Good Times, Bad Times: Innovation and Survival over the Business Cycle

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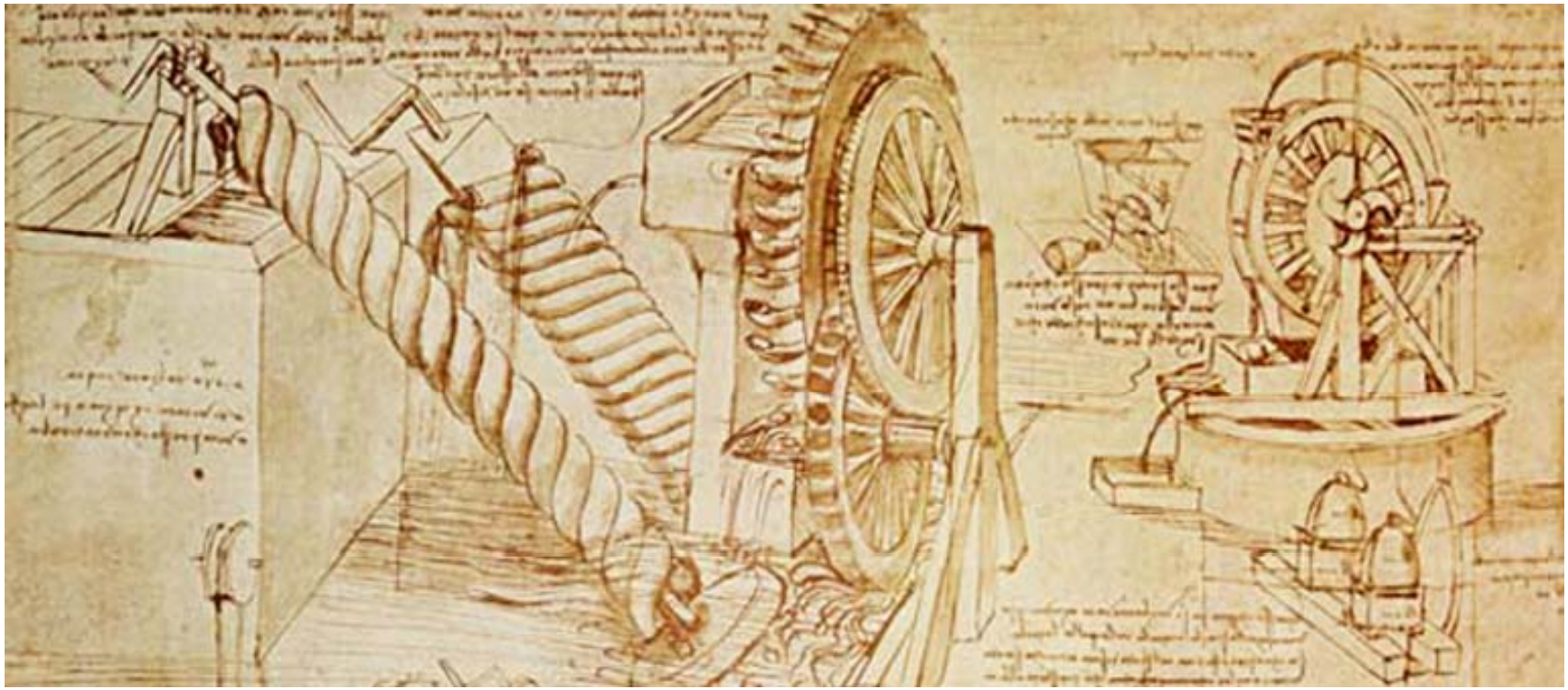
New ventures and Environmental jolts

Entrepreneurship as Experimentation



"*The freedom to conduct experiments is essential to any society that has a serious commitment to technological innovation or to improved productive efficiency.*

When technological uncertainties are high, it is often far more efficient to be able to conduct experiments in small firms on a small scale"

