Manager Allocation and Firm Dynamics

Job Market Paper (Preliminary)

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Motivation

- Finding, training and retaining managerial talent is a key determinant of firm productivity
- How do firms deal with managerial turnover?
- Understand flows of managers *between and within* firms
  - Between: On the job search and Poaching in frictional labor markets
  - Within: Costly internal promotion and talent retention
- How do these decisions affect firm's composition and productivity?
- How do these forces shape the distribution of firm productivity?

This Project

- Study managerial allocation between and within firms
- Model
  - Today: Setup of Firm Dynamics and search friction the managerial position
  - Understand (minimally) manager turnover vis-a-vis firm's composition (size) choice
  - Later: Add On-the-job search and internal promotion components

- Data: Details
  - German LIAB employer-employee administrative data
  - Large panel of labor market biographies and firm characteristics
  - Cleaning process following Dauth and Eppelsheimer (2020)
  - Good occupation details inside firms (5-digit level)
    - Good granularity of managerial positions, inside different "occupations"

Research Question

How do different firms manage allocation and turnover in managerial positions? How do flows between and within firms affect hiring decisions and firm composition? What is the impact of these forces on shaping the aggregate distribution of managerial talent and ultimately firm productivity?

Some Literature

- Managerial Alloc. and Productivity: Bloom and Van Reenen (2007), Minni (2023), Friedrich (2023), Pastorino (2022), Metcalfe, Sollaci, and Syverson (2023), Bender et al. (2018)
- Firm hierarchy and task division: Garicano and Rossi-Hansberg (2006), Caliendo et al. (2020)
- Firm dynamics with frictional labor markets: Schaal (2017), Gouin-Bonenfant (2022), Bilal et al. (2022), Herkenhoff et al. (2018)
- Set of recent JMPs: Adenbaum (2023), Kohlhepp (2023), Freund (2024)

Setting

Firm's Decision Problem

- Abstract from workers decisions
- Firm can hire 1 *manager*, and n *workers*
- Manager of quality $z \in [\underline{z}, \bar{z}]$ and suffer shocks acc. to cfd $F(z)$
- workers contribution depends on the mass n

$$y(z, n) = zn^{\alpha}, \quad \alpha \in (0, 1)$$

- Firm with no manager ("home production")

$$y(0, n) = b \geq 0 \ \textit{(small)}$$

Managers: Dynamic Frictional Labor Market

- Firms search and meet managers billateraly
- For now:
  - LM Friction: Prob λ of finding a manager $\bar{z}$ (makes our life easier)
  - Assume a known wage w_c
  - Separations are either exogenous (δ) or firing decision
- For later:
  - LM Friction: accounts for mkt tightness
  - $w_c(z, n)$ from bargaining problem
  - Separations b/c of Poaching (OJS)
  - Internal costly promotion to find new managers

Workers: Competitive Markets

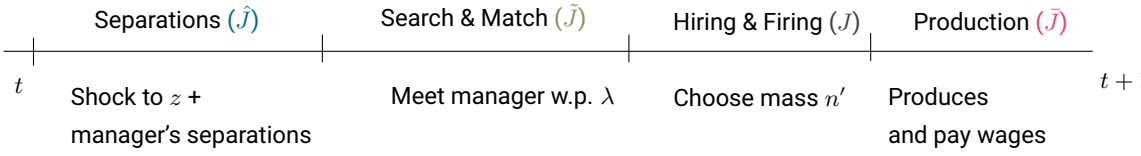
- Hire/Fire every period
- Contract at a fixed wage w, given to the firm
- In a full model w comes from Market Clearing
- Adjustment cost on hire/fire n'

$$c(n', n) = \frac{c(n' - n)^2}{2}$$

Why this setting?

- A big problem of firm dynamics + LM frictions is to keep track of dist. of wages
- Here the search/match decision concerns one worker
- Competitive wages are given to the firm
- Hope of tractability down the line!
- Today's main Exercises:
  - If the manager gets very unproductive, what is the firm's reaction?
  - What is the difference between big and small firms?
    - (this is our simplistic notion of firm composition here!)

