

**The Dynamics of Creative Networks along
the Industry Life Cycle:
The case of the Global Video Games Industry**

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Outline of the presentation

1. Industry life cycle, proximity and network dynamics
2. Research design
3. Empirical results



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1. Industry life cycle, proximity and network dynamics

- **Industry life cycle approach**
 - firm dynamics: entry and exits of firms
 - typical S-curve
 - but firms not only compete but also collaborate (especially in creative industries)
 - firm and network dynamics:
 - (1) entry/exit of firms: nodes come and go
 - (2) relationships are created and dissolved



1. Industry life cycle, proximity and network dynamics

- **Proximity approach**
 - proximity and innovation (French School)
 - forms of proximity: geographical proximity only one of them
 - may act as substitutes or complements
 - proximity dimensions drivers of network formation
 - but often static perspective
 - industry life cycle: effect of proximity dimensions stable over time?



1. Industry life cycle, proximity and network dynamics

- **Network approach**
 - networks and innovation
 - drivers of networks
 - proximity dimensions might be crucial, but also individual features of agents and structural features of networks
 - often a static perspective is adopted
 - what drives network formation over time?
 - industry life cycle approach provides a useful framework

therefore, there is a need to combine the literatures on industry life cycle, proximity and network dynamics



1. Industry life cycle, proximity and network dynamics

- **Main research questions**
 1. which proximity dimensions drive the evolution of creative networks?
 2. do the effects of the proximity dimensions increase or decrease along the industry life cycle (with the degree of maturity of the industry)?



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2. Research design

- **the case of the global video games industry**
 - creative industry (not high-tech: no patenting)
 - project-based networks: cultural products
 - local buzz and reputation
 - developers and publishers
 - type of network:

(1) joint creation of new video game

(2) commercialization (as in many other creative industries)

