

Learning by failing determines innovative and financial performance of Knowledge Intensive Services firms

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Summary

1. Innovation Failure;
2. Aim;
3. Research question;
4. Hypothesis;
5. Methodology;
6. Results;
7. Discussion;
8. Relevance.

Failure to innovate

- Understood as innovation activities that were abandoned;
- Failure is traditionally understood as problematic;
- However, it was recently shown that failures can positively impact on organizational activities.

Learning through Failing

- Learning and failure are closely related since trial and error are central for discovery/innovation;
- Failing is understood as a “focusing device”;
- It has been recently recognized that failure to innovate is central for firm’s learning and subsequent innovative performance, meaning that firms that fail the most are also the ones that innovate the most;
- These relations were explained on the basis of firms ability to learn from these abandoned processes (as learning is crucial for innovation).

Uncertainty likely leads to failure and learning

- Innovation links past, present and future and thus is an uncertain process;
- Firms are likely to fail not only because of specific barriers to innovation (e.g. financial constraints) but also because trial and error processes will eventually lead to failure;
- This failing experience rather than strictly a negative setback, it actually creates opportunities for learning, increasing firms' knowledge stock

Determinants of Innovation Failure

- It has been previously shown that R&D and R&D cooperation are critical for firms innovative success;
- However, it has also been shown that companies the cooperate with competitors; public research organizations and suppliers are more likely to abandon innovation processes. This has been explained on the basis of difficulties experienced in the management of inter-firm cooperation.

To do

- However, to the best of our knowledge, the role of trial and error processes for companies' financial performance has not been studied;
- Innovation failure has not been studied in the Portuguese context;
- Integrative model encompassing both “inputs and outputs” of innovation.

Aim

To characterize these trial and error paths, their firm and environmental underpinnings (including cooperation partners), as well as their impacts on innovation outputs and companies' turnovers.

Research question

Is firms' performance associated with innovation failure?

Hypothesis

Firms' financial performance is dependent on innovation failure

- Studies showing that innovation outputs are associated with innovation failure;
- Studies showing that firms' financial performance is associated with innovation outputs.

Methodological approach

- Community Innovation Survey for Portugal;
- Data collected by Statistics Portugal;
- Portugal: 2012-2014
- Knowledge Intensive Services and Knowledge Intensive Business Services (NACE rev1.1: 61-62; 64-67; 70-74; 80; 85; 92)
Firms that provide knowledge-intensive goods and services for other business firms
- n=2718

Methodological approach: Variables

Determinants of innovation Failure	Innovation Failure	Innovation Outputs	Turnovers
<ol style="list-style-type: none"> 1. <u>Types of R&D activities</u> <ul style="list-style-type: none"> In house R&D External R&D Acquisition of existing knowledge Design activities Training activities Machinery Market introduction Other R&D activities 2. <u>Partners in innovation activities</u> <ul style="list-style-type: none"> Universities Research Institutes Companies of the same group Consultants Suppliers Costumers Competitors Number of different partners 3. <u>Employees' qualifications</u> 4. <u>Expenses in R&D</u> 	<p>Abandoned innovation activities</p>	<p>Patents Models Trademarks Design</p> <p>New to the market New to the firm</p>	<p>Companies' turnovers Innovation turnovers</p>

The underpinnings of innovation failure

Results

Companies that fail the most cooperate with a diverse set of partners in innovation activities

