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Risultati della prima call

Progetto 97: Industrial policy, crises and the impact on research and innovation of the business and labor demand skills.

Can innovative behavior help firms to overcome the economic crisis?

Alessandro Zeli, Leopoldo Nascia

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#IstatWebinar

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Crisis and impact on Italian firms

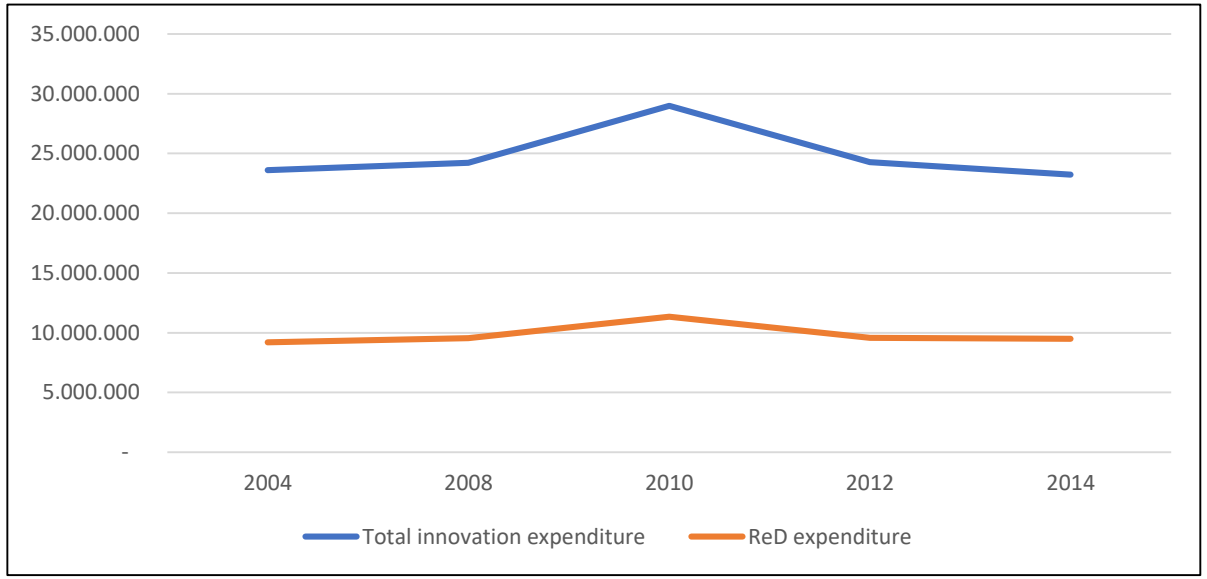
Some stylized facts

- Two crises: subprime (2008) and sovereign debt (2011)
- Crises effects:

