



# Legitimation and effects of mission-oriented innovation policy: A spillover perspective

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# Introduction

- R&D policy is commonly legitimized by the existence of spillover externalities
- R&D policy and STI policies are evolving into 'mission-oriented innovation policy' (**MIP**)
- MIP is systemic, cumulative and directional
- MIP involves firms in collective transformations

***What spillover externalities may we expect?***



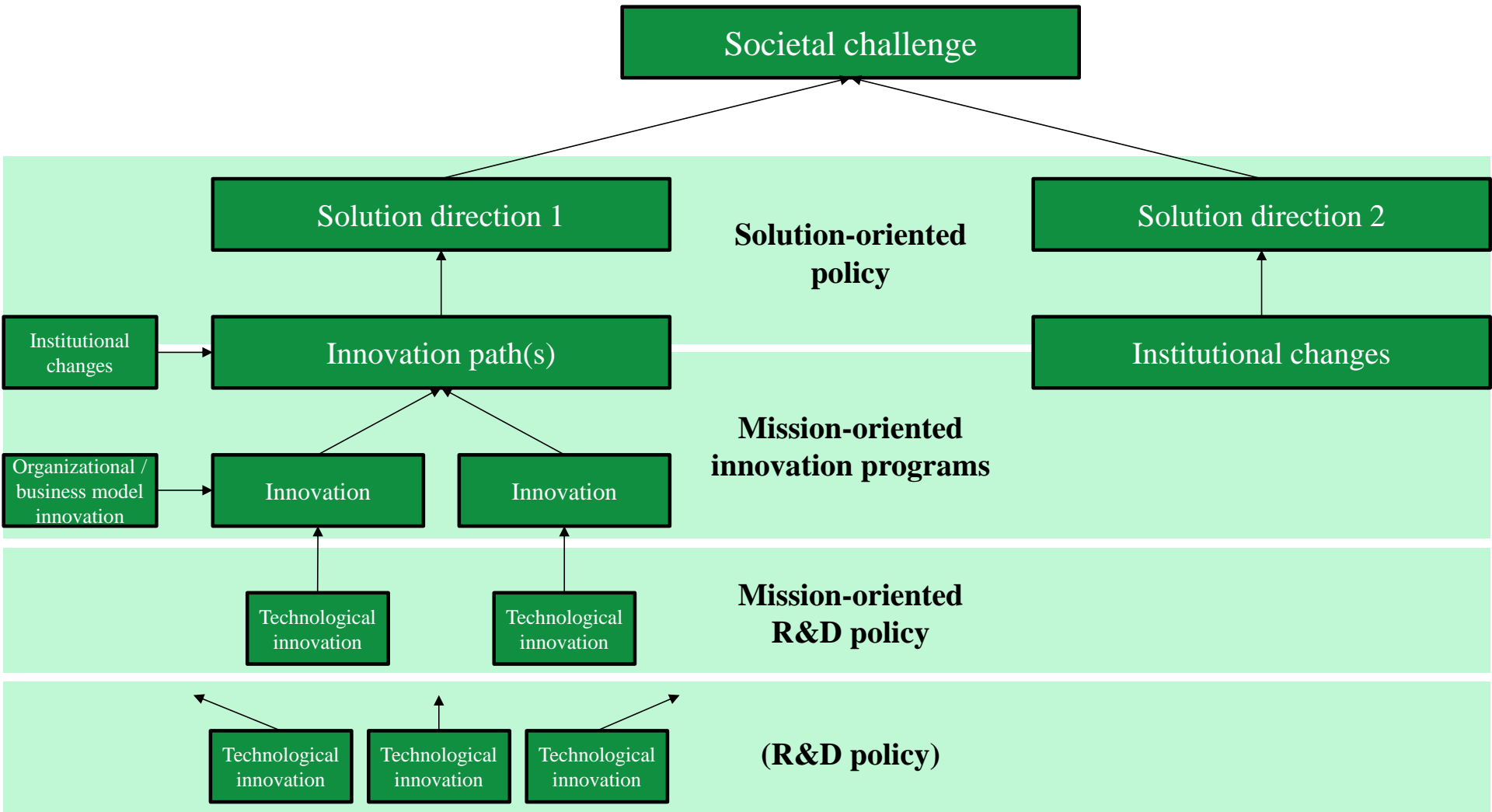
# Emerging mission-oriented policies

Overall outlines of 'the rise of MIP policy':

(Mazzucato, 2018; Schot & Steinmueller, 2018; Foray, 2019, ...)

