The regional economic impact of the High-Speed Rail on the Italian economy through a combined national and multiregional SUT based model

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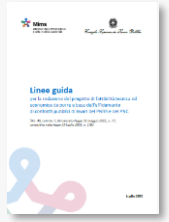
Introduction

The Economic Impact Assessment (EIA) of HSR during construction phase

Ex-ante evaluation is conducted to assess **infrastructure investment potential** to generate **impacts on society and the economy**. This is crucial for justifying **public financing** and **making informed decisions** on whether to proceed with infrastructure investments, especially for high-cost projects with a long-term horizon (as HSR).

EIA IN THE ITALIAN CONTEXT (eligibility of proposals for public funding):



Guidelines for Recovery and Resilience Facility (2021) → EIA as a facultative assessment

Operational Guidelines for Public Works Appraisal for Railways Sector (2022) → Requires employment estimates for short-term

What Economic Impact Assessment measures

CONSTRUCTION PHASE

Short term economic pull generated by the investment capturing sectors interdependencies and induced effects on:

- Economic Output
- Value Added
- Job-Years
- Labor Income

What Economic Impact Assessment DOESN'T measure

OPERATIONAL PHASE

Broader, more complex, and **longer-term** economic growth effects as well as socioeconomic impacts:

- Changes in Accessibility
- Social and Territorial System Effects
- Productivity gains
- Relocation of Businesses and Households

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The model

The impact of the High-Speed Rail on the Italian Economy

The model

The EIA model is based on national **Supply and Use Tables**.
It adopts the **input-output approach** which evaluates the impact of an increase in final demand on the economic system, considering sectoral interdependencies.

Metrics:

Output | Value Added | Employment

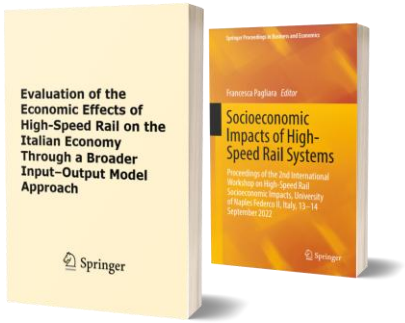
Impact components:

Direct — Connected to sectors firstly involved in the increase in demand

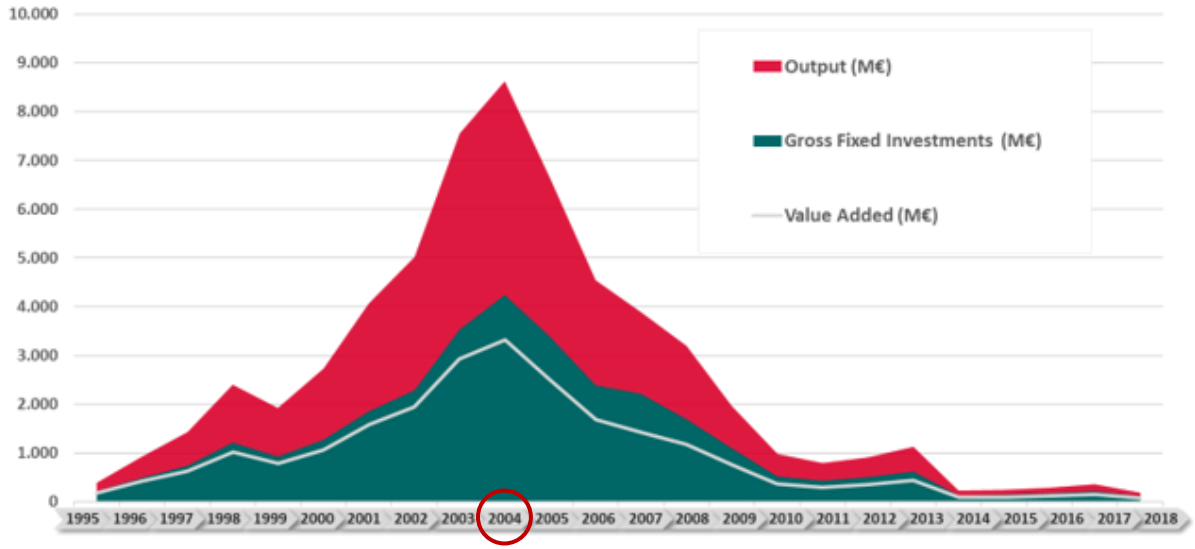
Indirect — Related to inter-sectoral trade necessary to support demand for intermediate inputs