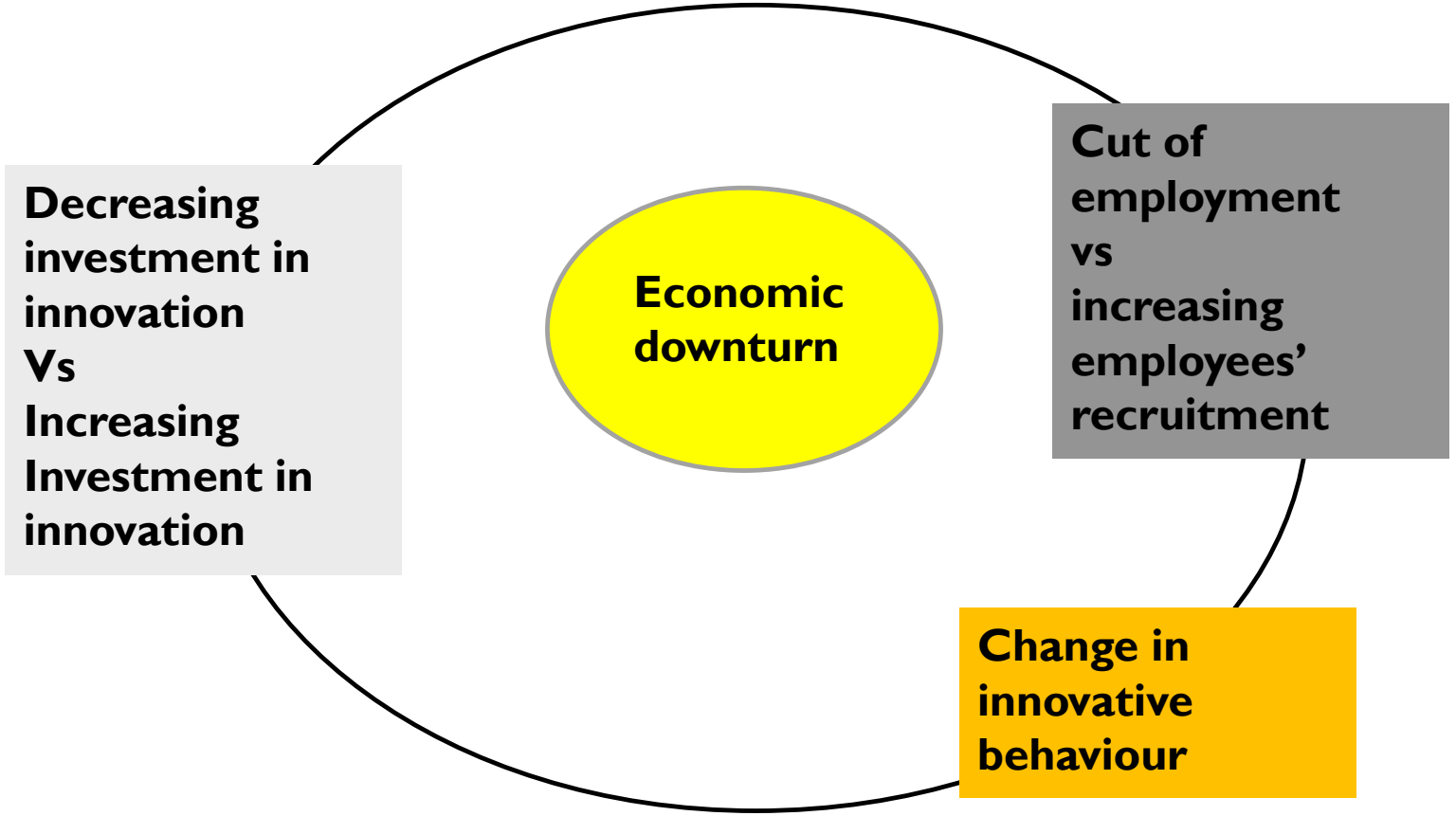
  - ✓ **1) turnover decrease**
  - ✓ **2) less growth perspectives**
  - ✓ **3) decrease of investment (also in innovations) (around 25%)**
  - ✓ **4) not homogeneous decrease in investment in innovation.**

The firms' innovation behavior

	Total innovation expenditure	R&D expenditure	CV Inno	CV R&D
2004	23,602,040	9,208,584		
2008	24,214,400	9,539,330	7.81	12.20
2010	28,987,248	11,337,113	9.30	12.10
2012	24,284,359	9,578,774	7.99	14.39
2014	23,238,642	9,481,510	8.32	11.95



The firms' innovation behavior



What kind of behaviour is more useful to face crises? What strategy for firms?

Aim of the contribution

- In the after crisis period (2008 – 2015) the Italian firms faced with a relevant change of economic perspectives and a deep reduction of growth opportunities.
- Government policy was focused on austerity. A set of measures aimed to comply the public budget indicators based on budget cuts. R&D policies shifted from direct subsidies to indirect incentives (R&D tax credits)
- According to literature when a economic crisis bites the innovation investments concentrate further in firms already innovative.
- Our aims is understand how the innovative firms reacts to the crisis in terms of change in innovative investments and in terms of innovative strategies.

Moreover we want evaluate if different strategies can have affected differently the firms' performances in the after crisis period.

The theoretical framework

The dynamic capacity is the capacity of a firms to reconfigure its organization and its resources to copy an economic crisis.

This kind of capacity may be declined in different forms, in the particular case of recent global financial crisis innovative firms could choose among different strategies.

The theoretical framework

Openness

In a downturn firms can:

- increase openness,
- strengthen in house R&D and innovation expenditure,
- cut employees and investment to follow austerity plans.

Many authors (Almirall and Casadesus-Masanell, 2010; Cruz-Gonzales et al. 2015) found evidences of positive impact of high level of openness in the more dynamic and turbulent contexts.

The theoretical framework

Ambidexterity

When the crisis bites less financial sources are available for investment in innovation.

A trade-off arises between the search of new products or markets (exploration) and activities aimed to increase efficiency in other areas (exploitation).

Firms having an appropriate balance between this two approaches are more likely to survive (March 1991).
The importance of simultaneous exploitation and exploration strategy (ambidexterity) and the related concept of dynamic capability in successfully overcame an economic downturn was stressed by many authors (Teece et al., 1997; O'Really and Thusman, 2004).

