Returns to Alliance Portfolio Diversity:

The Relative Effects of Partner Diversity on Firm's Innovative Performance and Productivity

Orlando, US: Aug-13-2013

Tim de Leeuw, Boris Lokshin, Geert Duysters

TU/e Technische Universiteit Eindhoven University of Technology

Where innovation starts

Introduction I

- **Alliances are ubiquitous phenomenon**
  (Contractor & Lorange, 2002)
- **Increasing # of simultaneous alliances**
  (De Man & Duysters, 2005; Li, Qian, & Qian, 2012)
- **Unlikely 1 alliances provides all**

- **Alliance portfolio perspective (Wassmer, 2010)**
  - **Different partners types (e.g. Duysters and Lokshin, 2011)**
  - **Incorporating (dis)synergies (Wassmer & Dussauge, 2011; 2012)**

Introduction II

- **Alliance Portfolio Diversity (APD) has been studied:**
  - **Financial performance (Faems, De Visser, Andries, & Van Looy, 2010; Lavie & Miller, 2008; Mouri, Sarkar, & Frye, 2012; Wassmer & Dussauge, 2011)**
  - **Innovative performance (Srivastava & Gnyawali, 2011, Duysters & Lokshin, 2011; Wuyts, & Dutta, 2012)**
  - **Firms' exit via sell-off and shutdown (Bruyaka & Durand, 2012)**

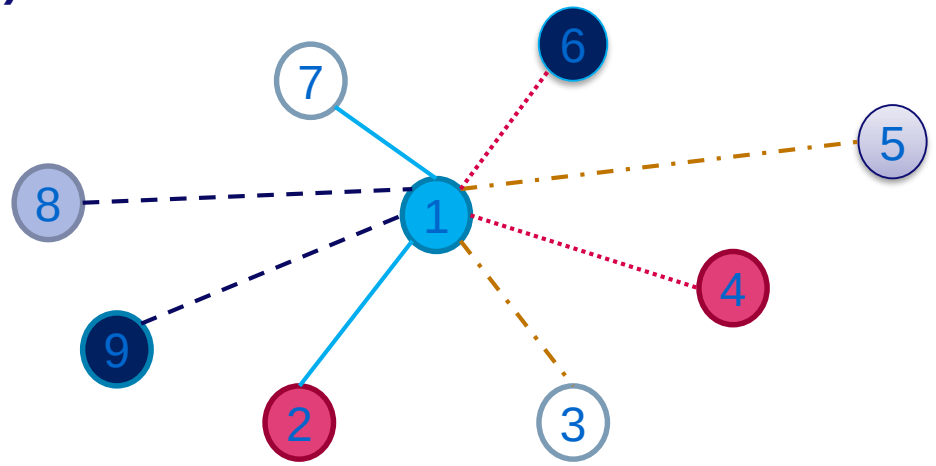
- **Only 1 performance dimension**

  Firms balance strategies, maximizing exploration and exploitation (e.g., Cao, Gedajlovic, & Zhang, 2009; Venkatraman, Lee, & Iyer, 2007)

  - ➢ **Relative performance effects?**
  - ➢ **Differences in optima?**

Introduction III

- **Independent variable:**
  - **APD: Different types of alliance partners (c.f. Faems, Van Looy, & Debackere, 2005; Oerlemans, Knoben, & Pretorius, 2013)**
  - **Different partner types=different resources (e.g. Aschhof & Schmidt; 2008; Belderbos, Carree, Diederen, Lokshin, & Veugelers, 2004; Teece, 1980)**



- **Dependent variables:**
  - **Productivity**
  - **Radical innovative performance**
  - **Incremental innovative performance**

Theory: APD and performance

+ Supplement, complement internal innovation (RVB, e.g. Poot, Faems, & Vanhaverbeke, 2009)
+ Combine, invest or exchange in skills, assets and knowledge, (e.g. Dyer, 1996; Nooteboom, 1999), like successive production stages
- Budget equation (Burt, 1992)
- Information overflow (too many, wrong time, attention) (Koput, 1997)
- Monitoring and controlling costs (e.g., Faems, Janssens, Madhok, Van Looy, 2008; Gulati & Singh, 1998)
- Inefficient resource allocations, opportunistic behavior (Combs & Ketchen, 1999; Teece, 2002), relations specific investments and adverse selection

- ***H1/H2: APD: Inverted U-shaped, both productivity as innovative performance***

Theory: Optimum productivity

- **Combine, invest or exchange in skills, assets and knowledge, (Nooteboom, 1999; Williamson, 1985; Rosenzweig et al., 2003) like successive production stages**

  - **Types of partners in the supply chain:**
    - **Supply chain management, Just In Time delivery, reductions of waste, optimalization of processes, economies of scale**

  - **Reduce uncertainty:**
    - **Joint forecasting (Metters, 1997), absorbing uncertainty, share risks, provide economies of scope (Baker, 1990; Burgers, Hill, & Kim, 1993)**

Theory: Optimum Radical inn. perf.