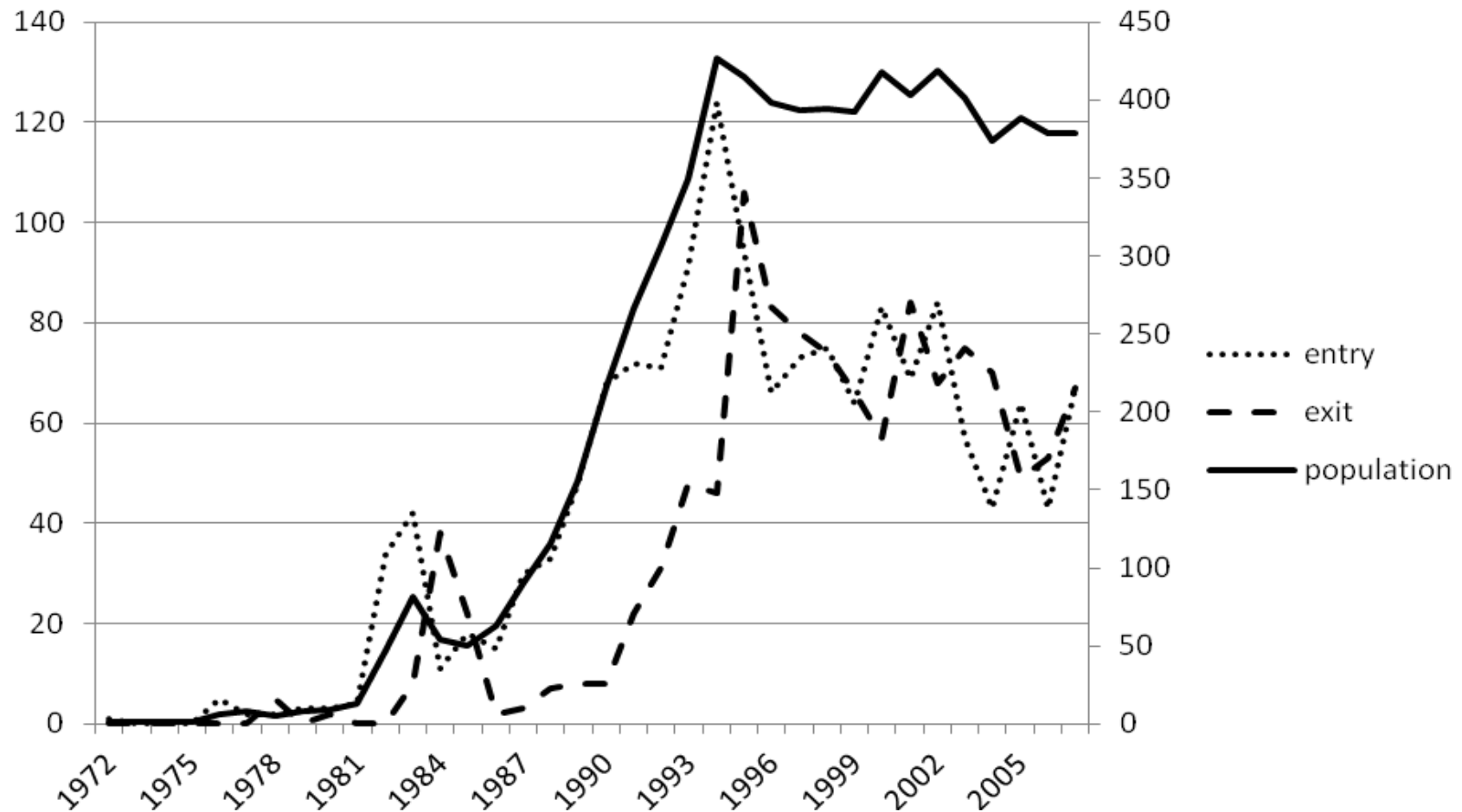


2. Research design

- **population**
 - unit of analysis = co-production of a video game (>75% of all video games are produced by at least 2 firms)
 - unique database (1972-2007): all producers of video games worldwide: we cover the whole industry life cycle
 - 6 different technological generations (GEN)
 - network analysis: only last 4 generations: 1987-2007
 - analysis of games produced by only 2 firms
 - 21.314 games and 1.358 unique firms



Entry, exit and population in the global video game industry



Collaboration patterns along six generations

	Gen 1	Gen 2	Gen 3	Gen 4	Gen 5	Gen 6
Years covered	1972-1981	1982-1986	1987-1992	1993-1998	1999-2004	2005-2007
Number of firms	21	166	510	1035	1029	757
Number of games	212	916	2526	5525	8406	4857
Games per firm (mean)	10,095	5,518	4,953	5,338	8,169	6,416
<i>Nb of games involving:</i>						
- A single firm	128	508	806	1394	1112	455
-Two firms	84	398	1659	3937	6841	4018
-Three firms	0	10	58	188	437	355
-Four firms	0	0	3	6	15	16
-Five firms	0	0	0	0	1	8
-Six firms	0	0	0	0	0	5



Network dynamics : relational and composition change

	Observed period	Ties created	Ties dissolved	Ties Maintained	Firms Entry	Firms Exit
Generation 3	1987-1988	132	92	28	52	1
	1988-1989	242	114	46	45	0
	1989-1990	402	180	108	45	4
	1990-1991	412	368	142	20	7
	1991-1992	492	394	160	0	23
Generation 4	1993-1994	734	566	282	61	14
	1994-1995	554	800	216	54	42
	1995-1996	584	572	198	42	46
	1996-1997	648	546	236	25	49
	1997-1998	478	628	256	0	51
Generation 5	1999-2000	754	468	324	55	10
	2000-2001	566	770	308	56	23
	2001-2002	872	502	372	35	37
	2002-2003	762	794	450	26	53
	2003-2004	678	796	416	0	65
Generation 6	2005-2006	508	526	300	17	16
	2006-2007	594	504	304	0	32



Explaining network formation

- a network tie between 2 firms is only active during the year of release of the video game
- network dynamics within each generation are analyzed separately
- conditional dependence of observations: specific models are required (like QAP)
- stochastic actor-oriented model (SOAM) (Snijders et al. 2010)
 - we account for network dependencies (QAP) but we also model these
 - dynamic model (SIENA) based on Markov chain
 - **actor**-oriented model: agents makes choices based on their preferences and constraints
 - flexible in terms of the variety of variables



Three sets of independent variables

1. **structural effects (network endogeneity: previous network structures)**
 - density effect (control): limited resources in creating and maintaining linkages
 - transitivity effect (triadic closure): partners of partners more likely to collaborate
 - preferential attachment: firms prefer to collaborate with most central actors: not included in the network analysis
2. **individual features (heterogeneity of firms)**
 - size of firm: bigness
 - experience: age of firm
 - absorptive capacity: not included in the network analysis



Three sets of independent variables

3. proximity dimensions (similarity of actors' attributes)

