

Workshop

*La struttura produttiva italiana a fronte dei recenti sconvolgimenti globali*

26 Gennaio 2023

# Does the NRRP speed up firms' Twin Transition? Empirical evidence from Italy

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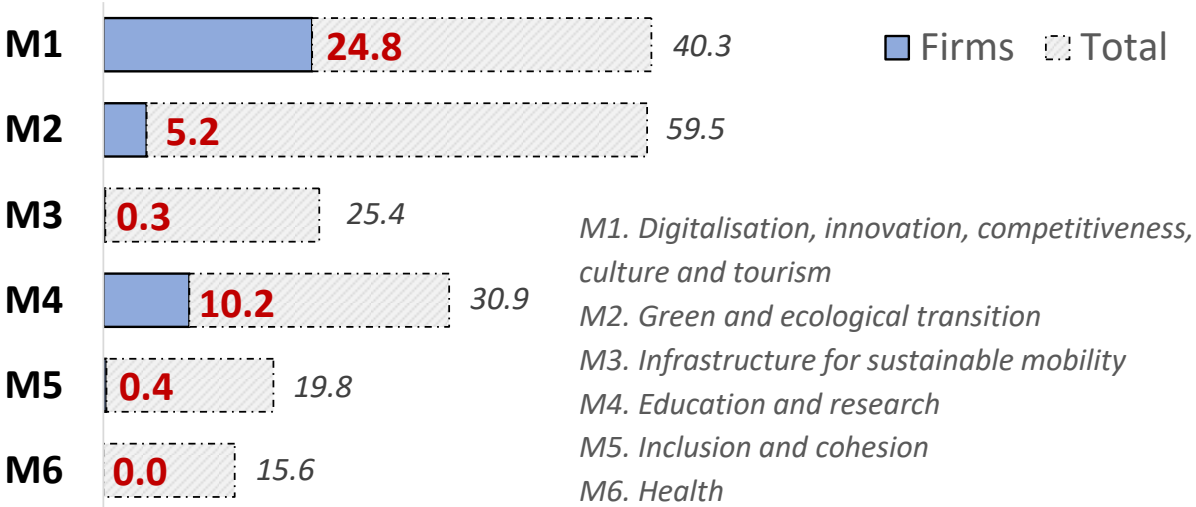
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# NRRP and the firms

**Next Generation EU** allocates 750 billions euro to support the Twin Transition (digital and environmental) of member countries, within a framework of cohesion and inclusion. **Italian National Recovery and Resilience Plan (NPRR)** decline the EU strategy at national level with an endowment of 191.5 billions.

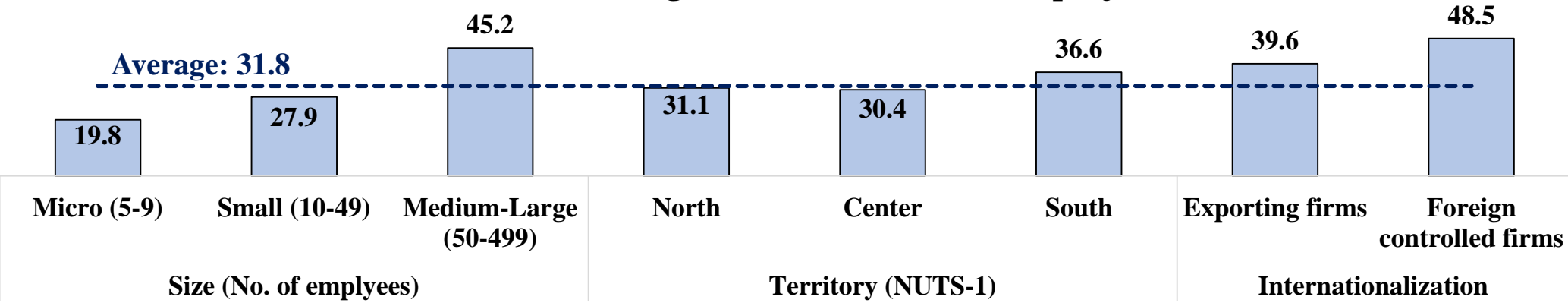
**21.3%** of the NRRP's resources (**40.8 billion** out of a total of 191.5 billion) are specifically allocated to firms thanks to 27 project lines (incentives and tax credits).