- Evolution from generic to specific policy
- Targeted at 'grand societal challenges'
- Innovation as one part of the solution
- Policy for socio-economic transformation
- "Systemic, preferential, experimental, adaptive"

**Which MIP types (steps and their key features)?**



	<b>R&amp;D policy</b>	<b>Mission-oriented R&amp;D policy</b>	<b>Mission-oriented innovation programs</b>	<b>Solution-oriented policy</b>
<b><i>Objective / Policy priority</i></b>	Boost innovative economic activity	Boost innovative economic activity with wider societal impact	Spur complementary innovative solutions to societal problems	Search solutions, with or without innovative market parties
<b><i>Rationale</i></b>	Market failures	Same, especially coordination failures. + System failures (NIS)	System failures (TIS) / directional failures / etc.	Transition failures
<b><i>Mechanism</i></b>	Push: Generic innovation policy	Push: Targeted innovation policy	Push-Pull: Demand-driven innovation policy / programs	Disentangle challenges into underlying problems
<b><i>Transformation focus</i></b>	Knowledge creation	Novelty creation	Novelty implementation + institutional change	Institutional change
<b><i>Responsibility</i></b>	Industry ( <i>or</i> science; not both)	Industry-science complex	Triple helix coordination	Policy makers + citizens + societal parties
<b><i>Governance</i></b>	Via policy execution agency	Priority setting (Top-down, <i>or</i> bottom-up)	Facilitate collective roadmap development ("top-down-bottom-up")	Wicked = organize debate; Non-wicked = Project mgmt., procurement
<b><i>Suitable instruments</i></b>	Tax credits	Norms, subsidies, vouchers	Purchasing (PPI), regulation, spurring broad interaction	Public discourse, nudging, prizes, contests
<b><i>Monitoring</i></b>	R&D expenditure, patent rate, etc.	Do R&D and innovation efforts follow priorities?	Are regime pressures converging and cumulating?	Are we reaching the actual goals?
<b><i>Challenges</i></b>	Trickling down of knowledge production	Accumulation of inventions	Conflicting solution paths, market distortion	Identifying urgent + manageable problem
<b><i>Examples (NL)</i></b>	<i>WBSO, Patent box</i>	<i>Valorisation grant, Topsector policy</i>	<i>Catalytic SBIR, Launching customership</i>	<i>Direct SBIR, National science agenda</i>



# Spillovers as a policy rationale

- Spillovers = innovation-based value benefitting other parties, without full compensation
- Innovation *externalities* (Breschi & Lissoni, 2001): not just unintended, but incomplete appropriation
- Implication: private returns below social returns
- Policy for *internalizing* externalities: e.g. via protection (IP) and/or compensation (subsidies)
- From an innovation systems and industrial policy perspective: policy for *augmenting* spillovers.

**But which ones?**



# Different types of spillovers

## **Rent spillovers** (Grilliches, 1992)

- Innovation-induced value not fully charged in prices (“customer surplus not entirely captured”)
- Inherent uncertainty of innovation obscures how customers will use it → Exaptation

Policy response targeted at strong competition, asymmetric information, transaction costs, etc.



# Different types of spillovers

## **Business stealing** (Bloom et al., 2013)

- Firms using their innovation to capture a disproportional large share of the market.
- The R&D investor appropriates more than it creates; it is a *negative spillover* (good for the firm, bad for society)

Policy response: competition law





# Different types of spillovers

## **Knowledge spillovers** (Hall et al., 2009; Aghion & Jaravel)

- ‘Technical’ knowledge (stemming from e.g. research, production, usage) informing others on how to do something. *Codified* or *tacit*.
- *Public good* nature if not protected → Imitation
- Leakage of knowledge can cause positive or negative *product rivalry effect* (Bloom et al., 2013)

Policy response targeted at protection and compensation



# Different types of spillovers

## **Absorption externalities** (Bye et al., 2011)

- Unaccounted improvements in *absorptive capacity*  
→ Enhanced ability to receive and use spillovers  
(Cohen and Levinthal, 1989)

