

Unfolding the Additionality of Innovation Policy

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policies, instruments and organisations: new
horizons and new challenges**

- Evaluation Problem
- Additionality Framework
- Additionality and Policy Rationales
- Behavioural Additionality
 - Conventional Understanding
 - Evolutionary View
- The Relationship Between IA, OA and BA
- Research Questions and Hypotheses
- Data and Methodology
- Results
- Discussion
- Conclusion

Evaluation Problem

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- How to understand the real contribution of a policy to the observed outcome?
- Net Impact of Policy = Observed Outcome – Counterfactual (what would have happened without the policy)
- Counterfactual is not observable, thus attribution is difficult
- Even more difficult for science and innovation (STI) policy, therefore there is a specific term: additionality
- The approach of other policy areas is more structured and highly quantitative while in STI policy it is used more flexibly by using both quantitative and qualitative methods

■ Input Additionality (IA):

- Question: How much additional inputs was spent because of the intervention?
- Includes a variety of input, e.g. financial resources, staff, infrastructure , etc.
- Assumptions: Constant returns to scale and clear input-output linkages

■ Output Additionality (OA):

- Question: How much of the outputs would have been created anyway?
- Includes a variety of output, e.g. profitability, patents, exports, etc.
- Assumptions: Clear input-output linkages and problem of cardinality

■ Behavioural Additionality (BA):

- Question: What is the real difference in the persistent behaviour of the firm in such a way that it would not have happened without the intervention?
- Includes any kind of persistent behaviour, e.g. collaborating, planning,

■ IA and OA:

- They are the core of neoclassical / heterodox policy rationale
- Trying to reinstate the second-best in the case of market-failure
- Focuses on incentives and resources

■ BA:

- It is the heart of the evolutionary/structuralist view
- To overcome learning failures, i.e. problems that limit (or constrain the use of) the cognitive capacity of agents and groups of agents in the case of exploitation/exploitation

Behavioural Additionality

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- Innovation as the change in behaviour by learning, adopting knowledge, developing new skills, practices and routines and applying all these in their respective contexts
- Innovation policy focus
 - Historically: changes in input and output by government intervention
 - Since 1990s : a growing trend to evaluate how innovation policy actually can change the way things are done (Georghiou and Laredo, 2006).
- Evaluation of behavioural changes as an implicit part of many studies and evaluations
- First explicit concept: BA
 - (Buisseret et al., 1995): the persistent change in the behaviour of the agents, which is exclusively attributable to the policy action, i.e. what difference a policy makes in those it supports
- Still serious conceptual, definitional and operational issues

- Issues of Conventional Understanding of BA (Gok, 2010 & 2013):
 - Unit of analysis:
 - Current studies analyse behaviour according to its input and output
 - Example: collaboration behaviour is evaluated in terms of the money spent to collaboration (i.e. input to collaboration behaviour) or the amount of collaboration (i.e. output of collaboration behaviour) but not the building blocks of collaboration
 - Behaviour per se is not a unit of analysis
 - *Organisational routines* should be used as the building block
 - Framework of analysis:
 - Comparative statics is not appropriate to study the change itself
 - Dynamic framework

A New Understanding of Behavioural Additionality

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- BA as the evolution of organisational routines (ORs) influenced by government intervention
- Levels of BA:
 - Micro: within an organisation
 - Meso: within a population (e.g. programme, sector, region)
 - Macro: within the institutions
- Evolutionary processes of MicroBA:
 - MicroBA I Origination of ORs:
 - MicroBA 1a Creation: creation of a new routine
 - MicroBA 1b Mutation: change of an existing routine
 - MicroBA 1c Recombination: recombination of existing routines to create a new routine
 - MicroBA 1d Migration/Diffusion: migration of a routine to other business units
 - MicroBA II Adaption of ORs:
 - MicroBA III Retention of ORs:
- Orders of routines that are subject to BA (Dopfer and Potts, 2009)
 - 0th Order Constitutive Routines: social, legal, political, cultural, and other constituent routines
 - 1st Order Mechanism Routines: routines to change other routines
 - 2nd Order Operational Routines: operational routines for transacting and transforming resources