NRRP resources for firms by missions (values in billion)



Source: Ministry of Economy and Finance

Italian manufacturing firms involved in NRRP projects (%)



Source: Centro Studi Tagliacarne-Unioncamere, survey 2022

# Introduction

**NRRP is the current main instrument of industrial policy:** «*Our generational challenges – the green and digital transitions – are even more important now than before the crisis started... solidarity, cohesion and convergence must drive Europe's recovery*»  
(NGEU, p. 1-2)

## What challenges in analyzing the role of the NRRP in the twin transitions?

- i. NRRP investments will be realized between 2021 and 2026. At this time, **positive effects may not yet be evident**
- ii. **The survey was conducted during a very difficult time** (April and May 2022) characterized by a triple crisis: health, geopolitical, and energy. Within this context, uncertainties about the success of the analysis grow considerably
- iii. There is a **risk that businesses will consider the measures as temporary**. This could work against the NRRP's ambition to feed the dual transition (digital and green) of production systems

## Why Italy?

- i. Italy is the country which benefited of the **largest allotment of NGEU's funds** (191.5 of 750 billion)
- ii. Italy hosts the largest and longest-lived **fracture at the regional level between Center-North and South**
- iii. Italy is a country that shows one of the **largest presence of micro and small enterprises facing the highest barriers to innovation**

# Aim of the study

For Italian manufacturing firms, empirical analysis on the effects of the firms' activation on NRRP projects on Twin Transition, specifically:

- 1) whether the **NRRP is effectively speeding up the firm's Twin Transition (TT)**. If yes, **how** the NRRP is speeding up the firm's TT :
  - i. **Supporting the start of TT** by firms that have never invested in TT
  - ii. **Accelerating the TT** of the firms which already invested in TT
  - iii. **Favoring the convergence of TT** between less and more competitive firms by size (micro-small vs medium-large) and regions (South vs Center-North)
- 2) whether the **TT supports the economic performance**

*To our knowledge, this is the first empirical study addressing the impact of the EU programs, NRRP in our case, at the firm level.*

# Research hypotheses

According to the New Institutional Economics, institutions play a key role by shaping the way an economy evolves, allowing entrepreneurs to maximize opportunities, achieve successful economic change and good performance overtime (North, 1989, 1990, 1994, 2005). In this vein, the main goal of the NRRP is boosting the Twin Transition (Italian Government, 2021).

*Hp1. The activation on NRRP projects increases the likelihood of starting to invest in the Twin Transition for the firms which have never invested in it (extensive margin effect).*

*Hp.2. The activation on NRRP projects increases the likelihood of continuing to invest on the Twin Transition for the firms which has already invested on it (intensive margin effect).*

*Hp.3. The activation on NRRP projects contributes to reducing the gap between less competitive and more competitive firms (inclusive margin effect).*

According to the literature, green investments and digitalization boost firm's economic performance (e.g., for Italy, Cassetta et al, 2022; Büchi et al, 2020). Twin transition represents a key push factor for firms' economic competitiveness (European Commission, 2020).

*Hp.4. The firm's investments in the Twin Transition positively influence its economic performance (growth margin effect).*

# Data and variables

The data source is a 2022 **survey** (**CATI** with interviews conducted between April and May) carried out by Centro Studi Tagliacarne-Unioncamere on a representative sample of **3,000 Italian manufacturing firms with 5-499 employees**. The **sample** represents **2.3%** of the **Italian firms** and **4.8%** of their **employees**. Specifically, the **stratification** have considered three dimensions of firm: i) **industry**; ii) **size class**; iii) **geographical location**.

