Where do firms come from? Knowledge relatedness and firm entry

Sung Hoon Lee, Roberto Fontana, Franco Malerba

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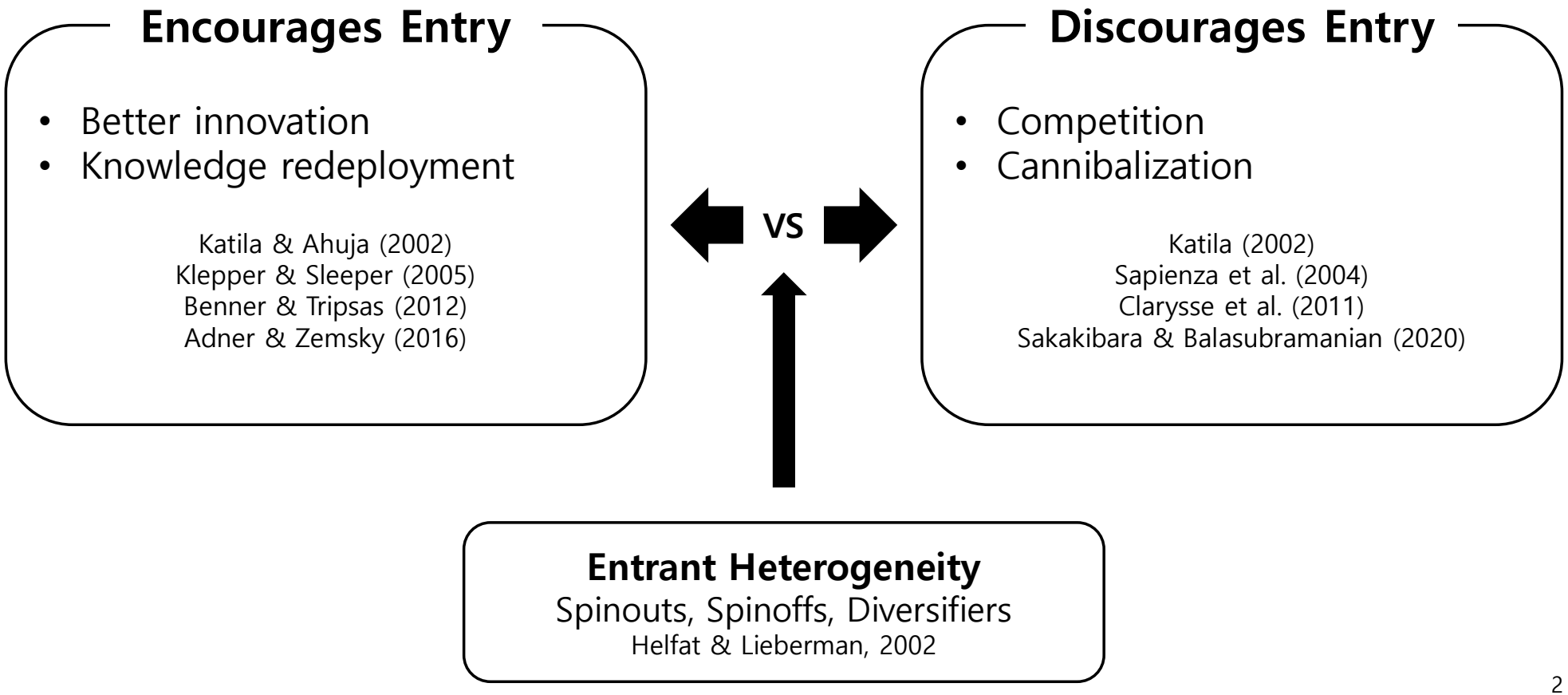
Università Cattolica del Sacro Cuore, Milano

Motivation

Knowledge Relatedness and Firm Entry



This Paper

- Provide a unified framework to analyze the effect of KR on entry
  - Account for the effect of KR on entry for a variety of potential entrants
  - Reconcile previous inconsistent findings in the literature
- Empirically test the framework in the context of 30 years of evolution of 4 industries (semiconductors, computers, comm eq, software)

MAIN FINDINGS

- The relationship between KR and the pattern of firm entry is generally non-linear
- The direction as well as the extent of non-linearity tend to be 'firm specific'

