BIOMEDICAL CATALYST EVALUATION

USING REGRESSION DISCONTINUITY DESIGN TO ASSESS THE EFFECTS OF SUBSIDIES FOR RESEARCH AND DEVELOPMENT

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INTRODUCTION

BIOMEDICAL CATALYST

- Delivered by Innovate UK and the Medical Research Council since **2012**
- **£180m of grants** for R&D and translational research in the biomedical sector awarded over 8 competition rounds
- No thematic priorities – diverse project portfolio
- High share focused on developing new **drugs** for the treatment of cancer**,** though many focused on **medical devices** or **digital health**
- Around two-thirds of projects led by **SMEs** (remainder by academic institutions)

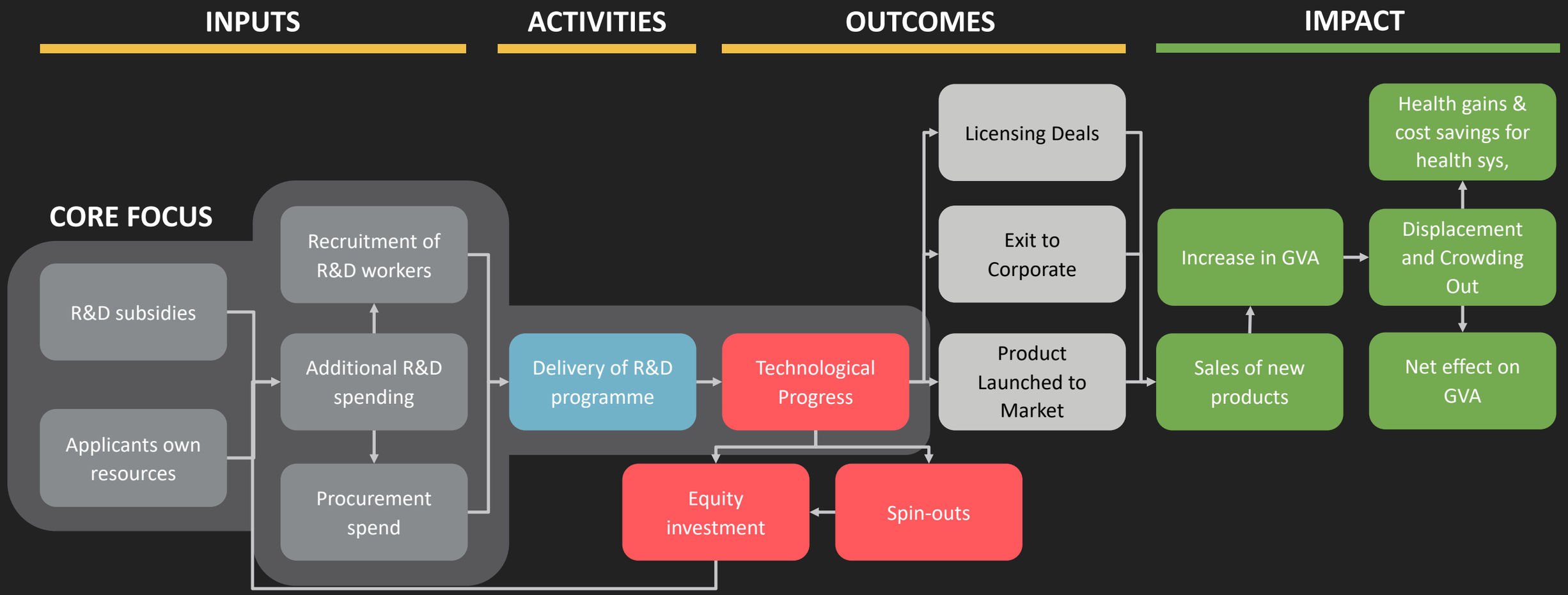
EVALUATION

- Mixed-methods study with **process** and **impact** evaluation objectives
- Took place in **2014/15** covering 255 projects funded
- Evidence on results gathered through a survey of **successful** and **unsuccessful** applicants
- Longer term follow-up is currently underway

IMPACT EVALUATION METHODS

- Exploit a very **common process** used to allocate R&D funding - highly transferable evaluations of other programmes