Induced — Generated by consumption expenditure from households who receive wages from the two previous effects

The application on Italian HSR



Output: 8.6B€ (2.03 multiplier)
Value Added: 3.3B€ (0.9 multiplier)
Labor Units (FTE): 52.9k€ (2003)



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The model extension

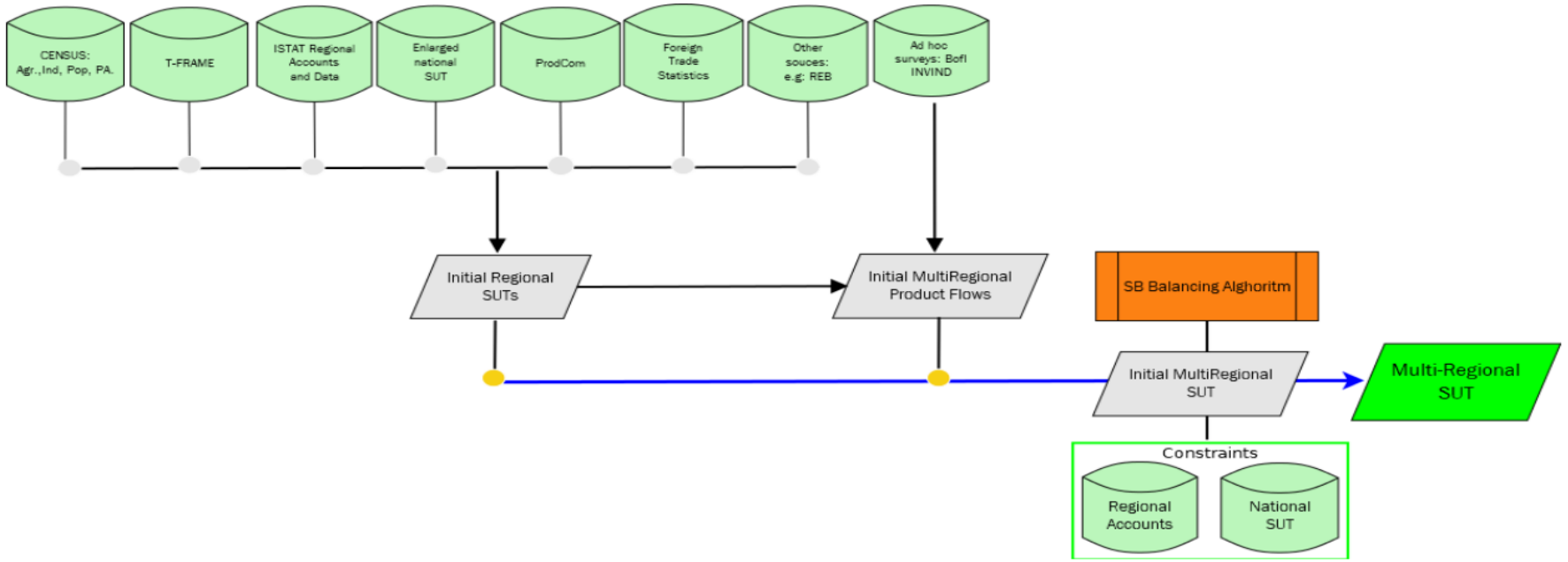
Objectives and integration with national model

Supply and Use Tables (SUTs) are essential tools for providing a systemic modelling framework, in order to analyse the economic interdependencies, related to production process, among institutional factors. SUT models support a wide range of analyses, among others: impact assessment, counterfactual evaluation and structural economic analysis.

In order to get the spatial heterogeneity, we extended the national SUT based model by integrating the **Multi-Regional SUT model for the NUTS2 Italian regions** estimated by IRPET. This allows for a more spatially detailed analysis which accounts for multiregional trade flows of products.

