



Technology and Innovation Management

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Inside out: Exploration and exploitation across firms' boundaries

Marvel's success with “distant knowledge”

Avengers: Endgame tops Avatar to be highest grossing film

\$2.9bn

(The Guardian, 2019)



MARVEL



Source: Google images

What are key factors of Marvel's success?

- Leverage a stable core
 - e.g. using high share of same crew for next movie
- Keep challenging the formula
 - e.g. using different emotional tones across series
- Cultivate customer curiosity
 - e.g. using “Easter eggs” in its current releases
- **Selecting for experienced inexperience**
 - e.g. hiring directors from other genres

Harvard
Business
Review

MARVEL



Source: Harrison, Carlsen, Škerlavaj (2019)

Marvel select directors with “distant knowledge” - two examples

- Iron Man (2008)
 - Directed by Jon Favreau
 - Previous experience with small indie movies
- Guardians of Galaxy (2014)
 - Directed by James Gunn
 - Previous experience in horror genre

(Harrison et al. 2019)

Only 1 of Marvels 15 directors had previous experience in superhero genre



Source: Google images



Inside out: Exploration and exploitation across firms' boundaries

Learning objectives

Key concepts

- Spin out, (de)socialization
- Outbound open innovation

Methods

- Comparison of 'teaching cases' vs. 'systematic' statistical evidence

Abilities

- Critical assessment of cases vs. quantitative evidence
- Connect micro evidence with macro effects

Required Readings for today

- Case Reading
- Chesbrough, H. W., & Garman, A. R. (2009). How open innovation can help you cope in lean times. Harvard business review, 87(12), 68- 76.
- Cirillo, B., Brusoni, S., & Valentini, G. (2013). The Rejuvenation of Inventors Through Corporate Spinouts. Organization Science, 25(6),1764-1784.

Suggested Reading for today

- March, J. G. (1991). Exploration and exploitation in organizational learning. Organization science, 2(1), 71-87

Recap

- Exploration and exploitation as a central innovation dilemma for organizations and managers
- Last week: understanding ambidexterity in individuals
- Last week: tensions within organizations when introducing new ‘things’

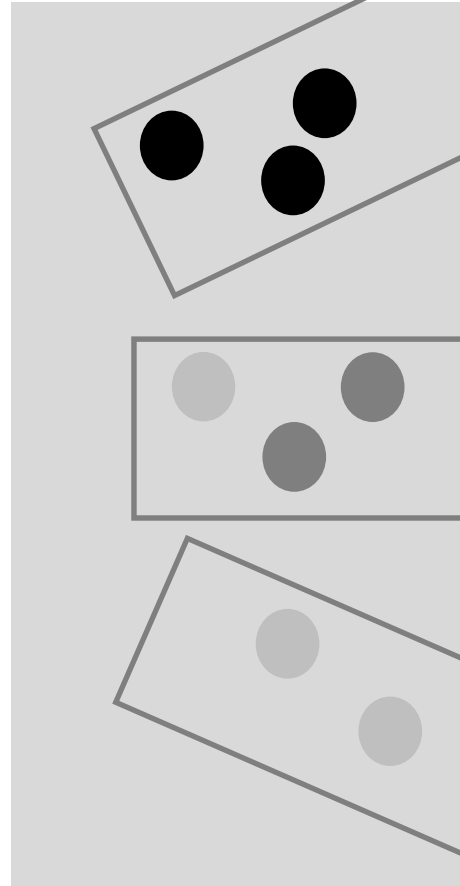
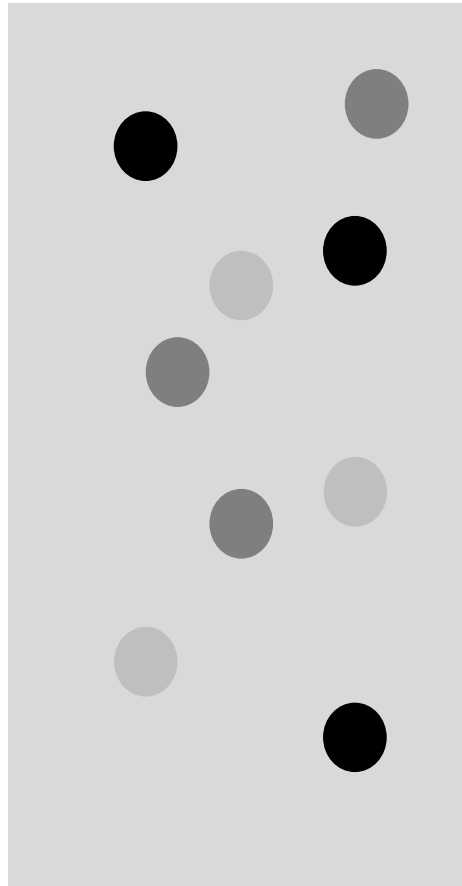
Socialization (March, 1991)

- As time goes by, people understands how an organization works, what makes it tick
 - Socialization, as in 'Flik is not really socialized'
 - High socialization is good for individual performance
- If all think alike, and behave alike, there is no scope for exploration
 - March 1991
- Solutions?
 - Turnover, open your boundaries ... → Open innovation (inbound)
 - Or let people go → Open innovation (outbound)

Inside Out

Research

Development



Existing Outside Firms

Some projects you ought to open up to investment and development by existing outside firms (black dots).