CORE FRAMEWORK FOR UNDERSTANDING IMPACT



KEY ISSUES

DEVELOPING A COUNTERFACTUAL

- Assessment of impact requires comparisons with an equivalent group of firms (or academic teams) **that did not receive the grant**
- Applicants for R&D subsidies likely to **differ** to those to do not apply in important ways:
  - Less innovation active?
  - More able to self-fund R&D?
- If so – comparison group of non-applicants could lead to a **biased result**

POSSIBLE OPTIONS

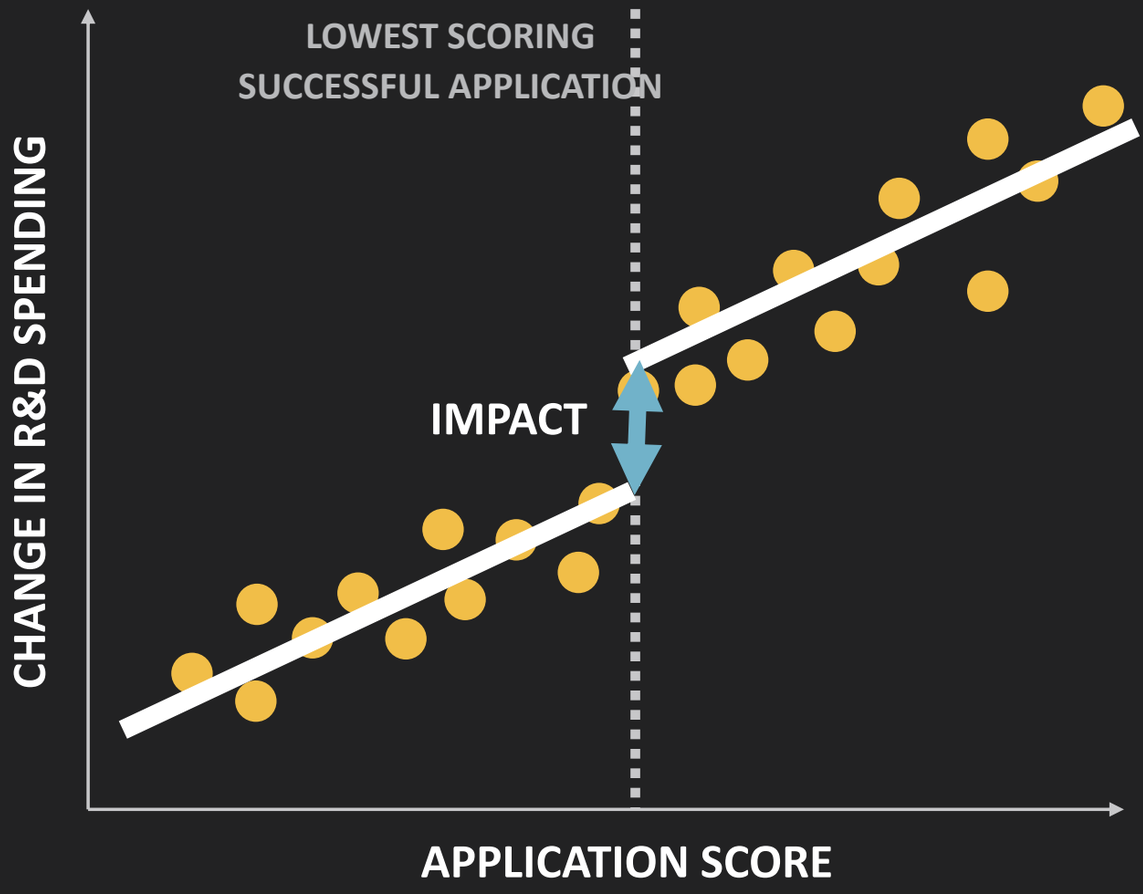
- Issues mitigated by focusing on **unsuccessful applicants** for R&D subsidies
- Can be assumed to **share similar characteristics** motivating their applications for funding
- But leaves **residual problems**:
  - Successful applicants chosen on **scientific and economic merits**
  - Features also likely determine **long run commercial success**
  - Simple comparisons likely to **overstate impact** of grants
- Further improvement needed for **robust findings**