## *Main dependent variable*

**Twin transition 2022-24**: Dummy 1 = if the firm will invest in the Twin Transition (both in 4.0 technologies and in the environmental sustainability) in the period 2022-24

## *Main independent variable*

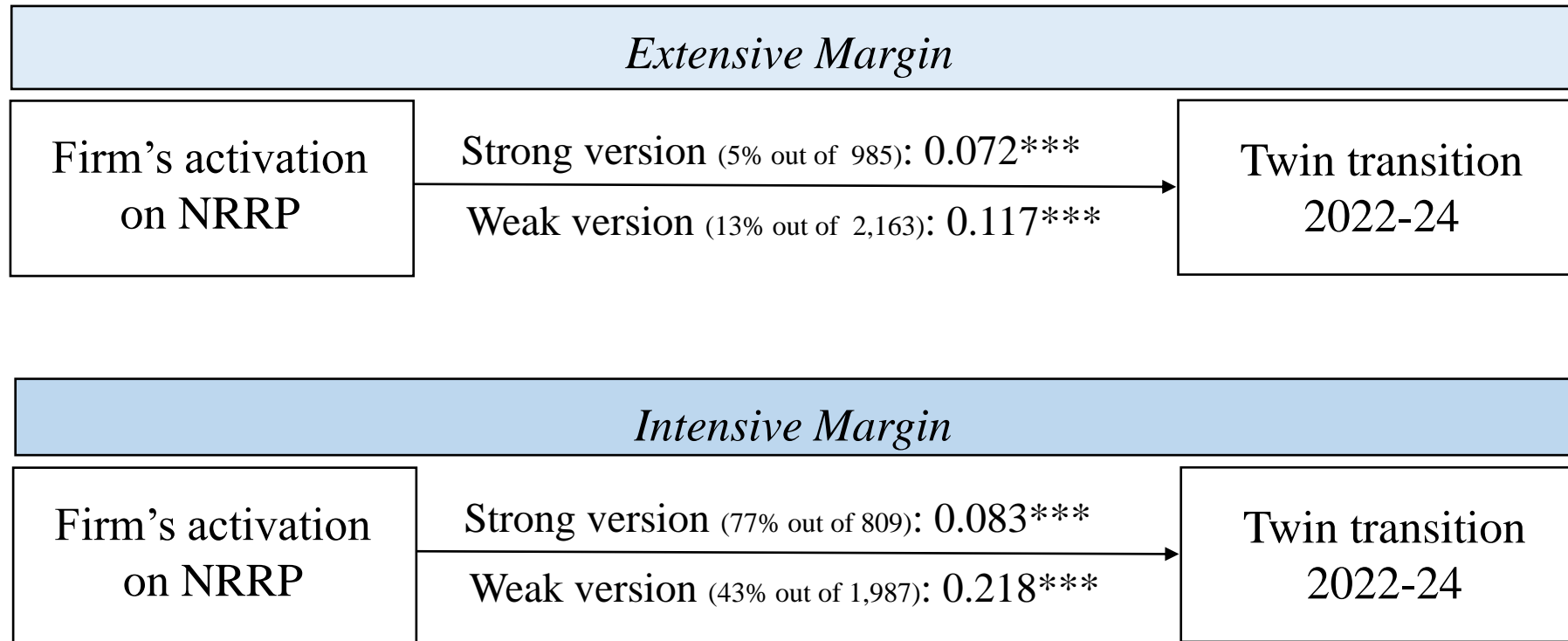
**NRRP**: Dummy 1 = if the firm is activating or has already activated on Italy's NRRP; 0 = otherwise

*Controls*: **Human capital** (share of employees with tertiary degree); **Age** (years of firm); **Size** (Micro, Small, Medium); **Sector** (Food, Personal and household goods, Mechanical, Other manufacturing); **Regions** (NUTS-1 level).

# Measuring NRRP effect

EFFECT	DESCRIPTION	SPECIFICATION	MODEL
EXTENSIVE MARGINE EFFECT	Probability that a firm starts to invest in the Twin Transition (digital and green) in the period 2022-24	« <i>Strong version</i> » : on firms that did not invest in <u>any</u> transition (neither digital nor green)	Probit
		« <i>Weak version</i> » : on firms that have invested <u>at most in only one</u> transition (digital or green) or in none	Probit
INTENSIVE MARGINE EFFECT	Probability that a firm continues to invest in the Twin Transition (both digital and green) in the period 2022-24	« <i>Strong version</i> » : on firms that have already invested in <u>both</u> transitions (green and digital)	Heckprobit
		« <i>Weak version</i> » : on firms that have invested in <u>only one</u> transition (digital or green)	Heckprobit
INCLUSIVE MARGINE EFFECT	comparing the extensive effect between less-competitive firms and more-competitive firms on NRRP (strong version)	micro-small firms vs medium-large firms	Probit
		firms located in the North-Central Italy vs in the South of Italy.	Probit
GROWTH MARGIN EFFECT	Probability that a firm registers a positive economic performance	Turnover: turnover increase in 2021 and 2022	Probit
		Resilience: to pass the pre-Covid-19 production level in 2023	Probit