Your Company

Some projects should be kept in-house (dark gray dots).

Spin-Off Ventures

Others can be spun off as separate ventures that allow you to retain some equity (light gray dots).

Source: Pg 4 Chesborough and Garman, 2009

Move 5: Create open domains to reduce costs and expand participation



Source: Chesborough and Garman, 2009

Move 4: Grow your ecosystem, even when you are not growing



Source: Chesborough and Garman, 2009

Philips started as a company producing light bulbs. Recently, it developed an ecosystem around smart lighting products, creating room for growth in products (like smart light switches and indoor positioning systems) and services (like smart home solutions)

(Note that Philips lighting became independent in 2015 and is called Signify since 2018)

Move 3: Make your IP work harder for you and others

(12) **United States Patent**
Mekenkamp et al.

(10) **Patent No.:** **US 8,537,231 B2**
(45) **Date of Patent:** **Sep. 17, 2013**

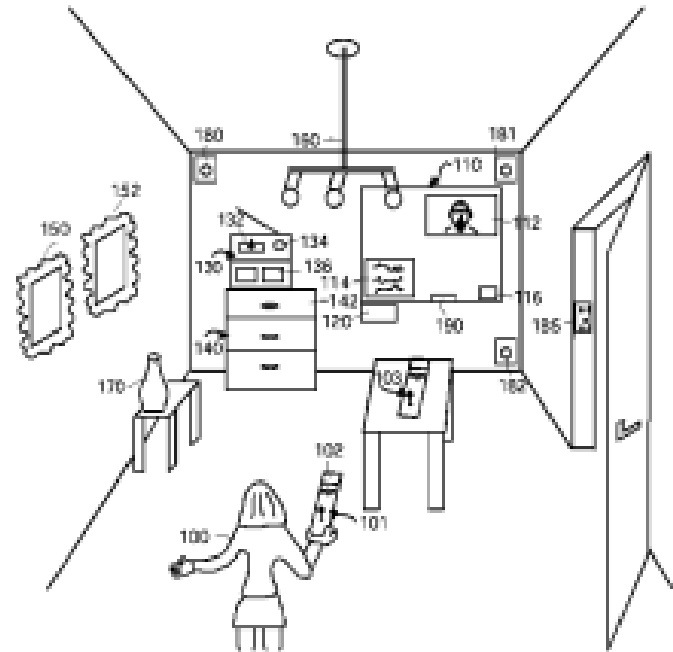
(54) **USER INTERFACE SYSTEM BASED ON POINTING DEVICE**

(75) **Inventors:** **Gerhardus Engbertus Mekenkamp**,
Eindhoven (NL); **Tim Dekker**,
Eindhoven (NL)

(73) **Assignee:** **Koninklijke Philips N.V.**, Eindhoven
(NL)

Philips has developed a thriving licensing business around its more than 60,000 patents and has spun out nearly two dozen new ventures.

This is the patent from Philips which it successfully used to sue Nintendo for the Wii



Source: Chesborough and Garman, 2009

Move 2: Let others develop your nonstrategic initiatives



Source: Chesborough and Garman, 2009

Shapeways is a company that 3D prints anything people want. The idea came from Philips Design, but it required a lot of investment in acquiring 3D printers so it was spun out. Its investors include Lux Capital and Union Square Ventures, but Philips kept part of the shares.

Move 1: Become a customer or supplier of your former internal projects



Philips engaged in a joint venture (with ASM International) to launch ASML (on the high-tech campus in Eindhoven). The first product was the Philips Automatic Stepper, sold to Philips

Source: Chesborough and Garman, 2009

What about the people?

- A key problem established organizations face is the tendency of tenured individuals to develop exploitative behaviors (e.g., Sorensen and Stuart 2000, Ahuja and Lampert 2001)
- Remember Flik's problems in 'selling' his harvesting machine



ARECO case

A LEADING DIFFUSION FOR
NATURAL HEALTH, FRESHNESS AND
QUALITY



Source: ARECO presentation at SKEMA Business School on 9th October 2015

Case questions

- How did ARECO develop such a diverse product portfolio
- Why couldn't they make it in the parent (IMRA) company?