## **Network trust**

- Unaccounted improvements in reputation and partnership possibilities

Policy response: capacity + system building



# Different types of spillovers

## **Information externalities** (Hausmann & Rodrik, 2002)

- 'Commercial' knowledge informing others on the existence of some unfulfilled demand.
- Typically the result of self-discovery processes.
- *Public good* nature → Imitation ('crowding in')

Policy response: *new industrial policy* driving bottom-up entrepreneurial experimentation (Rodrik, 2004)

- Also: green industrial policy (Rodrik, 2014)



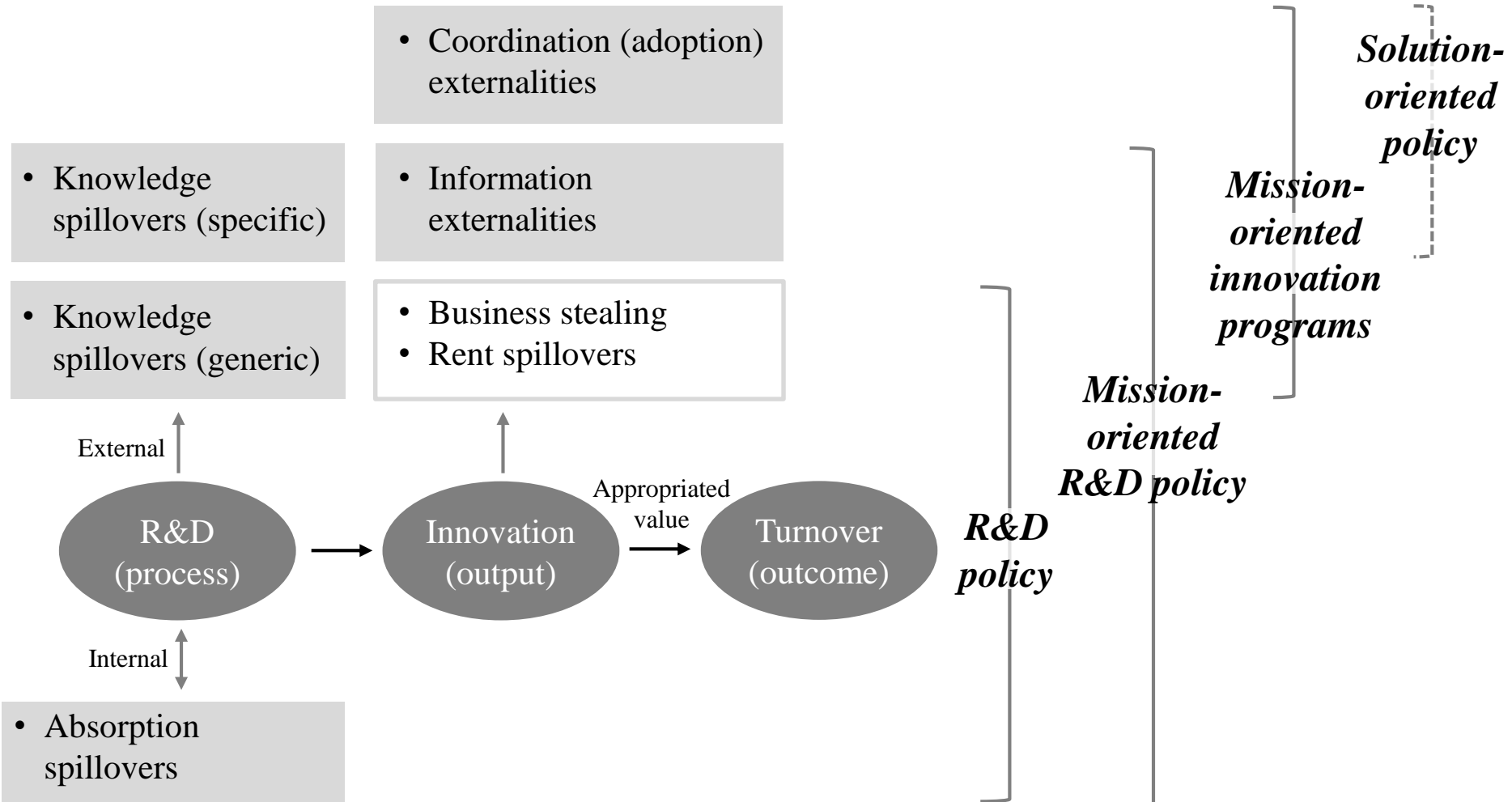