REGRESSION DISCONTINUITY DESIGN

MOTIVATION

- Applicants were chosen using a familiar process – a **blind, scored assessment** of the qualities of their applications
- Successful and unsuccessful applicants may differ in general terms – but around the **lowest successful score,** differences may be random
- Comparing those that **just made it** to those that **just missed out** can yield highly robust results

ILLUSTRATION

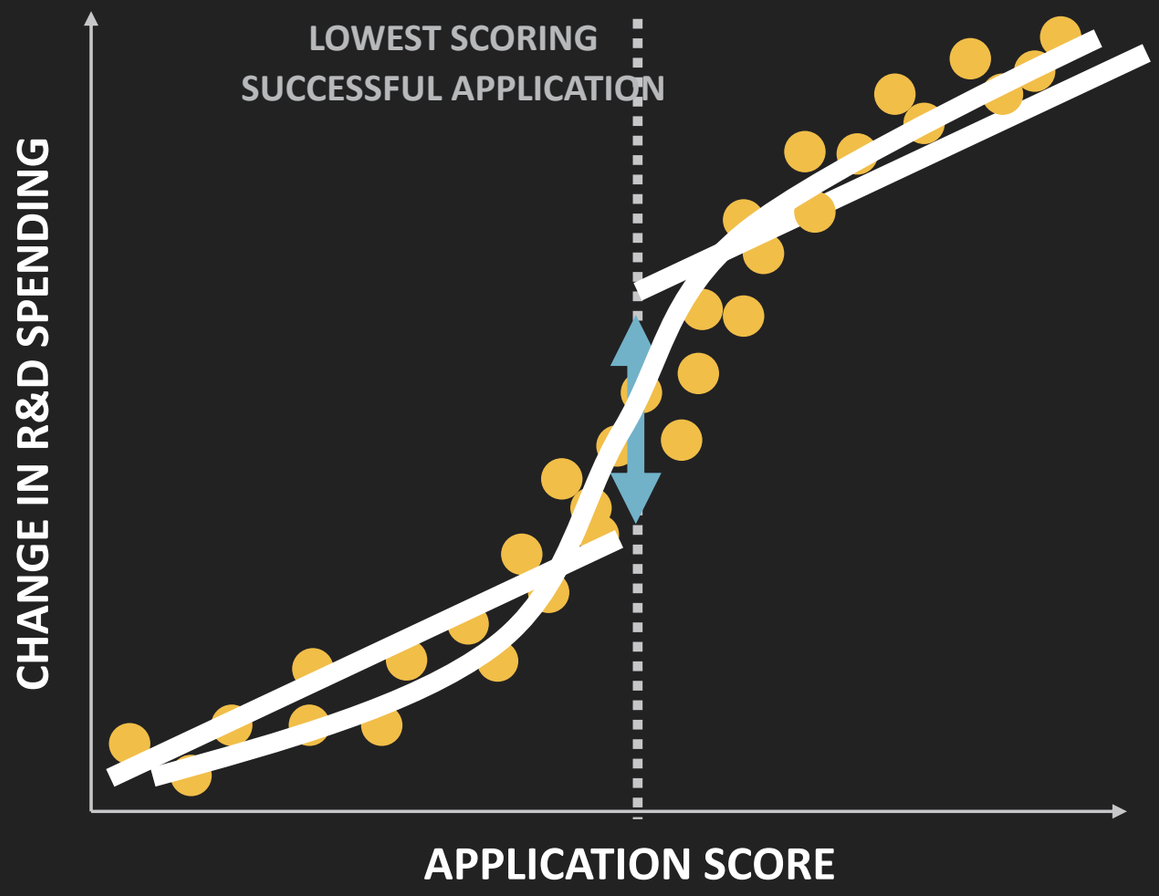


REGRESSION DISCONTINUITY DESIGN

ISSUES TO CONSIDER

- Not valid if some applicants can influence their success **outside of the scoring process** – e.g. political interference
- Should not need to worry about properties of projects or applicants – but problems arise if **characteristics** are subject to sudden changes at the scoring threshold
- Results are not generalizable – they describe the effect of subsidy on the **marginal applicant** or **project**
- Not appropriate for driving **cost-benefit analysis**
- Better with larger **sample sizes**