- cognitive proximity *Knowledge bases similarity*
- geographical proximity *Physical distance*
- organizational proximity *Group membership*
- institutional proximity *Institutional regime similarity*
- social proximity *Social embeddedness*



operationalization of independents

	Operationalization
Density	Out degree (sum)
Transitivity	Transitive triplets (sum)
Institutional proximity	Same country (dummy)
Geographical proximity	Inverse of Physical distance (natural log)
Organizational proximity	Same group of firms (dummy)
Social proximity	Same games produced previously (nb)
Cognitive proximity	Same genres of VG
Profile similarity	Similarity of profile (developers/publishers)
Absorptive capacity	Games produced previously (natural log)
Experience	Number of years since entry



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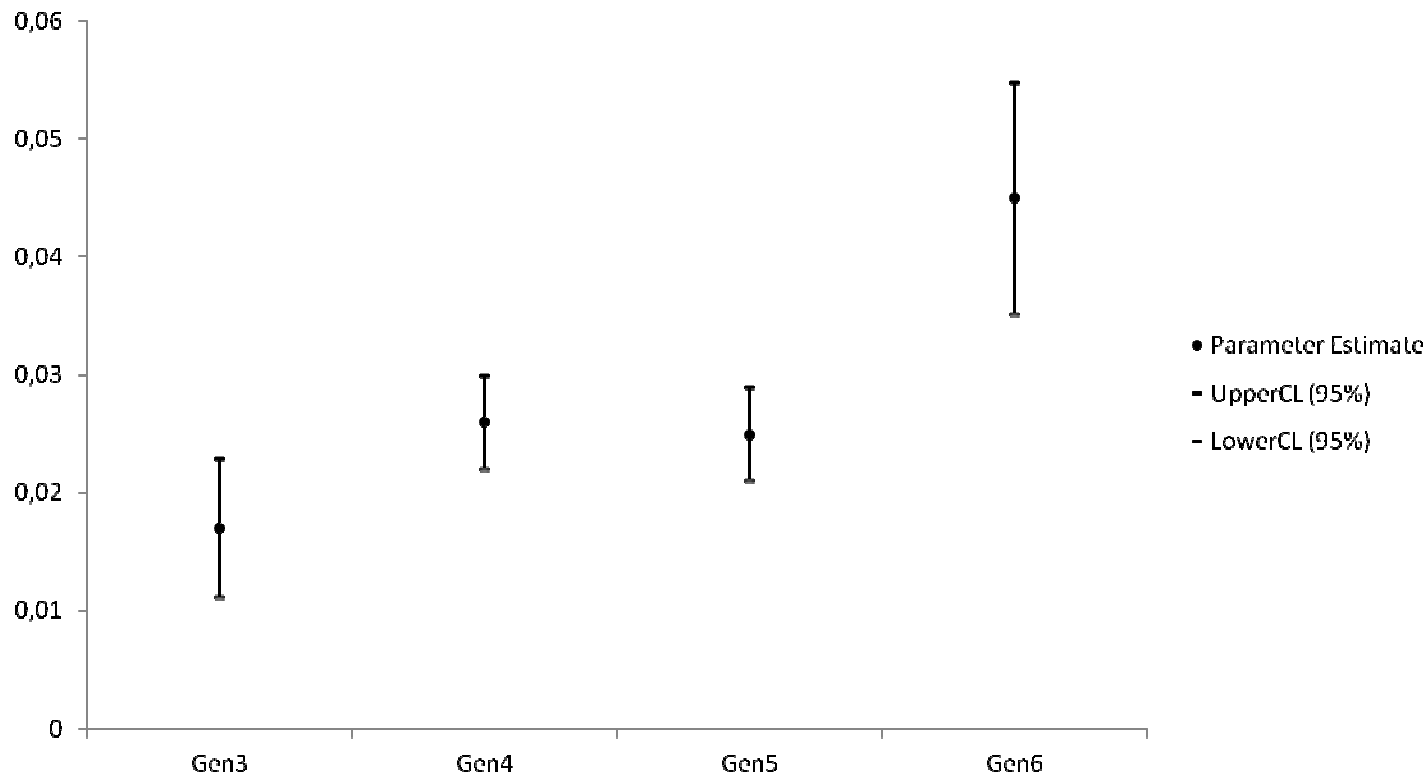