A spin off from IMRA EUROPE SAS *Toyota Group*



**Cooling application
for electric and
hybrid vehicles**



Source: ARECO presentation at SKEMA Business School on 9th October 2015

The technology advantages

1993 New constraints:

Operation in a moving car



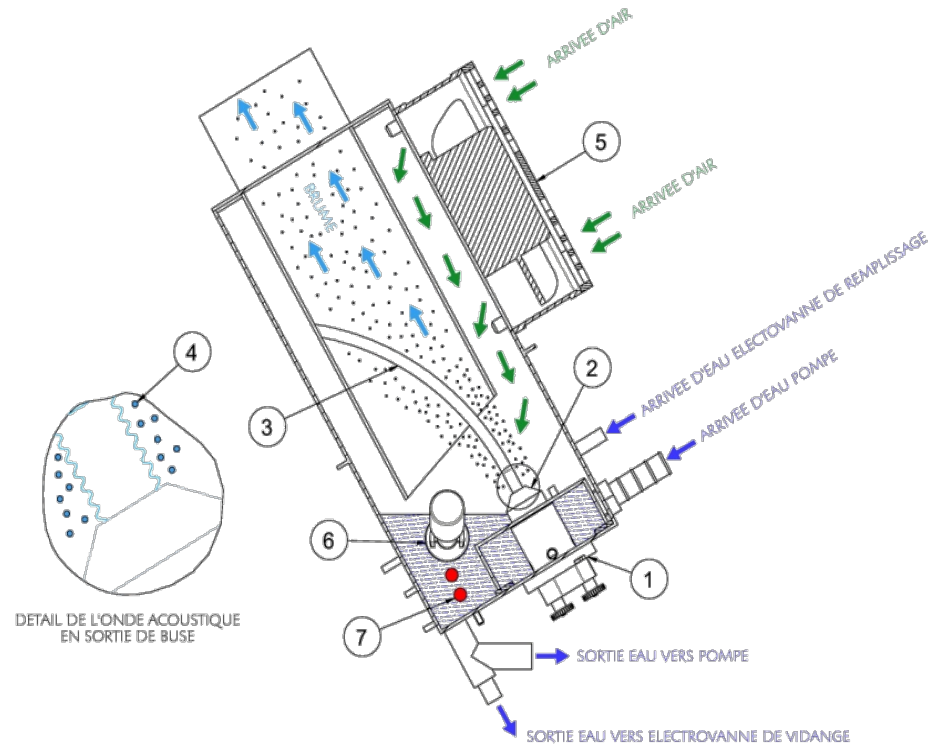
Innovation:

*Acoustic concentrator and a
Circulating pump*



Results:

*5 times more power, efficiency +40% Permanent
water circulation: better hygiene; Low influence of
vibrations and movements; The finest droplets with
high flowrate*



Source: ARECO presentation at SKEMA Business School on 9th October 2015

Industrial humidification



Painting

Clean Rooms

Plastics

Printing

Wood

Powders, explosive
materials

Chemistry



Fish Applications



14 years of nebulization

1998

2000

2002

2004

2006

2008

2010

2014

Tests

1

Creation of ARECO,
Development of
technology after 7
years of research at
IMRA

Creation of an
After Sales
Subsidiary :
AGEFI

Creation of a
holding
company,
ARFITEC

Creation of
ADDACOM

Activities

2



Cheese
making



Fruit & vegetables



Disinfection



Traditional food counter



Wine



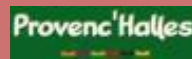
Fish



Digital
signage

Customers

3



Export

4

Chili, Argentina
(Wine)



Germany



Belgium



Spain,
Portugal



Brazil



USA



UAE



Russia



Case questions

- How did ARECO develop such a diverse product portfolio
- Why couldn't they make it in the parent (IMRA) company?

Case Discussion

- Close contacts to market and clients
 - Driver of broadening product portfolio
- Keep parent company happy with non-exclusive license deal (out of automotive)
- Internal processes simple and transparent
 - But do note that, with growth, formal processes appear also in ARECO
- New team, no one from ARECO
 - Also note his change in role

Spin-outs and the ‘Organizational code’

Voluntary incorporation of a new organization by a former employee, unit or division of the parent organization to product-market a corporate technology

“One of the biggest surprises is how different the cultures within the spin-outs are from the typical Xerox culture” ...



*“In these spin-outs, the culture is to set up the charter and ground rules”
... “Corporate ‘help’ is something you generally want to avoid”*



Andrew Garman, former vice president of
Xerox New Enterprises, Xerox Corporation
(Source: HBS, 1998)

Source: Cirillo, Brusoni & Valentini (2013)

Spin outs and de-socialization

**Do corporate spin outs enable old-timers
to develop explorative strategies?**

(do we have systematic evidence, besides ARECO?)