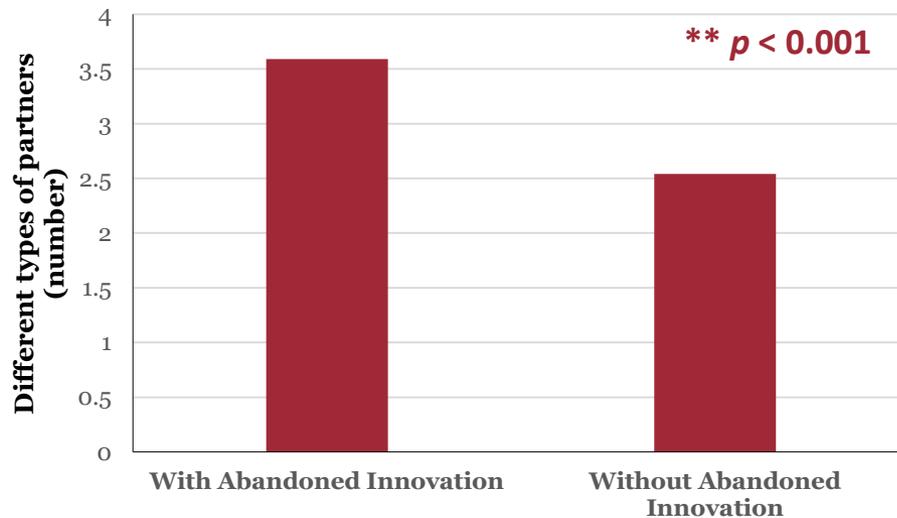
	χ^2	Adjusted residuals
Failure vs Universities	21,052**	4,6*
Failure vs Consultants	6,978 *	2,6*
Failure vs Research Institutes	4,335 *	2,1*
Failure vs Same group companies	10,416 **	3,2*
Failure vs Suppliers	6,339 *	2,5*
Failure vs Costumers	19,024 **	4,4*
Failure vs Competitors	ns	ns

** $p < 0.001$; * $p < 0.05$; $|Z| > 1.96$; level of confidence 95%

ns: non significant

Results

Companies that fail the most are the ones that have more different types of partners in innovation



Number of different types of partners in companies with and without abandoned innovation activities

T test

5,606 (163,095)**

Results

Companies that fail the most are the ones that develop more R&D activities

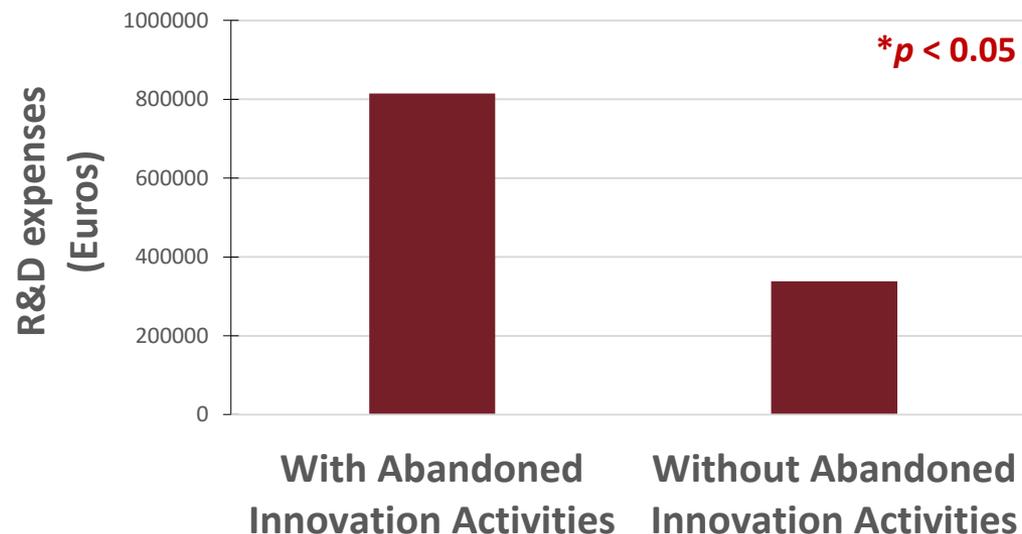
	χ^2	Adjusted residuals
Failure vs in house R&D	57,383 **	7,6
Failure vs external R&D	30,688 **	5,5
Failure vs acquisition of machinery, equipment, software & buildings	ns	ns
Failure vs acquisition of existing knowledge from other enterprises	ns	ns
Failure vs training for innovative activities	10,867 **	3,3
Failure vs market introduction of innovations	43,945 **	6,6
Failure vs design	30,124 **	5,5
Failure vs other	43,021 **	6,6