Theoretical Framework

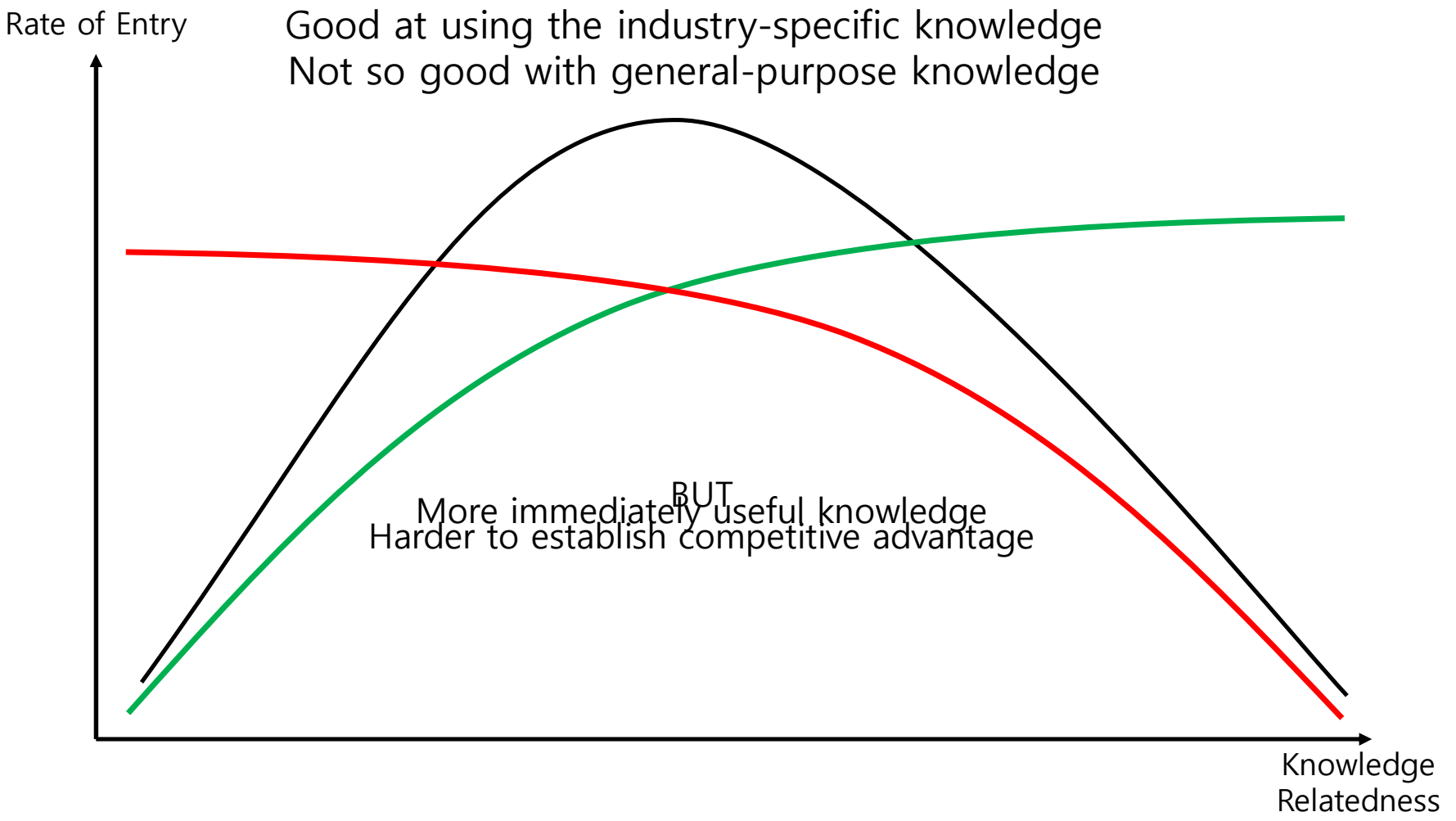
Building Blocks

1. Definition of KR
2. Firms endowed with two types of knowledge: Industry Specific Knowledge (ISK), and General Purpose Knowledge (GPK)

3. Two opposite influences of KR on entry: encouraging effect vs. discouraging effect
4. Heterogeneity of entrants (i.e., spinouts, spinoffs, diversifiers) moderate the effect of relatedness on the rate of entry