The MRSUT assembly line

Input data sources



The model extension

Methodology 1/2

The impact assessment is performed through a top-down procedure using the two SUT *based* models:

National Model: provides the initial estimate of the impact at the national level but with highly disaggregated sectors

Features:
i) increased sectors granularity
ii) Isard type foreign import treatment

Multi-regional Model: provides the spatial disaggregation of the impacts but with less sectoral detail

Features:
i) less sector granularity (43 instead of 70)
ii) less product granularity (54 instead of 63)
iii) Chenery type treatment of imports both interregional and foreign
iv) full accounting consistency with the national SUT

Full consistency between the two outputs

Key question: why using both models instead of just the MR-SUT

SUT model at national level embeds a higher level of informative content, especially on import (Isard approach).

By using only the MR-SUT model implies a significant loss of impact assessment capability.

Necessary condition for the top-down procedure is the full consistency of MR-SUT with national SUT.

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The model extension

Methodology 2/2

Given: A National impact scenario by product [F] at basic prices

National Side

Multiregional Side

1) $x = [I - D \cdot (T_w \times B)]^{-1} + D \cdot (Tf_w \times F)$

2) $F'_r = [Tf_w \times F] \cdot Q$

3) $xr' = \left[I - D \cdot \left(T_x \cdot (I - M_x) \cdot \widehat{B}\right)\right]^{-1} + D \cdot ([Tf_r \cdot F'_r])$

4) $xr = f(xr', \bar{x})$

1) Solution of national SUT model
2) Decomposition of national final production by product across regions according to a Q matrix of weights
3) Solution of the multiregional SUT model
4) Balancing the solution of MR-SUT model to national one

The model extension

Simulation outline

INVESTMENT INPUT DATA

Classification of investment into typological categories for each year and for NUTS2 shares

THE MODEL

Conversion of typological categories in CPA 63 products

Localization of NUTS2 and conversion in CPA 54 products

National SUT based model (69 sectors)

Multiregional SUT based model (43 sectors)

Aggregation matrix 69 - 43 sectors

Outcome at national level 43 sectors

Accounting consistency check

Preliminary Outcome at NUTS2 level 43 sectors

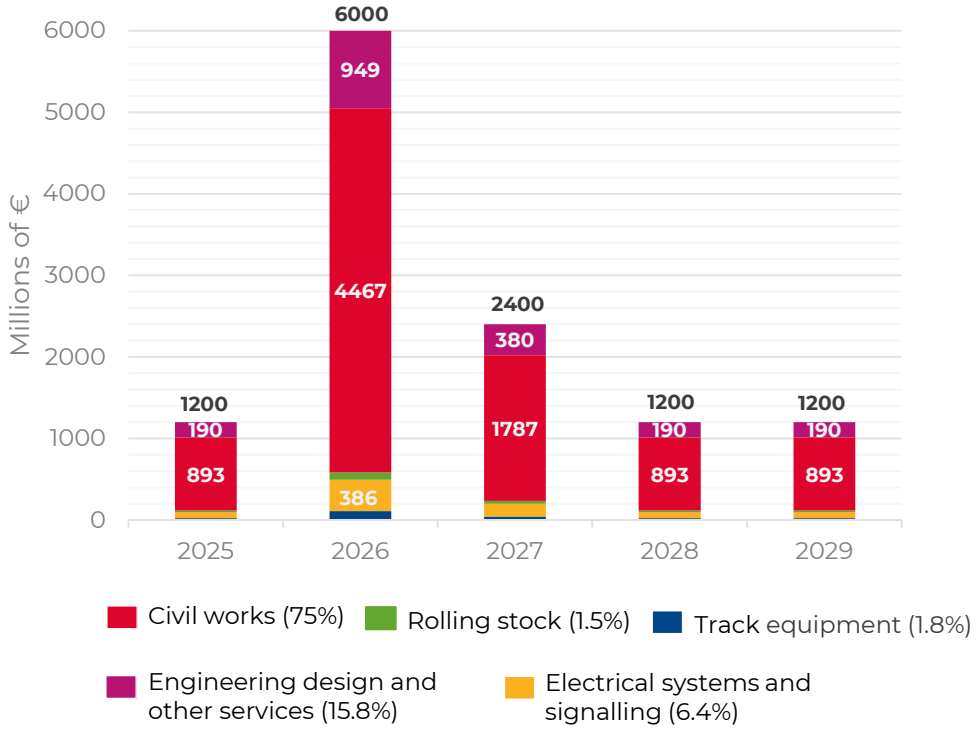
Final Outcome at NUTS 2 level – 43 sectors

Case Study

HSR investment - Scenario description

An identical fictitious investment is simulated for two different groups of regions