- **Radical: New innovations:**
  - **Adaptation of knowledge base (Cohen & Levinthal, 1990)**
  - **Concentrate limited # types of alliance partners (e.g., Belderbos et al., 2006; Riggs & Von Hippel, 1994; Zucker, Darby, & Brewer, 1998)**
  - **Attention-based theory (Simon, 1947; Ocasio, 1997)**
  - **Maximum span of control (see Simon, 1957; March, 1978)**
  - **Knowledge spillovers (Combs & Ketchen, 1999; Jiang et al., 2010; Teece, 2002)**

- ***H3: For radical innovative performance the point where additional APD becomes unproductive will be higher than for productivity***

Technische Universiteit Eindhoven University of Technology

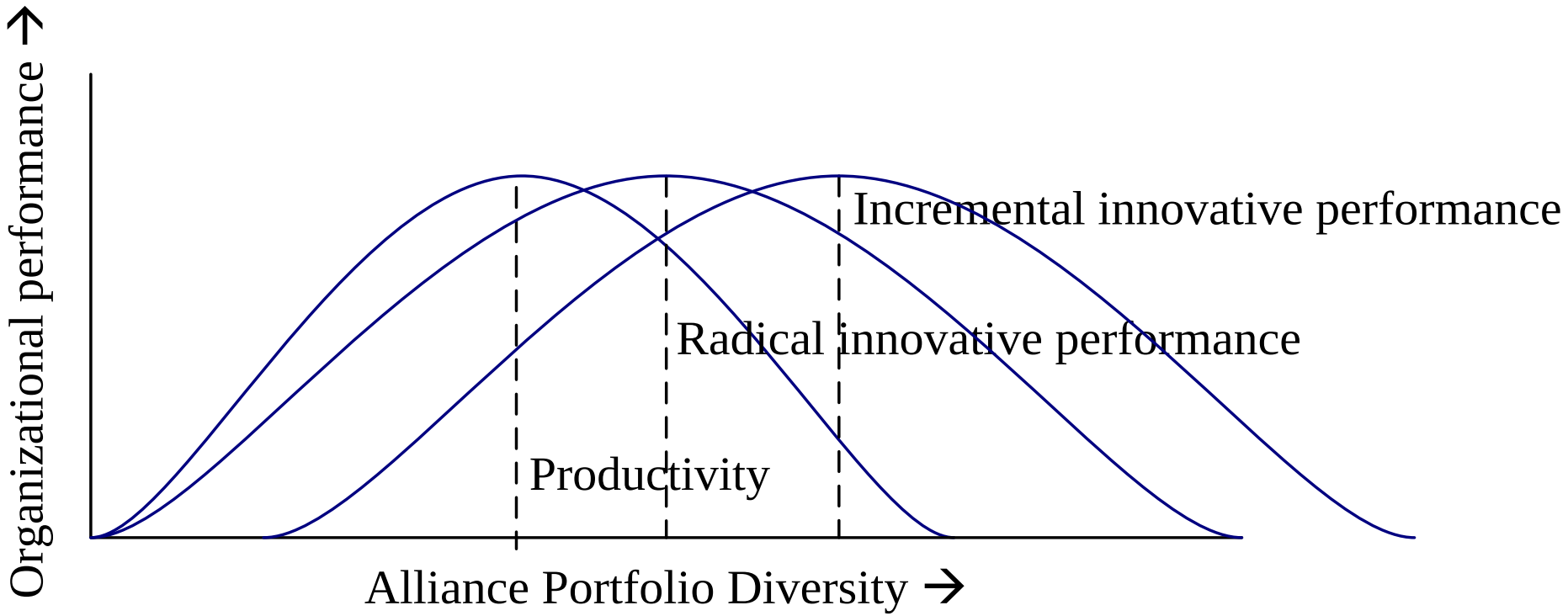
Theory: Optimum Incremental inn. perf.

