. Either on skill-task match (can measure from data)
  2. Or from unobservable characteristics (unobservable match quality)

⇒ Unemployment durations seem to be the best candidate

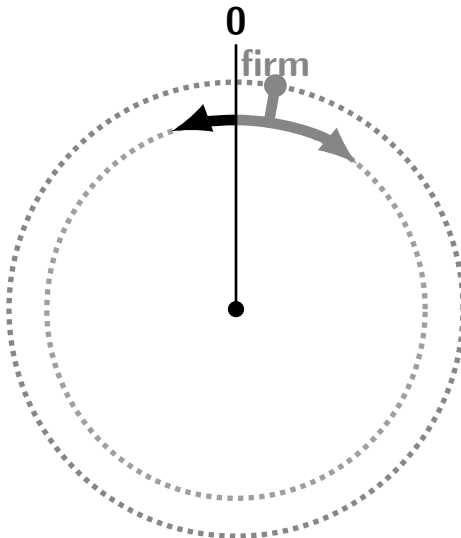
And...

- ▶ Vertical extension should be the benchmark
  - Closer to your data representation

⇒ But what happens at the boundary?



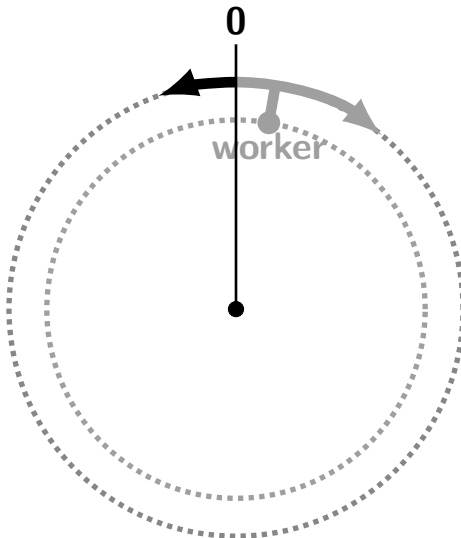
## Vertical Extension?



Low-task job hires high-skill worker?



## Vertical Extension?



Low-skill worker hired in high-task job?

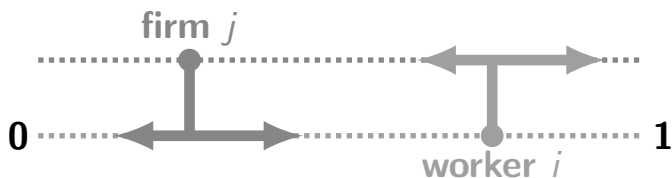


## Suggestion (Continued)

- ▶ To map to data, lines seem more representative than circles
  - TFP change could then be interpreted as biased technological change along the axis
  - Should be actually vertical, not just reordering



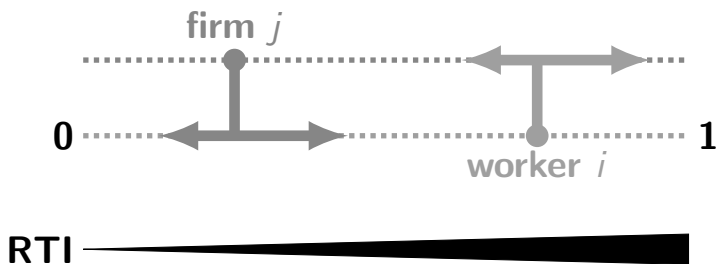
## Model to Data



Occupations and Industries ordered by RTI



## Model to Data



Technological Change by RTI or Offshoring



## Suggestions (Continued)

- ▶ To map to data, lines seem more representative than circles
  - TFP change could then be interpreted as biased technological change along the axis
  - Should be actually vertical, not just reordering

- ▶ Or, can focus on different objects in regression:

1. Concentration rises **even when** controlling for RBTC

$$\Delta \log \text{SSO}_{oi} = \underline{\alpha} + \beta_1 \text{RTI}_{oi}^{95} + \beta_2 \text{OFF}_{oi}^{95} + \mathbf{Z}_{oi}' \mathbf{C} + \epsilon_{oi}$$

2. Employment affected by SSO **even when** controlling for RBTC

$$\Delta \log(\text{Hours}_{oi}) = \gamma + \underline{\delta}_1 \Delta \log \text{SSO}_{oi} + \delta_2 \text{RTI}_{oi}^{95} + \delta_3 \text{OFF}_{oi}^{95} + \mathbf{K}_{oi}' \mathbf{C}_2 + \epsilon_{oi}$$



## Minor Comments

- ▶ Would be cleaner if technology is just written as a generic log-submodular function to begin with, the parametrization is only needed for the closed form solutions
- ▶ The effect of technological change as measured by RTI is non-linear (high vs low RTI)? Why?
- ▶ What are in the control variables?
- ▶ Make interaction terms explicit when presenting regression equations
- ▶ Subscript regression variables properly
- ▶ In first regression equation, missing a log on the dep. var.
- ▶ In intro, you say that more RTI *and* offshorability increases concentration



# Conclusion

- ▶ Intuitive model and new facts on occupational specialization
  
- ▶ But model does not map into data
- 1. Empirical analysis should be within, not across, cells
- 2. Or, make vertical extension the benchmark, and
  - analyze differential TC across jobs that are vertically differentiated
  - or reinterpret regressions