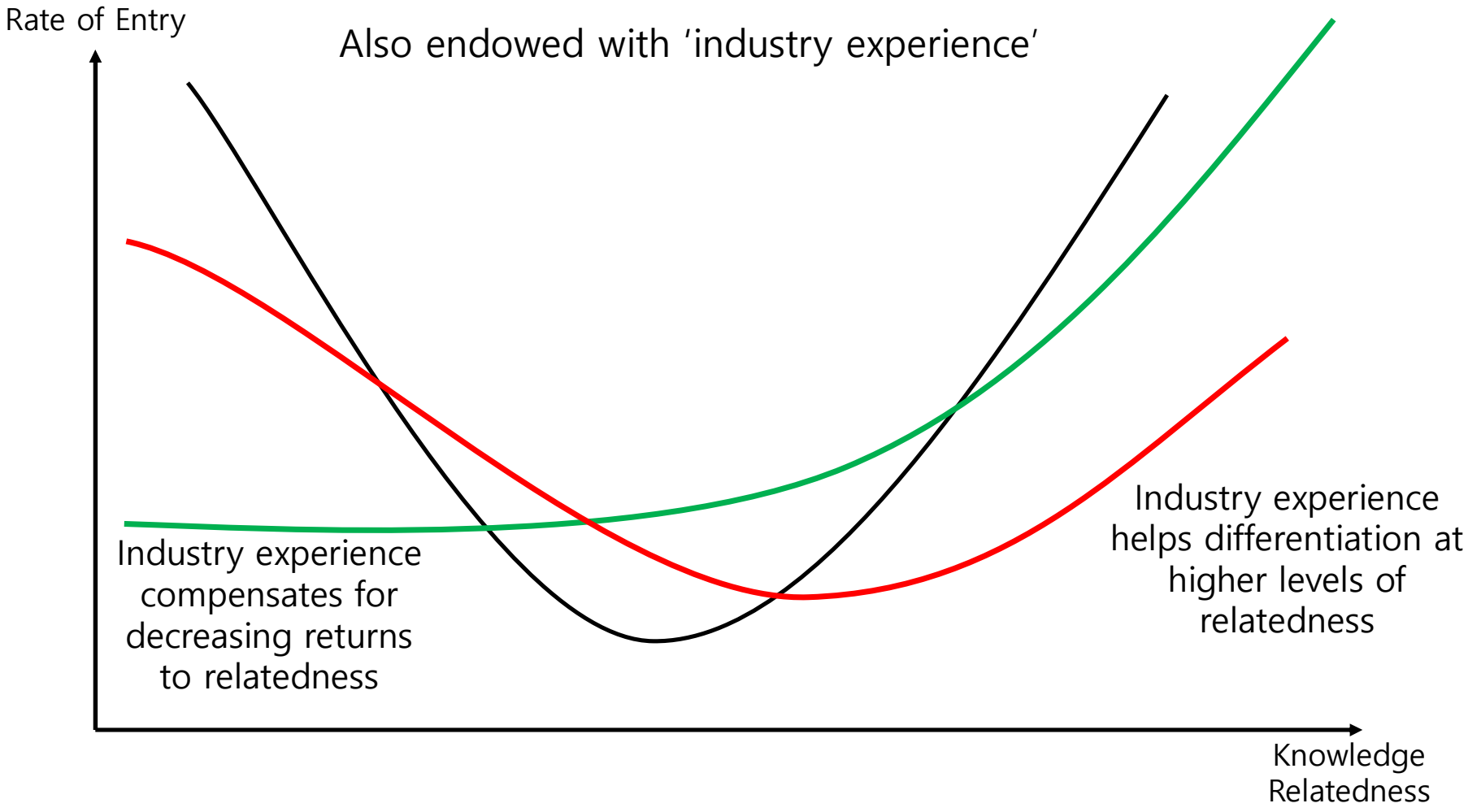
Theoretical Framework

Knowledge Relatedness – Base Mechanisms (Spinouts)