- **Incremental: Improvement of existing p.p.s:**
  - **Dominant design is there**
  - **All kinds of partners can provide resources, types are exchangeable (Garriga, von Krogh, & Spaeth, 2013; Feller, Parhankagas, & Smeds, 2007; Laursen and Salter, 2006)**
  - **Fine tuning: sufficient knowledge in-house, no large adaptation of knowledge base**
  - **Focal firm able to integrate the full range of information and resources; types of alliance partners (Pavitt, 1998)**

- ***H4: For incremental innovative performance the point where additional APD becomes unproductive will be higher than for radical innovative performance***

Technische Universiteit Eindhoven University of Technology

Theory: APD and 3 perf. dimensions



Data

- Community Innovation Surveys (CIS)
- The Netherlands
- Panel data: 1996-2006 (minus 2002 due to differences)
- Large, medium and small firms (~14,000 observations)
- 26 industries

Measurement

- **Independent variable:**
  - **APD: 7 types of alliance partners (national and foreign)**
- **Dependent variables:**
  - **Productivity: turnover per employee**
  - **Radical: % turnover new to the market**
  - **Incremental: % turnover new to firm and improved**
- **Controls: R&D intensity, Firm size, Firm AGE, APDexp, Resource constraints, Use of codified external info, MNE, Part of domestic group, basic research, performing R&D, continuous R&D, buying R&D, 26 industries and years.**

Methods

- DV = censored (%)
  - Random effects, Tobit analysis
    - Individual effect to control for unobserved heterogeneity
    - Retain firms with only one observation
    - Retain time-invariant variables
    - Does not suffer from incidental-parameter problem
- APD and financial: GLS

Results

Table 2: Analyses of APD and financial, radical and incremental innovative performance

	Productivity	Radical inn.	Incremental inn.
Constant	5.71 (0.09) ***	10.12 (2.72) ***	17.24 (2.33) ***
Alliance portfolio diversity (APD)	0.46 (0.24) *	34.20 (6.06) ***	23.54 (6.75) ***
Alliance portfolio diversity Squared	-0.79 (0.38) **	-25.64 (9.11) **	-9.02 (10.36)
Tipping point	0.29	0.67	-
Number of partner types at tipping point	7.59 (0.96) ***	11.43 (1.24) ***	-
Resource constraints	-0.03 (0.03)	2.31 (0.77) **	3.69 (0.79) ***
Part of domestic group	0.14 (0.07) *	-2.08 (3.24)	1.99 (2.84)
Use of codified external information sources	-0.10 (0.05) *	1.04 (1.31) *	6.36 (1377) ***
R&D intensity	-0.10 (0.01) ***	0.06 (0.21)	0.36 (0.22)
MNE	0.09 (0.07)	-1.83 (3.23)	2.26 (2.83)
Firm size	-0.06 (0.01) ***	-1.57 (0.24) ***	-2.23 (0.24) ***
Firm age	0.00 (0.00) ***	-0.10 (0.03) ***	-0.14 (0.03) ***
APD experience	-0.04 (0.03)	0.28 (0.86)	1.40 (0.88)
Dummy: Close to basic research	0.09 (0.06)	4.44 (1.48) **	1.53 (1.59)
Dummy: R&D active	-0.03 (0.03)	3.93 (0.88) ***	2.21 (0.90) *
Dummy: Continuous R&D	0.11 (0.03) ***	6.85 (0.82) ***	7.77 (0.88) ***
Dummy: R&D outsourced	0.18 (0.03) ***	1.37 (0.69) *	0.44 (0.74)
No. observations	10685	9205	9906
No. individual firms	8461	7322	7896
No. left-censored observations	-	5065	3698
No. right-censored observations	-	74	146
σ_u	0.71 (0.02) ***	12.02 (0.67) ***	10.42 (1.04) ***
σ_e	0.84 (0.01) ***	20.62 (0.41) ***	25.57 (0.47) ***
R-square	17.84%	-	-
Log likelihood full model	-	-27347***	-31410***

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. The models included 25 industry dummies and 5 year dummies.