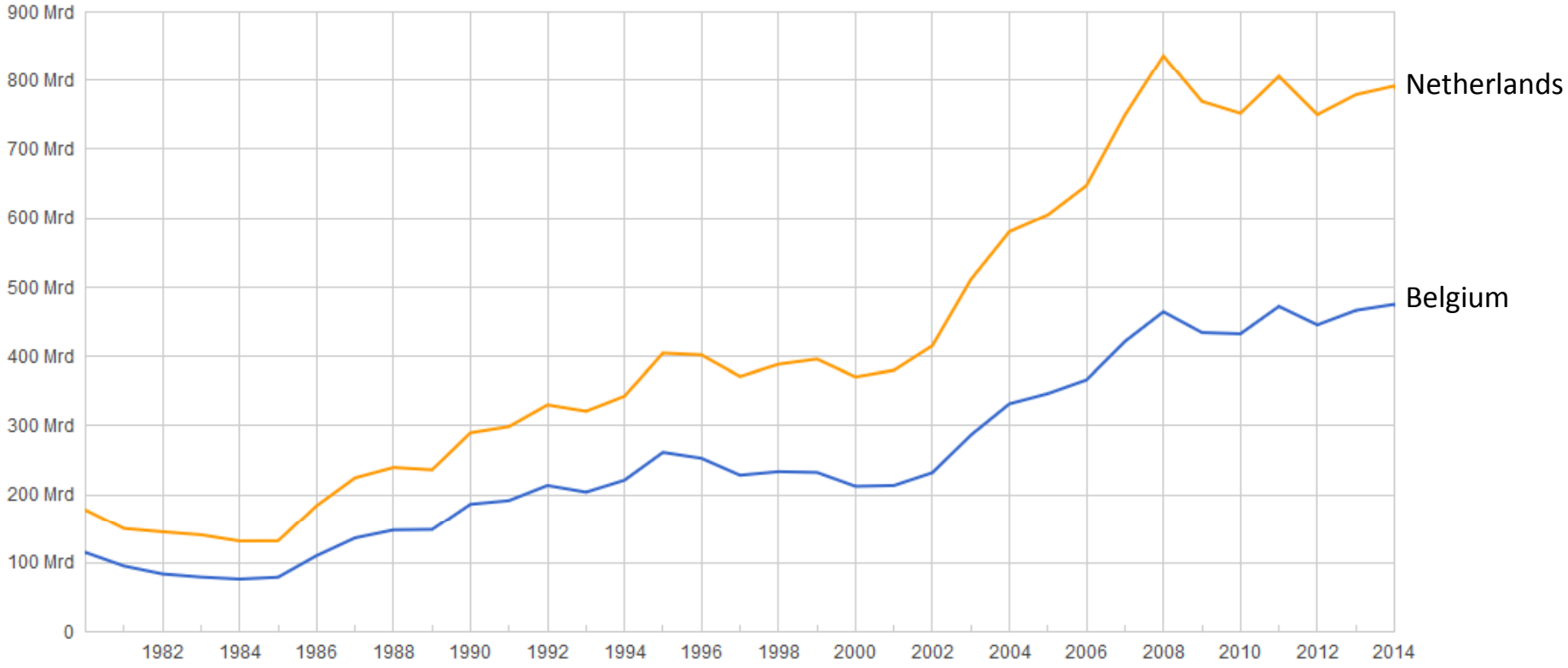
– Nathan Rosenberg (1992)

Entrepreneurship and Failure

"The willingness to undertake experiments in both the social and technological spheres depends upon some sort of limitation upon the negative consequences for the individual if the risky enterprise should fail, as it frequently did." ."

– Nathan Rosenberg (1992:191)

The global financial crisis



GDP (current US$)

Innovation and firm survival

- **In good times**…
  - Liabilities of smallness and newness (Stinchcombe 1965)
  - Innovation as a resource and capability which endow especially young and small firms of a premium for survival (Cefis and Marsili, 2005, 2006)
- **In bad times**…
  - Penalties and rewards are assigned through more intense market selection mechanisms (Nelson and Winter 1982)
  - When liabilities are stronger, does innovation become an even more important and necessary premium for survival?