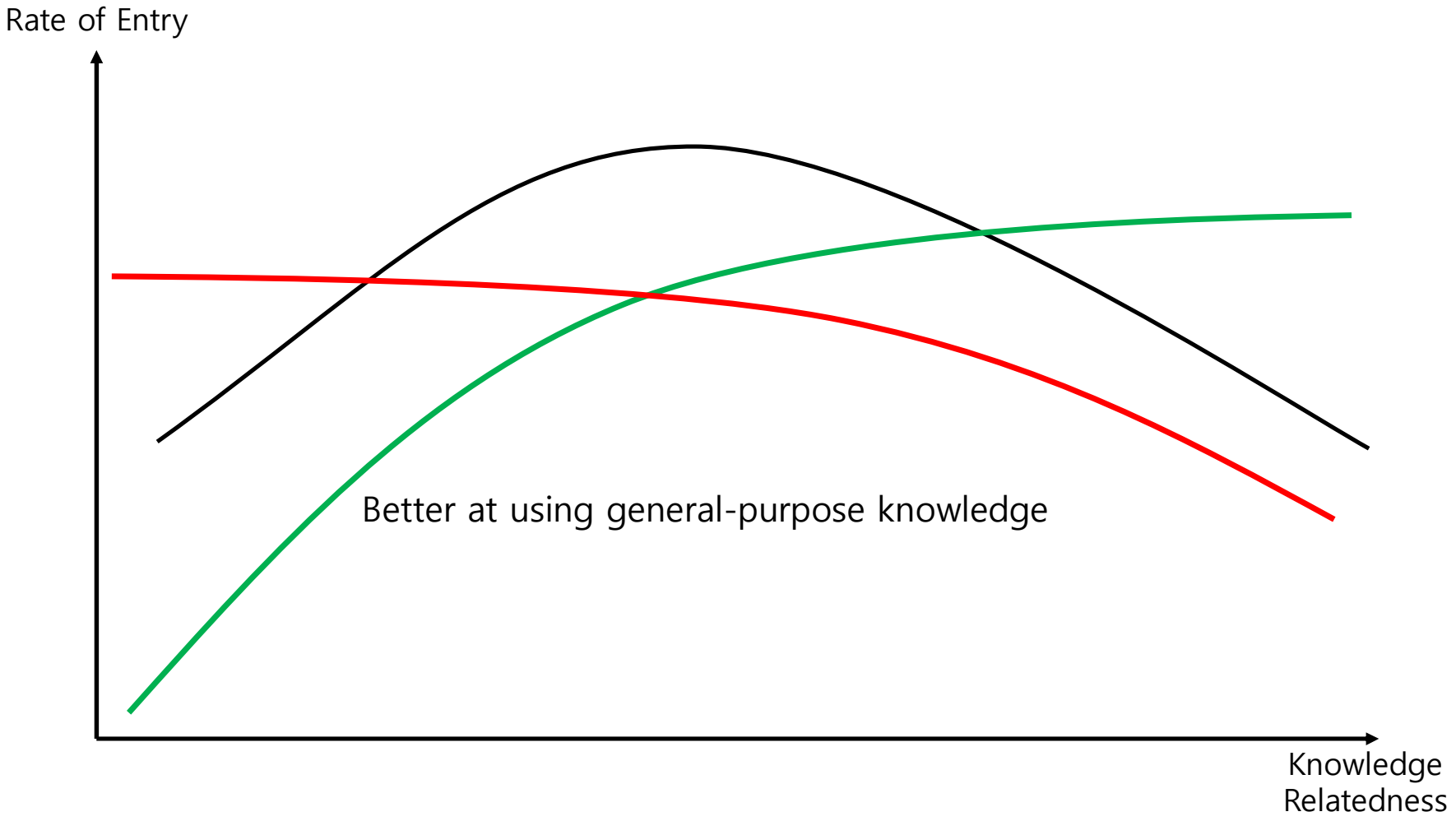
Theoretical Framework

Knowledge Relatedness – Spinoffs



Theoretical Framework

Knowledge Relatedness – Diversifiers



Empirical Analysis

Data

- Sample of all the firms listed in the Western Electronics Manufacturer Association (WEMA) directory 1960-1990 (work on a larger sample is undergoing)
  - Scanned and converted to electronic format using OCR
  - Info on: founded year, number of employees, location, and products
- Supplemented by extensive archival and Google Search to retrieve:
  - Founder(s)
    - Name, previous workplace (i.e., parent firm)
    - Not applicable for subsidiaries or divisions
  - Parent firm
    - Name, industry, founded year

