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# Assessing of Public RDD: Attribution of Benefits

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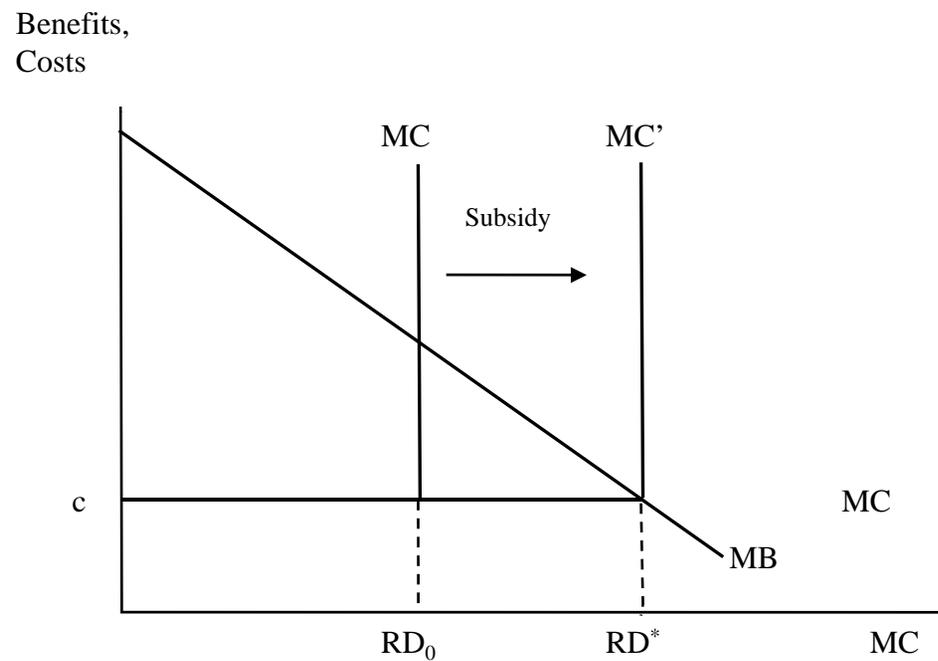
# Challenges in Measuring Benefits from Public RDD

- Measuring the private returns to RDD projects
  - Example: the timing of returns may not coincide with project expenditures or completion.
- Identifying and measuring the social benefits of RDD projects and programs
  - Includes knowledge, environmental and other non-market benefits, benefits to other firms, benefits to consumers.
- Attribution: Determining the contribution of the public program: the benefits accruing to the *increase* or *redirection* of RDD
  - Does public funding substitute for, or “crowd out” private funding?
  - Does public funding change the *direction* as well as, (or rather than) the rate of innovation?

