

# IMPACT ASSESSMENT OF INTERNATIONAL COOPERATION: THE PARTICIPATION OF SPANISH FIRMS IN THE FP

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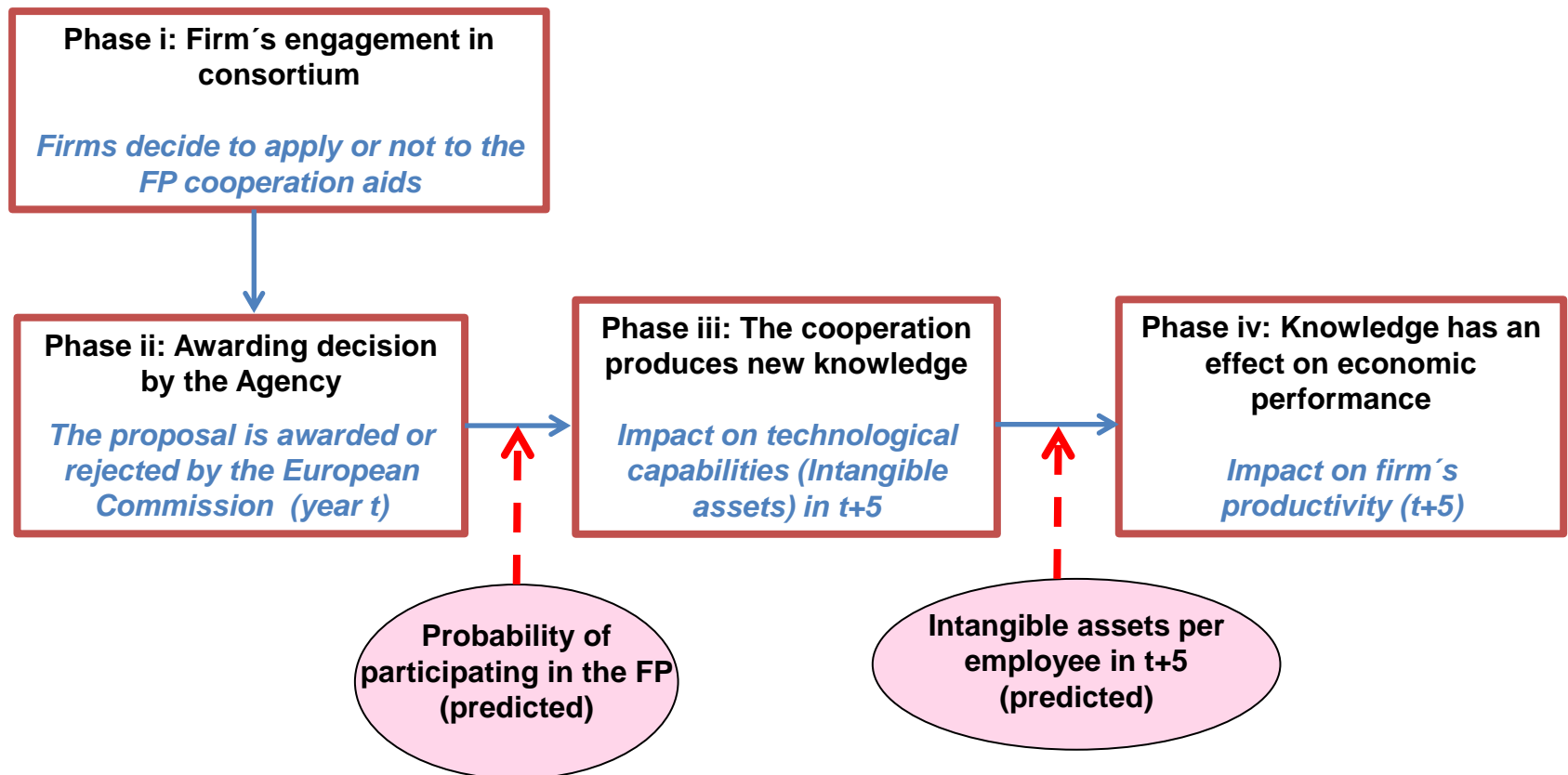
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# Objectives

- To analyse the **effects of R&D cooperation**, exploring the relationship between cooperation, knowledge generation and economic results.
- To provide **empirical evidence for Spanish firms** participating in the FP.
  - Does the participation in the FP improve the technological capital of Spanish firms?
  - Does the participation in the FP increase their economic results?
  - How should policy makers identify the technological and economic results of the FP?

# Theoretical framework

We follow CDM (Crepon, Duguet and Mairesse, 1998). We adapt this model in the following way:



# Empirical model

**We do not estimate all equations simultaneously, but apply a consistent three step estimation procedure (recursive model structure):**

- We consistently estimate the system of equations (i) and (ii) (the decision of applying and the decision of the agency of awarding or rejecting the proposal) as a probit model with sample selection by maximum likelihood. The significance of the correlation term confirms the necessity of estimating a selection model.
- We estimate an equation of the new knowledge (iii) using the predicted value of the probability to participate within the FP as one explanatory variable.
- We estimate a labour productivity equation (iv) taking into account the endogeneity of the knowledge input variable. We also consider the possible direct effect of the predicted participation.

In equations (iii) and (iv) dependent variables refer to period “t+5”, being “t” the awarding year, in order to capture the effect of FP projects once they have finished.

## Main contributions

- To avoid the self-selection effect.
- To joint data on participation and on economic performance for a period long enough to capture long-term effects.

# Data

## Databases: CDTI and SABI (Amadeus)

**CDTI:** All the proposals, finally approved or not, in which participates at least one Spanish firm during the period 1995-2005.

The period covers part of FP4 (1994-1998); FP5 (1999-2002) and part of FP6 (2003-2006)

**SABI:** Company accounts of more than 1,000,000 Spanish firms since year 1995 to 2007. **Control sample:**

- All companies employing more than 200 employees.
- 4% of firms employing between 10 and 200 employees, with respect to the Spanish *Central Companies Directory* (CCD).
- 0.5% of micro-companies respect to the CCD.

## Overall:

- 56,945 observations
- 11,435 firms
- 2,536 proposals (364 awarded)

# Results

- **Probability to apply** depends on technological capability; medium-high technological level sectors; exports; previous experience in FP
- **Probability of being awarded** depends on variables related to the consortia composition: access to information; coordination costs; nationality of the leader
- **Cooperation within the FP has a positive impact on the technological capacity of firms**, captured through intangible fixed assets: Being a firm that cooperates in an FP project increases the ratio of intangible fixed active over employment almost 40% (5 years after the project started)
- **Technological capacity of firms is positively related to their economic performance**, measured by labour productivity: If the ratio of “intangible fixed assets over employment” duplicates, it causes productivity to grow more than 12%.
- **The economic impact of the FP should be evaluated from a long term perspective**
- **Results are consistent with the evaluation criteria followed by the FP** (scientific and technological excellence, European added value and potential to disseminate the knowledge and reach innovations)

## Papers in international scientific journals

Barajas A., E. Huergo and L. Moreno (2011). “Measuring the impact of international R&D cooperation: the case of Spanish firms participating in the EU Framework Programme”. *The Journal of Technology Transfer*. Vol. 37(6), pp. 917-942

Barajas A., E. Huergo and L. Moreno (2014). “SME performance and public support for international RJVs”. *Journal of Small Business Management*. Forthcoming.

Barajas A. and E. Huergo (2010). “International R&D cooperation within the EU Framework Programme: empirical evidence for Spanish firms”. *Economics of Innovation and New Technology*. Vol. 19, pp. 87–111