

Preface

The noted Harvard Economist Zvi Griliches famously sought, but failed to find, a connection between Vannevar Bush's 'R&D' and economic growth in a landmark setback to Economics applied to innovation; from which it has never recovered.

That was in 1988. But with the advent of the PDMA (who defined development spending more broadly than possible within 'R&D') and with the accumulation of decades of data examined with new analytical tools, directed to what Griliches identified as the key stumbling block[†], the connections have now been established and ratified. And the following graphs show the first link, from **D** to innovation metric (**p/c**).

'Innovation Metrics for Economic Growth'
Working Paper No.5, (2009)
Technology Matters
Chicago
www.techmatt.com

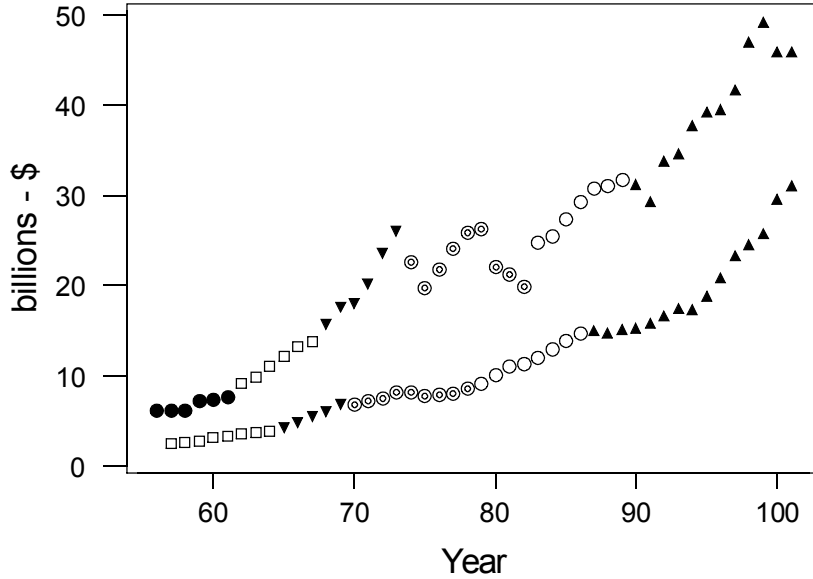
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[†] the *quality change problem*.

Connecting Innovation Metric to R&D (1)

All Durable Goods Firms

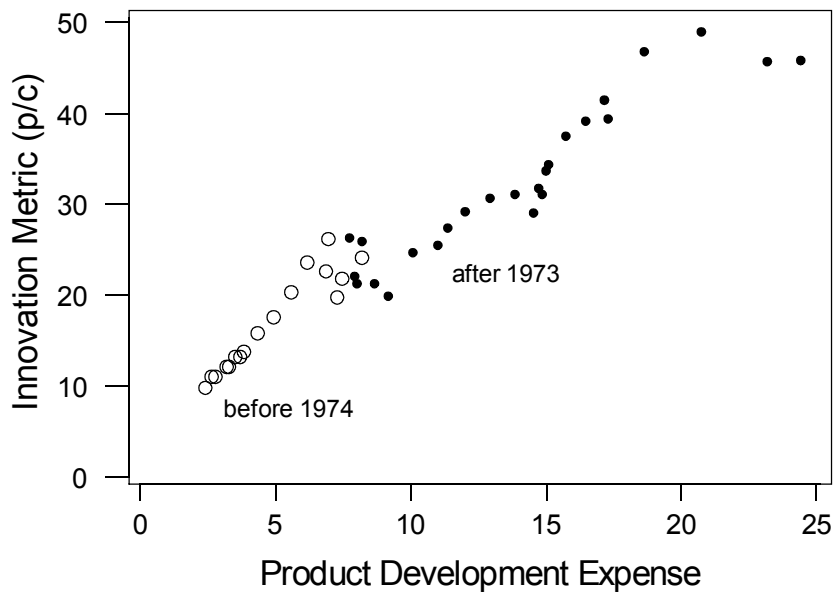
Upper - Aggregate Innovation Metric (p/c)
 Lower - Product Development Expense