Aim of the contribution

- The relevant literature concerning openness and ambidexterity permits us to identify the most important variables determining the firms' innovative investment behavior.
- We like to shed light how a specific innovative behavior could determine a better economic performance in a lagged period. On this basis we aim to detect, first:

❑ the determinants of firms openness and their effects in the after crisis period

Secondly:

❑ the determinants of firms ambidexterity and their effects in the after crisis period

Methodology

Referring to the recent literature we update and re-estimate two regression models.
The first is a modified version of Ahn et al. (2018) model to detect the effects of firms openness' strategies.

(I) $$R_{it+k} = a_0 + \beta_1 \boldsymbol{X}_{it} + \varepsilon_i$$

Where R_{t+k} represents the turnover change after 4 years. R is calculated as the ratio between the turnover value at year *t+k* and the turnover at year *t*.

X is a set of variables representing the openness of the firms and relevant variables for understanding the firms' innovation behavior collected at time *t*.

Methodology

The second model is a revised version of a model proposed by Archibugi et al. (2012) and it is aimed to estimate if the firms following mixed strategies of exploitation and exploration or ambidextrous firms perform better with respect to the period after the crisis.

$$R_{it+k} = a_0 + \beta_1 \boldsymbol{Y}_{it} + \varepsilon_i \quad (2)$$

Methodology

Where R_{t+k} represents the performance indicator change after 4 years with respect to the initial value at time *t* .

Dependent variables are value added, productivity, ROA and employment.

Y is a set of variables representing the ambidexterity of the firms and relevant variables for understanding the firms' innovation behavior change between *t-1* and *t*.

Data and variables

- Economic variables are taken from the economic micro-data ISTAT panel. This is a very rich in information database, based on the integration of several sources (both surveys and administrative databases), available in ISTAT.

- The ISTAT panel contains mainly information coming from financial reports (Balance sheet register) and demographic data from ISTAT business register (ASIA).

- The R&D and innovation data are drawn from the CIS surveys carried out in 2008, 2010 and 2012.

Data and variables

We build a panel of firms participating both at 2008 and 2010 CIS (Model 2) and another panel of firms participating both at 2010 and 2012 CIS (Model 1).

Both panel include over 2,000 firms.

The CIS data have been integrated with economic information coming from Istat panel.

2 steps:
micro ISTAT panel and CIS panel set up
Integration of panels

Data and variables

Model I

Label	Description	Variables	Source
tech	Tech level	5 levels: High, Medium-High, Medium_Low, Low and Others	Panel
size	Frim's size	Logarithm of number of personal employed	Panel
gov	Government or EU subsides	0 not received; 1 received	CIS
D red	Difference between 2012 R&D and 2010 R&D expenditure	Internal R&D expenditure	CIS
D skill	Difference between skilled employees	Numer of employees with university diploma or more	CIS
D empcut	The decrease in employment between 2010 and 2012	Firm's employent (negative coding)	CIS
D breadth	Differential of the number of external information source utilization	Breadth of information sources of CIS	CIS
D depth	Differential of the number of external information source highly used	Depth of information sources of CIS	CIS
D co	Difference in the number of collaborations	Breadth of collaborations in CIS	CIS
D vcc	Difference in the number of value chain collaboration	Vertical collaboration in CIS	CIS
D occ	Difference in the number of outside value chain collaboration	Horizontal collaboration in CIS	CIS
D icc	Difference in the number of international collaboration	International collaboration in CIS	CIS
Rturn	The ratio of 2015 turnover and 2012 turnover	Turnover Frame	Panel

Data and variables

Model 2

Label	Description	Variables	Source
D res	Difference between 2012 R&D and 2010 R&D expenditure	R&D expenditure	CIS
D Uexplor	Exploration - difference (i.e. if the 2008 ranking is maintained or not in 2010)	Dummy variable 1st quantile of the sum of respondents to the question: - How much is important in innovation decision: - the increasing range of goods or services - entering in a new market or increasing market share?	CIS
Duexploi	Exploitation - difference (i.e. if the 2008 ranking is maintained or not in 2010)	Dummy variable 1st quantile of the sum of respondents to the question: - How much is important in innovation decision: - improving quality of goods or services - increasing capacity or producing goods and services - reducing costs per unit produced?	CIS
D uambi	Ambidexterity - dummy variable	Enterprises following mixed strategies of exploitation and exploration	CIS
D sv	Difference between the innovation expenditure in services 2012 and 2010	Innovation expenditure in services	CIS
D pro	Difference between the innovation expenditure in goods and products 2012 and 2010	Innovation expenditure in goods and products	CIS
D tot	Difference between the total innovation expenditure in 2012 and 2010	Total innovation expenditure	CIS

