KAUST
The Policy Institute

OCCASIONAL PAPER

# Public Investment in R&D as a Source of Economic and Social Returns

MAY 2026

Classification: Internal

# Contents

1 Introduction ..... 3
2 Private Versus Social Rates of Return ..... 4
Private Rate of Return ..... 4
Social Rate of Return ..... 4
3 Quantifying the Rate of Return ..... 6
Case Study: Understanding the ROI of Medical Research ..... 7
Case Study: KAUST's Impact on the Saudi Economy ..... 7
4 Leverage Effect of Public R&D Investment ..... 8
5 Conclusion ..... 9

# 1 Introduction

Funding research and development (R&D) activity represents an investment in generating knowledge. As such, it fundamentally differs from investment in infrastructure and other physical assets. Both investment in R&D and investment in physical assets yield a measurable return on investment (ROI) but, alongside direct financial returns, R&D also yields broader economic and societal benefits. These wider returns, spanning from public health to economic growth, are the subject of a deep body of academic study that aims to understand and quantify their value.

Long-established economic theory holds that due to the indirect nature of these broader economic and societal benefits, private investors cannot fully capture the return on their R&D investments. Consequently, businesses tend to under-invest in R&D from a societal perspective, which, in turn, can hold back innovation. Popper and Wagner (2002) discuss this dynamic and point to the necessity of public investment and proactive innovation policies as means to achieving and sustaining a competitive, innovation-intensive economy.

This paper discusses academic evidence on the role of public R&D investment as a source of economic and social returns. It concludes that public R&D investment generates stronger direct economic returns than other capital investments, while yielding wider economic and societal benefits, including those to public health and the environment.

KEY CONCEPT

### What do we mean by return on investment (ROI)?

ROI is a measure of the net gain, oftentimes measured as profit, generated by an investment, relative to the initial cost of the investment. It is a standard indicator of value from investments, and, depending on how it is measured, it can provide insight to value for different types of investors in the private and public sectors who may have different priorities. For example, private investors might be seeking to maximize profit, while others, especially in the public sector, might be seeking to maximize wider economic and societal impacts.

When ROI methodologies extend beyond direct financial returns to map investment to wider economic and societal impacts, they can quantify the transformation of investment into different types of value, allowing different types of investors to evaluate their choices.

# 2 Private Versus Social Rates of Return

Quantifying the impact of R&D is complex, but economic research conducted over decades has consistently indicated extraordinary returns, significantly outpacing those from typical capital investments. These returns result from R&D yielding both *private returns* (i.e., the direct financial benefit captured by the investor, such as a business), and *social returns* (i.e., the wider benefits to the economy and society).

## Private Rate of Return

The private rate of return reflects the direct benefits (e.g., productivity enhancements, revenue gains, etc.) that accrue to an R&D investor. Econometric studies across different advanced economies and different time periods consistently show that private returns from R&D outperform those from typical capital investments in machinery or IT hardware (Hall, Mairesse, and Mohnen 2010).

This significant and directly captured return on investment offers the economic premium that underpins commercial R&D activity, despite its high upfront costs and failure risks. The incentive is sufficiently strong to drive substantial commercial investment. For example, gross domestic expenditure on R&D across the EU exceeded €400 billion in 2023, with businesses providing over half of that investment (Eurostat 2025).

However, the inability of private investors to fully capture the returns from R&D means that even this substantial commercial investment still sits below the optimal level for society. This shortfall is a systemic "market failure" that occurs because social returns, as discussed below, are a major component of R&D's overall impact.[1]

## Social Rate of Return

Even without considering some of the broadest societal gains, such as those to public health and the environment, the benefits of R&D spending can extend—or "spill over"—well beyond the initial investor. Seeking to probe the nature of spillovers and their effects, Griliches (1979, 1992) distinguished between the benefits to purchasers from quality improvements in goods that are not fully reflected in higher prices, which he framed as a "measurement problem," and the "pure knowledge spillovers" that occur when a discovery by one investor accelerates the R&D of another, without any financial transaction.