The spin-out experience

- **Inventor turnover and outbound mobility**
 - Turnover attenuates negative effects of socialization (e.g. March 1991, Miller et al. 2006)
 - Mobile inventors are likely to receive more citations (Trajtenberg 2005)
 - Inter-firm mobility enhances inventor productivity (Hoisl 2007)

➔ Break away from over-socialization with the code

H1. A spin-out increases the extent of exploration by inventors who join it

Knowledge dependence

- March's (1991) theory, the more a member is socialized, the more he or she relies on knowledge located in the immediate surroundings.
- Sorensen and Stuart (2000) also show that as firms grow old and establish long-standing routines, they become gradually insulated from external technological developments and are more likely to exploit established innovative domains within existing technological areas, rather than refining their areas of innovation.

H2. A spinout decreases the extent to which inventors who join it rely on the company's knowledge in their inventive activities.

Inventor tenure and the socialization constraint

- Founder tenure as determinant of spin-off performance (Klepper 2001)
- The effects of turnover differ according to individual tenure (Louis 1980)
- Long tenure, over-socialization and conservative behavior (March 1991)

➔ Old-timers are more over-socialized than newcomers

Inventor tenure and the socialization constraint

- H3A: The positive effect of spinouts on inventors' extent of exploration is stronger for highly socialized than for less socialized inventors.
 - **The 'older' the inventor, the more innovative he/she becomes**
- H3B: The negative effect of spinouts on the extent to which inventors rely on the parent company's knowledge is stronger for highly socialized than for less socialized inventors.
 - **The longer in the parent company, the more you look for alternative sources of knowledge**

Patents

Inventors
Assignee
Claims
USPC Class

United States Patent [19] Bil et al.

US005226653A

[11] Patent Number: 5,226,653

[45] Date of Patent: Jul. 13, 1993

[54] MULTILEVEL PLAY FEATURE FOR A
PINBALL GAME[75] Inventors: Zofia Bil, Chicago; Bill
Pfitzenreuter, Arlington Hts.; Barry
Oursler, Barrington, all of Ill.[73] Assignee: Williams Electronics Games, Inc.,
Chicago, Ill.

[21] Appl. No.: 906,523

[22] Filed: Jun. 30, 1992

[51] Int. Cl.⁵ A63F 7/02; A63F 7/30[52] U.S. Cl. 273/121 A; 273/177 R;
273/177 C; 273/118 A; 273/118 D; 273/119 A[58] Field of Search 273/118 R, 118 A, 119 R,
273/119 A, 120 R, 120 A, 121 R, 121 A, 121 D,
121 E, 122 R, 122 A, 123 R, 123 R, 124 R, 124
A, 125 R, 125 A, 127 R, 127 A, 127 B, 127 C,
127 D, 129 R, 129 S

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4,426,081 1/1984 Fainzilberg 273/127 D
4,773,646 9/1988 Joos, Jr. et al. 273/121 A

4,840,375 6/1989 Lawlor et al. 272/121 A
4,934,699 6/1990 Yaminkow et al. 273/121 A
4,943,061 7/1990 Grabel .

Primary Examiner—V. Millin .

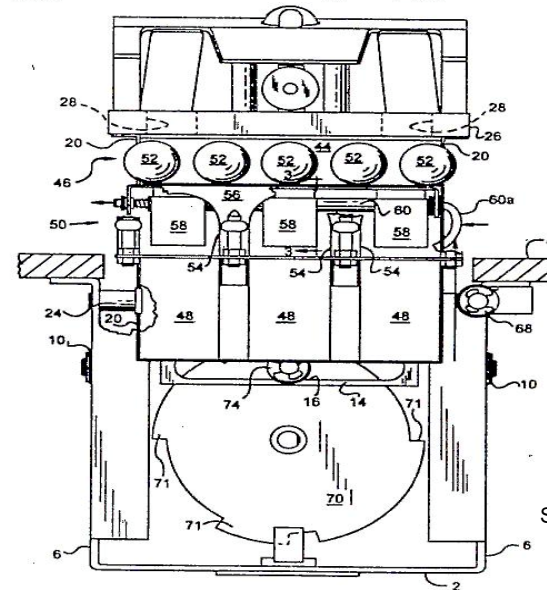
Assistant Examiner—Raleigh W. Chiu .