# Results: Extensive and Intensive margin effect



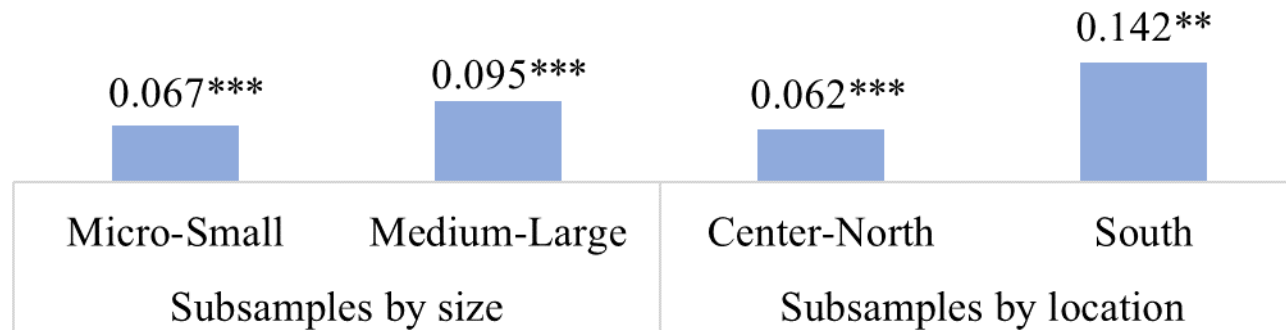
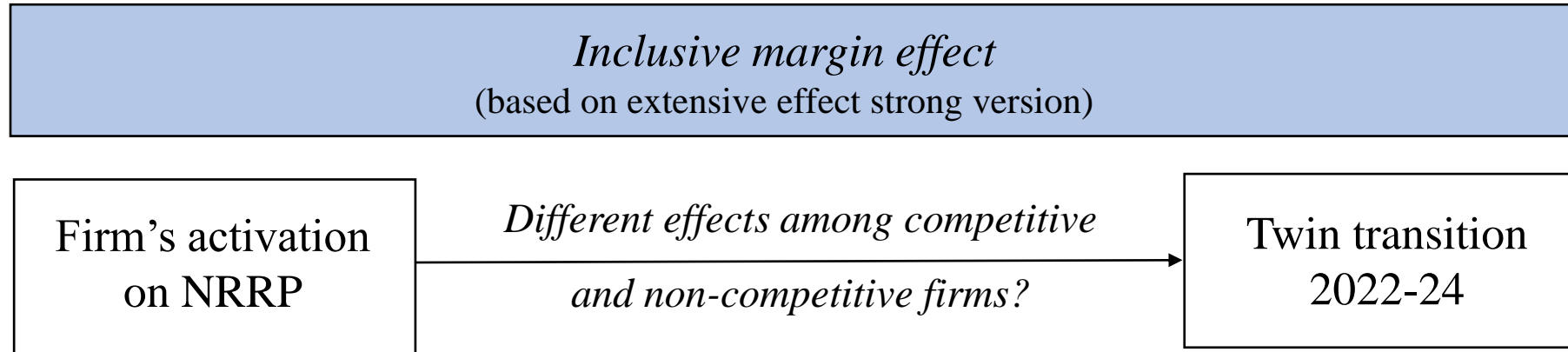
Average marginal effects. In parentheses shares and observation.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Controls included in the regressions.