Casting a somewhat wider net, Jones and Williams (1998) demonstrated that—because of spillovers—academic research consistently underestimates the value of innovation. The authors found that existing estimates of the returns on R&D represented only the lower bound of the true social rate of return and that optimal investment levels should be a multiple of 2

[1] Market failure refers to a situation in which market forces do not produce an economically efficient allocation of goods or services (Stiglitz and Rosengard 2015, chap. 4).

to 4 times actual market-driven investment. Their findings continue to propel large-scale government intervention in the innovation economy.

More recent academic research has further expanded our understanding of how the benefits of R&D propagate across the economy. For example, one study (Goodridge, Haskel, and Wallis 2017) on spillovers from industrial R&D in the United Kingdom confirmed that knowledge generated in one industrial sector can boost productivity in the wider economy. Figure 1 below depicts several types of spillovers that can flow from innovation.

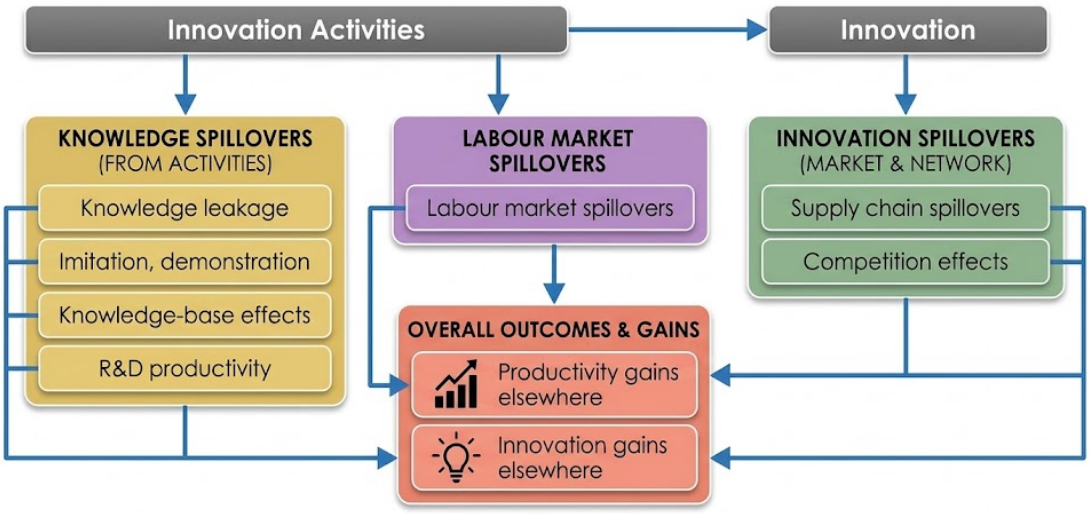


**Figure 1** — Overview of spillovers flowing from innovation. Source: Adapted from Roper (2024).

# 3 Quantifying the Rate of Return

Academic evidence on the impact of public investment into R&D consistently indicates impressive rates of return, with figures varying by the economic models used, the time window between investment and impact, and the national or sectoral context.

One report that synthesized several sources found robust evidence for an average (mean) private return on R&D investment ranging from 20 to 30 percent (UK Department for Business, Innovation and Skills 2014). This rate substantially exceeds that of other capital investments and appears stable across firms, sectors, and nations. The report also highlighted that these returns are supplemented by social returns that are typically 2-3 times larger than the private returns, i.e., as much as 60 to 90 percent of the original R&D investment.

More recent macroeconomic models have revised these ROI estimates significantly upward. One such analysis (UK Department for Science, Innovation and Technology 2024) quantified the rate of return on public R&D by estimating the relationship between public investment and private sector total factor productivity (TFP) growth. This study used data from 40 different industrial sectors across two decades and found an annual rate of return on public investment of up to 40 percent after six years. Put another way, a £100 million public investment in R&D would, after a six-year lag, yield a sustained increase in annual private sector productivity worth £40 million per year. After a 10-year lag, the rates of return range from 45 to 100 percent, depending on the spillover measures used.

KEY CONCEPT

### What do we mean by total factor productivity (TFP)?

TFP is a measure of the overall efficiency with which an economy creates outputs—or generates income—from *all* the inputs it uses in combination. Rather than reflecting the economic growth achieved just by employing more workers, investing in more machinery, cultivating more land, or using more raw materials, higher TFP reflects improvements driven by factors, such as skills and innovation that can be difficult to quantify.