Hypothetical HSR Investment of **12B €**



North-East Italy

Region	Spending share
Trentino Alto Adige	30%
Veneto	30%
Lombardia	10%
Emilia Romagna	30%

South-East Italy

Region	Spending share
Calabria	20%
Basilicata	40%
Puglia	40%

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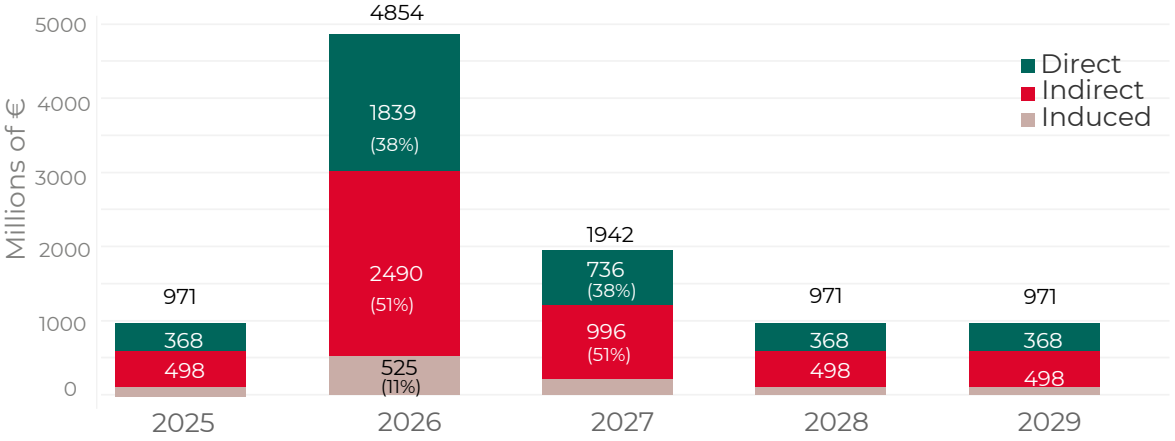
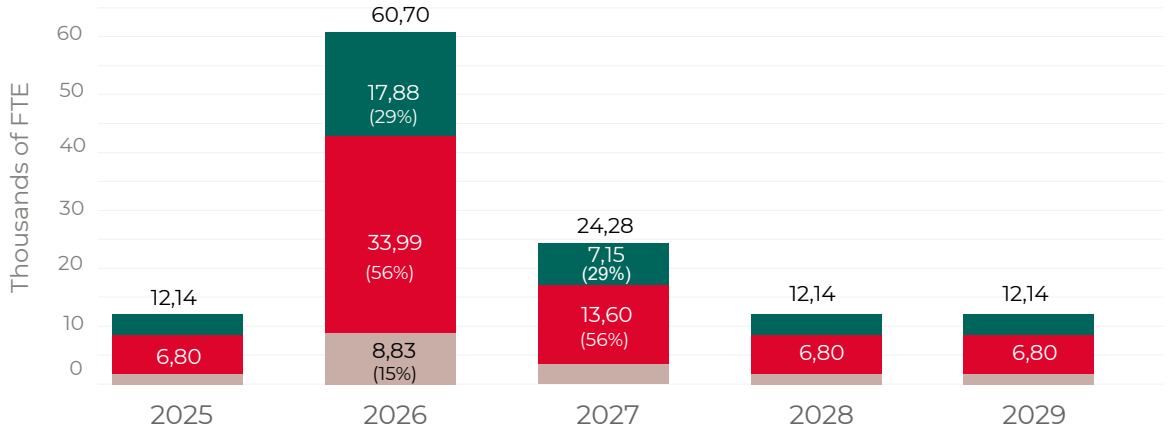
Case Study

