Creaming Off and Hiring Discrimination

Masataka Iwata

School of Economics, Nagoya University of Commerce and Business Administration

'Do not return skimmed milk into the barrel of fresh milk.'

Point of Interest and Literature

- Hiring Discrimination
  - Taste-based Discrimination (like/dislike a particular type)
  - Statistical Discrimination $\leftarrow$ *Interest of the current paper*
    :prefer statistically richer-endowed group

- Taste-based Discrimination
  Becker (1957): 'Taste for discrimination' dissipated by segregation
  Arrow (1973): Free entry drives discriminators away
  Stiglitz (1973): Segregation effect depends on complete information
  Black (1995): With search friction, taste effect survives
  Rosen (2003): An efficient individual level of discrimination (search)

Literature (cont'd)

- Statistical Discrimination
  Arrow (1973): statistical discrimination is self-fulfilling
  Coate and Loury (1993): formal analysis and proof of Arrow's claim
  Arcidiacono (2003): discrimination $\longrightarrow$ disparity along experience
  Norman (2003): discrimination improves human capital efficiency

- Common Feature of Statistical Discrimination Research
  : Interaction between discrimination and human capital investment

- Review: Cain (1986)

Current Method and Results: Overview

- 2 periods dynamic model, SPE notion
- Workers: resources, with types a and b (productivity-irrelevant)
  qualified and nonqualified workers (hidden symmetric proportion q)
- Firms: type-based screening, interviewing, and hiring
- Firms' manpower limit: cannot interview all the workers

- simultaneous shift in priority,
  ex.) prefer a at period 1 and b at period 2: stable equilibrium
- egalitarian equil. without screening: unstable equilibrium
- the former eq. is more efficient than the latter
  disc. $\longrightarrow$ likely to interview each worker once and for all
  equal $\longrightarrow$ interview thinner unemployed pool at period 2