Upper and lower data are from different sources, have different units, but show striking segmental upward shapes brought into congruence when 3 - 4 years elapses between cause (lower) and effect (upper).

shift lower data forwards and plot against upper data

Innovation Productivity



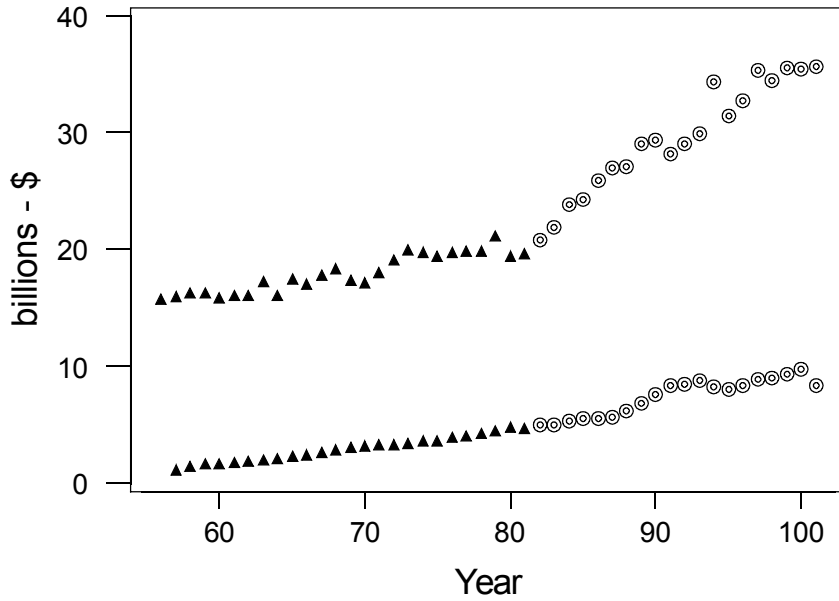
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Connecting Innovation Metric to R&D (2)

All Non-Durable Goods Firms

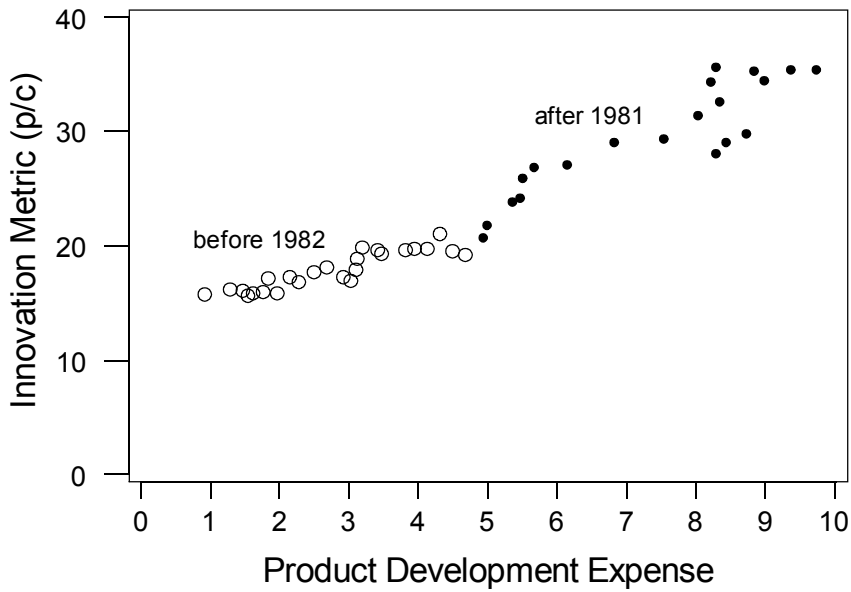
Upper - Aggregate Innovation Metric (p/c)

Lower - Product Development Expense



Again striking, the segmental upward shape for non – durable goods is simpler than for durable goods, with a shorter ~ 0 – 1 year elapse between cause (lower) and effect (upper).

Innovation Productivity



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