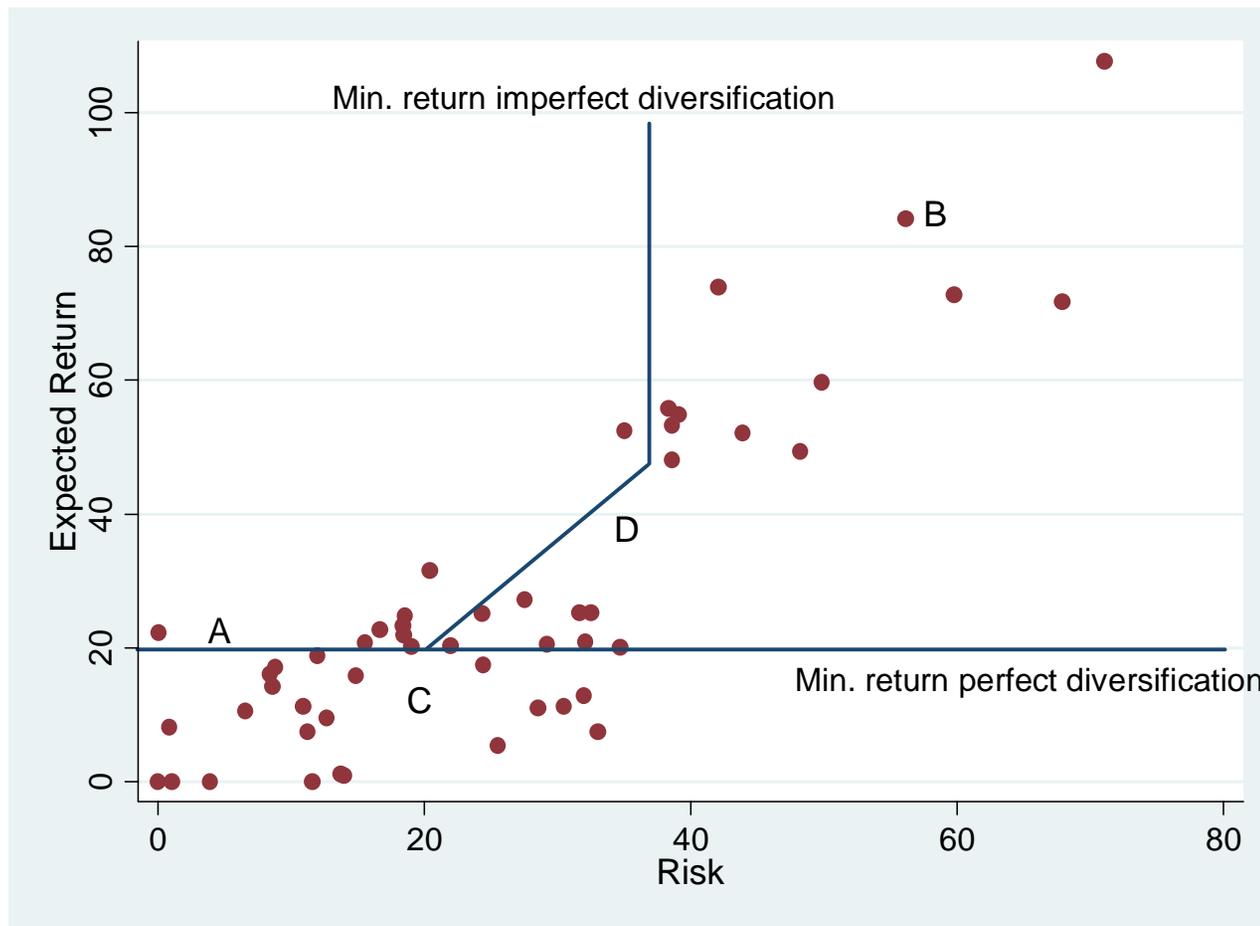
# Attributing RDD Benefits to a Public Program

- The prima facie case for public benefits comes from market failures in private provision of RDD.
  - positive spillovers leads to private underinvestment
  - information asymmetries and project risk lead to liquidity constraints and inefficient portfolio choices
  - difficulties in contracting for innovative activities reduces attractive collaborations
  - uncertain future markets depress investment
- Estimates of social returns are 1.5 – 3 times (or more) that of private returns; private returns are twice the returns to non-RDD investments.