# Different types of spillovers

## **Coordination externalities** (Rodrik, 2004)

- Collective benefits due to *complementarities* between innovation activities (private & public)
  - Regime pressures, infrastructure, regulation, etc.
- Firms yield more than they can appropriate; (selfish?) contributions to niche development → system transformation as a *club good*.
  - Similar to 'supply-side' network externalities, or adoption externalities (Arthur, 1983; Foray, 2019)

Policy response: transformative innovation policy  
(Weber & Rohracher, 2012; Schot & Steinmueller, 2018)

# An integrated spillover framework





# Empirical illustration

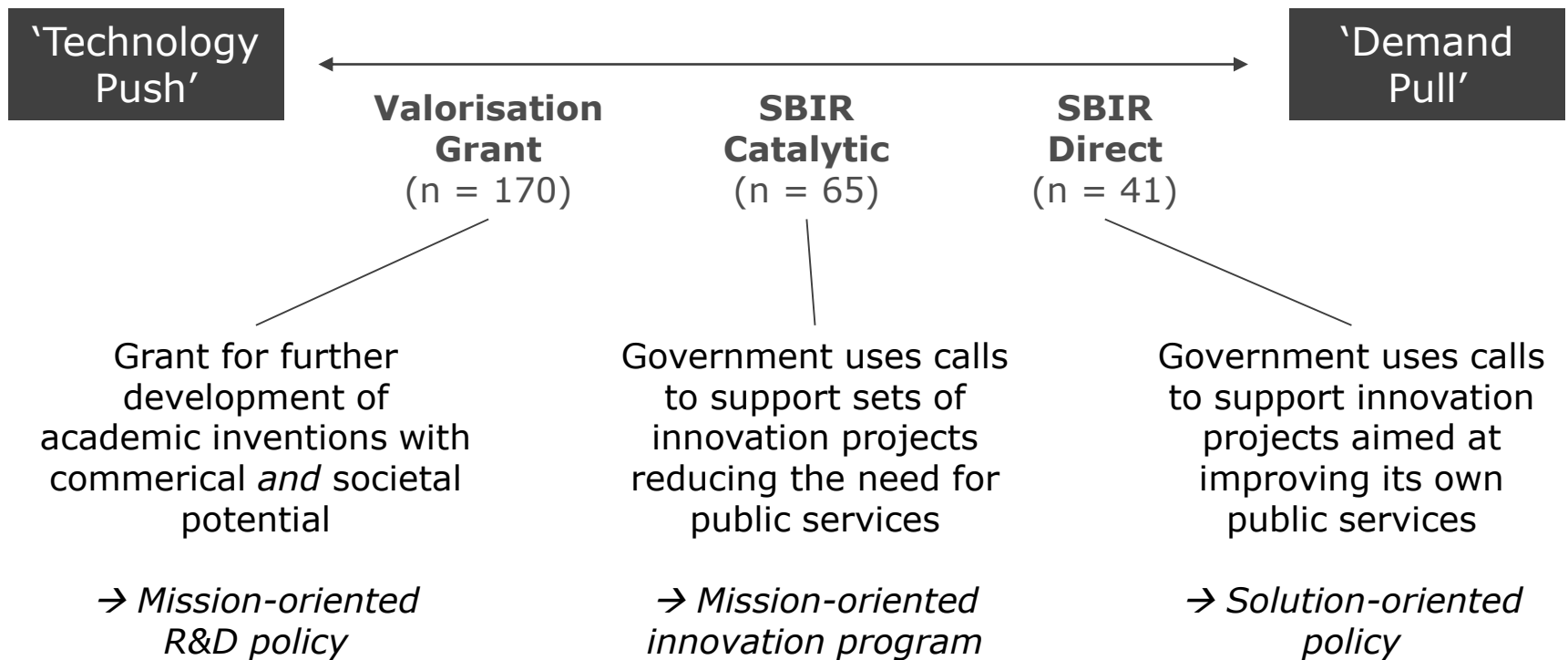
*How are the various spillover types dealt with?*