# Results: Inclusive margin effect



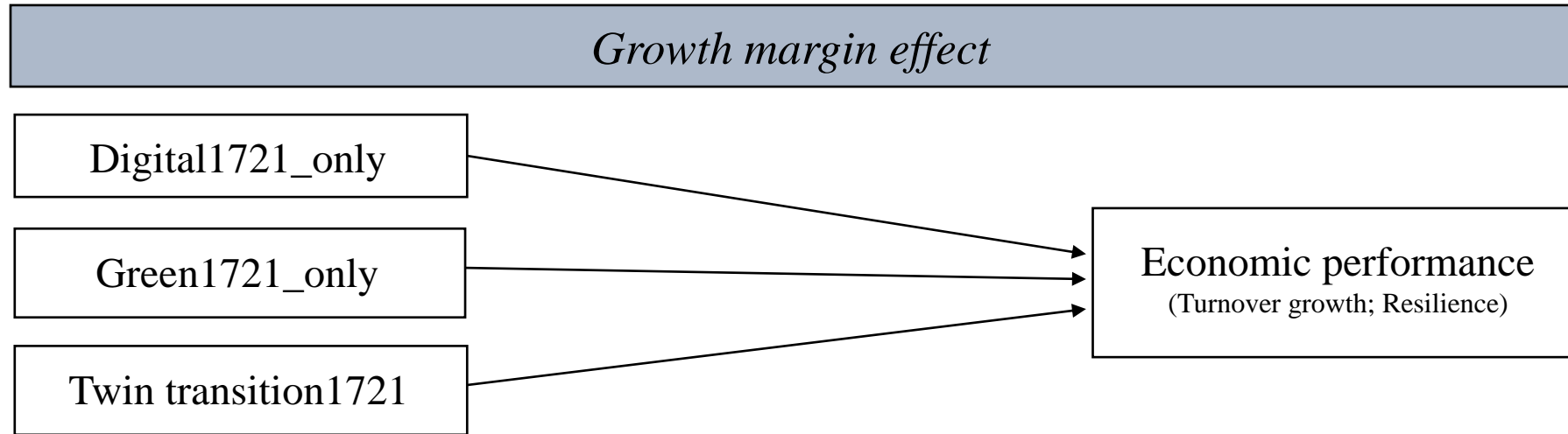
Average marginal effects of the variable NRRP.

Controls included in the regressions.

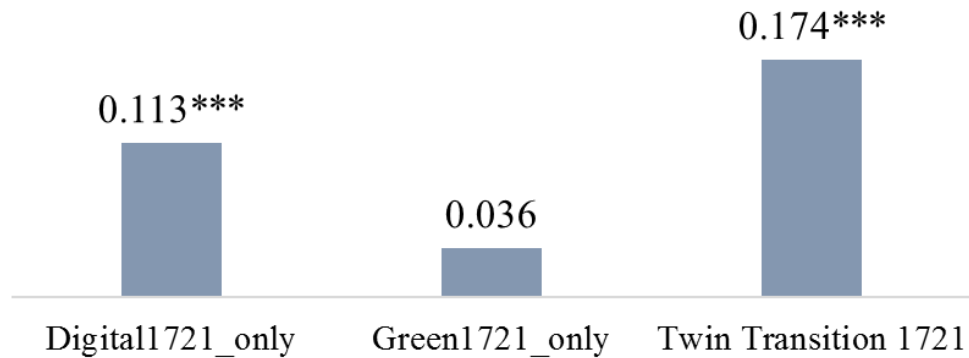
Obs: Micro-Small 484; Medium-Large 501; Center-North 829; South 156.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

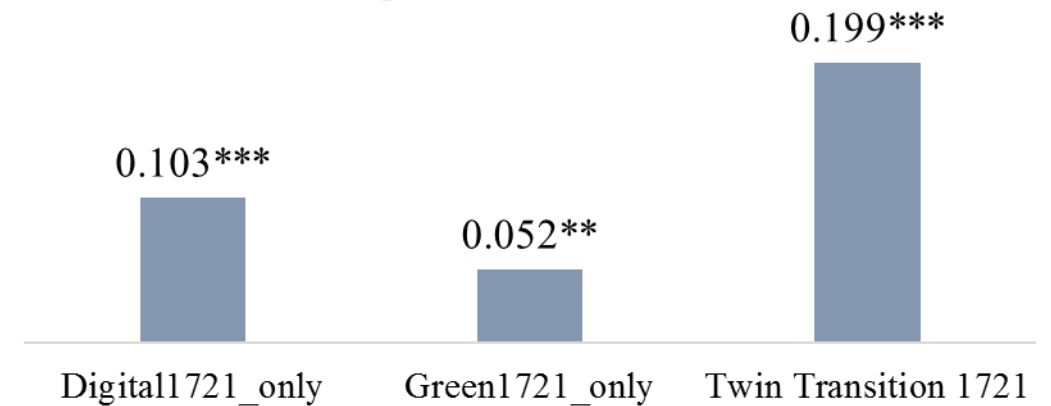
# Results: Growth marginal effect



DEP. VAR. **Turnover growth**: = 1 if the firm register a turnover increase in 2021 an 2022