Estimation results

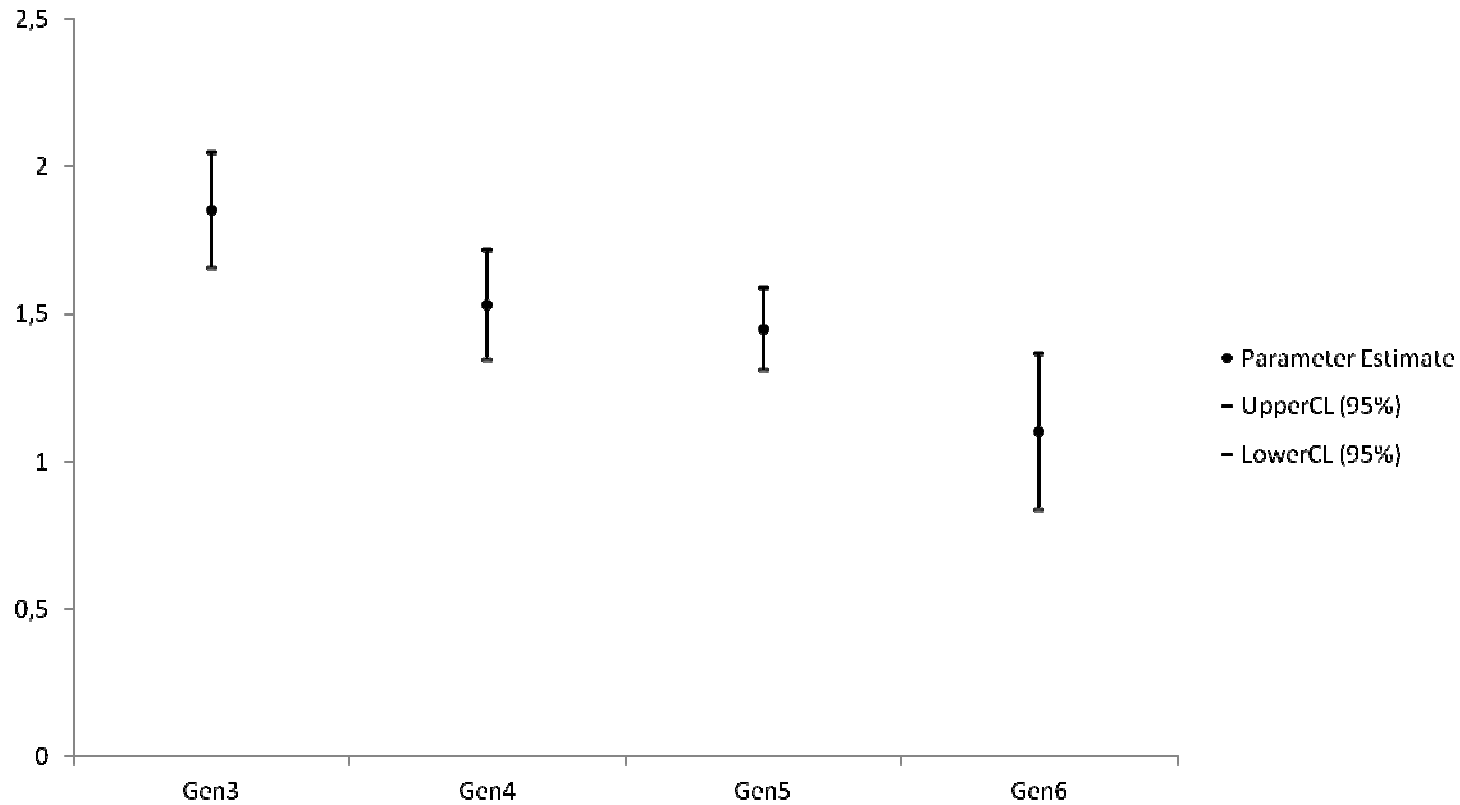
	Gen 3		Gen 4		Gen 5		Gen 6	
	N=349		N=664		N=724		N=479	
	β	SD	β	SD	β	SD	β	SD
Density	-1.957 ***	0.022	-2.209 ***	0.015	-2.456 ***	0.021	-2.362 ***	0.043
Transitive triads	0.654 *	0.331	0.653 ***	0.045	0.632 ***	0.031	0.700 ***	0.067
Institutional proximity	0.098 ***	0.038	0.140 ***	0.025	0.133 ***	0.023	-0.042	0.046
Geographical proximity	0.017 ***	0.003	0.026 ***	0.002	0.025 ***	0.002	0.045 ***	0.005
Organizational proximity	1.854 ***	0.100	1.533 ***	0.096	1.450 ***	0.071	1.104 ***	0.135
Social proximity	0.186 ***	0.038	0.079 ***	0.011	0.081 ***	0.011	0.044 ***	0.010
Cognitive proximity	-0.002	0.003	0.002	0.002	0.023 ***	0.003	0.025 ***	0.006
Profile similarity	-0.735 ***	0.050	-0.820 ***	0.035	-1.097 ***	0.032	-1.181 ***	0.059
Absorptive capacity	0.206 **	0.067	0.206 ***	0.003	0.166 ***	0.009	0.065 ***	0.015
Experience	-0.003	0.005	-0.005	0.014	0.004 ***	0.001	0.020 ***	0.002