This study

- Focus on high potential new firms (with 10 employees within two years) and innovation at the time of founding
  - Concurrent experience of the uncertainty of the innovation process and the uncertainty of the new venturing process
- Question
  - How innovation a the time of entry can help new firms to build adaptive capabilities to future environmental jolts (e.g. the financial crisis)
- Contribution: Qualify adaptive capabilities as…
  - Outcome of innovative capabilities
  - Persistent founding conditions
  - Heterogenous by innovation form (technical vs managerial)

Data

- Databases
  - Central Bureau of Statistics Netherlands
  - General Business Register (ABR): Demographic data
  - Community Innovation Survey (CIS): Innovation data
- Time frame
  - Survival before, during and after the shock (2001-2015).
  - Entries prior to the shock (2001-2006)
  - Innovation at the time of entry as covered by 3 waves of the CIS (2001-2006)

Sample: New firms with at least 10 employees in the first two years

Sectors: agriculture, mining, manufacturing, energy, water management, knowledge-intensive services, and less knowledge-intensive services

Cohorts	n° of firms
cohort 2001	325
cohort 2002	278
cohort 2003	309
cohort 2004	301
cohort 2005	449
cohort 2006	667
Total	2329

Definitions of entry and exit

Entry events:

- Greenfield birth
- Combination birth-death
- Entry due to spin-off
- Due to disintegration of an existing firm
- Due to merger
- Due to restructuring of an existing firm

Exit events:

- Closure
- Combination birth-death
- Exit by acquisition
- Due to disintegration of an existing firm
- Due to merger
- Due to restructuring of an existing firm

Forms of innovation

Product	Process
	
Organizational	**Marketing**
	

Variables

- **Explanatory:**
  - Innovation
  - Product innovation
  - Process innovation
  - Organisational innovation
  - Marketing innovation

- **Controls:**
  - Firm growth rate
  - Haltiwanger index on OECD classes
  - Independent or subsidiary
  - Industry dummies
  - Cohorts dummies