Timing


Separations ($\hat{J}$)
Search & Match ($\tilde{J}$)
Hiring & Firing (J)
Production ($\bar{J}$)
t
$t+1$
Shock to z +
manager's separations
Meet manager w.p. λ
Choose mass n'
Produces
and pay wages

Production

$$\bar{J}(z,n) = y(z,n) - wn - w_c + \beta \int \hat{J}(\tilde{z},n) dF(\tilde{z})$$

and

$$\bar{J}(0,n) = y(0,n) - wn + \beta \hat{J}(0,n)$$

Hire/Fire Decision

$$J(z,n) = \max_{n'} \left[-c(n',n) + \bar{J}(z,n') \right]$$

- Gives a policy function $n'(z,n)$

Search and Match

$$\tilde{J}(0,n) = \lambda J(\bar{z},n) + (1-\lambda)J(0,n)$$

and

$$\tilde{J}(z,n) = J(z,n)$$

- Firm with a manager employed skips the search step (No OJS for now)

Separations

$$\hat{J}(z,n) = \delta \tilde{J}(0,n) + (1-\delta)\left[d(z,n)\tilde{J}(0,n) + (1-d(z,n))\tilde{J}(z,n)\right]$$

and

$$\hat{J}(0,n) = \tilde{J}(0,n)$$

- Where $d(z,n)$ is the firm decision to fire the manager at state (z,n)
- Firm with no manager skips separation stage

Threshold $z(n)$

- $d(z, n) = 1$ iff

$$\tilde{J}(0, n) > \tilde{J}(z, n)$$

  implies

$$\lambda J(\bar{z}, n) + (1 - \lambda) J(0, n) > J(z, n)$$

- There exists a threshold $z(n)$, fire if z falls bellow

$$\lambda J(\bar{z}, n) + (1 - \lambda) J(0, n) = J(z(n), n)$$

Value Function

- With the threshold we can write

$$J(z,n) = \max_{n'} \Bigg[-c(n',n) + \pi(z,n') + \beta \left(p\left((z(n')\right) J(z(n'),n') + (1-\delta) \int_{z(n')}^{\bar{z}} J(\tilde{z},n') dF(\tilde{z}) \right) \Bigg]$$

- $p\left((z(n')\right) = (1-\delta)F(z(n')) + \delta$ prob of losing/firing manager
- No-manager firm

$$J(0,n) = \max_{n'} \Big[-c(n',n) + \pi(0,n') + \beta J(z(n'),n')) \Big]$$

Value Function

- Search Friction controls $z(n)$

$$\lambda J(\bar{z}, n) + (1 - \lambda) J(0, n) = J(z(n), n)$$

- Current version:
  - Hopenhayn and Rogerson (1993) (convex costs) + Mortensen and Pissarides (1994)
- Search frictions controls the intensity of separation with fixed input (manager)
- In turn it affects firm expansion/shrinking via $n'(n, z)$

Properties of the model

- Threshold $z(n)$ is decreasing in n
- But gets *flatter* as search frictions fall (λ increases)
- Combination of adjustment costs + search frictions
  - Without adjustment cost $\Longrightarrow z(n)$ indep. of n (Hopenhayn (1992))
  - No search frictions $\Longrightarrow z(n) = \bar{z}$