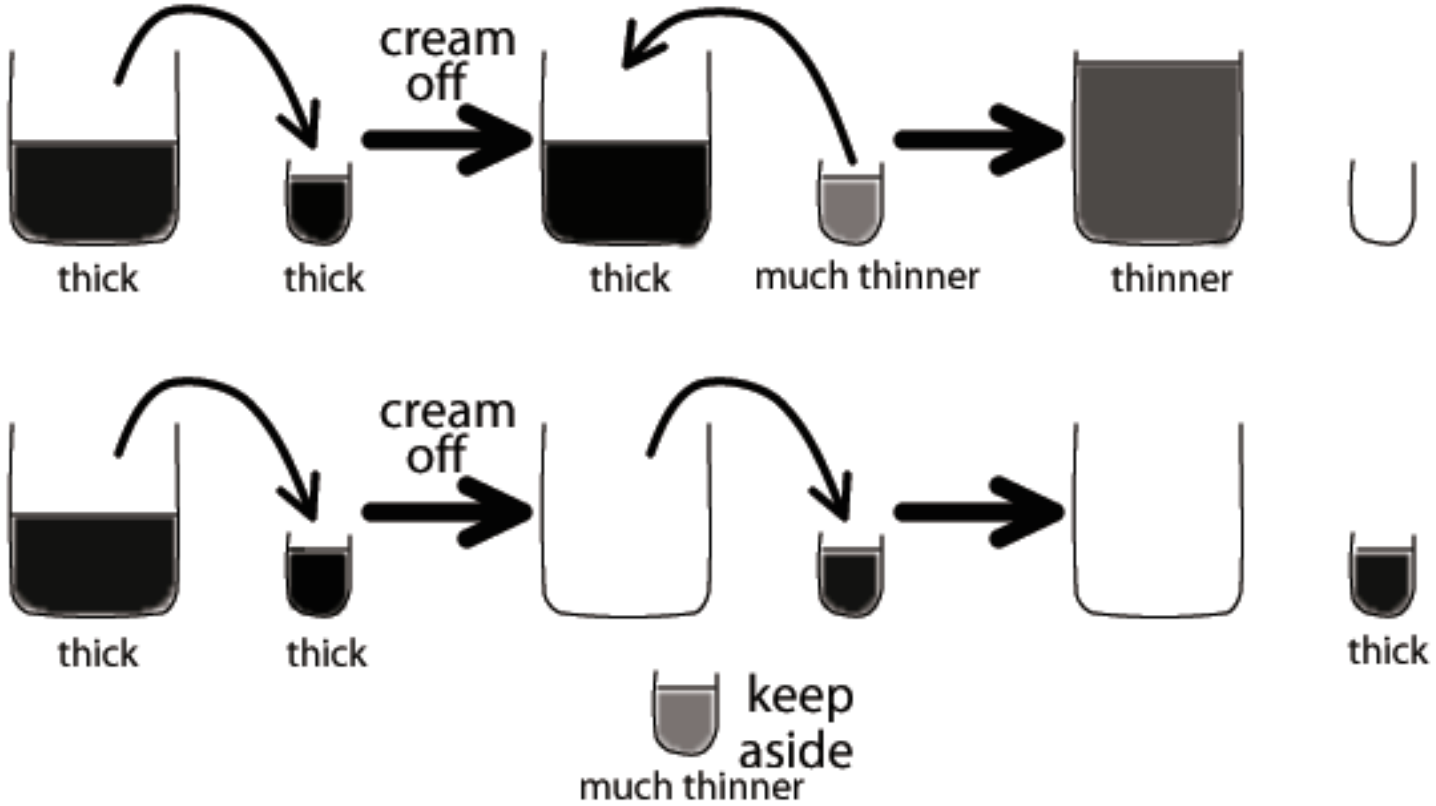
Current Paper and Related Literature

- Current Paper:
  statistical discrimination without human capital investment issue

- Related:
  Arcidiacono (2003): structural and dynamic cause of stat. disc.
  overlapping generations, OJT effect $\longrightarrow$ multiple equilibria
  Norman (2003): efficient discrimination
  free riding on human capital investment
  discrimination $\longrightarrow$ more efficient skill-based specialization
  Masters (2009): hiring-pattern-generated discrimination
  hiring deteriorates unemployed pool quality
  $\longrightarrow$ an interviewing precision level generates a dynamic equil.