** $p < 0.001$; * $p < 0.05$; $|Z| > 1.96$; level of confidence 95%

ns: non significant

Results

Companies that fail the most are the ones that invest more in R&D activities



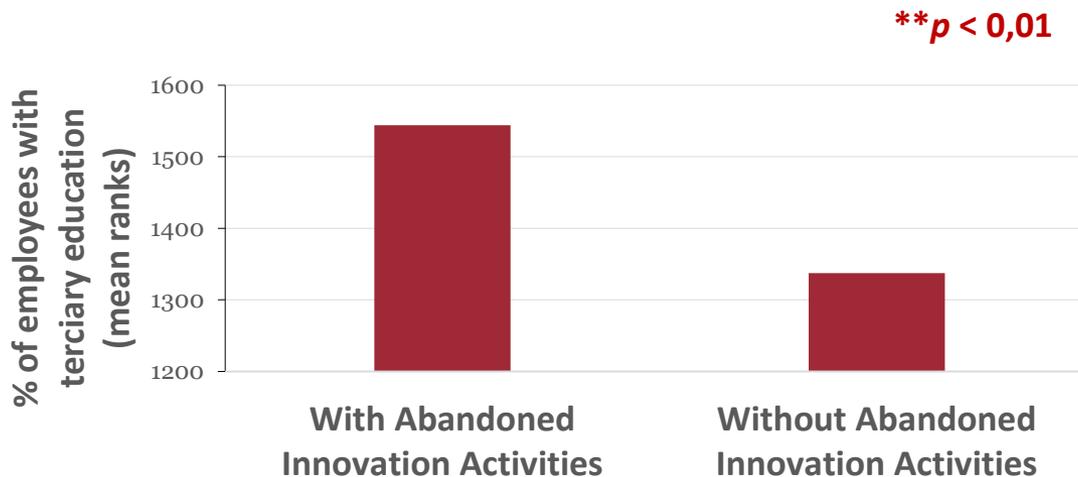
T test

R&D expenses in companies with and without abandoned innovation activities

2,593 (219,399) *

Results

Companies that fail the most are the ones with more qualified personnel



	Mann-Whitney
% employees with tertiary education in companies with and without abandoned innovation	208196,500 **

Innovation failure and innovation outputs

Results

Companies that fail the most are the ones that innovate the most

	χ^2	Adjusted residuals
Failure vs Patents	201,621 **	14,2
Failure vs Models	45,932 **	6,8
Failure vs Design	43,332 **	6,6
Failure vs Trademark	106,948 **	10,3
Failure vs New to the Market	22,204 **	4,7
Failure vs New to the Firm	ns	ns

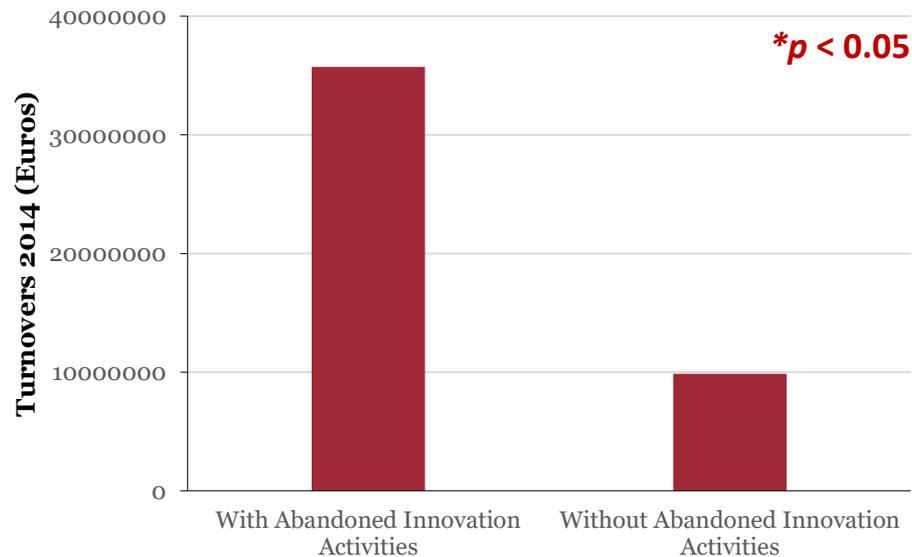
** $p < 0.001$; $|Z| > 1.96$; level of confidence 95%