Properties of the model

- Bigger firms have a *lower* threshold $z(n)$
  - $\Longrightarrow$ Retain worse managers for longer while peeling off workers
  - Intuition: Costly for big firms to fire and find a new manager, as they have to shrink meanwhile
- Some flavor of misallocation: you would want better managers to overlook more resources (larger firms)
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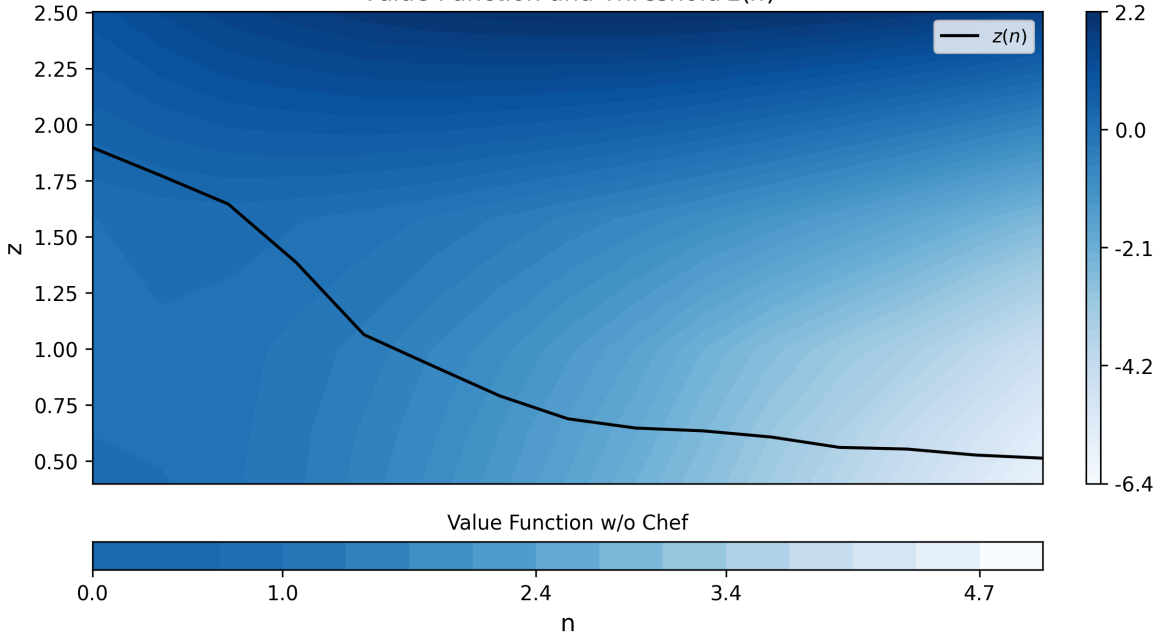
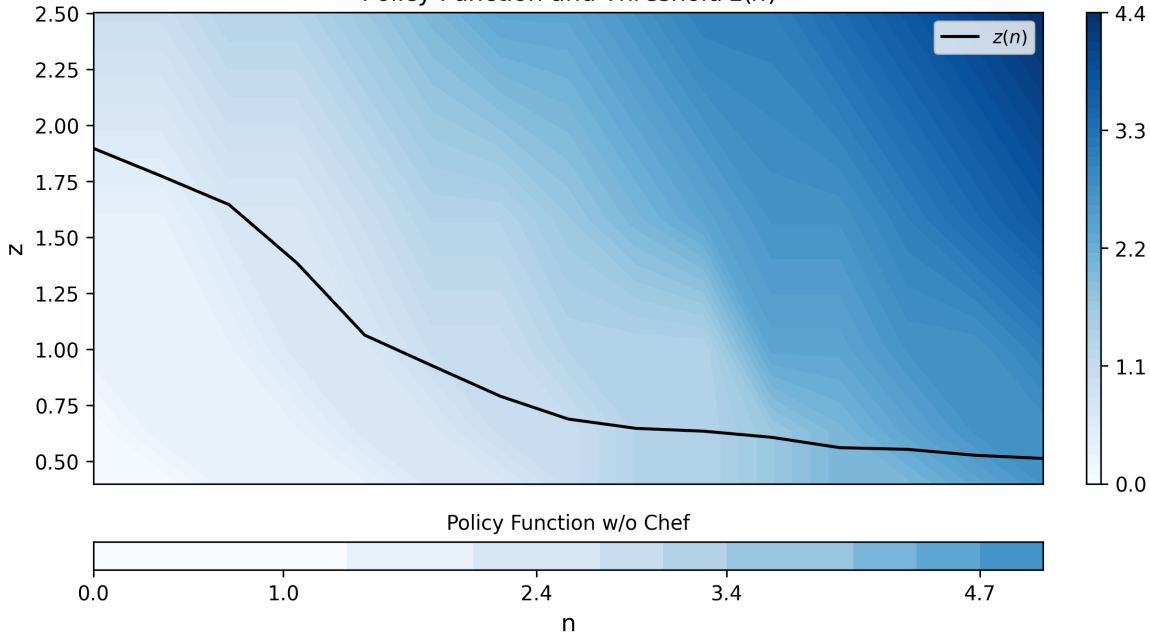
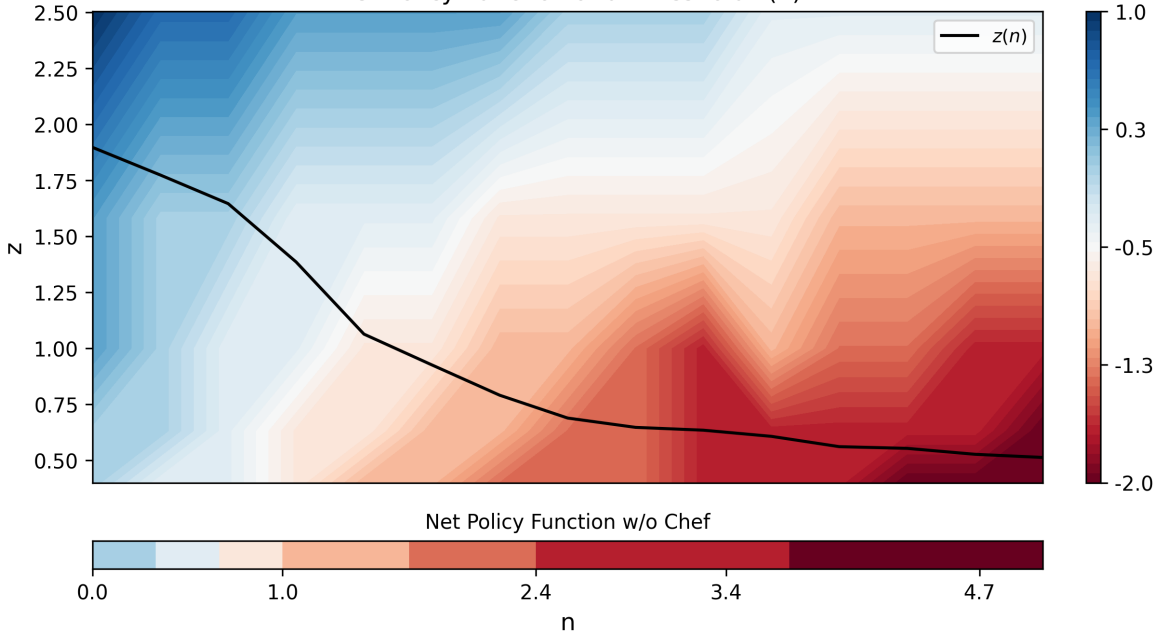
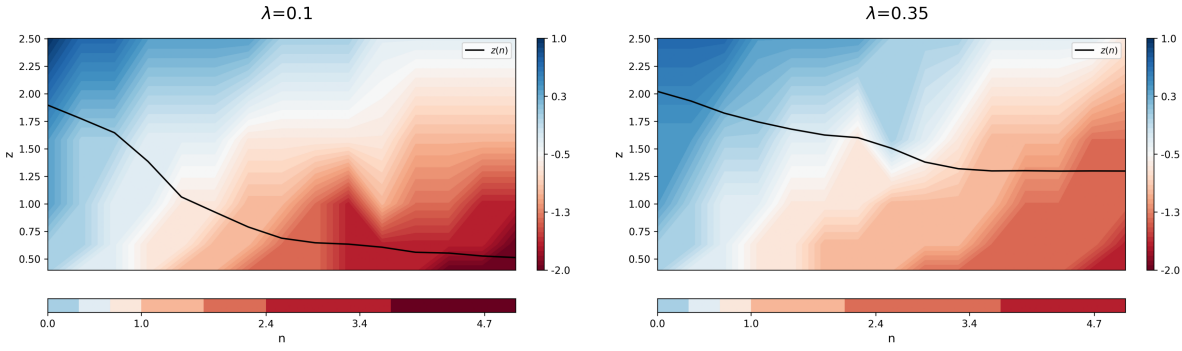
- Small firms have to be very selective as they are far from optimal size
- Adding OJS and internal promotion will make this more interesting, as counter