- **Additionality as an evaluation concept:**
 - BA is often defined and evaluated as the residual and rival of IA and OA
 - Some policy-makers preferred IA and OA, as they are historically accepted performance criteria and easier to communicate
 - BA is often investigated if there is weak IA and OA (Gök and Edler, 2012)
 - IA, OA and BA is often evaluated in isolation (Edler et al., 2012 and Gok and Edler, 2012):
 - Around 60% of evaluation studies in Europe between 2002 and 2007 looked at any type of additionality
 - Only 30% of evaluations studied all three at the same time
 - Only a limited number looked at them together
- **Additionality as an observed phenomenon:**
 - BA as a substitute to IA and OA
 - BA as a complement to IA and OA

■ Questions:

- What is the relationship between the three types of additionality?
- Under what conditions are they complement and substitute to each other?

■ Hypotheses:

- **H1:** Size, R&D experience, government support history influence the type of BA created
- **H2:** BA is the substitute of IA and OA
- **H3:** Mutation, migration and recombination BA is more related with IA and OA than creation BA

- Monitoring data from the Turkish TIDEB Programme, spanning 2002-2004
- 8 page extensive survey verified by a programme manager and a prerequisite of the release of final payments
- Full coverage of 431 R&D projects supported decreased to 385 observations due to data cleaning
- Data includes extensive firm characteristics and insights into input, output and behavioural change
- Information on additionality through an umbrella question of “would you carry out the project in the absence of the support?”
- Econometric set-up: simultaneous probit (and ordered probit) regression of various types of IA, OA and BA together through Maximum Simulated Likelihood Method (Roodman, 2009).

Data and Methodology: Variables

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Type	Order	Process	Variable
BA: Technological Learning	1st order mechanism	creation	technology monitoring
	1st order mechanism	creation	new tech in product and process development
	1st order mechanism	creation	identification of tech capabilities
BA: R&D Management Learning	1st order mechanism	mutation	restructured R&D dept
	1st order mechanism	creation	project based R&D
	1st order mechanism	creation	team culture in R&D
	1st order mechanism	migration	R&D awareness in different depts
	1st order mechanism	migration	new management approaches
	1st order mechanism	migration	dissemination of R&D
BA: Network Realisation	2nd order operational	creation	new strategic collaborations
	2nd order operational	creation	new networks
	2nd order operational	creation	new processes
BA: Process Realisation	2nd order operational	mutation	improved processes
	2nd order operational	mutation	solved problems
			Efficiency gain
			Sale increase
			New markets
	OA		New products
			Product improvement
			R&D infrastructure improvement
			New IPR
		IA	R&D employee increase
			SME firm
			First R&D project
	Controls		First R&D support (grant)
			Existing R&D Management
			Existing R&D Department

- **H1:** Size, R&D experience, government support history influence the type of BA created
 - Rejected: there is no effect except
 - First time supported firms tend to have less “BA: Technological Learning (1st order mechanism)”
 - First time R&D performers tend to have less “BA: Process Realisation (2nd order operational)” but otherwise
- **H2:** BA is the substitute of IA and OA
 - Rejected:
 - Composite BA indicator: Although IA does not explain BA, various types of OA (sales increase, new markets, new products, product improvement, R&D infrastructure improvement) do
 - BA components:
 - New products OA is related with both 1st and 2nd order BA,
 - While Product improvement, R&D infrastructure improvement and new IPR is only related with 1st order BA

- **H3:** Mutation, migration and recombination BA is more related with IA and OA than creation BA
 - Supported
 - IA is related with migration
 - OA is related with mutation and migration except new product development which is related with creation BA

- Absorptive capacity is a more important determinant of BA than size, R&D experience, government support history (*H1*)
- Tangible OA is related with both orders of BA while intangible OA is related with only 1st order mechanism BA (*H2*)
- Creation of new routines tend to be a substitute for IA and OA while mutation, migration and recombination of routines are complement to IA and OA (*H3*)

- BA should be understood as the evolution of organisational routines
- IA, OA and BA are complement to each other but there are differences according to the type of OA and BA
- There is a certain degree of bias in the data due to self-reporting non-experimental design but this should be the same across IA, OA and BA: so the results are unaffected
- More investigation into the nature of additionality is needed

Thank You!

questions, comments, remarks
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