DEP. VAR. **Resilience**: = 1 if the firm passes the pre-Covid production level in 2023



Average marginal effects. Obs: 2,972.

\*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

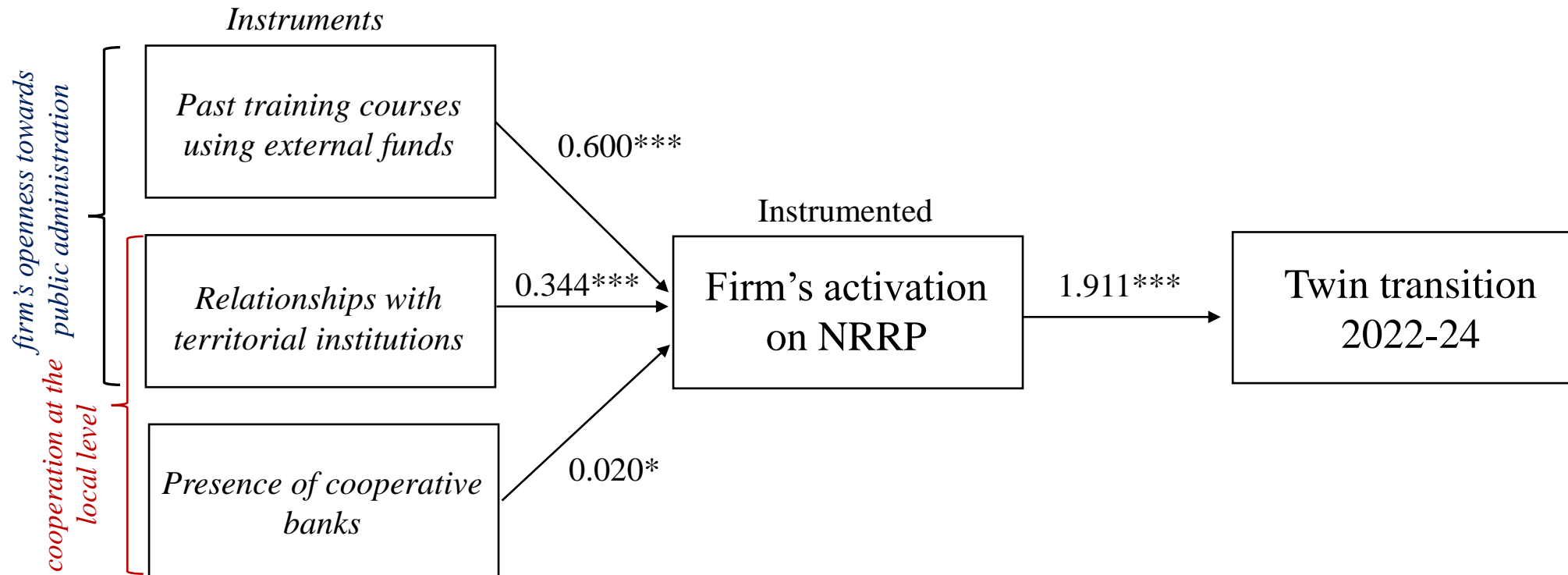
Controls included in the regressions.

# Deepening the endogeneity of NRRP: instrumental variables approach

*Past training courses using external funds*: Dummy 1 = if the firm carries out training courses by using external funds such as interprofessional funds, public regional funds, European funds

*Relationships with territorial institutions*: Dummy =1 if the firm has strong and enduring relationships with territorial institutions (Government agencies, Chambers of commerce, etc.)