National results for the investment

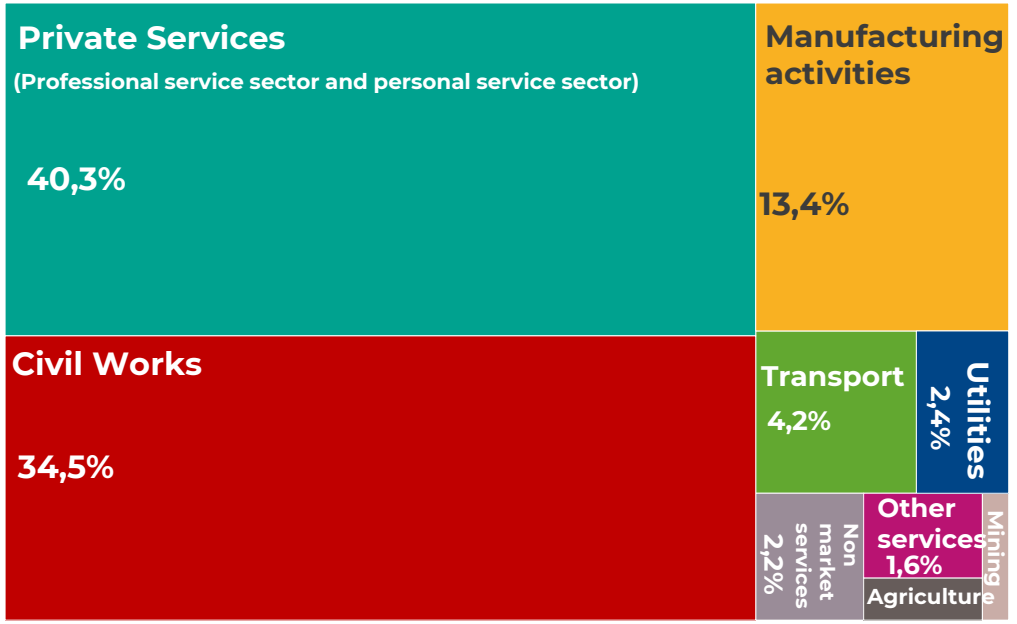
VALUE ADDED (M €)



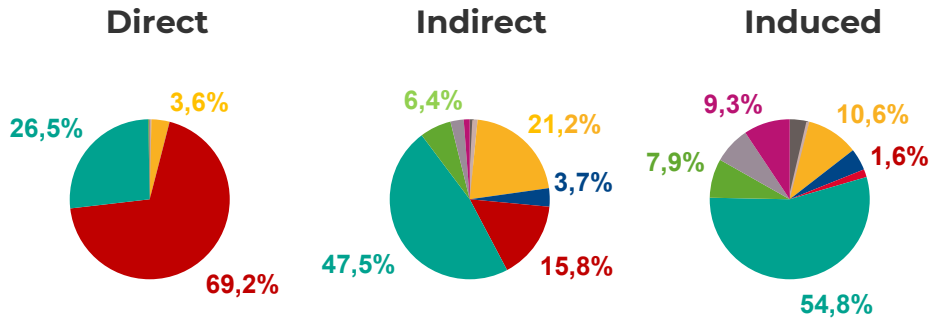
EMPLOYMENT (k FTE)



MACRO SECTORS, VALUE ADDED



IMPACT COMPONENTS BY SECTOR



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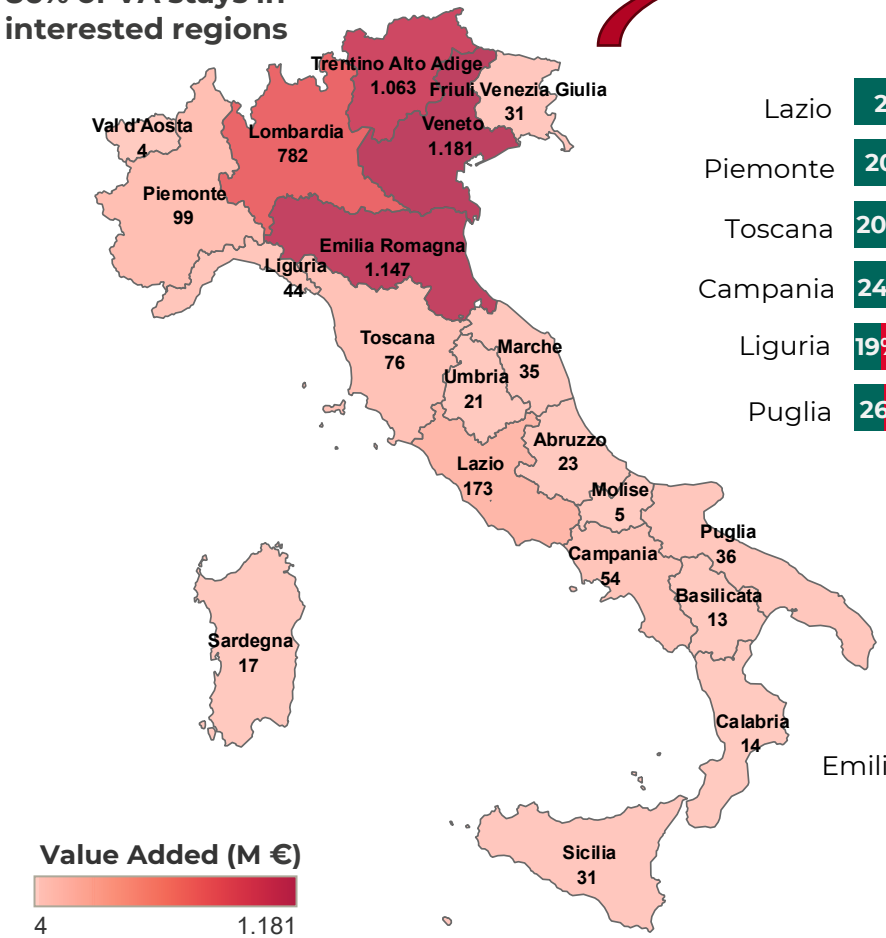
Case Study