Results

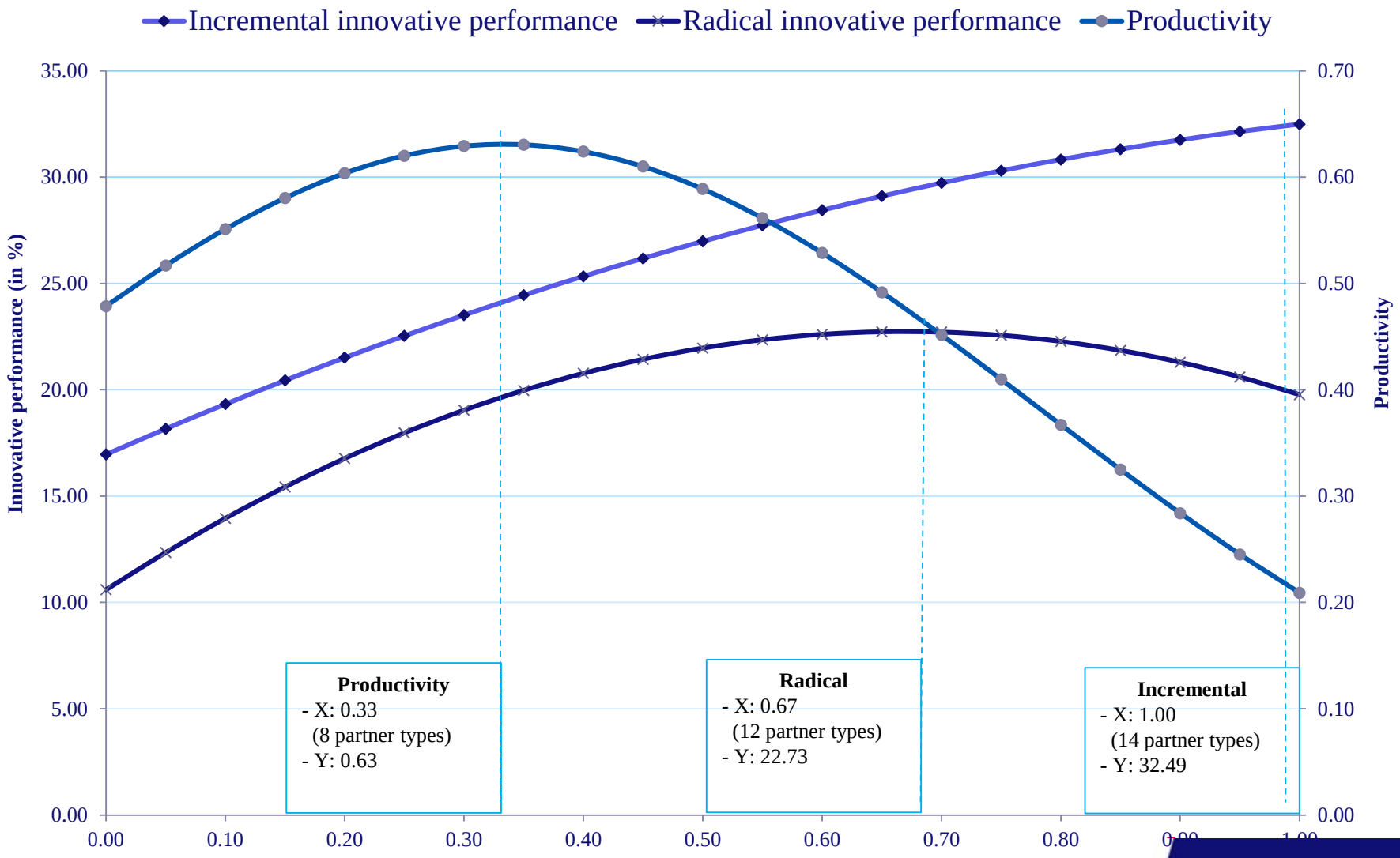
Table 2: Analyses of APD and financial, radical and incremental innovative performance

	Productivity	Radical inn.	Incremental inn.
Alliance portfolio diversity (APD)	0.46 (0.24) *	34.20 (6.06) ***	23.54 (6.75) ***
Alliance portfolio diversity Squared	-0.79 (0.38) **	-25.64 (9.11) **	-9.02 (10.36)
Tipping point	0.29	0.67	-
Number of partner types at tipping point	7.59 (0.96) ***	11.43 (1.24) ***	-

- ✓ **H1 APD → Productivity = Inv U.**
- ✓ **H2 APD → Inn = Inv U. (partly)**
- ✓ **H3 Optima Rad > Optima Productivity**
- ✓ **H4 Optima Inc > Optima Radical**

Results

Productivity, Radical and Incremental innovative performance (f) APD



Discussion and Conclusion

- **Results differ per performance dimension**
- **Different levels APD optimal for different dimensions**
- **Performance new partner, depends on previous APD: management of portfolio**
- **Multiple performance dimensions + multiple APD dimensions**

Thank you

Tim de Leeuw

t.deleeuw@tias.edu