## **Case study: Dutch SBIR schemes**

- *Valorisation Grant*
- Public Procurement of Innovation (PPI)
  - *Catalytic SBIR*
  - *Direct SBIR*
- >20 interviews
- 267 survey responses



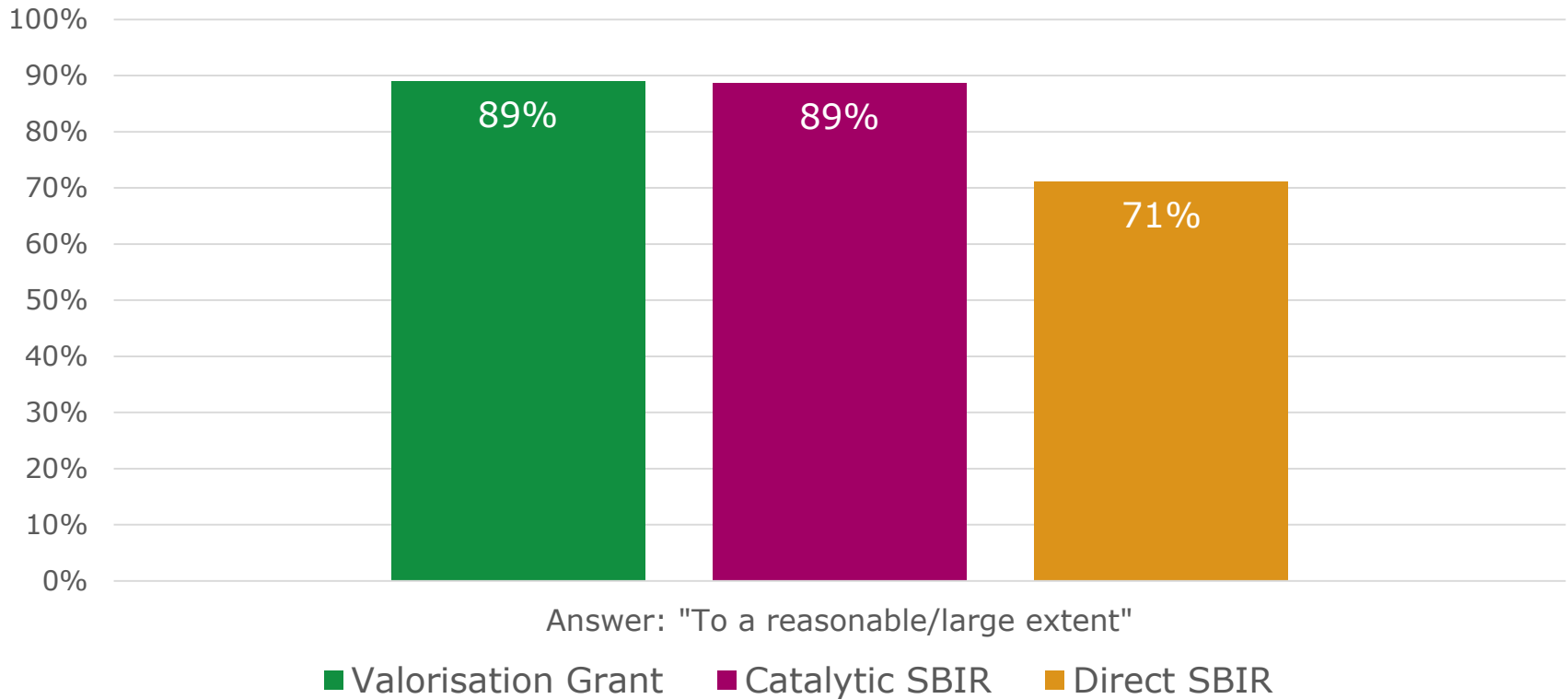
# Empirical illustration





# Empirical illustration: spillovers

To what extent do you regard your project as an experiment at the frontier of a broader innovation path?