ns: non significant

Innovation failure and companies' turnovers

Results

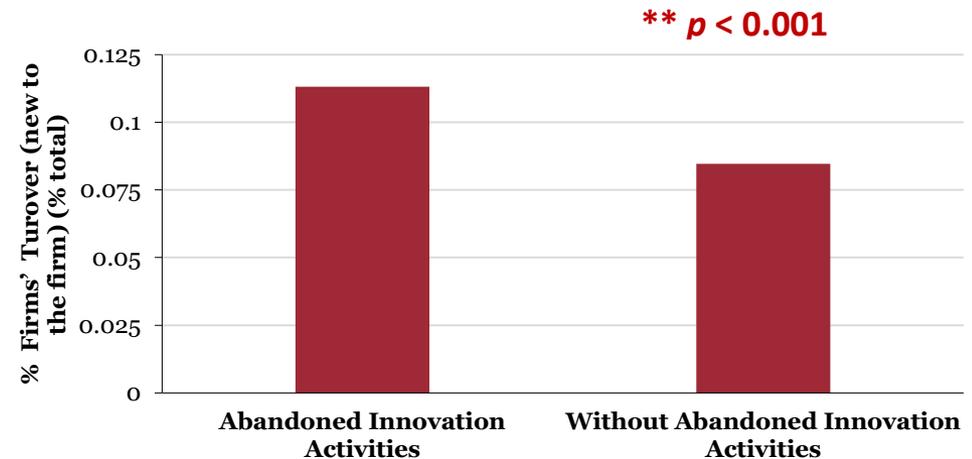
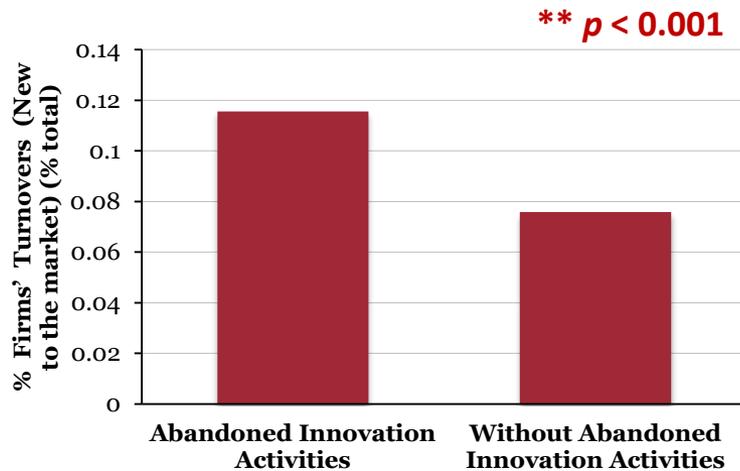
Companies that fail the most present higher turnovers



	T test
Turnovers 2014 in companies with and without abandoned innovation activities	2,546 (220,679) *