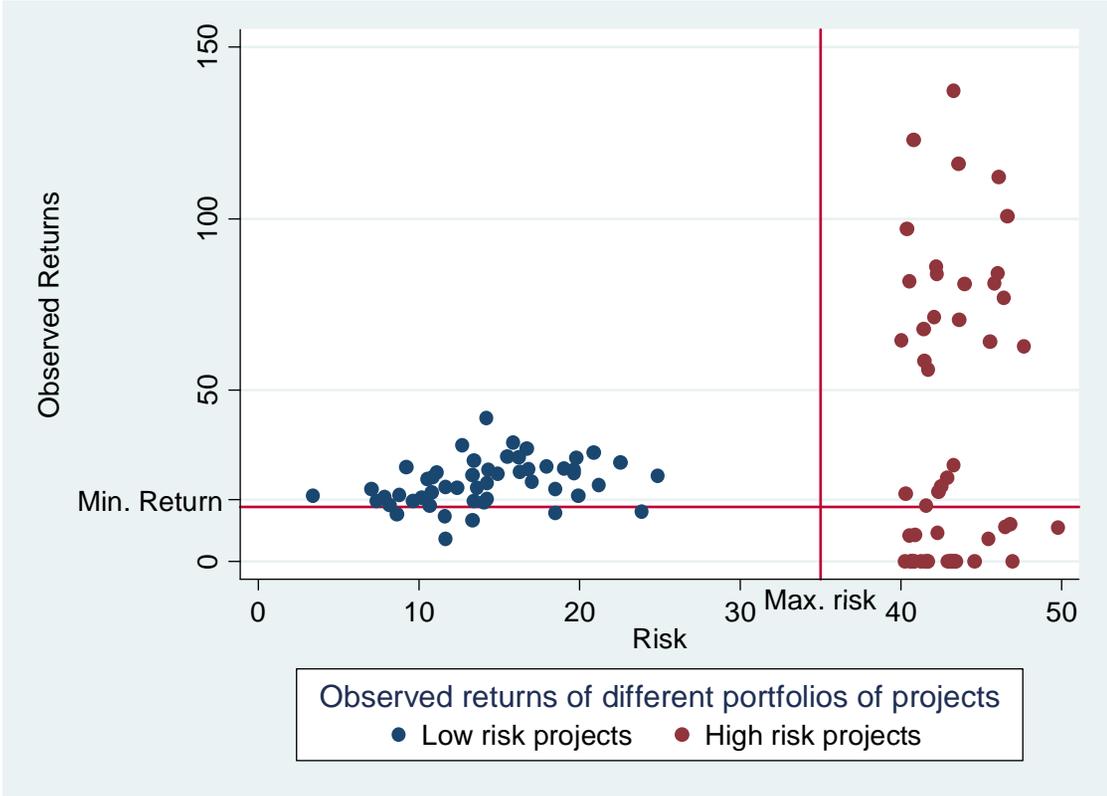
# Subsidies can reduce the liquidity constraint