Attorney, Agent, or Firm—Rockey, Rifkin and Ryther

[57] ABSTRACT

The play feature of the invention consists of a three level target assembly where the uppermost level is mounted on a section of the playfield. The two lower levels are mounted to the underside of the playfield section such that upon activation of the play feature's drive system, the playfield section is raised to sequentially expose the two lower levels. In the preferred embodiment, the upper level includes ball ejector holes, the middle level includes button targets and the lower level includes ball diverting chutes. The game's microprocessor can be programmed to allow the ball ejector holes to eject the trapped ball only after the player completes a predetermined series of shots using a second ball. In such a situation, the ejection of the trapped ball will result in multi-ball play where more than one ball is in play at the same time.

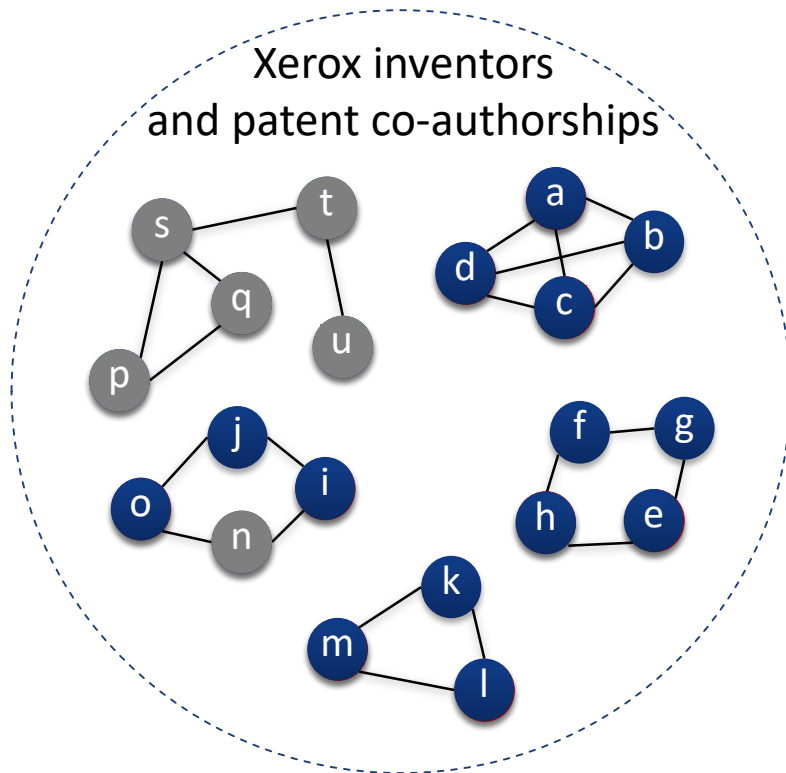
9 Claims, 4 Drawing Sheets



Source: all images from Internet

Methods: Treated and Control groups

Xerox Corporation



Treated group

136 US inventors who moved to **8** spin-outs and have patent records at USPTO before and after the spin-out

Spin-out A

Spin-out B

Control group

226 US inventors who stayed in the parent after the birth of a spin-out. Criteria:

- Exposure to same ‘organizational code’
 - Co-inventors who stay in the parent
- Similar characteristics
 - Closer match in probability of spin-out*

* (propensity score match on **age, seniority, productivity, knowledge background**)

Methods: Measures

Dependent variable

Extent of exploration: Number of claims produced in new technological classes

- USPC classes new to the inventor and the parent portfolio
- Claims refer to knowledge which is new to the world (e.g. Lanjouw and Schankerman, 2004)

Share of citations to Xerox : Percentage of backward citations made by inventor i in year t to prior Xerox's patents

Independent variables

Spin-out: Inventor affiliation at year t (1 if spin-out; 0 if parent)