Methodology

Piecewise exponential constant hazard model

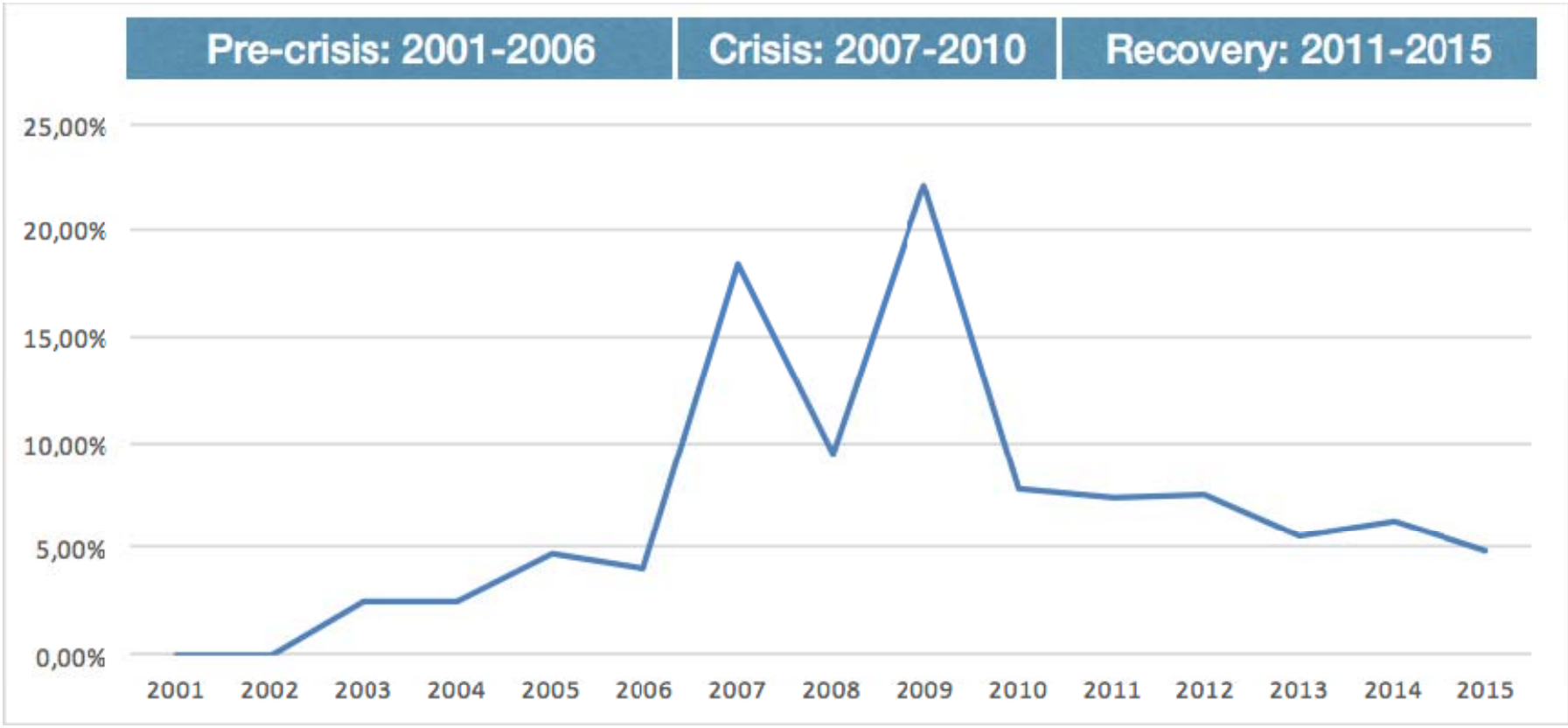
We assume that the baseline hazard is constant within each interval:

$$\lambda_0(t) = \lambda_j \quad \text{for } t \text{ in } \left[\tau_{j-1}, \tau_j \right)$$

Time periods:

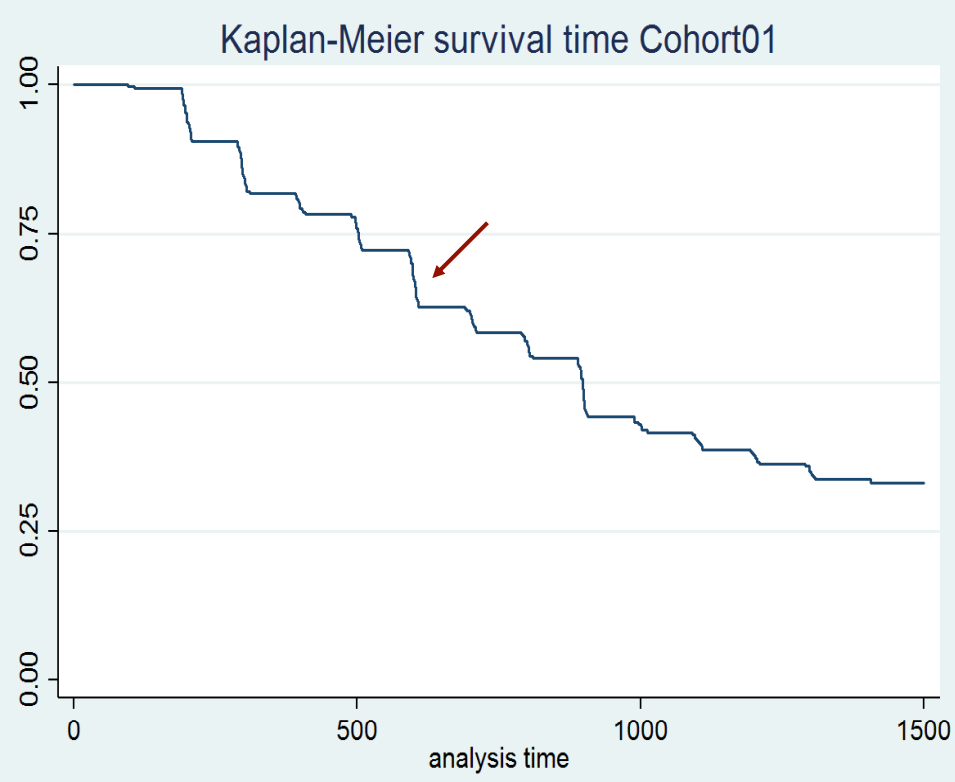
- Pre-crisis: 2001 – 2006
- Global financial crisis: 2007 – 2010
- Eurozone debt crisis and recovery: 2011 - 2015