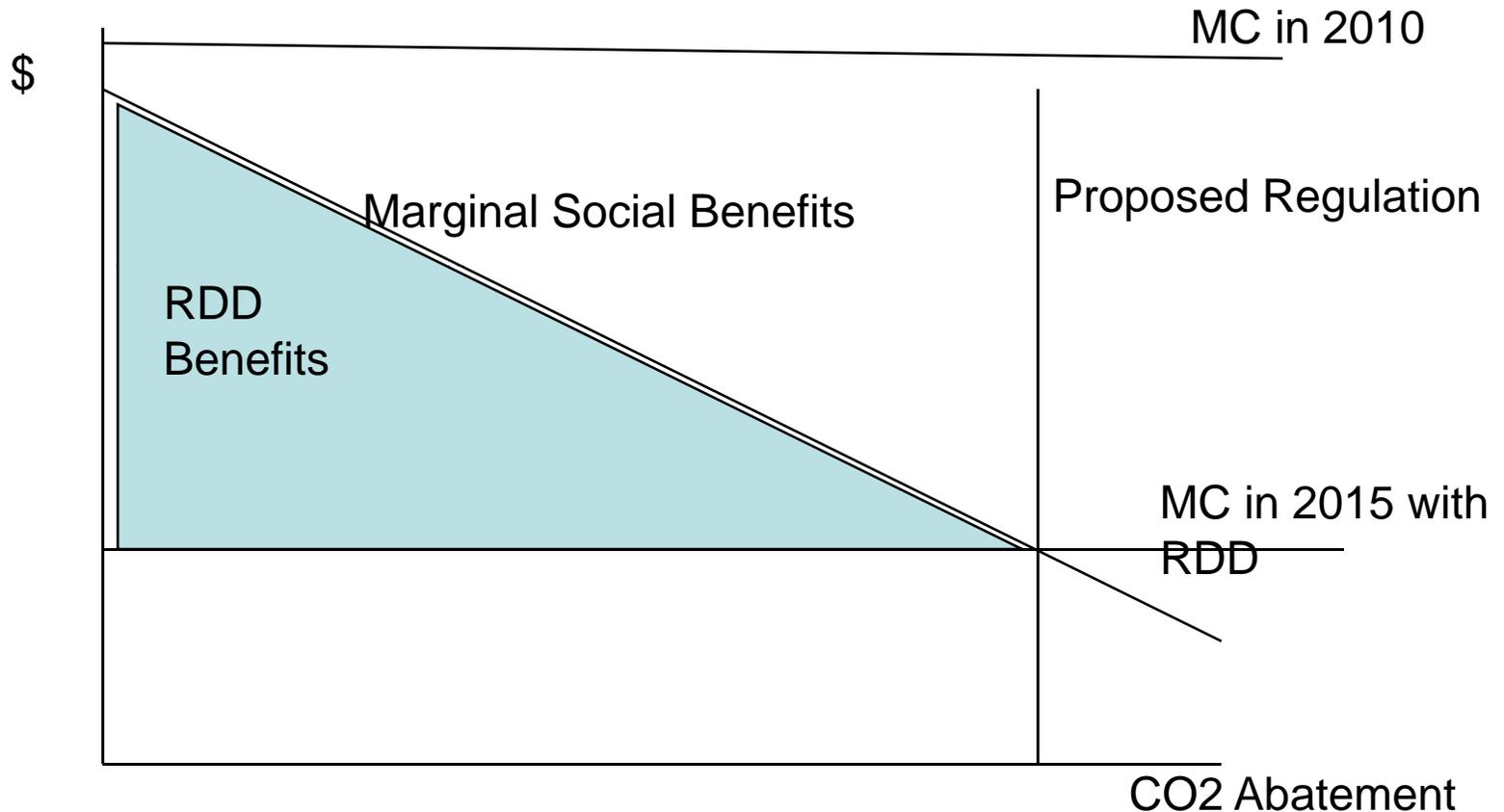
# Under imperfect diversification firms choose lower risks projects