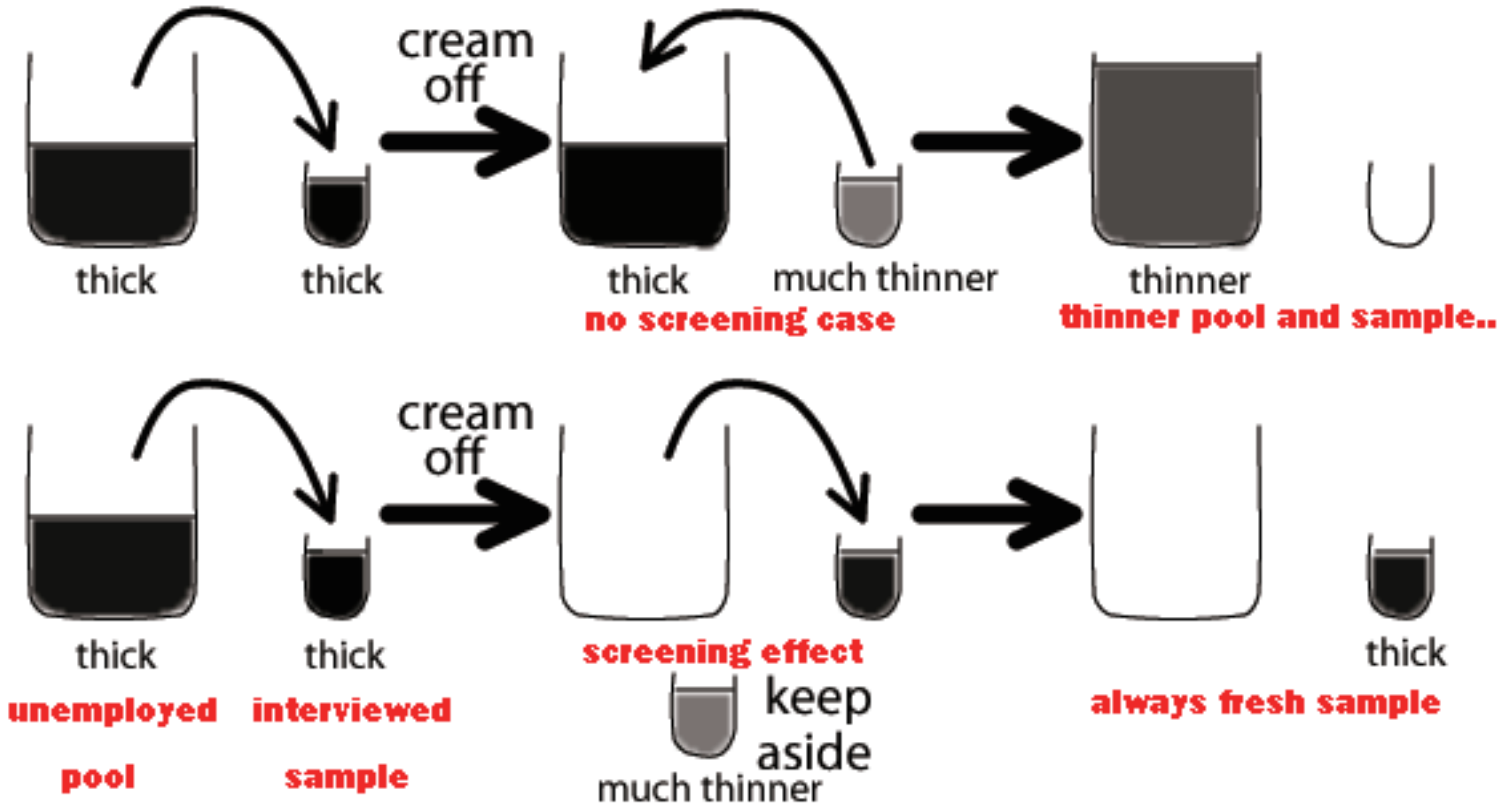
Key Point

Anecdote: taking cream from a barrel of fresh milk



→ Divide the pool,
and cream off each of the division once and for all.

Key Point (cont'd)



Model

- Workers and Firms
  - dynamic model with periods 1 and 2; each period the market opens
  - continuum workers (size L) and profit maximizing firms (size F)
  - proportion q (size qL) of workers are *qualified*
    a qualified worker $+$ a firm $\longrightarrow$ able to produce payoff v
  - workers are divided into types a and b: irrelevant to productivity
  - limited manpower for each firm:
    able to interview density m of workers each period
    $L > 2mF$ is assumed ($\leftarrow$ *critical*)
  - screening policies: r, a, and b
  - firm's strategy $\in \{r, a, b\} \times \{r, a, b\}$
    (x, y): x at period 1, y at period 2

Model (cont'd, 1)

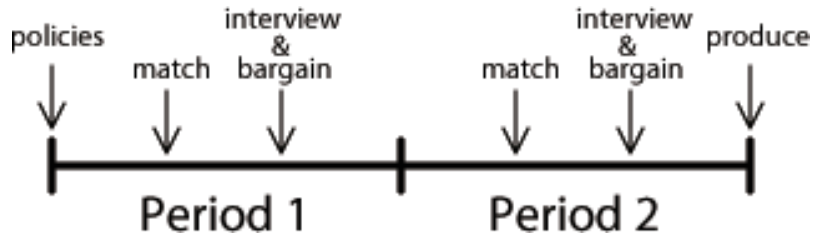
- Market Structure
  - $F_r(t)$, $F_a(t)$, and $F_b(t)$:
    the size of the firms following policy r, a, and b (resp.)
  - Rationing:
    1) a-firm: density $\min\{m, A(t)/F_a(t)\}$ of type a and
    $\max\{0, m - A(t)/F_a(t)\}$ of type b workers
    2) b-firm: density $\max\{0, m - B(t)/F_b(t)\}$ of type a and
    $\min\{m, B(t)/F_b(t)\}$ of type b workers
    3) r-firm:
    density $m \cdot \frac{\max\{A(t)-mF_a(t),0\}}{\max\{A(t)-mF_a(t),0\}+\max\{B(t)-mF_b(t),0\}}$ of type a and
    $m \cdot \frac{\max\{B(t)-mF_b(t),0\}}{\max\{A(t)-mF_a(t),0\}+\max\{B(t)-mF_b(t),0\}}$ of type b workers

