Portfolio Analysis as a Prelude to Econometric Analysis

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1. National Institute of Dental & Craniofacial Research (NIDCR)

- Mission: Improve dental, oral, & craniofacial health through research, research training, & dissemination of health information
  - Perform & support basic, translational, & clinical research
  - Conduct & fund research training & career development
  - Coordinate & assist relevant research throughout the research community
  - Promote the timely transfer of knowledge gained from research and its implications for health

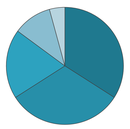
2. Using Portfolio Analysis as Prelude to Econometric Analysis

- How can program evaluators and policy analysts at NIH use portfolio analysis to select topics for econometric analysis?
- What qualities of a portfolio of biomedical research projects suggest feasibility and utility for econometric analysis?
- Can portfolio analysis be a useful tool in exploring the economic return on investment of public funds at NIH?

3. What is Portfolio Analysis?

- …careful examination of different elements of the products of a company…to determine the best possible allocation of the resources of the company
- In terms of securities, a(n) analysis…in which the investment portfolio is checked…to optimize the allocation of holdings

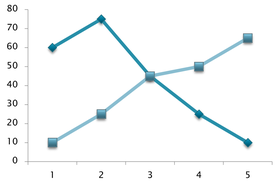
  Black's Law Dictionary, retrieved 10 July 2015
- At NIH, descriptive analysis of a set of funded research projects that have important common elements…for multiple purposes



4. What is Econometric Analysis?

- The application of mathematics, statistical methods, and computer science, to economic data
- The branch of economics that aims to give empirical content to economic relations

  Wikipedia, retrieved 10 July 2015



5. NIDCR's Interest in Econometric Analysis

- Document the impact of NIDCR-funded research on oral health care utilization & expenses
  - Step 1: Define & measure oral health care utilization & expenditures
    - Cost of illness economic model
      - Direct economic costs
      - Indirect economic costs
        - Labor market costs 2^0 morbidity & mortality
        - Quality of life
  - **Step 2: Define & measure NIDCR funded research (outlined in this presentation)**
  - Final Step – The Attribution Problem
    - How do we attribute changes in cost of illness to NIDCR-funded research = Determine the causal relationship between Steps 2 and 1

6. Potential NIDCR Research Portfolios

- All projects in the IC for a given time period
- All extramural or intramural projects in a given time period
- Disease-specific or condition specific projects
- Tools or technology projects
- Small business projects
- Clinical trials projects
- Outcomes-based selection of projects (prize winners, bibliometrics, creation of a field, patents, licenses)

- Data available from QVR, RCDC, Annual Reports, Congressional Justifications

7. Create Portfolios Suited to Econometric Analyses (Actual)

- Access to Data
  - QVR History (1970-present)
  - RePORTER (1991-present)
  - Internal SCORE system (2002-present)
- Data Quality
  - Availability of Abstracts/Specific Aims
  - Accuracy of data (curation of publications, foreign sites, older records)
- Other considerations
  - Use of Nominal vs Real dollars
  - Admin IC, Funding IC, co-funding
  - Project categories
    - RPGs, Research Projects, Training
    - Clinical, Translational, Basic
  - Outputs of interest (serial number, activity, project titles, total cost)

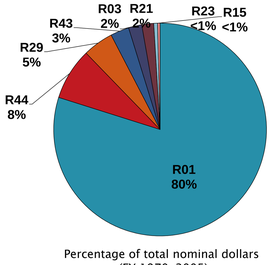
8. NIDCR Portfolios Created

- Total extramural funding
- Dental materials
  - Amalgam
  - Composites and resins
- Oral health disparities
- Dental sealants
- Oral HPV infection
- Early childhood caries
- Oral cavity & pharyngeal cancers in the elderly
- Validated cell lines in head and neck cancers
- Salivary diagnostics

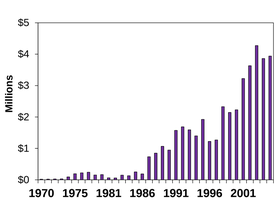
9. Composite Resin Portfolio Development

- Background
  - Composite resins are synthetic tooth colored dental materials developed to replace amalgam and gold in restorative dentistry
  - NIDCR has invested in research to develop and test composite resins
- Approach
  - QVR search: FY 1970-2005 NIDCR RPGs with 'composite' or 'resin' in the title and/or abstract
  - Unique projects identified by removing duplicate serial numbers
    - 104 unique projects initially identified
  - Project titles and abstracts were read and unrelated projects were removed
- Final Composite Resin Portfolio
  - 69 unique composite resin projects
  - $41.9M (nominal dollars, FY 1970-2005 combined)

10. Composite Resin Portfolio



Percentage of total nominal dollars (FY 1970-2005)



11. Lessons Learned

- **What is the best type of portfolio?**
  - Should it be expansive or narrow? Focused on a project, disease, research area, technology, etc.?
  - What is the optimal time frame, given data limitations and the timing of new treatment or technology discovery, validation, and adoption?
- **Generating a portfolio is a challenge**
  - Limits of internal and public databases, especially when looking at historical data
  - Large portfolios can be difficult to handle
  - Single large projects can unduly influence results

12. Next Steps

- Understand what types of portfolio analysis can be a useful tool in exploring NIH economic return on investment
- Consider the challenges of attributing economic return to NIH investments