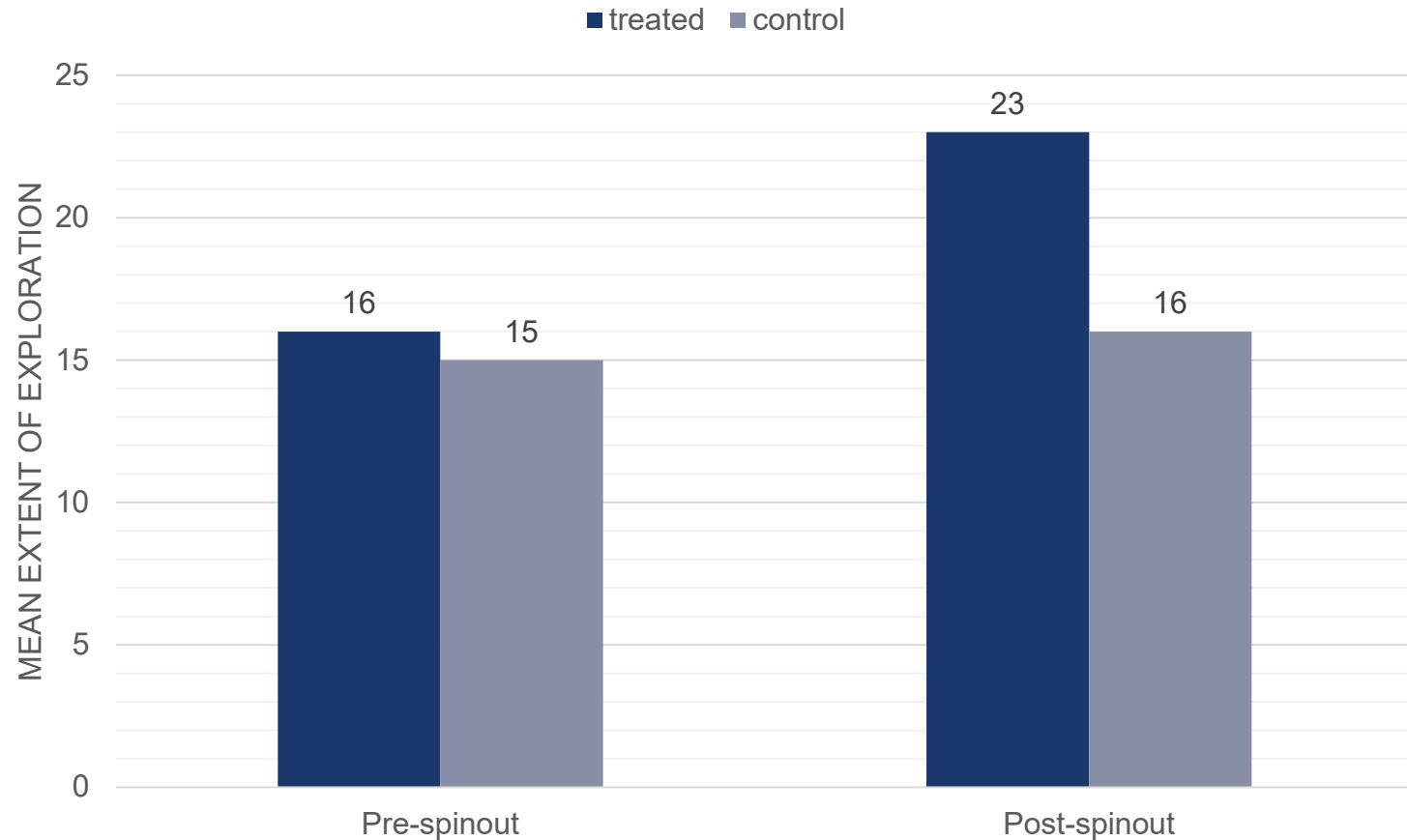
- Patent assignee (e.g. Almeida and Kogut 1999)

Tenure : (Tenure clock in Xerox at year t | spinout = 0); (max prior tenure clock in Xerox | spinout = 1)

Control Variables

- Inventor level: productivity, knowledge, seniority
- Firm level: productivity, ownership, division dummy