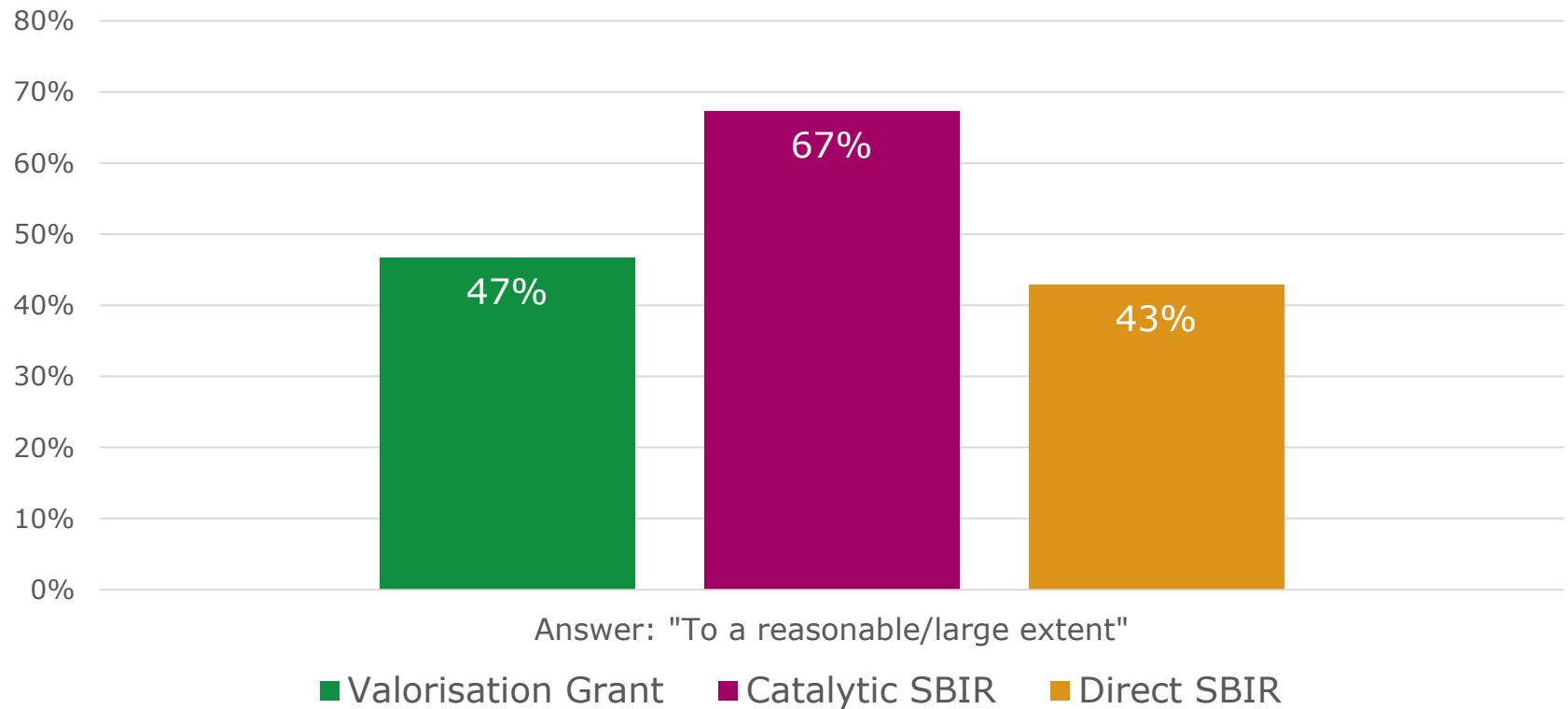






# Empirical illustration: spillovers

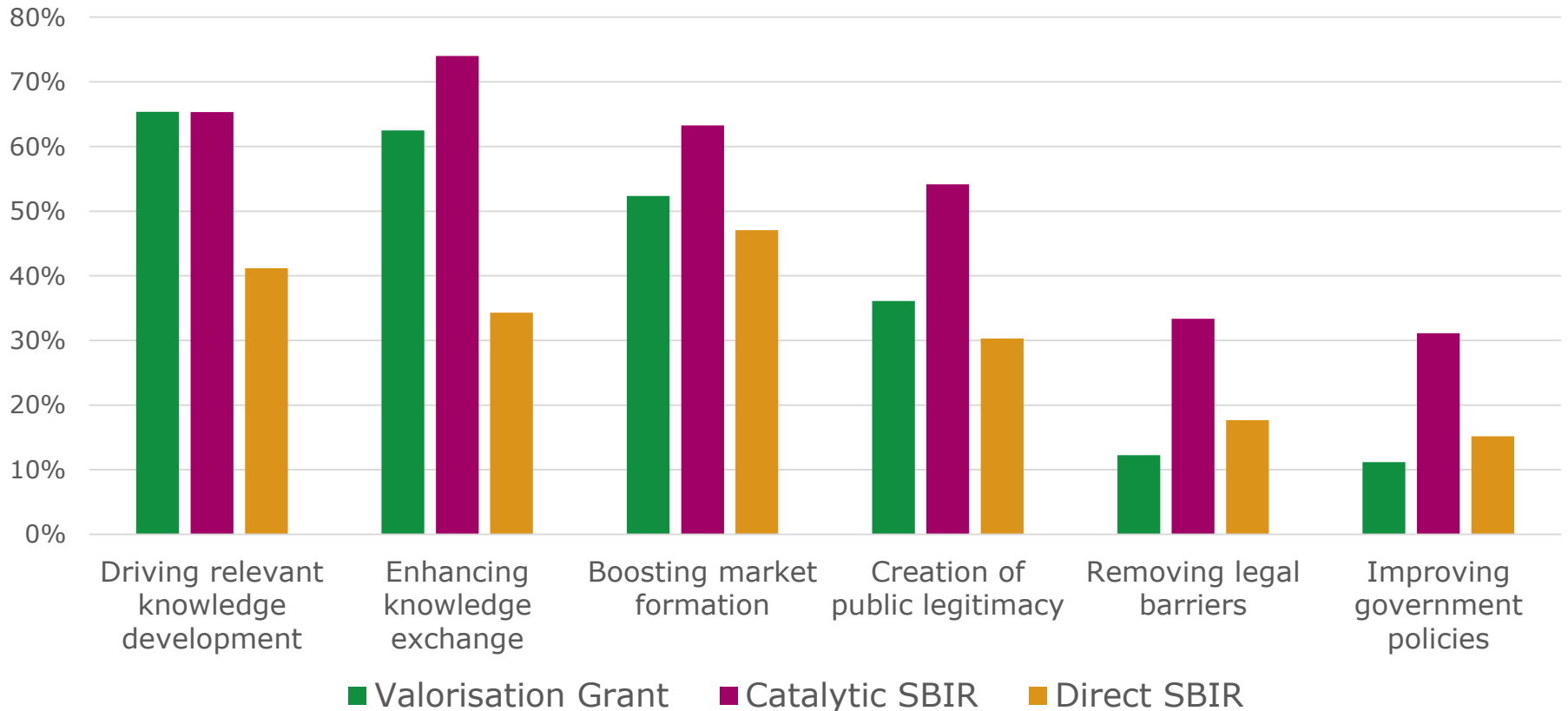
Do other parties already provide products/services based on your project?





# Empirical illustration: spillovers

Contributions to innovation development/adoption  
(Answer: "To a reasonable/large extent")