Average exit rates

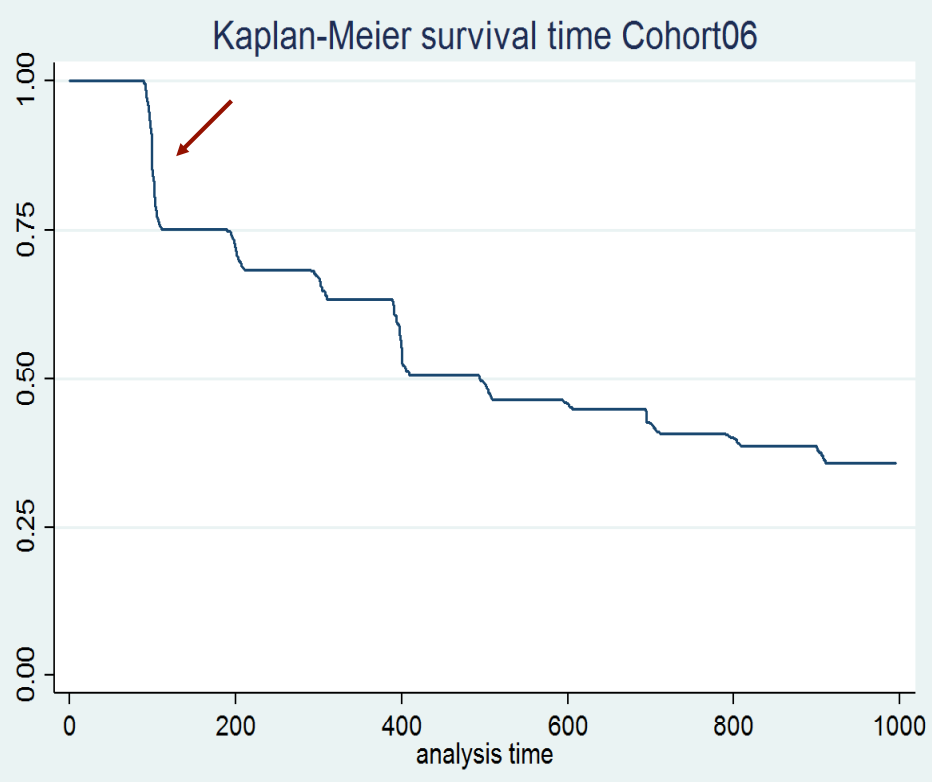


Estimated unconditional survival function

2001 entry cohort



2006 entry cohort



Hazard model with time-period specific effects (odds ratio)

VARIABLES	Mod.1	Mod.2	Mod.3	Mod.4	Mod.5	Mod.6
Innovator	0.829***					
	(0.0441)					
Product Inn.		0.794***		0.840**	0.843**	0.821***
		(0.0505)		(0.0602)	(0.0610)	(0.0606)
Process Inn.			0.815***	0.885*	0.891	0.884*
			(0.0516)	(0.0630)	(0.0644)	(0.0640)
Organizational Inn.					0.973	0.949
					(0.0544)	(0.0547)
Marketing Inn.						1.134*
						(0.0869)
Cohort and Sector dummies included						
Observations	5445	5445	5445	5445	5445	5445
n° firms	2329	2329	2329	2329	2329	2329
n° exits	1551	1551	1551	1551	1551	1551
chi2	7811	7815	7805	7806	7809	7811
p-value	0.000	0.000	0.000	0.000	0.000	0.000
log-likelihood	1206	1207	1205	1208	1208	1210