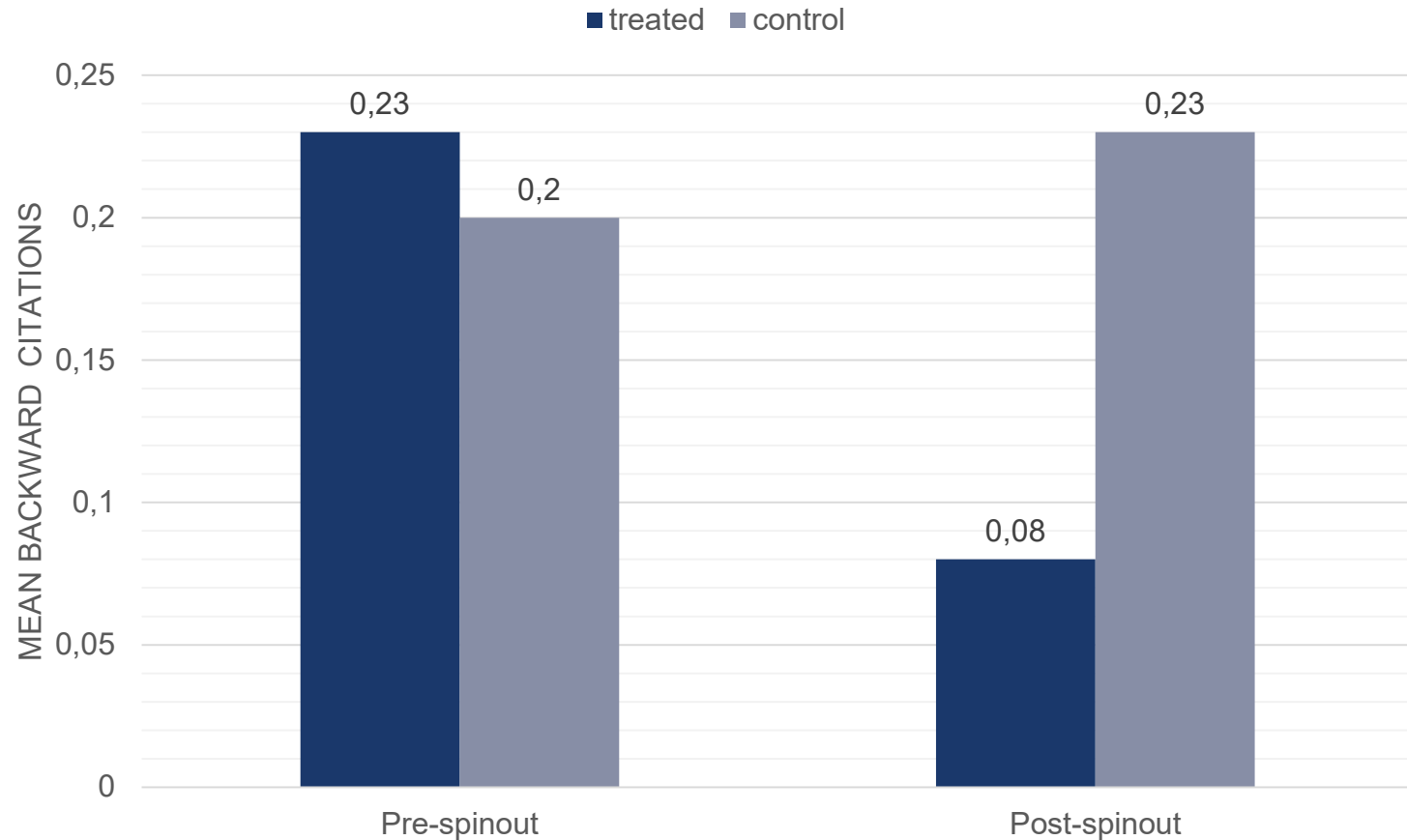
Group differences- Explorativeness



Note: 1st year in spin-outs (i.e., t_0) dropped

Source: Cirillo, Brusoni & Valentini (2013)