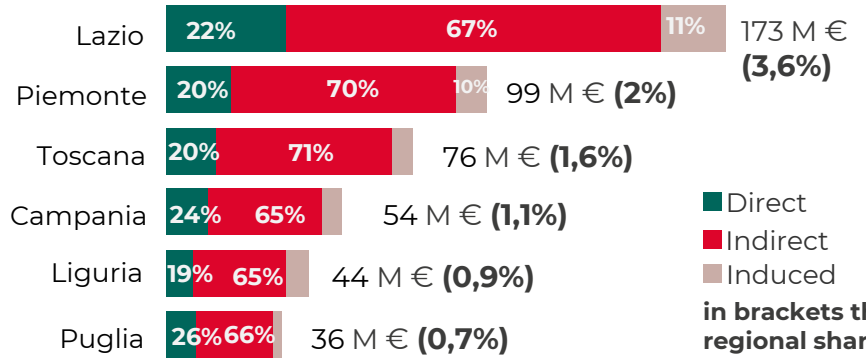
Results at regional level – Value Added for **2026**

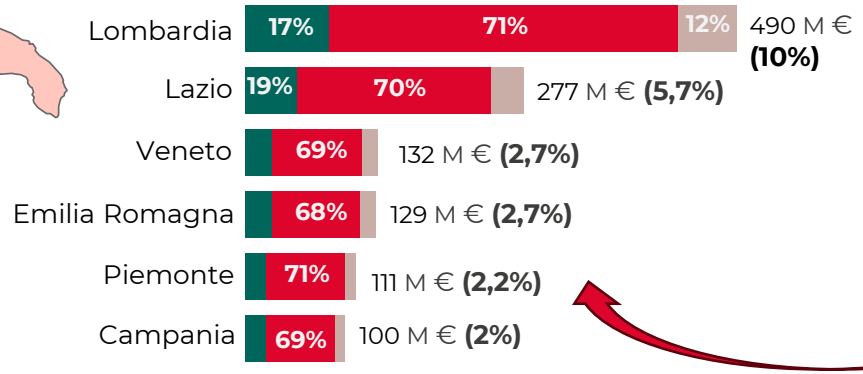
North-East Italy

86% of VA stays in interested regions



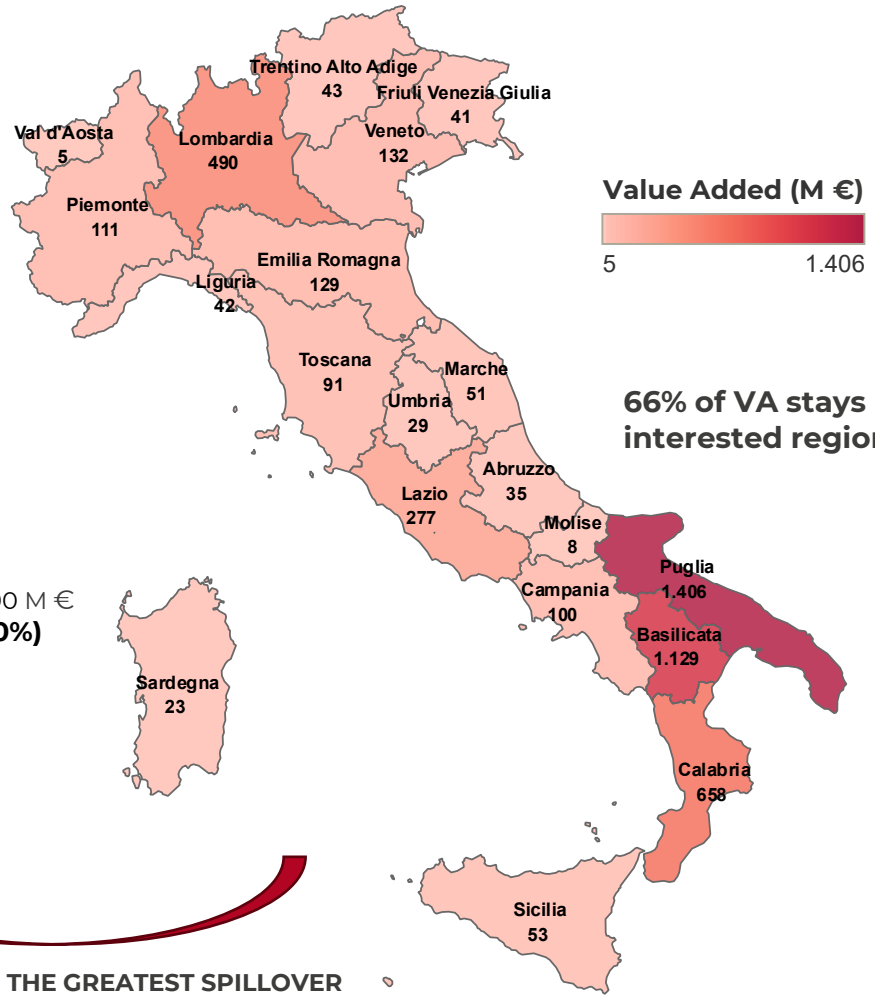
REGIONS WITH THE GREATEST SPILLOVER