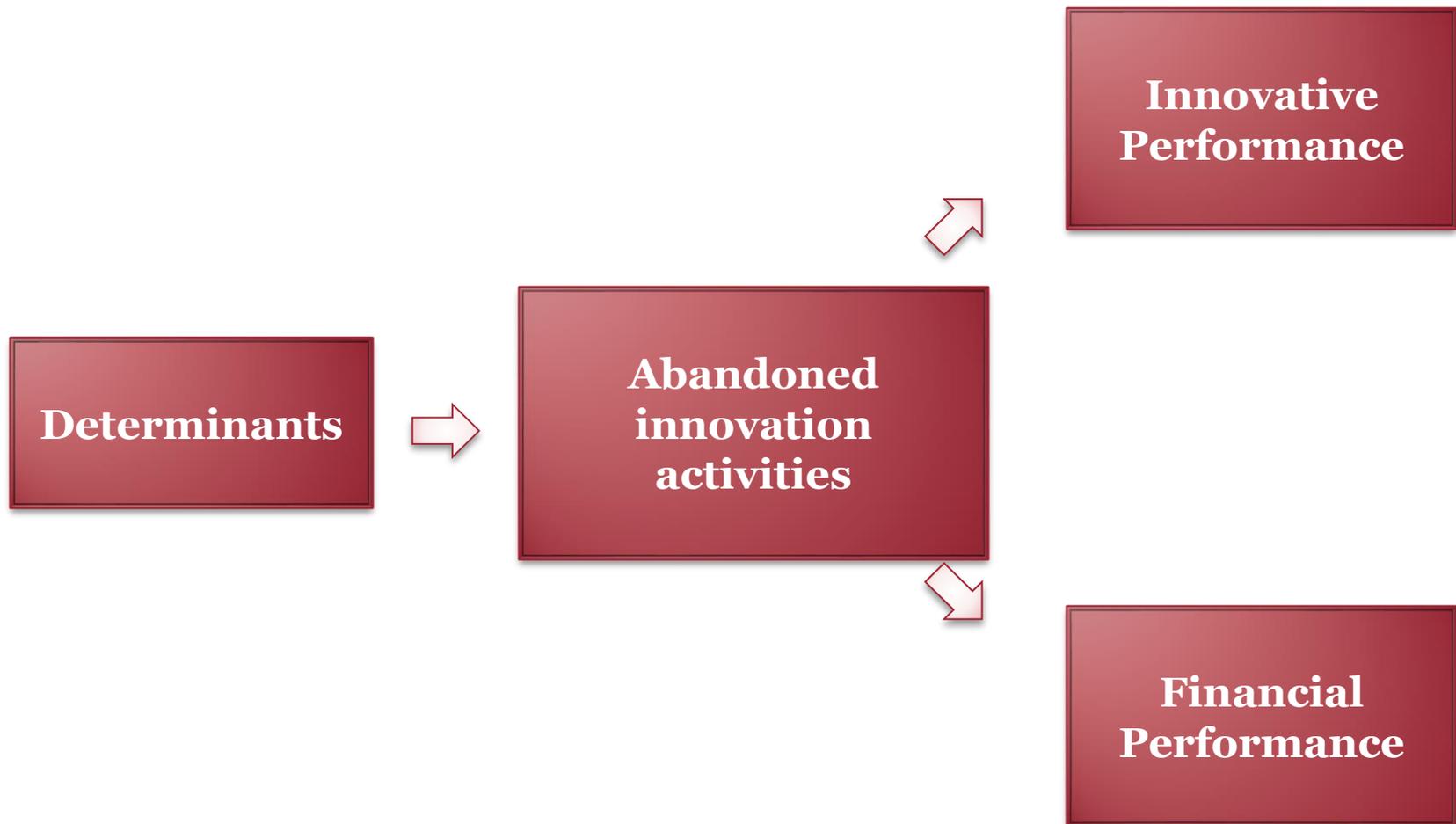
Results

Companies that fail the most present higher turnovers resulting from innovation

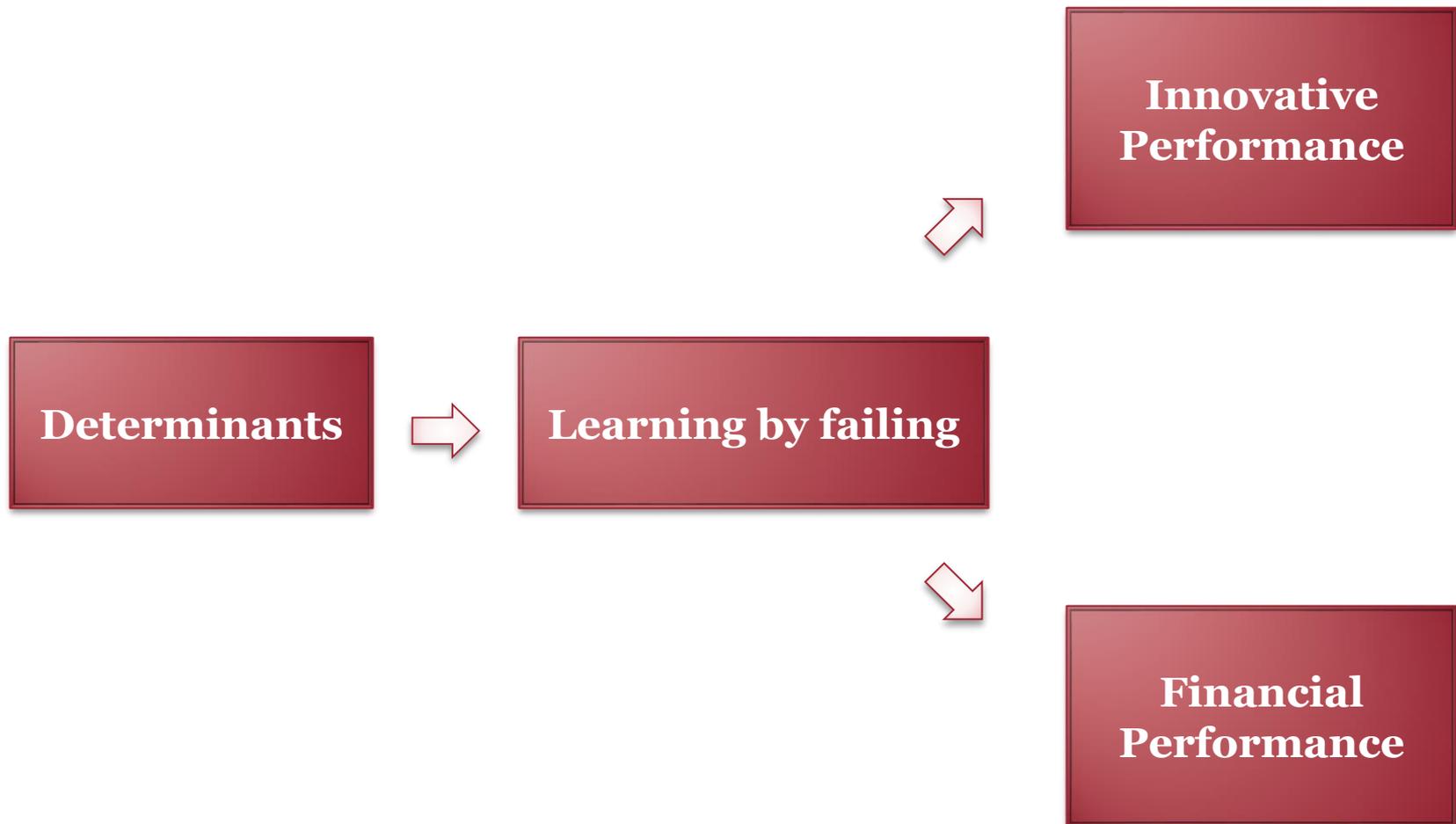


	T test
Turnovers from New to the market in companies with and without abandoned innovation activities	3,753 (230,639) **
Turnovers from New to the firm in companies with and without abandoned innovation activities	3,097 (1115,000) **