# Discussion

## **(In)consistencies rationale vs. spillovers**

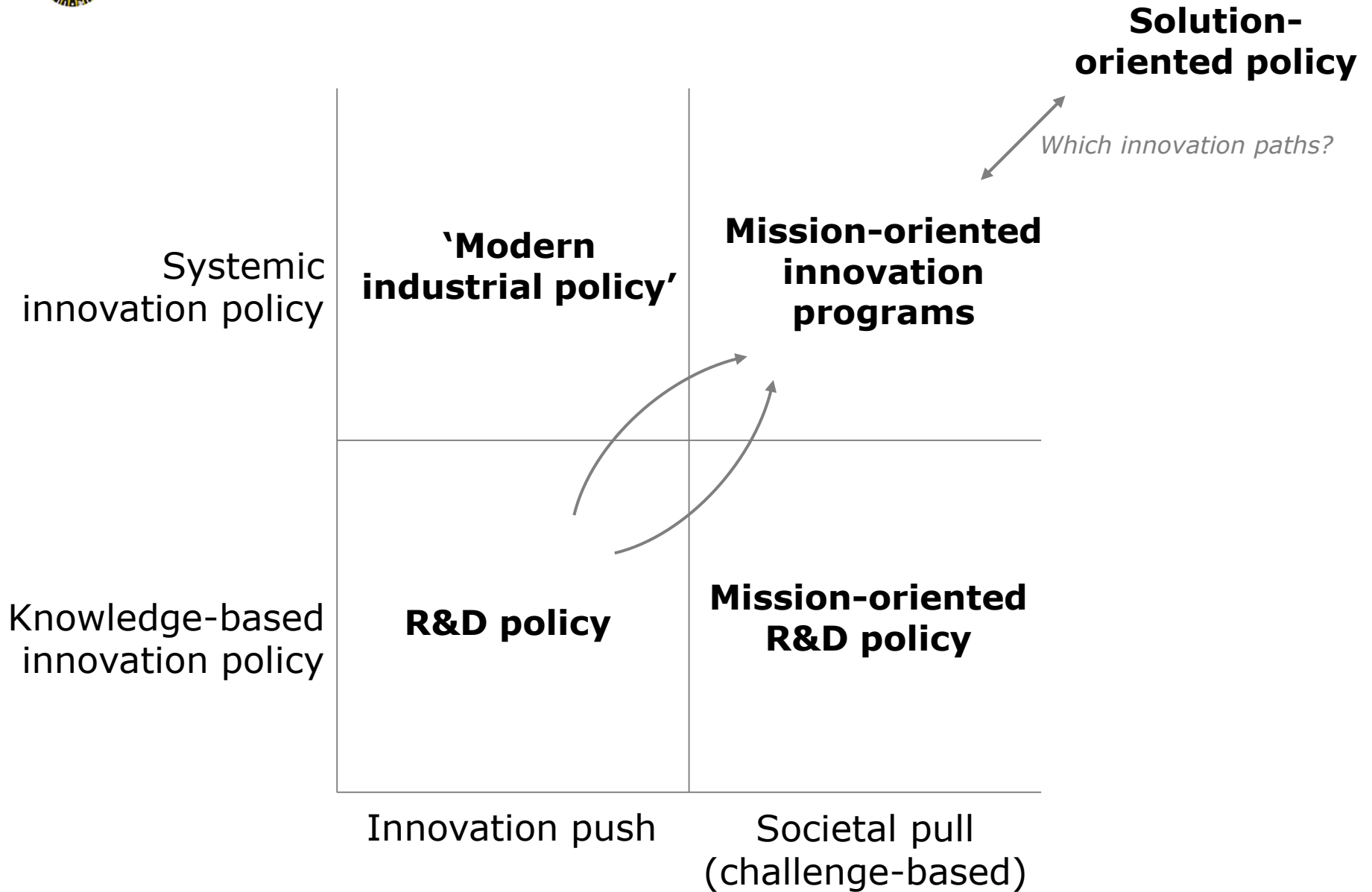
- Valorisation: mostly new knowledge
- Catalytic SBIR: transformative effects
- Direct SBIR: just incidental ('local') adoption?  
→ Solution-focus can hamper scaling up?  
*MIP-related policy myopia*
  
- New positioning expects even more transformation, without policy changes  
→ *MIP-related policy drift*



# Discussion

## The relation between MIP approaches

- Evolution of innovation policies
  - From R&D policy to mission-oriented innovation programs, or 'working back' from solution-oriented policy?
- Extension of innovation policies
  - Complementarities in the policy mix?





# Conclusions

- Parallel literatures on MIP and spillovers. Spillovers matter when MIP involves markets.
- STI policies evolving into MIP correspond with *broader range of relevant spillover types*
- Case study: not evident that new policies address and monitor the appropriate set of spillovers, fitting their rationale  
→ *MIP policy myopia & MIP policy drift*
- Further research: Combination of MIP types?
  - Also: measurement of (neglected) spillovers



# Contributions

- A *MIP overview* describing different approaches to mission-oriented innovation policy.
- An *integrated spillover framework* capturing a wide variety of innovation externalities.
- Theorizing and an empirical illustration of the *spillovers associated with respective MIP types*.
- Discussion of MIP-related *policy myopia* as the risk of spurring context-specific innovations.
- Discussion of MIP-related *policy drift* as mismatches between rationales and intervention.



**Thank you!**

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