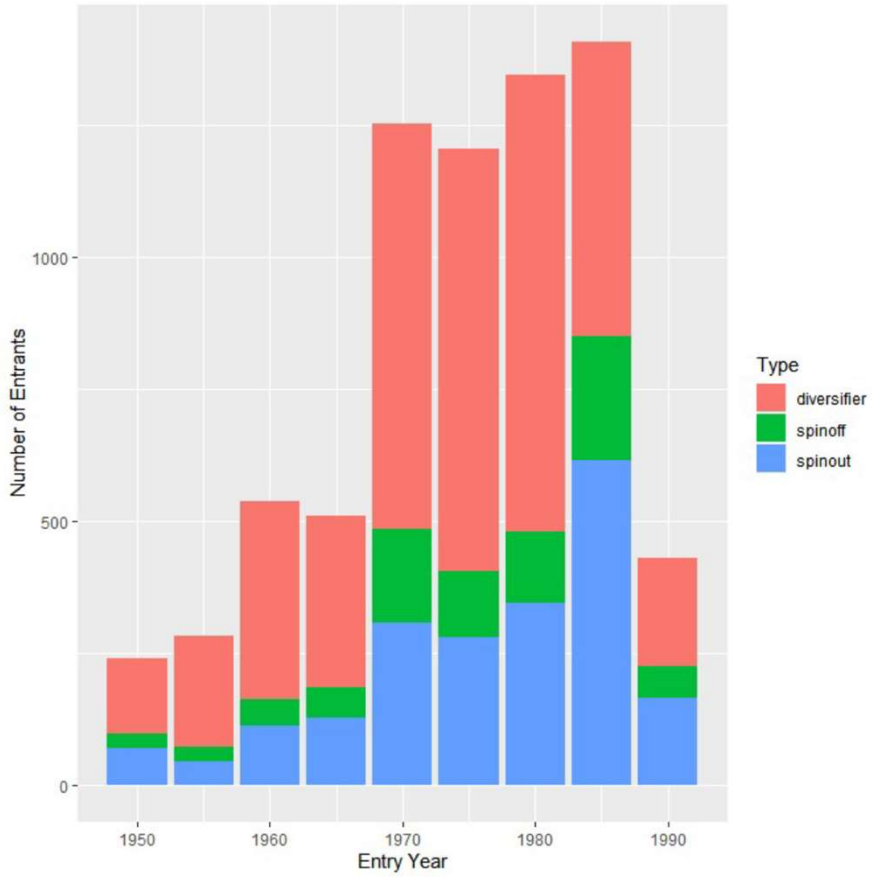
Empirical Analysis

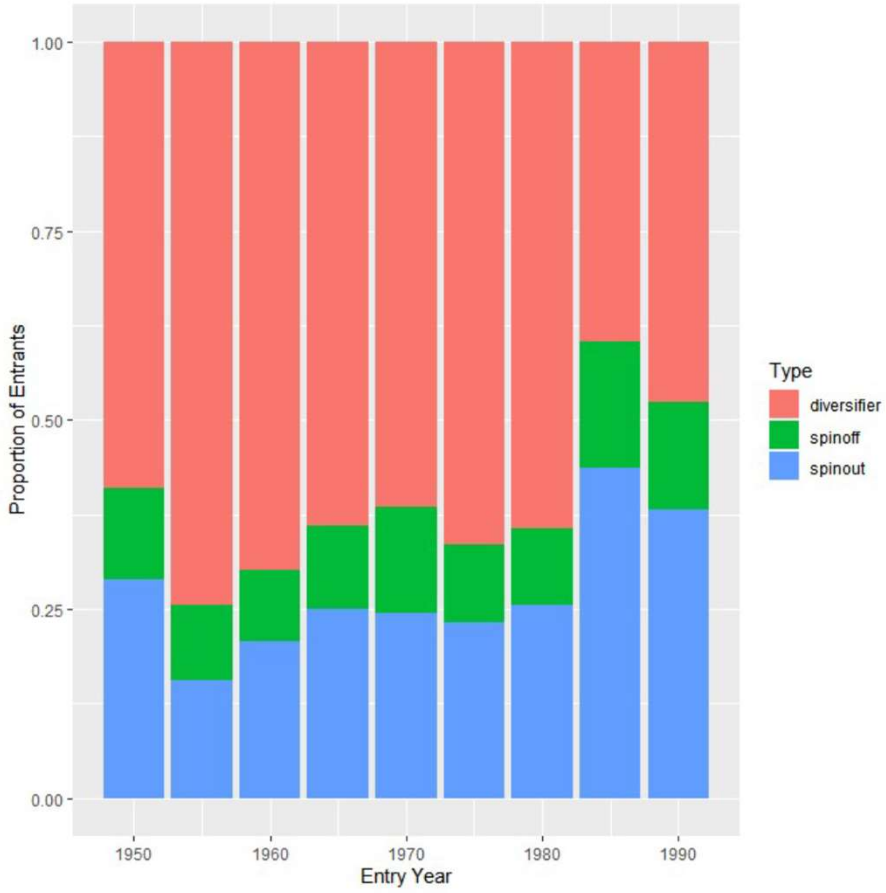
Sample and Method

- Focus on four industries (SIC 3674, 3571, 3663, 7372)
  - Sample size: 14,766 firms. 7,650 'non-startups'
  - 60% diversifiers (i.e., subsidiary, division etc.), 28% spinouts, 12% spinoffs
- Method
  - Separate Logit regressions (one for each industry)
  - Dep var: $Prob_{kjt}$
  - Entry coincides with the first year of commercialization of a specific product in industry j