# Portfolio of subsidized projects should be characterized by skewed benefits



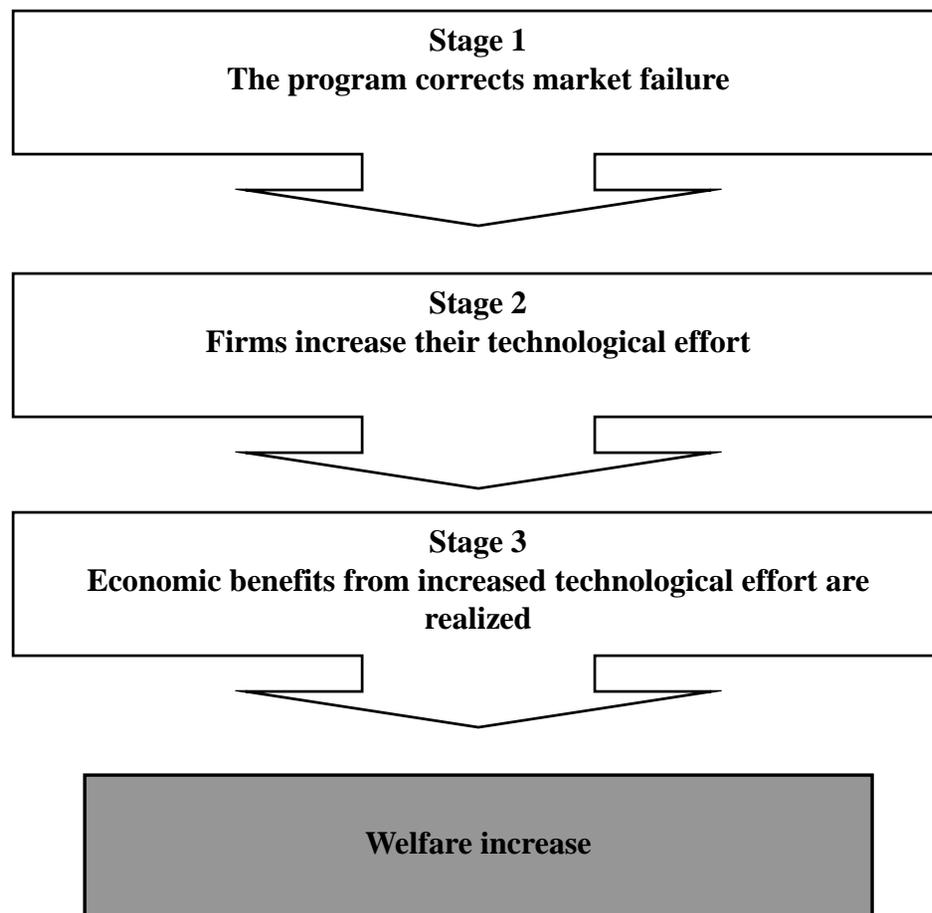
# Example: RDD on a technology that satisfies a technology-forcing regulation



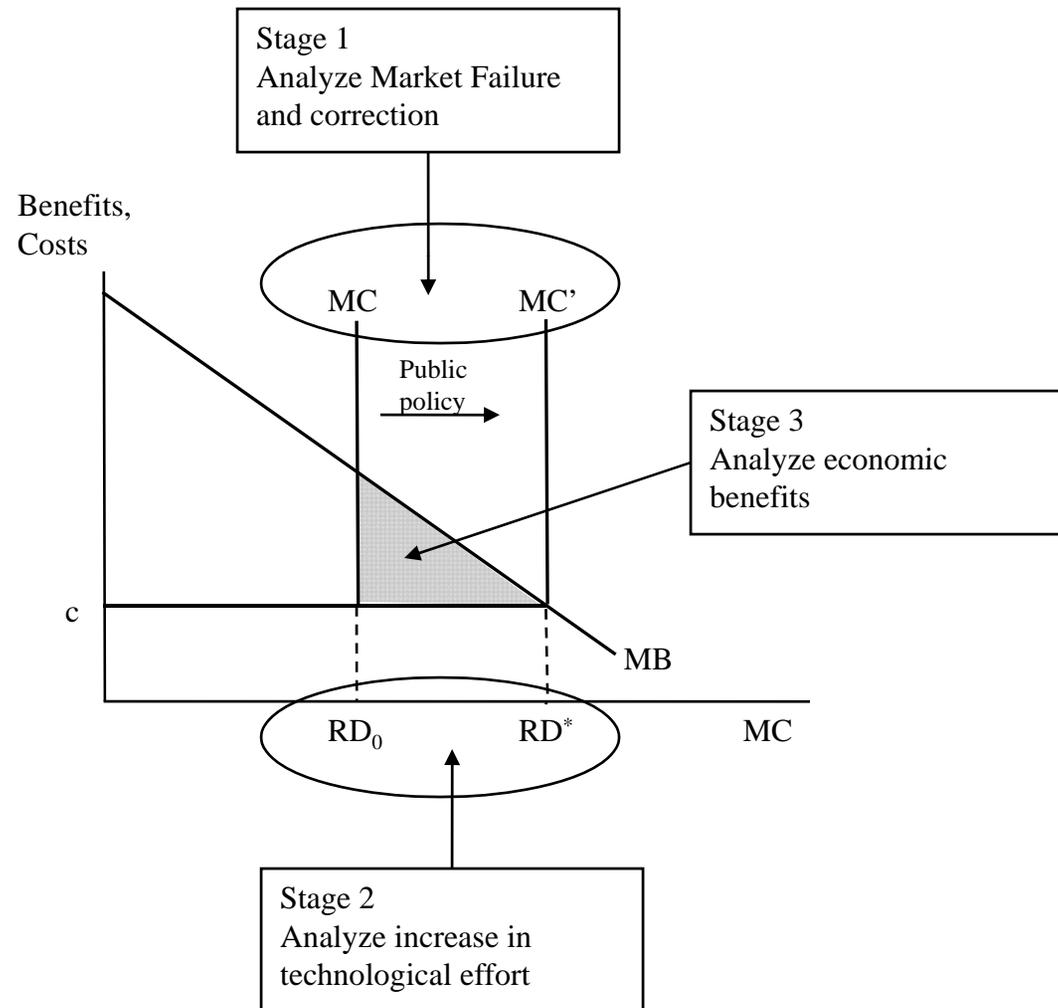
Subsidizing RDD enhances feasibility of standard, allowing policy-induced demand to support demand-induced innovation.