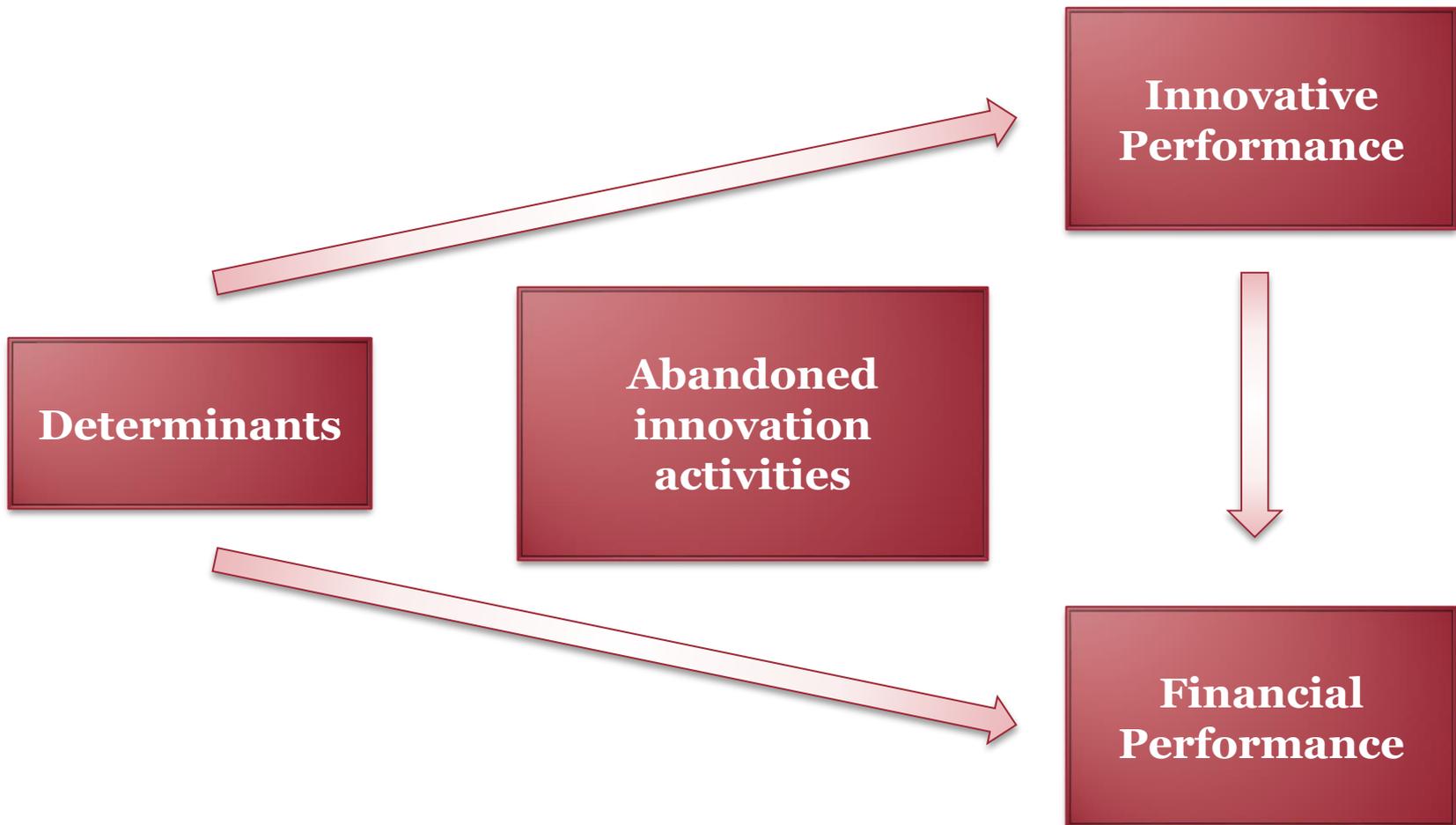
Discussion



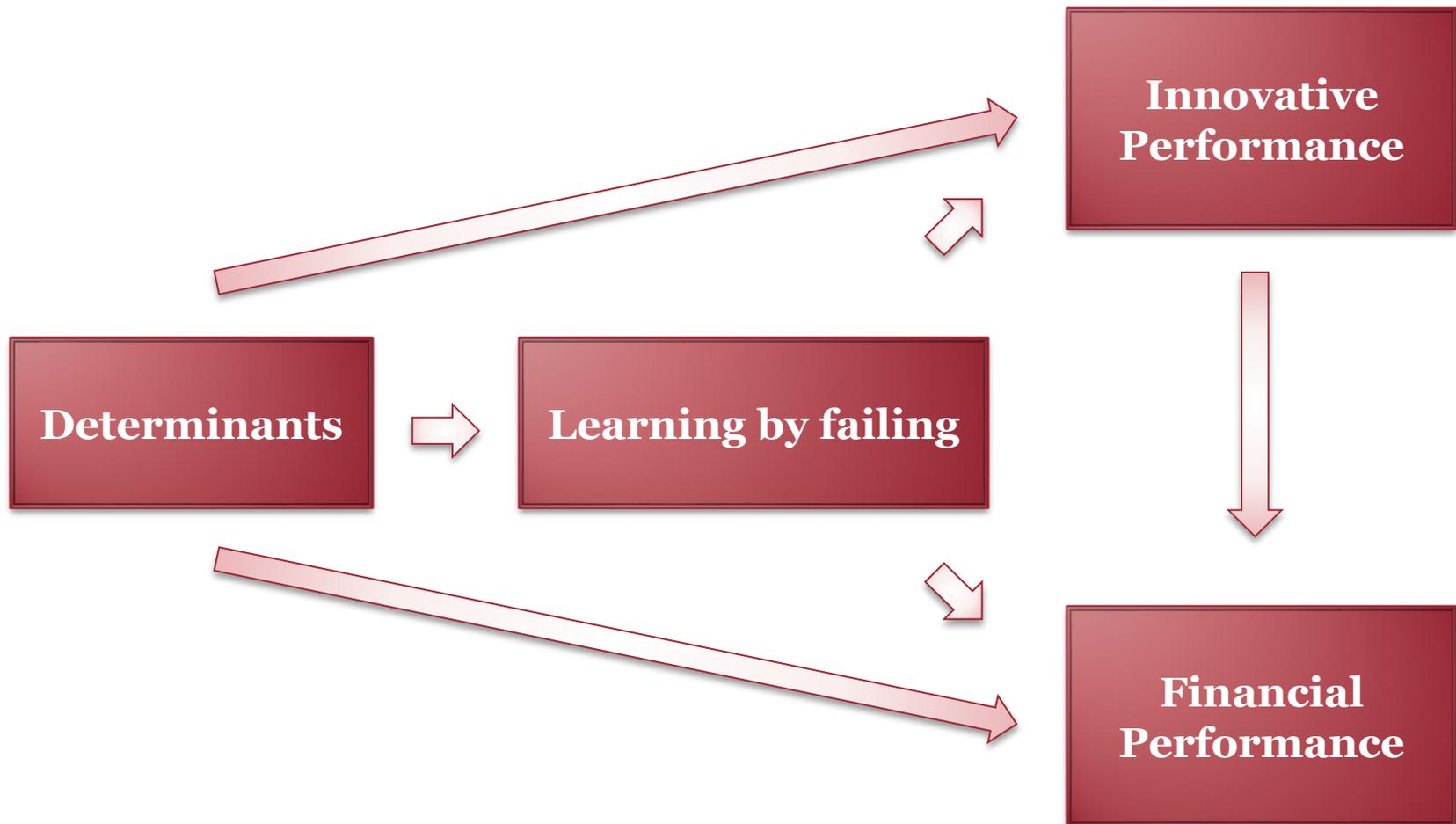
Discussion



Discussion



Discussion



To do

- Bivariate analysis will be extended to a path dependence analysis, allowing to understand the feedback and feedforward mechanisms involved in innovation process.

Relevance

- This study reveals the importance of trial and error processes for firms' innovative and financial performance;
- It suggests that learning with ineffective innovative activity might ultimately be critical for firms' success.

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