MODELLING CHALLENGES

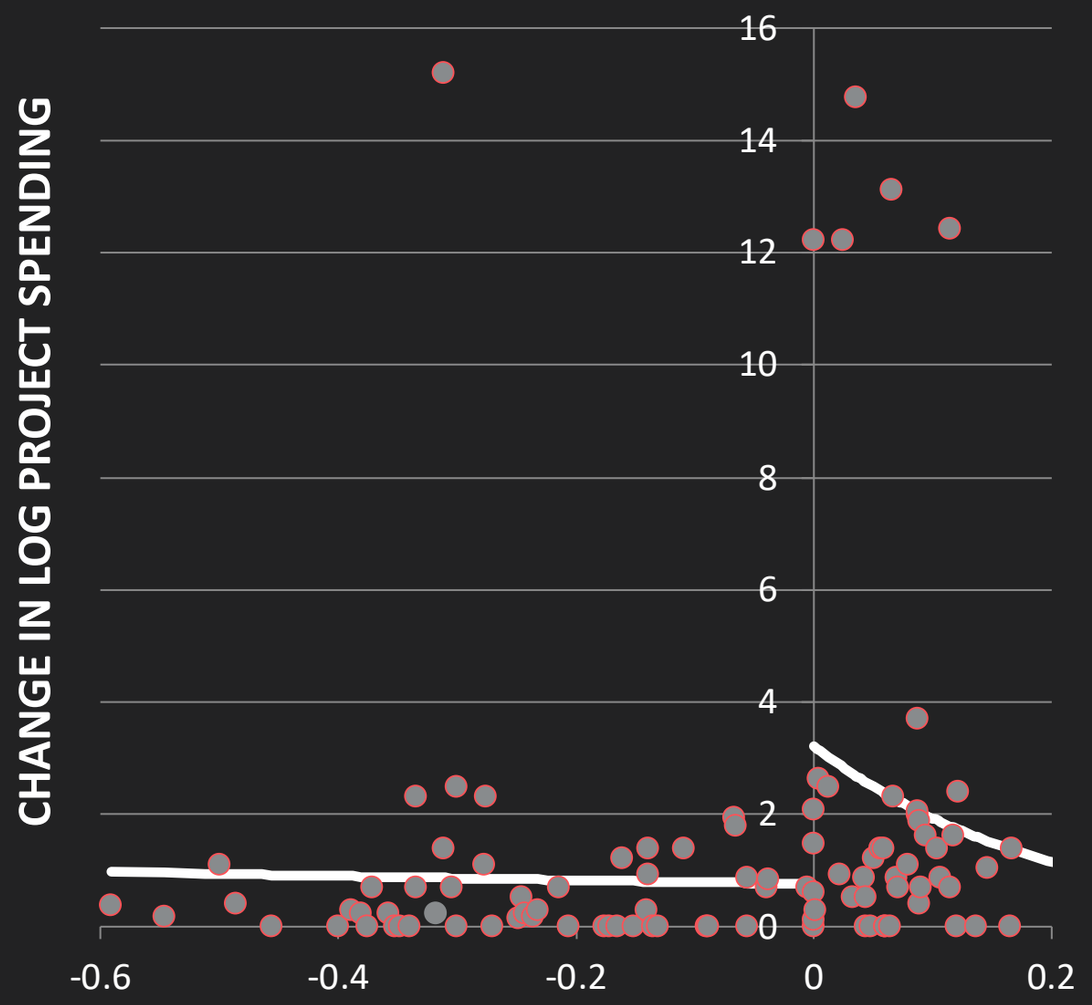


KEY FINDINGS

SIGNIFICANT EFFECTS AT PROJECT LEVEL

- Increase in spending **on the project being taken forward with the grant or subsidy**
- **Acceleration of the project** through the development pathway – as measured using the TRL scale