# Framework for evaluation

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# Benefits can be measured at each stage



How do we know if the benefits are caused by the program?

- We need a good counterfactual as we cannot observe the behavior of the subsidized firm when it does not receive subsidy.
- We need to find out what would have happened in the absence of the program. Would the benefits be the same?

## Ideal counterfactual: randomized trials

- Randomized trials
  - Select a group of potential recipients according to their merits.
  - Give the subsidy to half of them selected randomly
  - Use the randomly non selected firms as control group
- Simple statistical techniques are adequate to evaluate benefits
- BUT: Subsidized firms are not chosen by randomization.
- Comparing subsidized and unsubsidized firms would lead to biased estimates of the effect of the subsidy.

# Evaluation Methods 1: Econometrics

- Regression with controls: correct for observed differences
- Matching methods: find very similar unsubsidized firms
- Quasi-experiment: use firms at the threshold, correct unobserved differences
- Structural modelling.
  
- Advantages of econometric studies
  - Good counterfactuals: deal with causation
  - Technical difficulties
  - Data intensive\*

## Evaluation Methods, cont.

- Case Studies:
  - Find counterfactual by
    - Expert judgment
    - Historical Tracing
    - Detailed interviews
  - Characteristics:
    - Very resource intensive
    - Appropriate for programs where few projects identify success
    - May not capture benefits from portfolio management
- Descriptive surveys, Interviews, bibliometric analysis, benchmarking, network analysis
  - Provide large amounts of descriptive information on firms' activities
  - Difficulties interpreting causal nature of relationships

Neither benefits of RDD nor the component of benefits associated with public RDD are possible without adequate data

- Status reports
- Surveys – subsidized firms and other potential performers and consumers of RDD.
- Examples of research topics:
  - innovation and jobs: current literature focuses only at the establishment level (RD-performing firms) or economy-wide. Spillovers, relationships between first movers, early technology, commoditization and local employment is an important component of benefits.
  - benefits from public RDD changing the *direction* of RDD: example of portfolio choices.
  - benefits and interactions of public policies

## Concluding remarks

- Benefits can be characterized in terms of the market failure (i.e., the theoretical basis for public benefits), a large set of RDD outcomes, and, if adopted, the economic, environmental, and security benefits of the technology.
- Once the benefits are defined, the main problem in program evaluation is attributing them to the program itself.
- Finding causal relationships between the program and benefits requires the use of adequate counterfactuals.

## Concluding remarks

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- Econometric techniques can find causal relationships between program and benefits.
- Other techniques such as case studies are useful to tools to estimate the benefits of individual projects and accommodate both qualitative and quantitative information.
- Other descriptive techniques are useful to describe a program and to support evaluation studies performed using either econometric methods or case studies.