Schumpeter (1942, 2003) famously described the process of "creative destruction," wherein the cycle of innovation cannibalizes established market leaders and legacy technologies, with new products, services, and economic growth emerging from the disruption.

For a fuller discussion of TFP, including the role of innovation in driving gains, see Zymek (2024, 8), who characterizes TFP as "a measure of an economy's ability to… do more with less" and argues that, for advanced economies, "the most likely source of sustained TFP growth is innovation in technology, production processes, and product variety."

An analysis of macroeconomic data from 17 OECD countries corroborated these findings, showing an internal rate of return for public R&D in the UK of 162 percent (Ziesemer 2024). Similarly, studies of US data revealed a strong connection between non-defense federal R&D

funding and private sector productivity growth, with estimated social returns of 140 to 210 percent (Fieldhouse and Mertens 2023 and 2025).

### Case Study: Understanding the ROI of Medical Research

While TFP and gross domestic product (GDP) gains reflect one component of the return on R&D investment, they struggle to fully capture important societal benefits such as improved public health or environmental protection.

Studies on the impact of publicly funded medical R&D have sought to capture a more holistic view of the value generated by combining direct GDP gains with health gains, to quantify the benefit of longer, healthy lives. Work conducted in the UK (Glover et al. 2018) has established that public medical research generates an ongoing return of 25 pence for every £1 invested, every year, in perpetuity.

Recent analysis of grant data has also extended our understanding of the spillover benefits of medical R&D, by showing that research on one disease often yields progress on a wider range of conditions (Coburn et al. 2024).

The emergence of South Korea as one of the "Asian Miracle" economies offers further evidence on the transformative impact of sustained government investment into R&D. From the 1960s to the 1980s, the South Korean government aggressively prioritized public funding of R&D in economically strategic fields, nurturing an innovation-intensive economy which has subsequently shifted towards high levels of private sector investment across a range of industries (Lee and Choi 2024).

### Case Study: KAUST's Impact on the Saudi Economy

A new report on KAUST's economic impact demonstrates the value of investing in R&D through academic institutions (KAUST 2026). The report presents the findings of an economic impact assessment (EIA) undertaken by L.E.K. Consulting for the 2024–25 assessment year. The EIA estimated that KAUST generated approximately USD 5.6 billion in annual economic value for Saudi Arabia through 6 quantifiable pathways to impact, and it supported at least 28,800 jobs across the Saudi economy.

Two such pathways—knowledge and commercialization—speak directly to R&D and innovation. Along the first pathway, the EIA estimated a multiplier on research spending of 2.26-3.76, meaning that each dollar spent on research more than doubled or tripled in value economywide. These larger benefits, referred to as the "research spillover," arise when new knowledge diffuses beyond the institution and increases productivity across firms, sectors, and the broader economy. The multiplier was estimated from a well-known statistical approach, linking TFP growth with lagged research intensity, applied to Saudi data. Consequently, the results are applicable to other Saudi public investment in research. Perhaps most obviously tied to innovation, the EIA also found that commercialization through spinouts and startups contributed almost USD 1.9 billion to the USD 5.6 billion total.

# 4 Leverage Effect of Public R&D Investment

Beyond direct productivity gains, public R&D investment is also known to "crowd-in" private investment. By generating foundational discoveries, creating research assets (e.g., data repositories), or training scientific talent, public investment can signal commercial viability to private investors. In this way, government funding spurs private investment, expanding overall innovation capacity rather than displacing private involvement.

A recent report on UK R&D spending calls out the role of public investment in boosting private investors' confidence to pursue high-risk, potentially high-reward R&D that might otherwise struggle to attract investment (UK National Centre for Universities and Business [NCUB] 2024). More specifically, the report (NCUB 2024, 3) finds that £1 of public R&D investment in the UK stimulates substantial additional private R&D investment, amounting to £0.60 to £1.10 in the short term and about £3.10 to £4.00 in the long term. The report also notes that the UK's long-term figures lag those of several other innovation-led economies, with the long-term figures for the US and Germany ranging beyond £7 for each £1.