REGIONS WITH THE GREATEST SPILLOVER

South-East Italy



66% of VA stays in interested regions

NB: comma for decimals; point for thousands

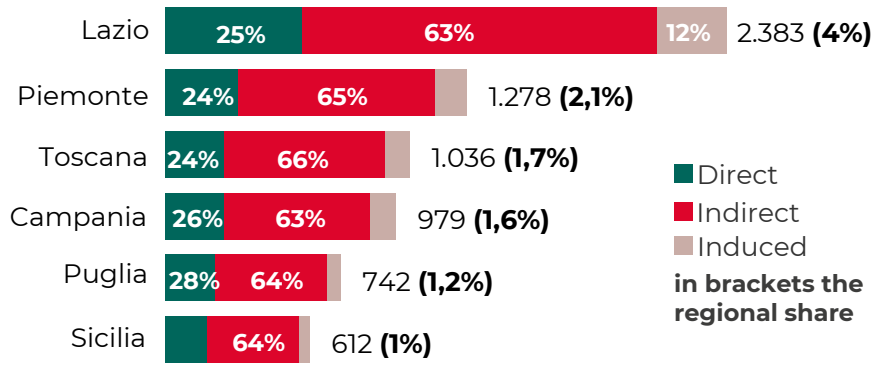
Case Study

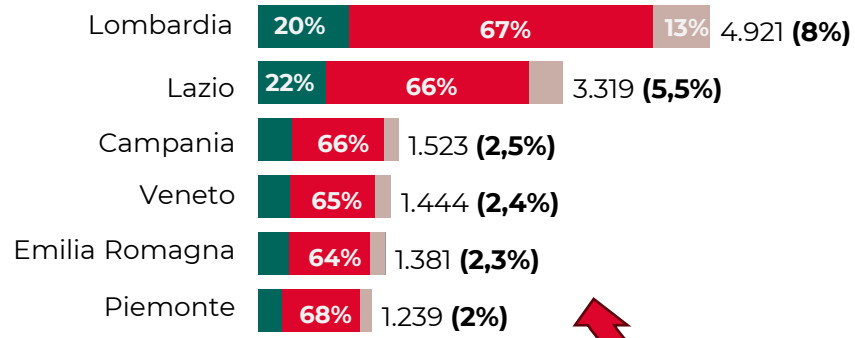
Results at regional level – Employment for **2026**