Model (cont'd, 2)

- Interviewing and Bargaining
  - $(1-\epsilon_2)$ of qualified and ϵ_1 of nonqualified applicants are hired
  - $w_t(k) \equiv \alpha \left(\frac{q_t(k)(1-\epsilon_2)}{q_t(k)(1-\epsilon_2)+(1-q_t(k))\epsilon_1} v \right) + (1-\alpha) R_t(k)$
  - $\alpha \in (0,1)$: workers' bargaining power, $R_t(k)$: reservation value

- Intuitively: firms' recruiting activity during their rather slack seasons
  a certain fixed cost of advertisement $\longrightarrow$ finite number of periods

- Decision: at the beginning of period 1



Model Extension: Treaters

A representation of non-economic force that conducts discrimination

- proportion $\delta \in [0, 1)$ (size δF) of firms are 'treaters'
- treaters follow policy a for $\rho \in \{1, 2\}$ periods from period 1
  $\rho = 1 \rightarrow$ maximize profit at period 2

- Candidates of their motive:
  taste, governmental regulation (ex. employment protection),
  cultural/religious habit

Equilibria ($\delta = 0$ until 'Treaters' section)

Proposition 1:

If all the firms take (r, r), that strategy profile is an equilibrium.

: no firm has an incentive to deviate from the policy, because there appearrs no difference in 'thickness' between two types of workers.

Proposition 2:

If all the firms take (a, b) (resp. (b, a)), that strategy profile is an equilibrium.

: policy a at period 1 makes type b workers at period 2 thicker than type a workers. policy b at period 2 makes $R_1(b)$ $(w_1(b))$ higher than $R_1(a)$ $(w_1(a))$. $q_2(b) > q_2(a)$ is the essential condition.

Equilibria (cont'd)

- Stability issue
  - the equilibrium (r, r) is unstable against an intrusion of treaters
  - the equilibrium (a, b) (*resp.* (b, a)) is stable

Proposition 3:

Each of the equilibria (a, b) *and* (b, a) *exhibits better welfare than the equilibrium* (r, r).

: higher frequency of matching with relatively thicker type of workers, particularly at period 2. This result crucially depends on the assumption $L > 2mF$. Only if there remains unmatched workers, the firms can improve their total welfare performance by minimizing the size of thicker type of unmatched workers.

Distribution

- demand side surplus ($DS(j,k)$ $(j,k) \in \{(r,r),\ (a,b),\ (b,a)\}$) and supply side surplus ($SS(j,k)$ $(j,k) \in \{(r,r),\ (a,b),\ (b,a)\}$)
  : integral of $v - w_t(k)$ and $w_t(k)$ (*resp.*)
- $e(k;x,y)$: employment rate for type k workers in the equilibrium (x,y)

Lemma 1:

i) $DS(a,b) > DS(r,r)$ *and* $DS(b,a) > DS(r,r)$.

ii) There exists a value $\alpha_0 \in [0,1)$ *that satisfies* $SS(a,b) > SS(r,r)$ *if* $\alpha > \alpha_0$. *A similar result stands for* $SS(b,a)$.

: trade-off between employment and payment
more bargaining power, more SS.

Distribution (cont'd, 1)

Lemma 2:

i) If $\min(A, B) \geq mF$,

$w_1(k; r, r) > w_1(a; a, b) = w_2(b; a, b) > w_2(k; r, r)$.

ii) If $A > mF > B$,

$w_1(k; r, r) > w_1(a; a, b) > w_2(b; a, b) > w_2(k; r, r) > w_2(a; a, b)$.

iii) If $B > mF > A$,

$w_1(b; a, b) > w_1(k; r, r) > w_1(a; a, b) > w_2(b; a, b) > w_2(k; r, r)$

where $(k \in \{a, b\})$.