Empirical Analysis

Descriptive Statistics





Variables – Main Explanatory Variable

- Knowledge Relatedness
  - Based on Chang, Eggers, & Keum (2021), using patent data from ORBIS IP
  - Primarily based on technological classes relevant to the industry, weighted by generality

$$R_{ijt} = \begin{cases} \frac{1}{n(C)} \sum_{c \in C} \max_{d \in D} (S_{cdt}) \cdot (1 - Generality_{ct}), & i \neq j \\ 1, & i = j \end{cases}$$

Similarity between CPC *c* and CPC *d*

CPCs in industry *i*

CPCs in industry *j*

Industries

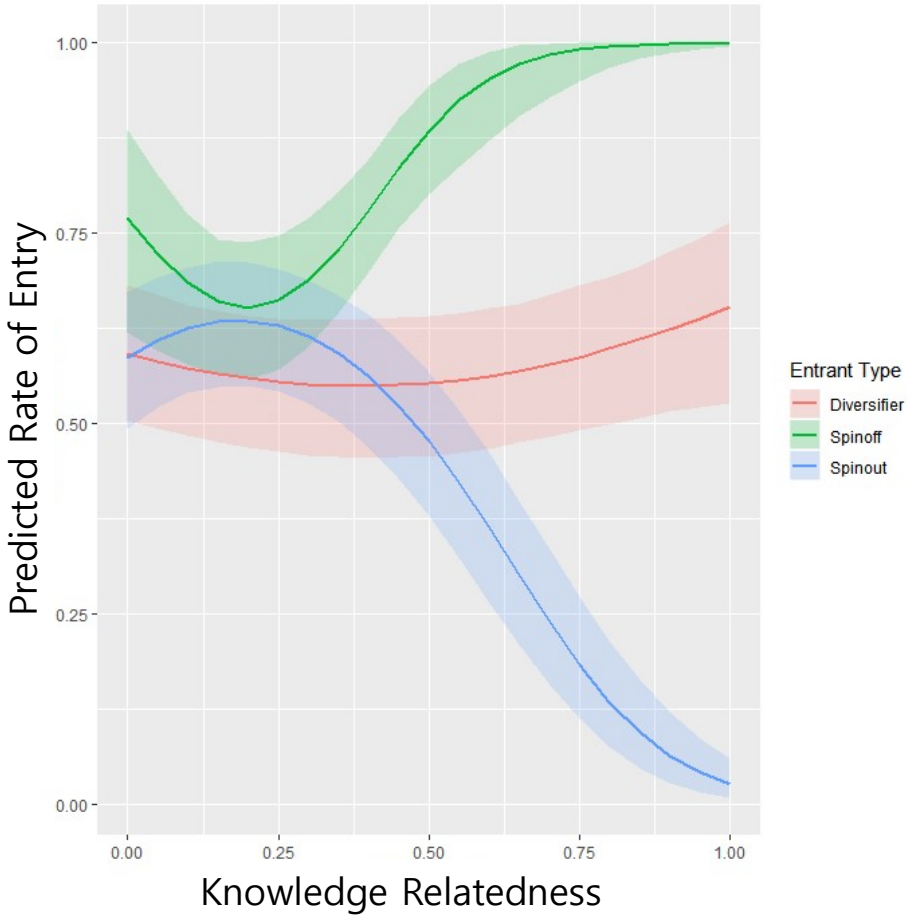
Variables – Other Explanatory Variables

- Entrant Type
  - Diversifier
    - Equals 1 if the company is a subsidiary or division
  - Spinoff
    - Equals 1 if the company is an independent company that produces a product associated with the industry of origin
- Controls
  - Number of founders, Log(number of employees), Product diversity, Age of parent
  - Entry time and location fixed effects