North-East Italy

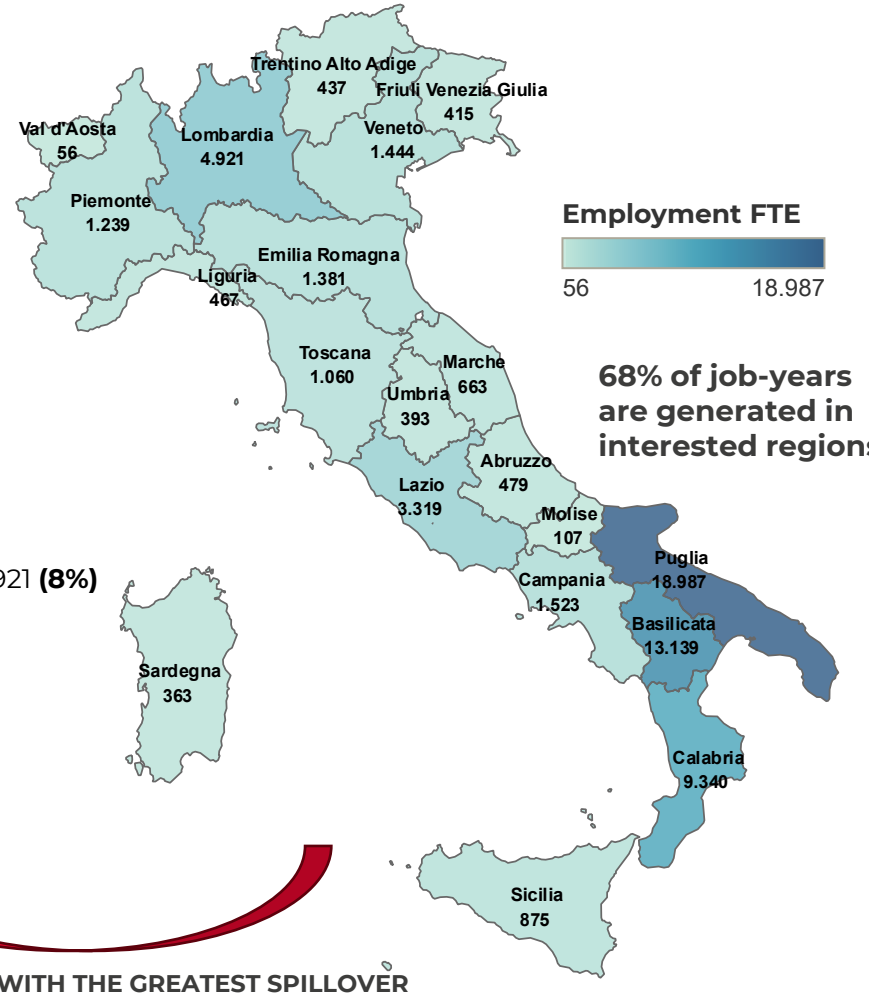
83% of job-years are generated in interested regions

REGIONS WITH THE GREATEST SPILLOVER





South-East Italy



68% of job-years are generated in interested regions

REGIONS WITH THE GREATEST SPILLOVER

NB: comma for decimals; point for thousands

Conclusions

1. **Ex-ante evaluation** is conducted to assess **infrastructure investment potential** to generate **impacts on society and the economy**. This is crucial for justifying **public financing** and **making informed decisions.**

2. The proposed model allows for the estimate of **short-term economic pull** generated by the investment spending, capturing **sectors interdependencies** and induced effects on **value added, employment and other macroeconomic aggregates.**

3. The **integrated use of national and multiregional models** allows for catching the spatial/regional heterogeneity in impact analysis by accounting also for multiregional trade flows patterns of products.

4. Case studies highlight that **role played by northern regions of Italy in retaining the impact effects** in the first case study **and getting the spillover effects, especially as suppliers of specialized services,** when the investments are located in southern regions. These **spillover effects** must be taken into account when evaluating economic impacts at the regional level.

5. **Future developments** of the tool include **further spatial disaggregation** (NUTS3 – Province level) and the expansion of the dimensions of the impacts to include fiscal and **distributive effects.**

Thanks for your attention

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