Studies also show that this powerful leverage effect from public R&D investment extends beyond R&D-intensive clusters. For example, a comparison of 12 UK regions with international peers showed that a 10 percent boost in public R&D investment spurred an increase in private R&D investment regardless of a region's R&D intensity (OECD 2025). For additional supporting evidence on "crowding in," Sussex et al.'s (2016) study on health research in the UK demonstrates the complementarity of public and private R&D funding.

# 5 Conclusion

Decades of evidence across differing nations, economic sectors, and R&D domains has firmly established the case for sustained public investment in R&D as part of a national strategy to deliver economic and societal benefits. Although it is sometimes labelled as a "cost" or something that public money is "spent on"—even in this paper and the studies it cites—public funding for R&D represents one of the highest-yielding investments available to governments around the world.

While sub-optimal commercial R&D investment alone gives reason for public R&D investment, studies consistently show that stepping in to fill the gap yields remarkable returns for governments, the economy, and society. Crucially, this public investment serves to further "crowd-in" private sector investment at substantial multiples, rather than displace it.

In an increasingly complex and competitive global economy, the case for the value of—and need for—public R&D investment remains strong. The economic and societal impacts that flow from R&D mean that public investment will continue to be an important lever for any government seeking to drive economic development, elevate living standards, and support social prosperity. The importance may become yet greater for Saudi Arabia, if, as Zymek (2024) suggests, innovation is the most likely path to leveraging resources—or "doing more with less"—in advanced economies.

# References


Coburn, Josie, Ohid Yaqub, Ismael Ràfols, and Joanna Chataway. 2024. "Cross-Disease Spillover from Research Funding: Evidence from Four Diseases." *Social Science & Medicine* 343. https://doi.org/10.1016/j.socscimed.2024.116883.

Eurostat, R&D Expenditure, November 2025. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=R%26D_expenditure.

Fieldhouse, Andrew J., and Karel Mertens. 2023. "The Returns to Government R&D: Evidence from U.S. Appropriations Shocks." Working Paper 2305. Federal Reserve Bank of Dallas. https://www.dallasfed.org/-/media/documents/research/papers/2023/wp2305.pdf.

Fieldhouse, Andrew J., and Karel Mertens. 2025. "The Social Returns to Public R&D." Working Paper 33780. National Bureau of Economic Research. https://doi.org/10.3386/w33780.

Glover, Matthew, Erin Montague, Alexandra Pollitt, Susan Guthrie, Stephen Hanney, Martin Buxton, and Jonathan Grant. 2018. "Estimating the Returns to United Kingdom Publicly Funded Musculoskeletal Disease Research in Terms of Net Value of Improved Health Outcomes." *Health Research Policy and Systems* 16 (1). https://doi.org/10.1186/s12961-017-0276-7.

Goodridge, Peter, Jonathan Haskel, and Gavin Wallis. 2017. "Spillovers from R&D and Other Intangible Investment: Evidence from UK Industries." *Review of Income and Wealth* 63 (S1): S22-S48. https://doi.org/10.1111/roiw.12251.

Griliches, Zvi. 1979. "Issues in Assessing the Contribution of Research and Development to Productivity Growth." *The Bell Journal of Economics* 10(1): 92–116. https://doi.org/10.2307/3003321.

Griliches, Zvi. 1992. "The Search for R&D Spillovers." *Scandinavian Journal of Economics* 94 (Supplement): S29-S47. https://www.jstor.org/stable/3440244.

Hall, Bronwyn H., Jacques Mairesse, and Pierre Mohnen. 2010. "Measuring the Returns to R&D." MERIT Working Papers. United Nations University. https://ideas.repec.org/p/unm/unumer/2010006.html.

Jones, Charles I., and John C. Williams. 1998. "Measuring the Social Return to R&D." *Quarterly Journal of Economics* 113 (4): 1119-1135. https://doi.org/10.1162/003355398555856.

King Abdullah University of Science and Technology (KAUST). 2026. *KAUST Economic Impact Assessment*. https://www.kaust.edu.sa/docs/kaustlibraries/downloads/kaust-economic-impact-assessment.pdf.

Lee, Dong-hyun, and Hyun-seok Choi. 2024. "The Transition of South Korea's Economic Growth Drivers — From Labor-Intensive to Knowledge-Intensive Industries." *Law and Economy* 3 (6):9-22. https://www.paradigmpress.org/le/article/view/1165.

