Keeping up with “The Joneses”: reference dependent choice with social comparisons

Alastair Langtry

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University of Cambridge

Motivation

- People often make social comparisons
- Social media may have made this worse
- They push people into a race to “Keep up with the Joneses”

Summary of Results

1. Stronger social comparisons increase consumption, but reduce welfare
2. A higher marginal cost reduces consumption but increases welfare for agents who are highly central in the network
3. When agents form the network endogenously they only connect to others with the same level of consumption
4. In a simple labour market model, stronger social comparisons with co-workers reduces labour market sorting

Related Literature

- Closest to this paper are Ghiglino & Goyal (*2010, JEEA*), and Immorlica, Kranton, Manea & Stoddard (*2017, AEJ Micro*)

1. Ghiglino & Goyal consider a two-good general equilibrium exchange economy, where social comparisons apply to one good.
   - Find that Bonacich centrality is a key determinant of consumption and prices
2. Immorlica et al. suppose that agents only make social comparisons with to those richer than themselves. This generates multiple equilibria.
   - In the equilibrium with the highest consumption, Immorlica et al. find that agents stratify into a “class structure”.

Related Literature II

Other related areas:

1. Reference Dependence: Kahneman & Tversky (*1979, Econometrica*), Kőszegi & Rabin (*2006, QJE*)
2. Social comparisons: Frank (*1985, AER*), Frank (*1985, OUP*)
3. Easterlin Paradox: Easterlin (*1974, 2020*), Decancq, Fleurbaey & Schokkaert (*2015, Economica*)
4. Labour markets: Frank (*1986*), Goerke & Pannenberg (*2013, WP*)
5. Endogenous network formation: Hiller (*2017, GEB*), Ushchev & Zenou (*2020, JET*)

Model: network & reference point

- $N = \{1, ..., n\}$ agents.
- Weighted and directed social network G. $G_{ij} \geq 0$ for all i, j. Assume $G_{ii} = 0$.
- It will be helpful to decompose G in the following way: $\alpha_i = \sum_j G_{ij}$ and $g_{ij} = \frac{G_{ij}}{\alpha_i}$.
- Call α the *reference strength* and g the *reference structure*.
- An agent i has a *reference point* $R_i = \alpha_i \sum_j g_{ij} x_j$

Model: preferences & choices

- Each agent i has preferences

$$u_i = f\left(x_i - \alpha_i \sum_j g_{ij} x_j\right) - c x_i + b_i \alpha_i \sum_j g_{ij}. \tag{1}$$

- Assume $c > 0$, $f(\cdot)$ is twice continuously differentiable, strictly increasing and concave, and that $f'(0) > c > f'(+\infty)$.
- All agent choose $x_i \geq 0$ simultaneously. I look for Nash Equilibrium

Bonacich Centrality

Bonacich Centrality of agent i is

$$C_i^b = \sum_j \left[\sum_{k=0}^{\infty} G^k\right]_{ij}$$

Equilibrium

The game has linear best replies. i's best reply is

$$BR(x_{-i}) = f'^{-1}(c) + \alpha_i \sum_j g_{ij} x_j. \tag{2}$$

So we can now say something about the equilibria.

Remark

If $\lambda_1 < 1$, then there is a unique Nash equilibrium with

$$x_i^* = C_i^* f'^{-1}(c) \text{ for all } i$$

where λ_1 is the largest eigenvalue modulus of the matrix G.

Strength of comparisons & cost

Stronger social comparisons increase consumption, but reduce welfare

Proposition

If $\lambda_1 < 1$: (i) x_i^* is weakly increasing, and (ii) u_i^* is weakly decreasing, in α_j for all i, j, and strictly so if $i = j$.

A higher marginal cost reduces consumption but increases welfare for agents who are highly central in the network

Proposition

If $\lambda_1 < 1$: (i) x_i^* is strictly decreasing and convex in c for all i, (ii) supposing $f(a) = a^\gamma$, then u_i^* is strictly increasing in c if and only if $C_i^b > \frac{1}{\gamma}$.

Network structure

Definition: Comparison shift

A *comparison shift* is an $n \times n$ matrix D, where $D_{ru} = \phi$, $D_{rd} = -\phi$ for $r, u, d \in N$, and all other elements are equal to zero.

Proposition

Consider a comparison shift, D, of magnitude ϕ. Then: (i) x_i^* is strictly increasing, and (ii) u_i^* is strictly decreasing, in ϕ for all i if and only if $C_u^b > C_d^b$.

Endogenous network

- Additional assumption the network is symmetric, so $G_{ij} = G_{ji}$ for all i, j, links need mutual consent to form, but can be broken unilaterally.
- We now need a notion of equilibrium for an endogenous network.

Definition: Pairwise stability (Jackson & Wolinsky (1996))

A network G is pairwise stable if:
(i) for all $G_{ij} > 0$: $u_i(G) \geq u_i(G - G_{ij})$ and $u_j(G) \geq u_j(G - G_{ij})$,
(ii) for all $G_{ij} = 0$: if $u_i(G + G_{ij}) > u_i(G)$ then $u_j(G + G_{ij}) < u_j(G)$

When agents form the network endogenously they only connect to others with the same level of consumption

Proposition

In all pairwise stable networks, if $b_i \geq cf'^{-1}(c)$, then $G_{ij} > 0$ only if $b_i = b_j$, and if $b_i < cf'^{-1}(c)$ then $G_{ij} = 0$ for all j.

Labour market sorting

Intuition

- Agents can change their income (and hence consumption) by changing firms – some firms are more productive than others.
- But this also changes their co-workers.
- This change in co-workers can be costly to agents in my model. At a more productive firm, the new co-workers will earn (and hence consume) more.
- So high-skilled agents, who can take their pick of firms, might choose to work at less productive firms. This is because these agents want to be a *big fish in a small pond*.

Formal Set-up I

- Two types of worker: skilled (S) and unskilled (U).
- Two types of firm: high productivity (H) and low productivity (L).
- Consumption depends only on the worker and firm type.
- Conditional on firm type, skilled workers earn more than unskilled ones.
- Conditional on worker type, workers at high productivity firms earn more than those at low productivity ones.
- Each firm has a fixed number of job openings, and all firms prefer to hire skilled workers over unskilled ones.
- Also assume the total number of job openings is equal to the number of workers
- We can divide an agent's neighbours into *friends* and *co-workers*.

Formal Set-up II

- As a benchmark case, I assume agents form equally strong links with all of their co-workers. So preferences are now

$$u_i = f(x_i - \alpha_{1i} \sum_{j \in \text{friends}} g_{ij} x_j - \alpha_{2i} \overline{x}_m) + b \sum_j \alpha_{1i} g_{ij} \quad (3)$$

- where $\overline{x}_m$ is the average consumption of co-workers at i's firm, and $\alpha_{1i} + \alpha_{2i} \equiv \alpha_i < 1$, is fixed for each agent.
- Assume firms are large, so each individual worker has a negligible impact on $\overline{x}_m$.

Labour market sorting

Sorting is equal to the fraction of skilled workers that work for high productivity firms.

Results

stronger social comparisons with co-workers reduces labour market sorting

Proposition

If the strength of social comparisons with co-workers weakly increases for all workers, then labour market sorting weakly decreases.

Proposition

There exists a threshold value α_1^{crit} such that a skilled worker works at a high productivity firm if and only if $\alpha_{1i} \geq \alpha_1^{crit}$.