

# Innovation in Economics from Neglected Numbers

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## **The Situation**

### **Innovation Drives Economic Growth, everywhere except in Economics,**

It's apparent to most thinkers that innovation drives economic growth. But Economics doesn't help them much. It pacifies innovation within a proxy called Factor Productivity - a principal outward manifestation of Neo-Classical Growth Theory - whose sufficiency remains conjectural. Or within intellectual capital, an intangible stock, from which future technology and products are presumed to develop without enumerating when or how.

Such shortfall invites explanation – and an excuse. The excuse occupies the next two paragraphs; the explanation the next ninety pages.

Economics has missed an industry standard, the Innovation Funnel, which controls output to commercialization. The mechanism for successful passage through this funnel is an essential consideration on which Economics remains silent. That's a consequence of what the perceptive economist Zvi Griliches once called its 'data constraint'. He exhorted economists to overcome it, but only outsiders could do so.

That's because business lore is systemically out of academic reach. It's hidden away from campuses; within factories, corporate offices and especially in technical centers. And most of it relates to successful funnel passage. Access to tacit knowledge allows Innovation Professionals to use these resources to serve commercial purposes. Incorporation of Economics is a natural extension, contingent only on the de-fragmentation of data into DINTEC or Data on INnovation TEchnology and EConomics.

The following eight chapters address two well-known knowledge gaps in Economics. What economists have identified as its 'Quality Change' problem is one. The other is the long sought never found numerical link between current innovation spending and future GDP.

When armed with these missing elements the dominating factor for economic growth clearly emerges. Innovation metrics control the funnel through which any technology must pass to become commercial. Its products then overcome market incumbents by the process called creative destruction. Growth can be calculated upwards from first principles. Such capability bestows global economic advantage.

## The Direct Economic Measurement of Innovation

Each **Part** uses otherwise neglected data, or interprets such data, to illustrate increasingly complex commercial activity that puts innovation into Economics. Its direct economic measurement becomes a talisman linking growth to original factors that are arranged with utmost simplicity to provide new possibilities for economic enhancement.

- Part Ia** - Develops an otherwise unknown economic equation that enumerates absolute product advantage by an analogy between creative destruction for money in the economy and species competition for food in nature. It overcomes the limiting anchor of current evolutionary modeling, which is the firm; an entity with little correspondence in nature, 5-13
- Part Ib** - Validates its ability to quantify product performance<sup>‡</sup> in a dozen varied commercial instances, where performance is known or can be reliably judged, making it universal, and providing insight into limitations of the current hedonic method for correcting price indices, 15-33  
‡ 'quality' in Economics
- Part II** – Enumerates the historical performance of light-bulbs to resolve the ‘Price of Light’ quandary that has stymied understanding of quality change bias in price indices for decades, 35-37
- Part III** - Develops algebra from the equation that shows GDP is driven primarily by innovation, 39-40
- Part IV** – Provides an economics of the Innovation Funnel, a mathematical treatment of creative destruction that exactly defines innovation and its measurement, 41-44
- Part V** - Applies this direct economic measurement of innovation to enumerate the consequences for individual firms when creative destruction grows the economy, while incidentally providing a new tool for investors, 45-53
- Part VI** - Sums manufacturing innovation to reveal a unique rising shape that provides a congruent match between current commercial R&D spending on creative destruction and future GDP. This not only reveals the long sought temporal link but also provides a global innovation explanation for the great productivity slowdown from the 1970s. 55-63
- Part VII** – Shows that Factor Productivity, derived from Neo-Classical Growth Theory, is insufficiently related to innovation and must be measuring something else. Offers a new way to envisage economic growth using an Innovation Parallelogram across which simple mathematics between new variables controls creative destruction by the Innovation Funnel mechanism. Recommends that the proposed direct economic measurement of innovation be included in National Accounting so that its currently missing mechanistic role for growth is properly tabulated therein; an essential for informed economic policy. 65-69
- Part VIII** – Appendices **A** to **D** – including how to treat the Service Sector and presenting an experimental bias-free inflation index - with References and a Glossary. 71-95