PROJECT SPENDING

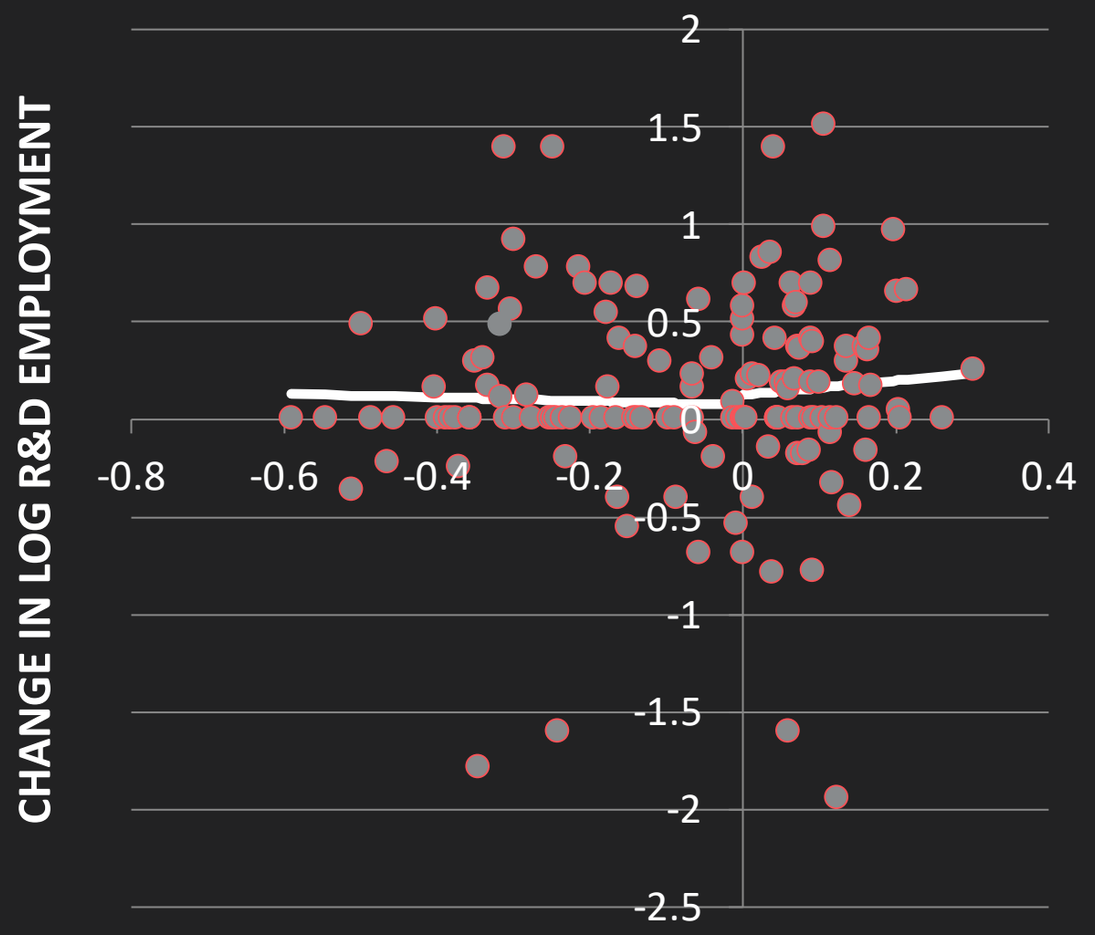


KEY FINDINGS

NO EFFECT ON R&D AT LEVEL OF FIRM

- No effects on total R&D **spending** or **employment** of R&D workers
- **Multi-asset firms** – grants appeared to shift focus of attention rather than lead to increase in overall activity
- Possible that grants allow firms to focus on **higher risk projects** – leading to lower risk projects being shelved
- Issue of **'virtual'** companies