Common Feature: $w_1(k; r, r) > w_1(a; a, b) \geq w_2(b; a, b) > w_2(k; r, r)$

disc. $\rightarrow$ lessening the opprotunities of 'second interview'

$\rightarrow$ more euqal for majority, sometimes with extreme minority

Distribution (cont'd, 2)

Lemma 3:

i) Suppose $\min(A, B) \geq mF$. $\exists\ \gamma\ (> 1)$ *s.t.* $e(a; a, b) > e(a; r, r)$ *(resp.* $e(b; a, b) > e(b; r, r)$*) iff* $\gamma > A/B$ *(resp.* $\gamma > B/A$*).*

ii) Suppose $A > mF > B$. $\exists\ \gamma_0\ > 0$ *s.t.* $e(a; a, b) > e(a; r, r)$ *iff* $\gamma_0 > A/B$. $\exists\ \mu^*$ *s.t.* $\gamma_0 > 1$ *if* $mF/L > \mu^*$. $e(b; a, b) > e(b; r, r)$ *stands without any additional condition.*

iii) omitted.

Common Feature: minority enjoy higher employment under disc.

equal $\longrightarrow$ same probability of being interviewed

disc. $\longrightarrow$ similar *size* of being interviewed

Treaters ($\delta > 0$, assume $\rho = 1$)

Notation: (x, y): a profile s.t. the non-treaters take the strategy (x, y) and the treaters take the strategy (a, y).

Large size of treaters $\longrightarrow q_2(b) > q_2(a)$ guaranteed
$\longrightarrow$ best responce at period 2 is $b \longrightarrow$ equilibrum (b, a) does not exist
$\longrightarrow (a, b)$ is unique equilibrium

Lemma 4:

Suppose $\rho = 1$ and $\delta > 0$. The equilibrium (a, b) always exists. The equilibrium (b, a) exists if $\frac{A}{A+B} > \delta$.

Brief Summary

Two key points:

1) Discriminatory hiring behavior appears as the outcome of stable equilibrium and it shows better welfare performance than the egalitarian behavior
2) If the firms treat the minority preferentially, the wage level and employment rate for the minority tend to be better than those for the majority

Testable Cases

- Japan youth employment
  irregular mid-way hiring (*chuto saiyo*) v.s. regular hiring (*teiki saiyo*)
  - cohort effect (Ohta, Genda, and Kondo 2008)
  - substantial amount of the mid-way workers (Ministry of Labor 2009)
  - new graduates as minorities seem to enjoy their privileged status
- China urban labor market
  rural migrants v.s. city residents
  - labor market segregation on both institutional and economic basis (Knight, Song, and Jia 1999, Demurger et al. 2006, etc.)
  - dualism between the rural and city residents (Wang and Zuo 1999)
  - hierarchy: privileged and successful elites, nonmigrant natives, temporary migrants (Fan 2002)

Policy Implication

Suspicion against the relevancy of anti-discriminative legislative schemes

If the economy is in the discriminatory equilibrium,

- Anti Discrimination Act: might punish just the profit maximizer
- Affirmative action: shift of equilibrium from discriminatory one to discriminatory another
- Population-based quota: dispel the discrimination, with some second-best welfare performance

Possible Extension

- Sector-wise discrimination
  - high productivity public sector and low productivity private sector
  - discrimination: public sector prefers city residents
    private sector prefers migrants
  - discrimination might be outcome of stable and efficient equilibrium

- Infinite horizon version (with migrants)
  - workers increase $\longrightarrow$ creaming off $\longrightarrow$ efficiency gain $\longrightarrow$ more workers
  - efficiency gain $\longrightarrow$ new firms entry $\longrightarrow$ more welfare $\longrightarrow$ more workers

Concluding Summary

- labor matching model with the manpower-based friction in interviewing process
- a pattern of welfare maximizing hiring discrimination
- minority side of workers tend to enjoy higher employment
- non-economic force may determine unique equilibrium
- testable cases as Japan youth employment and China urban labor market

Robustness

- results vulnerable in a dynamically extended version?
  - depends on specific manner of the extension.
    with n periods, as long as $L > nmF$ is satisfied, the result is robust

- why not raise q or m?
  - raise of q might lower v: trade-off, endogenous level of q
  - limited $m \rightarrow$ limited total laborforce $\rightarrow$ stationarily limited m

Note:
slight productivity difference between types ($q^a > q^b$) might determine unique equilibrium ((a, b)).