OECD. 2025. *Leveraging Government R&D Investment to Boost Private R&D Investment in Regions*. https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/06/leveraging-government-r-d-investment-to-boost-private-r-d-investment-in-regions_22f76dff/b3c460e8-en.pdf.

Popper, Steven W., and Caroline S. Wagner. 2002. *New Foundations for Growth: The U.S. Innovation System Today and Tomorrow*. RAND Corporation. https://www.rand.org/pubs/monograph_reports/MR1338z0.html.

Roper, Stephen. 2024. "R&D and Innovation Pathways to Business Productivity and Growth: What Does the Evidence Suggest?" Enterprise Research Centre. https://www.enterpriseresearch.ac.uk/wp-content/uploads/2024/05/ERC-Insight-RD-and-innovation-pathways-to-business-productivity-and-growth-Roper.pdf.

Schumpeter, Joseph A. 1942, 2003. *Capitalism, Socialism and Democracy*. Routledge, published in the Taylor & Francis e-Library. https://doi.org/10.4324/9780203202050.

Stiglitz, Joseph E., and Jay K. Rosengard. 2015. *Economics of the Public Sector*, *4th ed.* W. W. Norton & Company, Incorporated.

Sussex, Jon, Yan Feng, Jorge Mestre-Ferrandiz, Michele Pistollato, Marco Hafner, Peter Burridge, and Jonathan Grant. 2016. "Quantifying the Economic Impact of Government and Charity Funding of Medical Research on Private Research and Development Funding in the United Kingdom." *BMC Medicine* 14 (32). https://link.springer.com/article/10.1186/s12916-016-0564-z.

UK Department for Business, Innovation and Skills. 2014. *Rates of Return to Investment in Science and Innovation*. https://assets.publishing.service.gov.uk/media/5a7f02a840f0b62305b8490b/bis-14-990-rates-of-return-to-investment-in-science-and-innovation-revised-final-report.pdf.

UK Department for Science, Innovation and Technology. 2024. *Returns to Public Research and Development*. https://assets.publishing.service.gov.uk/media/6759c68b9f669f2e28ce2b6d/returns-to-public-research-and-development.pdf.

UK National Centre for Universities and Business. 2024. *Unlocking Growth: The Impact of Public R&D Spending on Private Sector Investment in the UK*. https://www.ncub.co.uk/insight/unlocking-growth-the-impact-of-public-rd-spending-on-private-sector-investment-in-the-uk/.

Ziesemer, Thomas H.W. 2024. "Internal Rates of Return for Public R&D from VECM Estimates for 17 OECD Countries." *Economic Change and Restructuring* 57 (164). https://doi.org/10.1007/s10644-024-09740-8.

Zymek, Robert. 2024. "Total Factor Productivity: How Can Economies Do More with Less?" *F&D Magazine* (September):8-9. https://www.imf.org/en/publications/fandd/issues/2024/09/back-to-basics-total-factor-productivity-robert-zymek

## KAUST CONTRIBUTORS



**Obaid Younossi**
Executive Director, The Policy Institute at KAUST
Professor of Practice
View full profile on KAUST.edu



**Victoria A. Greenfield**
Senior Fellow, The Policy Institute at KAUST
View full profile on KAUST.edu

## THE POLICY INSTITUTE AT KAUST

The Occasional Paper series explores wide-ranging topics of interest to policymakers, KAUST academics, and other scholars engaging in research that supports policymaking. Papers may synthesize research findings on national priorities, discuss recent developments in policy analysis, or address the relationship between policy and research, including opportunities to strengthen the bonds between communities of interest. They are not formally peer reviewed.

The Policy Institute is designed to expand KAUST's contributions to national policy and advance the ambitions of Saudi Vision 2030 and beyond, by bridging science, technology, innovation, and public policy to create a pathway to impact. For more information about the Institute, see https://www.kaust.edu.sa/en/about/policy-institute.

**kaust.edu.sa**
King Abdullah University of Science and Technology
Building 16 Level 3, Room 3612
Thuwal 23955-6900, Saudi Arabia

© 2026 King Abdullah University of Science and Technology. All rights reserved.