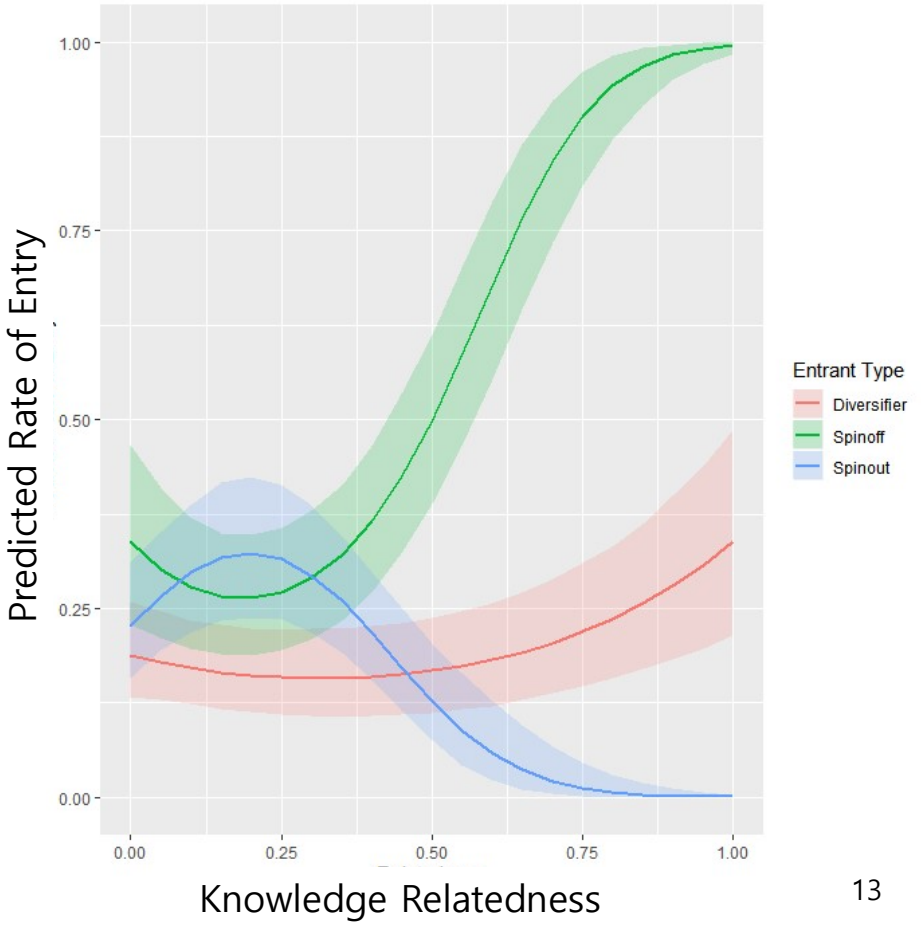
Results

Visualization – Predicted Rate of Entry

3674
Semiconductors



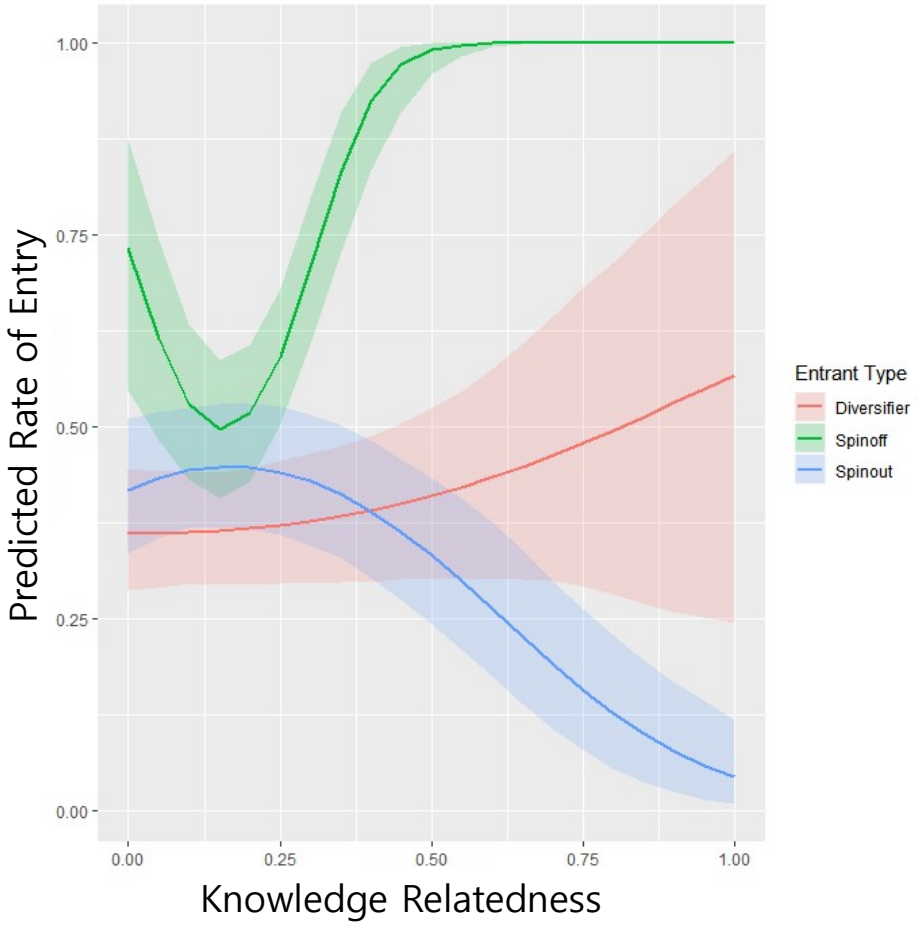
3571
Computers



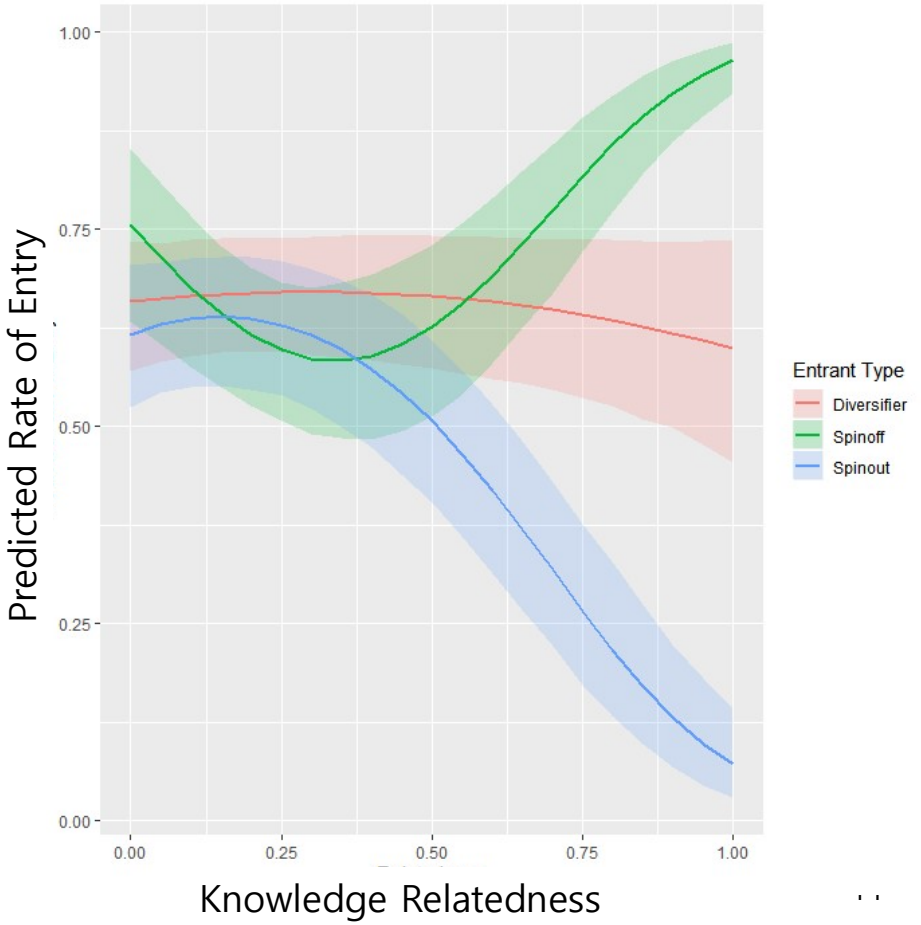
Results

Visualization – Predicted Rate of Entry

7372
Software



3663
Communications Equipment



Results

Discussion

- Relationship varies across different types of entrants
  - Aligned with predictions across all industries examined
- New entrants with highest KR tend to be diversifiers or spinoffs
  - May suggest importance of the role of competitive pressure
- IUS for spinouts, peaks at slightly different levels of KR
  - Looking at computers, for example
  - Possible role of industry-level differences

Conclusion

- Highlights mechanisms of how KR might affect firm entry
  - Nonlinearity in the relationship between KR and firm entry
  - Differences across types of entrants are especially prominent
  - This implies that incumbents will need to be aware of the different knowledge characteristics of each entrant type
- Next steps
  - Think about how contingencies (e.g., tech discontinuities, modularity, market structure) may affect the relationship
  - Looking at post-entry performance (e.g., survival, growth)