Value Function and Threshold $z(n)$
$z(n)$
z
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
2.2
0.0
-2.1
-4.2
-6.4
Value Function w/o Chef
0.0
1.0
2.4
3.4
4.7
n

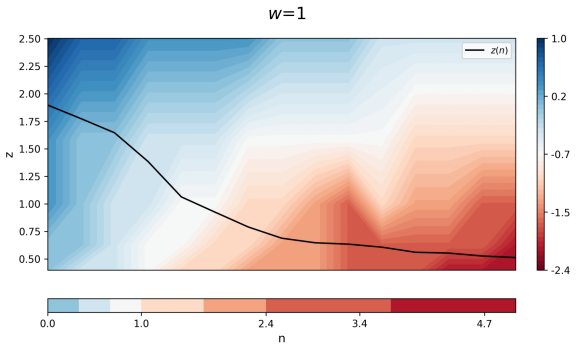

Policy Function and Threshold $z(n)$
$z(n)$
z
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
4.4
3.3
2.2
1.1
0.0
Policy Function w/o Chef
0.0
1.0
2.4
3.4
4.7
n

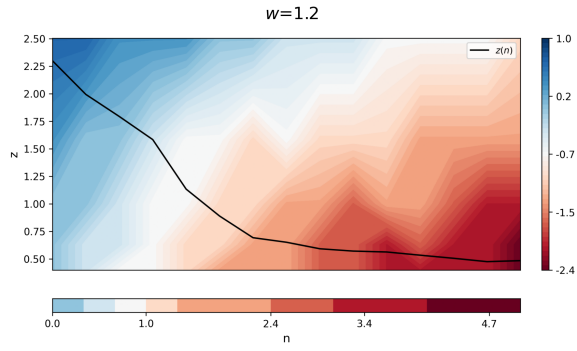

Net Policy Function and Threshold $z(n)$
$z(n)$
z
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
1.0
0.3
-0.5
-1.3
-2.0
Net Policy Function w/o Chef
0.0
1.0
2.4
3.4
4.7
n

Net Policy Functions for Different λ

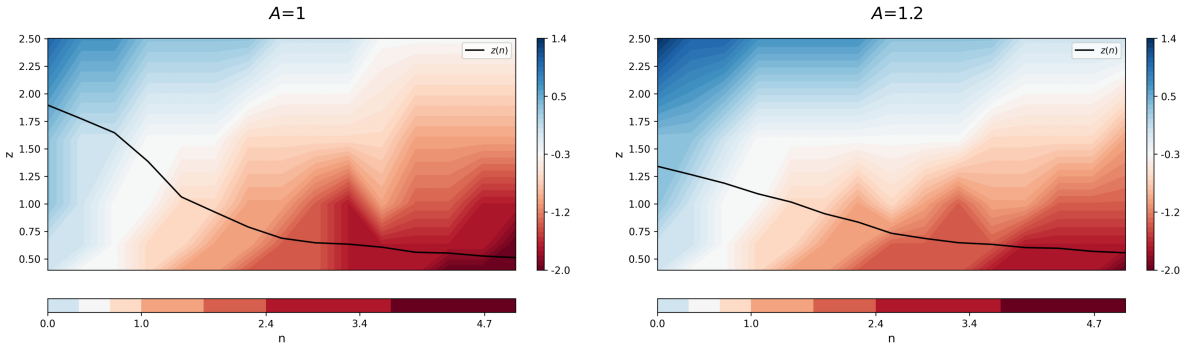


Net Policy Functions for Different wages





Net Policy Functions for Different TFP: $Af(z, n)$



Next Steps

Make the model more complete

- On the job search, firms can poach talent from other firms
- Internal promotion with costly training that depends on the firm's size and productivity
- Add more layers of workers, with different marginal products
  - Wages competitive within these layers
  - Model can address firm composition issues and speak to Garicano and Rossi-Hansberg (2006)

Next Steps

Data

- Identify manager positions in the data, using 5-digit occupation codes
- Get patterns of internal/external hiring across firm size distribution
- Look at teams inside the firm, sharing 3-digit occupation codes with the manager
- Is there any interesting pattern there?
- AKM-like approach to measure manager skill,
- Look at flows taking into account managerial skill

Thank You!

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Can we say anything else analytically?

- Policy function solving the FOC
- Envelope condition is

$$J_n(z, n) = -c_n(n'(z, n), n)$$

- FOC becomes a function equation of $n'(n, z)$ ◂ FOC
- Unsure if can say anything else at this point…

FOC

Let $g(z,n)$ be the policy function. It solves:

$$\pi_n(z, g(z,n)) = c_{n'}(g(z,n), n) +$$
$$\beta \left(p(g(z,n)) c_n\Big(g(z(g(z,n)), g(z,n)), g(z,n)\Big) + (1-\delta) \int_{z(g(z,n))}^{\bar{z}} c_n\Big(g(\tilde{z}, g(z,n)), g(z,n)\Big) \right)$$

Data Sources

- LIAB LM-7519
  - A Representative sample of establishments is surveyed from 2009–2016
  - *Entire workforce* of these firms is recorded from 2008–2017 (panel cases)
  - Entire biographies of these workers from 1975-2019
  - Spell-level Data on daily wages, occupation, and matched firm characteristics
- BHP
  - 50% sample of all establishments in Germany
  - Granular industry data (5 digits), district location (sensitive variable)
  - Annual Data on Occupation and Wage Structure
  - Extensions on firm inflows/outflows, as entry and exit
  - All these components can be matched to LIAB

Data Sources

- Linked Employer-Employee Data from the IAB: LIAB Longitudinal Model (LIAB LM) 1975–2019