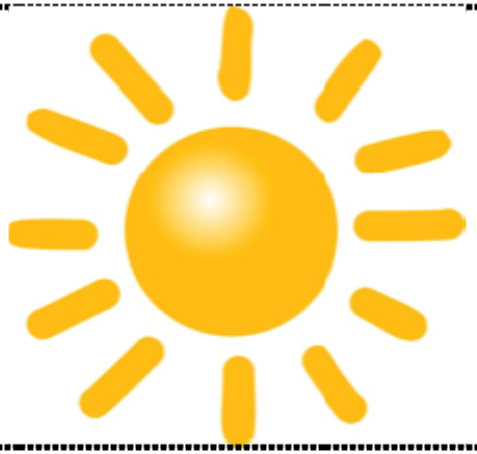
Clustered standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

Model with time-periods interaction effects (odds ratio)

VARIABLES	Mod8	Mod9	Mod10	Mod11	Mod12	Mod13	Mod14
Innovator x tp1	1.176						
	(0.135)						
Innovator x tp2	0.710***						
	(0.0471)						
Innovator x tp3	0.969						
	(0.115)						
Product Inn x tp1		1.079		1.009			0.932
		(0.137)		(0.149)			(0.141)
Product Inn x tp2		0.717***		0.835**			0.817**
		(0.0588)		(0.0760)			(0.0773)
Product Inn x tp3		0.794*		0.699**			0.717**
		(0.107)		(0.108)			(0.115)
Process Inn x tp1			1.147	1.132			1.050
			(0.149)	(0.172)			(0.162)
Process Inn x tp2			0.657***	0.713***			0.735***
			(0.0561)	(0.0676)			(0.0701)
Process Inn x tp3			1.062	1.272			1.262
			(0.139)	(0.190)			(0.197)
Organiz Inn x tp1					1.341***		1.314**
					(0.152)		(0.164)
Organiz Inn x tp2					0.770***		0.817***
					(0.0535)		(0.0607)
Organiz Inn x tp3					1.024		1.065
					(0.123)		(0.139)
Marketing Inn x tp1						1.191	1.054
						(0.159)	(0.153)
Marketing Inn x tp2						0.977	1.261**
						(0.0878)	(0.125)
Marketing Inn x tp3						0.830	0.858
						(0.143)	(0.161)
Cohort and Sector dummies included							
Observations	5445	5445	5445	5445	5445	5445	5445
n° firms	2329	2329	2329	2329	2329	2329	2329
n° exits	1551	1551	1551	1551	1551	1551	1551
chi2	7834	7825	7817	7806	7836	7831	7811
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
log-likelihood	1214	1210	1214	1219	1210	1201	1226

Clustered standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

Results

Product	Process
	
Organizational	**Marketing**
	

How new firms adapt to external changes

- Experimentation => resilience and recovery
- Efficiency => resilience but no recovery
- Organisational change => resilience if already overcome the liability of newness
- Marketing change => risk of mis-adaptation

Definitions

Organisational innovation

1. New or significantly improved knowledge management systems to better use or exchange information, knowledge and skills within your enterprise.
2. A major change to the organisation of work within your enterprise, such as changes in the management structure or integrating different departments or activities.
3. New or significant changes in your relations with other firms or public institutions, such as through alliances, partnerships, outsourcing or subcontracting.

Marketing innovation

1. Significant changes to the design or packaging of a good or service (Exclude routine/ seasonal changes such as clothing fashions).
2. New or significantly changed sales or distribution methods, such as internet sales, franchising, direct sales or distribution licenses.