Young, Restless and Creative: Openness to Disruption and Creative Innovations

Daron Acemoglu, MIT

Ufuk Akcigit, UPenn

Murat Alp Celik, UPenn

Discussion:

Samuel Kortum, Yale
Hypotheses

- Economic progress hinges on acceptance/celebration of new ways of doing things

- Younger people in influential positions encourage innovation/change

- *Youthful CEO's promote radical breakthrough innovation by the firm

- Get at these larger issues via an empirical evaluation of *
An Impossible Empirical Task?

- Age of CEO is one of many factors determining CEO's attitude toward change

- Attitude of CEO is one of many factors determining firm's innovative strategy

- Citations per patent is an imperfect measure of radical innovation

- Correlation of CEO age and radical innovation does not indicate a causal magnitude
Findings

- A year of CEO age is associated about 1/3 less citations per patent (more than a 1% reduction)

- Holds conditional on firm age, which is also associated with fewer citations per patent

- Robust to different measures of radical innovation

- Holds up weakly in the within-firm dimension

- Coefficients more than double, but noisy, in cross-country dimension
Illustrating the Challenge
Radical Innovation and CEO Age

The graph shows a scatter plot with the y-axis representing 'average patent quality' and the x-axis representing 'CEO age'. The data points are distributed across the graph, indicating a potential relationship between CEO age and average patent quality.
Role of “Motivating” Theory

- Read: “window dressing” prior to the substance ...

- ... in the regression tables

- Yet the theory occupies first 24 pages, and does more than you’d think possible

- If only a motivation, strip it down

- Better yet, use it
Peek at Theory I

- Differentiated products with quality ladders:

\[ Y(t) = \frac{1}{1 - \beta} \left( \int_C q_j(t)^\beta k_j(t)^{1-\beta}dj \right) L^\beta \]

- Quality ladder dynamics:

  - Radical innovations arrive to a high type firm (with manager age \( a \)) at rate \( \psi + \Lambda(\bar{q}_{t-a}/\bar{q}_t) \):

    \[ q_j^0 = (1 + \eta_0)q_j \]

  - The \( n \)'th incremental innovation (\( \kappa = 1 \)) arrives to high and low-type firms at rate \( \xi \):

    \[ q_j^n = q_j^{n-1} + \bar{q}_t \eta \alpha^n \]
A firm is composed of a set of product lines

Value of product line of low type (ignore Markov transitions between types):

$$\left[ r + \tau - \frac{\dot{V}_L}{V_L} \right] V_L(q_j, n) = \Pi^I_L$$

$$\Pi^I_L = \max_a \left\{ \pi q_j + \bar{q}_t f(a) - w_{a,t} \right\} + \xi \left[ V_L(q_j + \eta_{n+1}, n + 1) - V_L(q_j, n) \right]$$
Peek at Theory III

- High type must also choose between radical and incremental

\[
\left[ r + \tau - \frac{\dot{V}_H}{V_H} \right] V_H(q_j, n) = \max \{ \Pi^L_H, \Pi^R_H \} + \psi EV_H(\bar{q}_t)
\]

\[
\Pi^R_H = \max_a \left\{ \pi q_j + \bar{q}_t f(a) - w_{a,t} + \Lambda(\bar{q}_{t-a}/\bar{q}_t) EV_H(\bar{q}_t) \right\}
\]

- Result: high-type firms seeking radical innovations hire younger managers
Role of Theory in Combination with Data

- Theory is rich enough to illustrate:
  1. Sources of the error term
  2. Two-way causation between age and radical innovation
  3. Interpretation of between-firm vs. within-firm relationships
  4. Interpretation of country-level relationships
  5. Other relationships to investigate

- More generally, a structure to support rather tenuous empirical findings
A Step in the Right Direction

- Section 4.4 on “Indirect Inference” is beginning to combine theory and data

- Preliminary finding: empirical relationship largely reflects sorting ...

- ... of younger managers into more innovative firms

- Causal effect of age contributes only a bit

- Now its starting to get interesting.
Conclusion

- Good start on a very challenging issue
- You’re young: don’t be incremental
- Be radical!