*Presence of cooperative banks*: Number of cooperative banks branches per 100,000 inhabitants at the provincial level



The figure displays coefficients of the bivariate probit regression (extensive margin strong version). Obs: 985. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Controls included in the regression. The model passes the tests (calculated on OLS) concerning the instruments relevance (F-statistics on instruments restriction  $>10$  and sig. at 1%), instruments exogeneity (Overidentification test Sargan  $\text{Chi}^2=1.110$  not significant).

# NRRP supports Twin transition... and so what?

- ✓ NRRP potentially involves almost one third of Italian manufacturing enterprises: much work will need to provide the opportunities of the Plan to all firms.
- ✓ Behind the positive effect on the average, NRRP proves to be strategic for the **convergence in Twin Transition (TT)**:
  - **Entrepreneurship convergence**, especially by supporting the starting of the investments in TT by the non-investing firms; as well as by exerting around the same effect between micro and large firms but micro firms involved are less than half of medium-large (19.8 vs 45.2); importance to inform, involve and stimulate them.
  - **Regional convergence**: NRRP shows a larger effect in southern regions, suggesting growing territorial cohesion.
- ✓ Since that the interviews were conducted after the start of the Russia-Ukraine war, the Plan proves to be resilient to the shock in the firm's intentions at a time of extreme economic and politic uncertainty.
- ✓ The resilience and the strength of the Plan may come from also from its medium-period of reference, that provide more stability to the firms in their decisions.
- ✓ The local environment, composed of Social capital, public institutions, ecc., plays a key role by positively influencing the best the firms' decision.

# Limits of research and future development

- i) Only manufacturing
  - ii) No sectoral analysis
  - iii) Cross-section
  - iv) Intensity of the investments
  - v) Skills mismatching and training
  - vi) Perspective 2022-24... See you at the 2025 survey
- } Questionnaire 2023 and following

# APPENDIX

# Appendix 1. Reading the NRRP thinking to the firms

**Next Generation EU** allocates 750 billions to support the Twin Transition (digital and environmental) of member countries, within a framework of cohesion and inclusion. **Italian National Recovery and Resilience Plan (NRRP)** improve the EU strategy with 6 **Missions** divided into 16 **Components** and 132 **Investments** associated with 58 strategic reforms.

## SOME OF STRATEGIC NRRP INVESTMENT FOR ITALIAN PRODUCTIVE SYSTEM

**M1-C2-1.1** (Transition 4.0): 13.4 billions

**M1-C2-1.5** (Supply Chain Industrial Policies and Internationalization): 1.95 billions

**M2-C1-2.2** (Agrisolar park): 1.5 billions

**M2-C2-5.4** (Support to start-ups and venture capital active in the ecological transition): 0,25 billion

**M2-C2-3.1** (Production of Hydrogen in brownfield sites): 0.5 billion

**M2-C2-4.2** (Development of rapid mass transport): 3.6 billions

**M2-C2-4.3** (Development of infrastructure for electric charging): 0.74 billion

**M2-C2-4.4** (Renewal of bus fleets and trains with low environmental impact): 3.64 billions

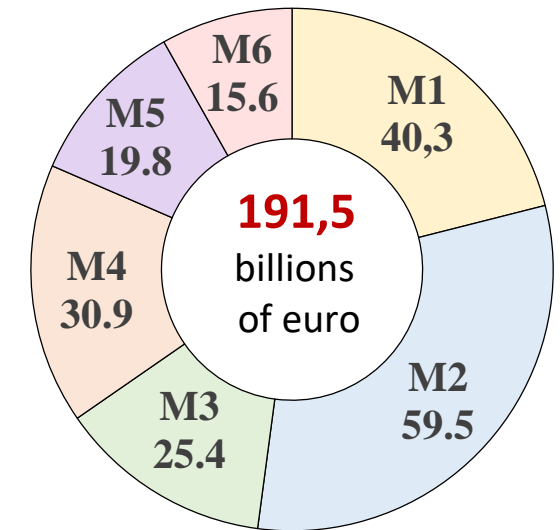
**M3-C2-5.0** (R&D leadership in renewebles, battery, idrogen and others supply chains): 2 billions