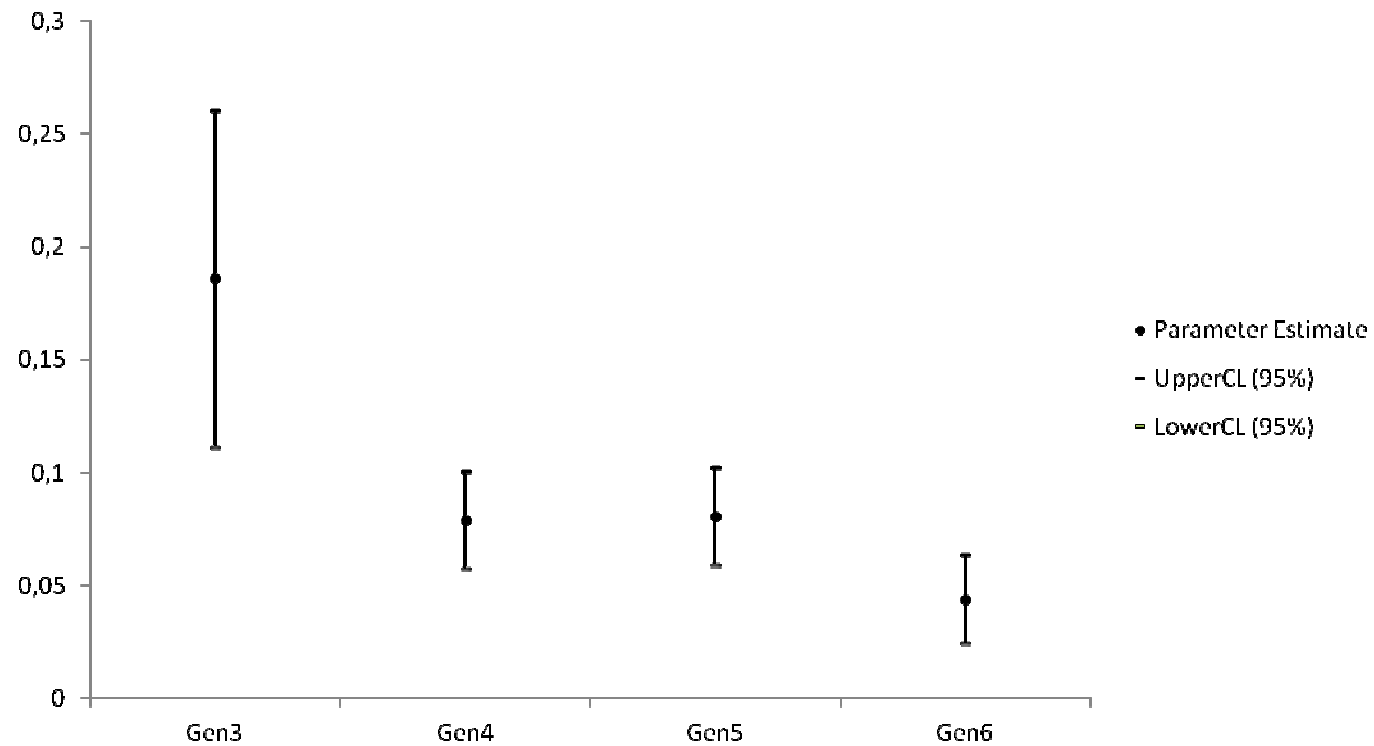
Geographical proximity



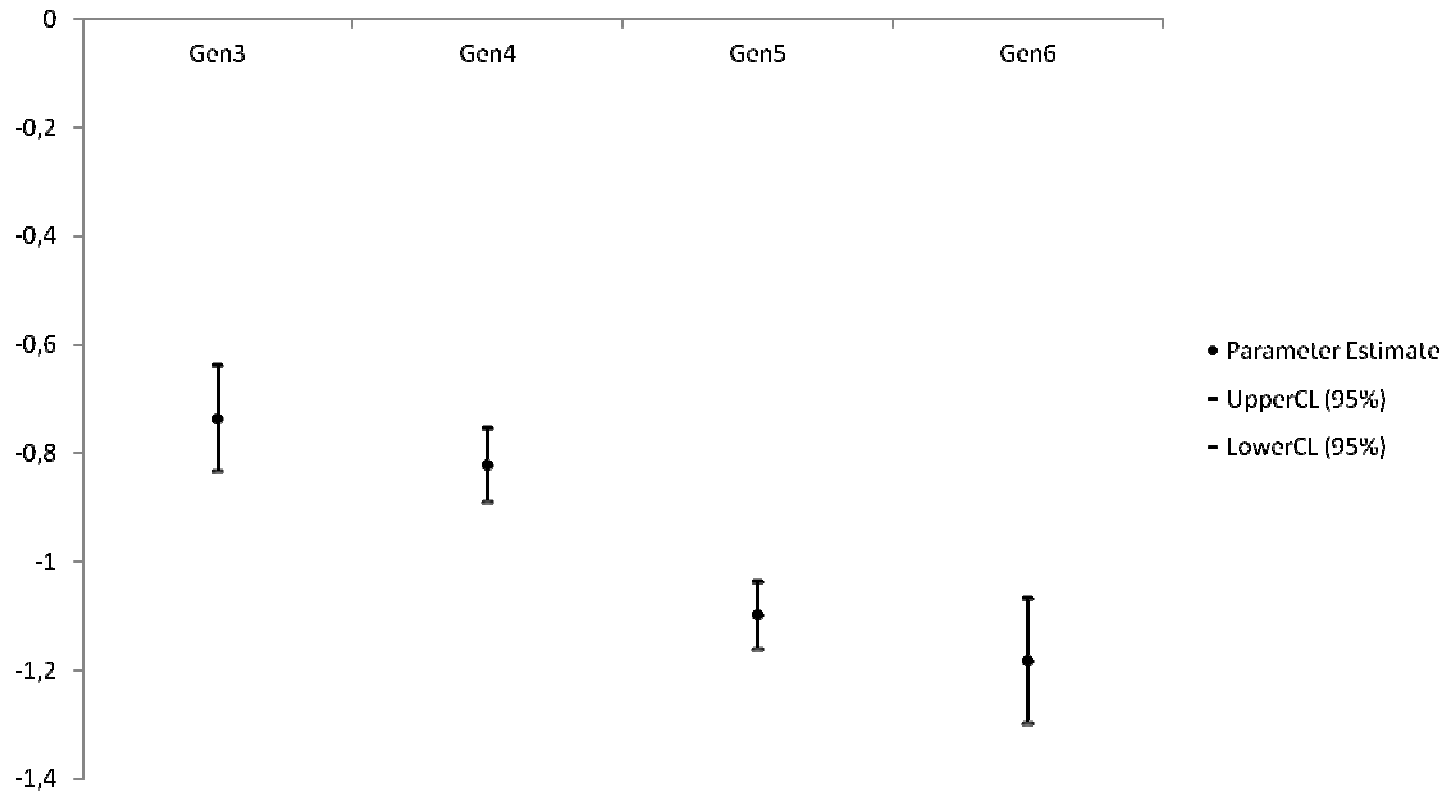
Organizational proximity



Social proximity



Profile similarity



Conclusions

- proximity matters not only for innovation networks but also for creative networks
- proximity dimensions have different effects
- effects of proximity vary with the degree of maturity of the industry
- how to explain why different effects occur between the different stages of the industry life cycle?



Thank you very much for your attention!



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Structural descriptive statistics

Observed Year	Number of Firms	Number of Ties	Average degree	Density
1987	187	120	0,642	0,003
1988	238	160	0,672	0,003
1989	283	288	1,018	0,004
1990	324	510	1,574	0,005
1991	337	554	1,644	0,005
1992	314	652	2,076	0,007
1993	482	848	1,759	0,004
1994	529	1016	1,921	0,004
1995	541	770	1,423	0,003
1996	537	782	1,456	0,003
1997	513	884	1,723	0,003
1998	462	734	1,589	0,003
1999	552	792	1,435	0,003
2000	597	1078	1,806	0,003
2001	630	874	1,387	0,002
2002	628	1244	1,981	0,003
2003	601	1212	2,017	0,003
2004	536	1094	2,041	0,004
2005	462	826	1,788	0,004
2006	463	808	1,745	0,004
2007	431	898	2,084	0,005