R&D EMPLOYMENT

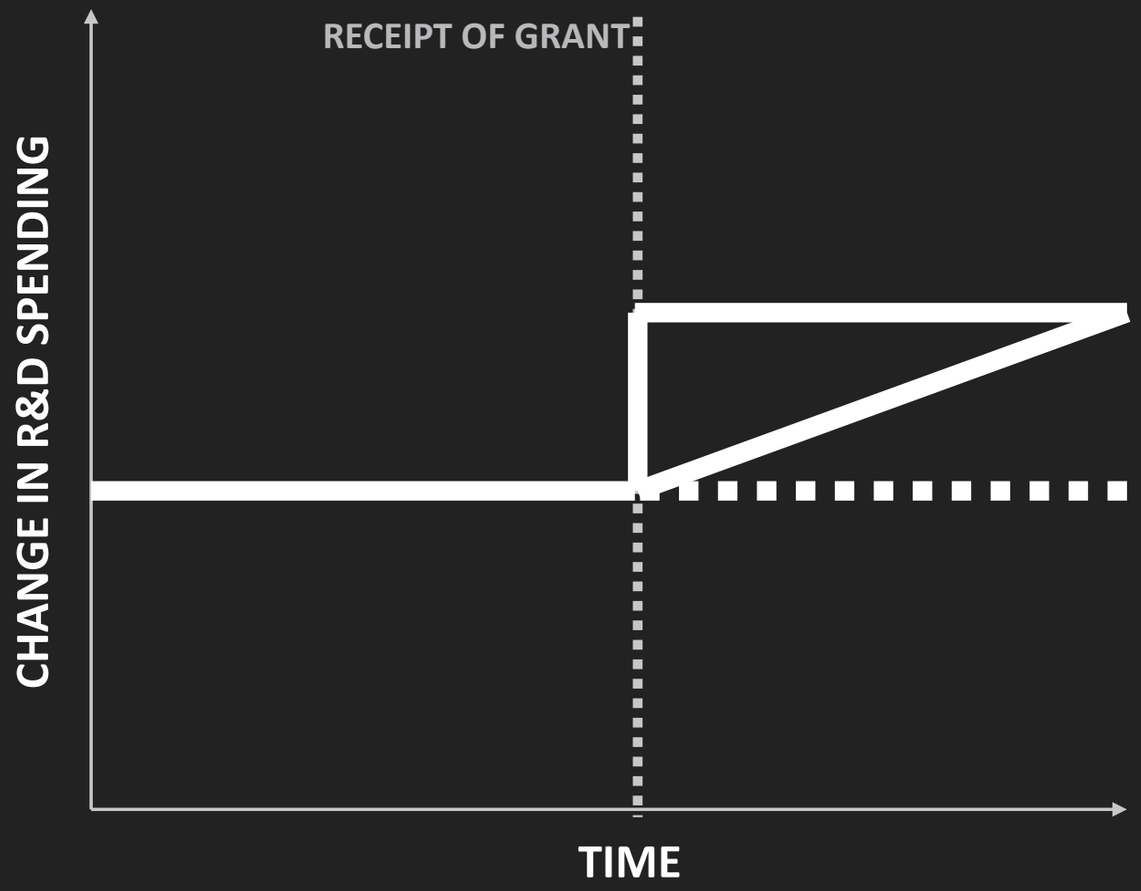


TIME DISTRIBUTION OF EFFECTS

FINDINGS FROM OTHER STUDIES

- Findings may be misleading owing to **short time frame** for analysis
- Later study examining grants for agricultural biotechnology show grants do lead to greater R&D – **which grows over time**
- Explainable by time needed to deal with **contractual aspects** and **recruit additional personnel**
- Non-linearities also evident in the longer term – projects generate **new ideas** and firms **expand their overall R&D project portfolio**

TIME PROFILE OF IMPACT



NEXT STEPS

FINAL EVALUATION UNDERWAY

- Follow-up research being completed – will give **up to six years of data on progress**
- More significant role for **administrative data:**
  - Business Structure Database
  - Company Account filings
  - Patent records
  - Clinical trials

MAJOR OUTSTANDING ISSUES

- **Cost-benefit analysis:**
  - Conventional measures of economic benefit (i.e. productivity gains) not useful – **firms not expected to generate sales / output**
  - **Alternative** way of understanding economic benefit is required
  - Possible solution in examining changes in **firm valuations –** represent expectations of future abnormal profits
  - But issue of **illiquidity** of VC investments – values may not always be observed
  - **Other ideas?**