Group differences- Knowledge dependence

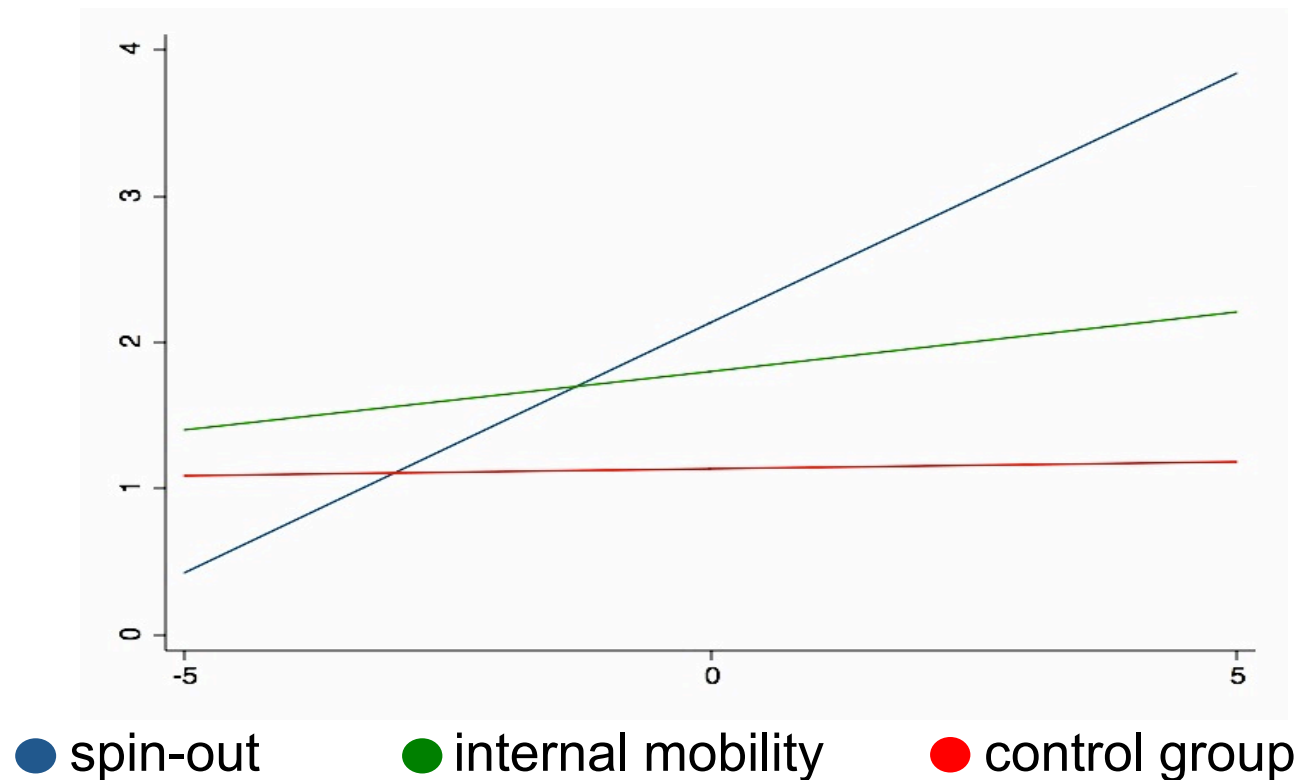


Note: 1st year in spin-outs (i.e., t_0) dropped

Source: Cirillo, Brusoni & Valentini (2013)

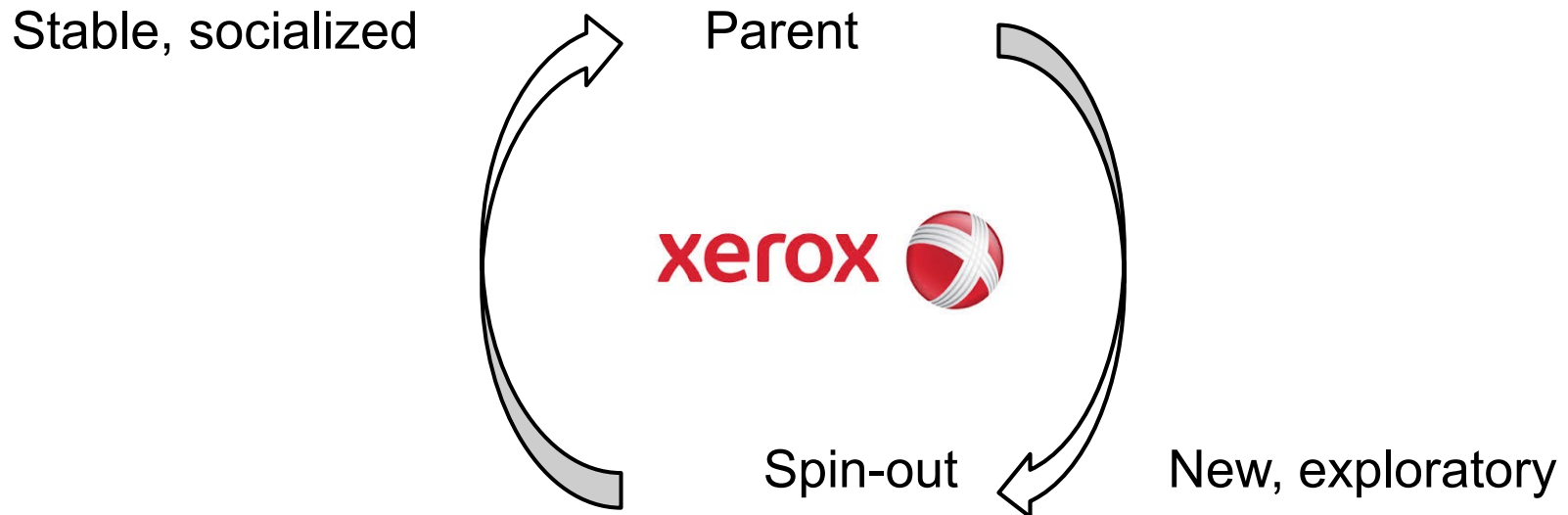
Additional analyses (1)

If spin-out de-socialize inventors due to the combined effects of de-socialization and mobility, similar (but weaker) effects should be observed from intra-corporation mobility



Source: Cirillo, Brusoni & Valentini (2013)

What about the parent company ? (preliminary evidence)



Source: Cirillo, Brusoni & Valentini (2013)

Spin-Outs

- Emerging evidence that spin out organizations benefit the parent company in various ways:
 - Motivation: people know they have an exit strategy
 - Informal knowledge transfer: the parent company access new, relevant knowledge
 - Formal knowledge transfer and 'buy back' closes
 - Assessment of market readiness to new technologies

Learning objectives

Key concepts

- Spin out, (de)socialization
- Outbound open innovation

Methods

- Comparison of 'teaching cases' vs. 'systematic' statistical evidence

Abilities

- Critical assessment of cases vs. quantitative evidence
- Connect micro evidence with macro effects

Next time:



Source: Images from internet