**M4-C2-2.1** (Important Project of Common European Interest): 1.5 billions

**M4-C2-2.2** (Horizon Europe partnerships): 0.2 billion

**M4-C2-2.3** (Strengthening of technology transfer centers by industry segments): 0.35 billion

**M4-C2-3.3** (innovative doctorates and promote the hiring of researchers in firms): 0.6 billion



- M1. Digitalisation, innovation, competitiveness, culture and tourism
- M2. Green revolution and ecological transition
- M3. Infrastructure for sustainable mobility
- M4. Education and research
- M5. Inclusion and cohesion
- M6. Health

## Appendix 2. Variables description (1)

Variable		Definition
<i>Dependent variables</i>		
TWIN TRANSITION 2022-2024	Dummy	1 = if the firm will invest in the Twin Transition (both in 4.0 technologies and in the environmental sustainability) in the period 2022-24
Resilience	Dummy	1 = if the firm expects to pass the pre-Covid-19 production level in 2023
Turnover growth	Dummy	1 = if the firm states to register a turnover increase in 2021 and 2022
<i>Main Independent variables</i>		
NRRP	Dummy	1 = if the firm is activating or has already activated on Italy's NRRP; 0 = otherwise
TT1721	Categorical	0 = if the firm has invested in the period 2017-21 in any transition (neither 4.0 technologies, nor environmental sustainability) ( <i>TT1721_NO</i> ); 1= if the firm has invested in the period 2017-21 in only digital transition (4.0 technologies) ( <i>Digital1721_only</i> ); 2= if the firm has invested in the period 2017-21 only in green transition (environmental sustainability) ( <i>Green1721_only</i> ); 3= if firm has invested in the period 2017-21 in both digital and green transition ( <i>TT1721</i> )
<i>Control variables</i>		
Human capital	Continuous	Share of employees with tertiary degree (0-100)
Age	Discrete	Number of years since inception
Size	Dummies	Micro (5-9); Small (10-49); Medium (50-249); Large (250-499)
Sector	Dummies	Food manufacturing sector; Personal and Households goods manufacturing; Mechanical; Other manufacturing
Geographical location	Dummies	Nort-West; North-East; Center; South



## Appendix 2. Variables description (2)

Variable	Definition	
<i>Moderator</i>		
Social capital	Continuous	Number of blood donation per inhabitant ( <i>Italian volunteers blood association and Istat</i> )
<i>Instruments</i>		
iv_training	Dummy	1 = if the firm carries out training courses by using external funds such as interprofessional funds, public regional funds, European funds
terr_relations	Dummy	1 = if the firm has strong and enduring relationships with territorial institutions (Government agencies, Chambers of commerce, etc.)
coop_banks	Continuous	Number of cooperative banks branches per 100,000 inhabitants ( <i>Bank of Italy</i> )

# Appendix 3. Summary statistics

	<u>Obs.</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Min</u>	<u>Max</u>
TWIN TRANSITION 2022-2024	2,972	0.304	0.460	0	1
NRRP	2,972	0.317	0.465	0	1
TT1721_NO	2,972	0.331	0.471	0	1
Digital1721_only	2,972	0.126	0.332	0	1
Green1721_only	2,972	0.271	0.444	0	1
TT1721	2,972	0.272	0.445	0	1
<u>Resilience</u>	2,972	0.271	0.444	0	1
<u>Turnover growth</u>	2,972	0.347	0.476	0	1
Human capital	2,972	9.720	14.719	0	100
Age	2,972	32.086	16.467	3	135
Micro	2,972	0.320	0.466	0	1
Small	2,972	0.439	0.496	0	1
Medium	2,972	0.208	0.406	0	1
Large	2,972	0.033	0.179	0	1
<u>Sect Food</u>	2,972	0.223	0.417	0	1
<u>Sect P&amp;H</u>	2,972	0.227	0.419	0	1
<u>Sect Mech</u>	2,972	0.297	0.457	0	1
<u>Sect Other</u>	2,972	0.252	0.434	0	1
North-West	2,972	0.317	0.465	0	1
North-East	2,972	0.315	0.465	0	1
Center	2,972	0.202	0.401	0	1
South	2,972	0.166	0.372	0	1
Social capital	2,972	0.041	0.021	0.001	0.118
<u>iv training</u>	2,972	0.379	0.485	0	1
<u>terr relations</u>	2,972	0.364	0.481	0	1
<u>coop banks</u>	2,972	2.627	4.020	0	35.281