

# Real Options Thinking in Public Sector Management

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*Under uncertainty, traditional approaches to strategic planning can be downright dangerous*

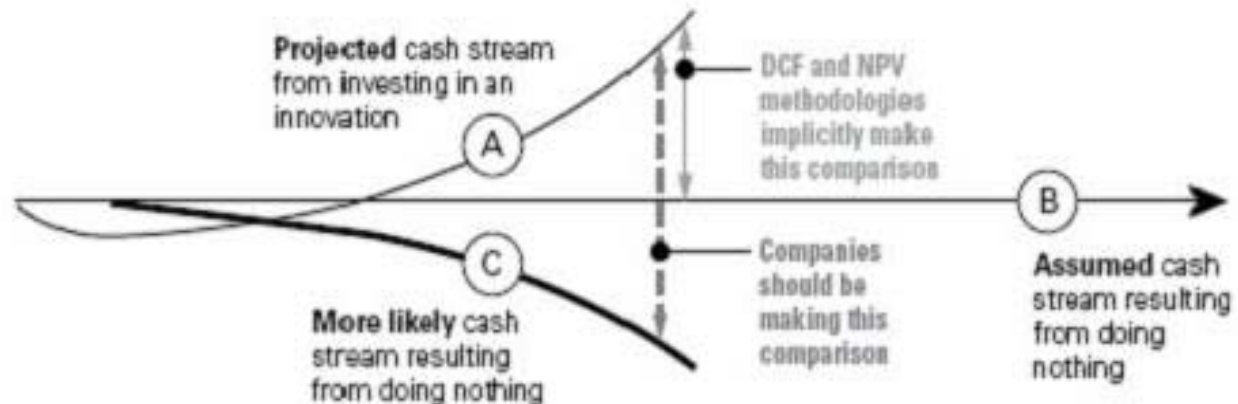
Courtney, Kirkland and Viguerie (1997) *Harvard Business Review*.

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# Traditional approaches to valuing innovation projects have significant problems!

## The DCF Trap

Most executives compare the cash flows from innovation against the default scenario of doing nothing, assuming—incorrectly—that the present health of the company will persist indefinitely if the investment is not made. For a better assessment of the innovation's value, the comparison should be between its projected discounted cash flow and the more likely scenario of a decline in performance in the absence of innovation investment.



Source: Christensen et al 2008 (HBR)

# And it's not just a private sector problem....

“Making the business case for an innovative solution can be difficult. Business case evaluation is typically ROI (return on investment) driven. An innovative solution carries inherent risk of a new approach. An innovative solution can be more difficult to cost than a tried-and-true solution.”

*Submission published in ‘Empowering Change’*

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Is there an alternative to predictive project selection under uncertainty?

*When You Come to a Fork in the Road, Take It!*



# What about the valuation of financial options?

$$C = S N(d1) - X e^{-rT} N(d2)$$



# How do we value an option?

EXHIBIT 1

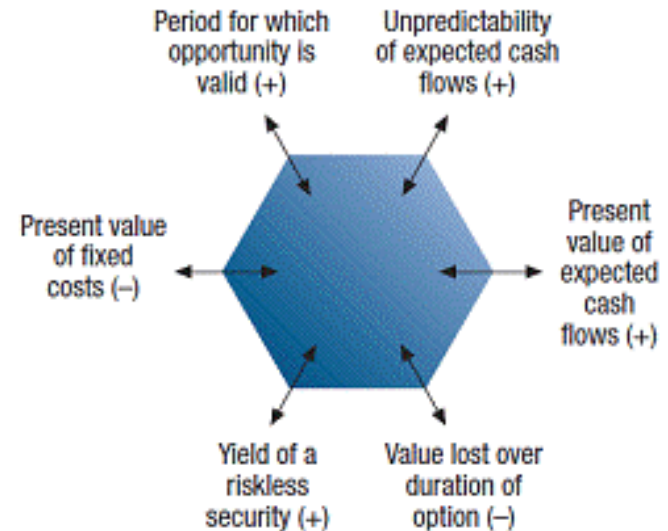
**The six levers of financial and real options**

+ Increase raises option value     
 - Increase lowers option value

**Financial-option value levers**



**Real-option value levers**



# How do real option and NPV heuristics affect innovation?

## Real Option Heuristics

- By making *nominal* investments, decision makers accept that projects are opportunities to create innovation outputs,
- By *staging investments*, decision makers recognize that the value of options evolves with the anticipated cash flows and volatility associated with different stages of product development
- Postponing investments* concerns the heuristic of waiting and learning more about opportunities.
- Exercising options* reflects the heuristic that ongoing investments signal decision makers' intent to exercise options
- Abandoning options* means that by being prepared to abandon unpromising innovations, decision makers free up managerial resources and capital for emerging opportunities

## Net Present Value Heuristics

- “Assessing the current value of future cash flows minus the current value of costs/investments aids my decision making relating to investments” (NPV valuable)”,
- “I usually calculate the current value of an opportunity and its associated costs when considering a project (NPV applied)”, and
- “I rely on expected value of cash flows rather than my gut feel or intuition when investing (NPV rule)”.

# Sample and Research Method

- We use self-reported patent counts as of 2004 to measure innovation.
  - From a population of 381 biotechnology companies, responses were obtained from 99 firms.
  - At survey time, these companies were on average 7.5 years old and consisted of 14.9 full-time equivalent employees. Over 65% of the respondent firms had 20 or less employees.
  - The mean value of R&D expenditure was AUD1.66 million and the mean number of patents held was 9.0.
  - Control variables: Size, Age, R&D spend.
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# Results (GMM regression): Predicting Patents

	Model 1 (GMM)	Model 2 (GMM)	Model 3 (GMM)
Intercept	1.10***	-6.98*	-1.36
Std Error	0.22	4.12	2.03
Firm Age	0.03	0.97*	0.56
Std Error	0.02	0.54	0.54
Firm Size	-0.01	-0.62	-0.66
Std Error	0.01	0.43	0.47
Firm R&D	0.00	0.00*	0.00*
Std Error	0.01	0.00	0.00
Firm Collaborations	0.01	0.27	0.22
Std Error	0.01	0.19	0.20
ROR-Factor		8.86**	
Std Error		3.29	
NPV Factor			-3.74*
Std Error			1.87
Observations	89	89	89

\*\* Significant at the 0.05 level, \* Significant at the 0.1 level

# Open Government Data Initiative: An Example of a Public Sector Real Option?