Preliminary Results of the analysis

Cluster

CLUSTER	Open innovator	Closed innovator	Austerity planners
tech	1.93	2.14	1.98
gov	0.44	0.76	0.45
size	4.87	5.35	4.75
D red	314	-401	-2,142
D empcut	-0.60	0.25	3.20
D skill	1.07	3.71	0.87
D breadth	**3.54**	-1.23	-5.91
D udepth	**6.46**	-2.31	-11.40
D co	**-0.10**	-0.37	-0.31
D vcc	**0.24**	0.06	-0.24
D occ	**0.34**	0.00	-0.34
D icc	**0.37**	0.01	-0.24
D turn	787	3,522	-5,013

Results of the analysis

rturn	(1)		(2)		(3)		(4)		(5)	
tech	0.017		0.017		0.018		0.017		0.017	
	0.011		*0.011*		*0.011*		*0.011*		*0.011*	
size	0.044	***	0.045	***	0.045	***	0.047	***	0.050	***
	0.011		*0.012*		*0.012*		*0.012*		*0.012*	
gov	-0.044	***	-0.042	***	-0.043	***	-0.044	***	-0.041	***
	0.015		*0.015*		*0.016*		*0.015*		*0.015*	
Dred			0.110	**					0.117	**
			0.044						*0.053*	
Dskill			-0.005						-0.115	
			0.903						*0.912*	
Dempcut			-0.012	**					-0.014	**
			0.005						*0.005*	
Dbreadth					0.073		0.145		0.097	
					0.219		*0.228*		*0.233*	
Ddepth					0.011	*	0.011	*	0.012	*
					0.006		*0.006*		*0.006*	
Dco					-0.015					
					0.025					
Dvcc							0.022		0.021	
							0.018		*0.018*	
Docc							-0.025	*	-0.026	*
							0.014		*0.014*	
Dicc							-0.486		-0.679	
							0.806		*0.813*	
cons	0.807	***	0.798	***	0.857	***	0.854	***	0.848	***
	0.057		*0.057*		*0.058*		*0.058*		*0.058*	
Adj R^2 (%)	4.78		5.31		5.65		6.12		6.78	

Regression results - Model I

Results of the analysis

- The general factors' effects estimated by our model are in line with the ones expected on the basis of the relevant literature.

- The larger the firm the more it can invest in innovation.
- The gov aid's don't seem to give a substantial help to the firm's performance.
- Outcomes show that the austerity choice is substantially wrong. (austerity policies and smart consolidation)
- Innovation and R&D expenditure foster the firms' growth.

- Particular cooperation strategy does not grant a substantial advantage to the firms implementing them.

Results of the analysis

	rvag14	rprod14	rroa14	rempl14
Dred	0.155	0.15	0.139	0.002
	0.54	0.61	0.744	0.001
Dsv	16.342 **	17.202 **	14.845	0.014
	7.337	*8.289*	*10.113*	*0.016*
Dpro	16.508 **	17.866 **	15.621	0.021
	7.914	*8.941*	*10.908*	*0.017*
Dtot_inno	0.000	0.000	0.000	-0.002 **
	0.000	*0.000*	*0.000*	0.001
Duexplor	0.843	-0.185	0.252	0.020
	9.996	*11.293*	*13.778*	*0.021*
Duexploi	-58.886 ***	-63.292 ***	-53.144 ***	0.046 *
	13.126	*14.829*	*18.092*	*0.028*
Duambi	58.451 ***	62.230 ***	48.642 **	-0.028
	15.771	*17.817*	*21.737*	*0.034*
constant	3.094	4.161	7.027	0.989 ***
	4.041	*4.566*	*5.570*	*0.009*
Adj R^2 (%)	1	1	1	1

Regression results - Model 2

Conclusions

The major results achieved by the analysis can be synthetized as follows:

- A strong relevance of innovation in overcoming the crisis:
  - **Firms increasing innovation expenditure in services and goods production show increasing performance indicators after 4 years.**
- Particular openness strategies do not seem foster the firms' performances.
- Exploration and exploitation strategies alone do not strengthen the performance indicators. Only mixed strategy (ambidexterity) gives positive results in terms of productivity and profitability.
- Innovation introductions are generally labor saving.

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grazie

Alessandro Zeli, Leopoldo Nascia

zeli@istat.it; nascia@istat.it

Istat | Istituto Nazionale di Statistica