

Measuring the Social Returns of R&D Investment: Evidence, Gaps, and Research Opportunities

Governments and private firms have long invested significant proportions of their budgets in scientific and technological R&D, with the belief that these investments generate a substantial return to society. However, measuring the causal impact of R&D hasn't always been easy, especially when it comes to considering impact beyond economic terms. There is little consensus on how large these benefits are, and how to measure potential spillover effects of R&D investments.

Now more than ever we are seeing the need of quantifying and understanding these returns. There have been calls from major philanthropic funders like the Alfred P Sloan Foundation and Coefficient Giving launching a [pop-up journal](#), [calls for letters of inquiry](#), and [NBER meetings](#). We are also seeing interest from different OECD governments in understanding the complexities around these questions and seeking more rigorous frameworks to evaluate their R&D portfolios.

As part of our work at the Innovation Growth Lab and in support of our policy partners, we undertook a rapid evidence review on the social impact of R&D to identify research gaps that could be addressed through future research and experiments. The review includes inputs from a call for evidence shared across IGL Research Network. We thank all submissions from the 24 IGL Research network Members across the UK, US, and EU, who submitted a total of 32 papers. Below you can find the main insights on what came out.

1. R&D Funding has large social returns - but distribution and institutional environment matters

Research has found that more than half of total R&D funding across OECD countries between 2015 and 2023 is related to the UN Sustainable Development Goals, particularly SDG 9 (Industry, Innovation and Infrastructure: 30%) and SDG 3 (Good Health and Well-being: 23%). These two goals dominate both in terms of funding volume and number of projects (3).

The evidence indicates that R&D investments generate substantial social returns that significantly exceed private returns, primarily due to positive spillovers that benefit society more broadly. Estimates suggest that £1 of R&D investment can generate between £5 and £20 in social value (1), and specific causal evidence finds that £1 of non-defence public R&D (in areas such as health, energy, and science) generates a gross social return of between

140% and 210% (4). A single patent produced by a grant recipient can also generate three additional inventions by others, underscoring the scale of spillover effects (2).

If you would like to dive deeper into some examples, we have extracted three case studies that explore how researchers have used economic modelling, natural language processing, and machine learning to capture returns that go beyond traditional evaluation frameworks.

[Read the case studies below](#)

2. Funding design shapes social outcomes and who benefits from innovation

The design of R&D funding, as well as early-life exposure to innovation, play a crucial role in shaping who participates in and benefits from technological progress. A growing body of research shows that social mobility in innovation is strongly shaped by early-life exposure to scientific and technological environments, with children from high-income families being significantly more likely to become inventors than equally high-achieving children from low-income backgrounds, largely because they have greater access to innovation-rich environments, networks, and role models (6). This suggests that innovation policy carries long-term distributional consequences that begin well before individuals enter the labour market.

At the firm level, innovation does not automatically reduce inequality. Evidence indicates that the profits from patents are often shared unevenly between firms and workers, and that innovation can in some cases sustain or widen the gender wage gap (7). Funding design itself also matters. Long-term, flexible grants encourage greater risk-taking and more exploratory research than short-term or tightly specified funding, with direct implications for the nature and social value of the research produced (5). Universities play a critical role here too, as they are the engines of innovation ecosystems that support high-quality firm formation - but only where the broader legal, regulatory, and financial environment is aligned with the type of innovation being promoted (8, 9, 10). At the state level, the funding design of both public and private R&D also shapes its outcomes (11, 12).

3. Innovation policy creates jobs - but not evenly

Innovation policies, whether delivered through business accelerators, cluster initiatives, or major public sector relocations, can increase the concentration of economic activity in targeted sectors. However, they do not automatically translate into broad productivity gains or net new employment (13). The mechanisms of support matter significantly. For example, financial assistance or office space alone, without complementary investment in human capital, is generally ineffective (15).

Place-based interventions in particular tend to shift the composition of local industries rather than creating genuinely additional jobs. Evidence from the BBC's relocation to Salford illustrates the pattern showing that while sectoral employment rose, total local employment remained broadly unchanged, with benefits accruing disproportionately to commuters rather than residents ([14](#)). Similarly, accelerator programmes can relax financial and informational constraints for high-potential firms, but cannot compensate for weak initial access, and standard selection practices can systematically disadvantage underrepresented entrepreneurs, hence reinforcing existing inequalities rather than broadening opportunity ([16](#), [17](#)).

Evidence gaps

Despite the breadth of evidence reviewed, three gaps still stand out. Most studies continue to rely on conventional economic metrics (wages, firm growth, patent counts) and there is no agreed framework for measuring social impact, inclusion, or mobility in ways that go beyond economic returns or labour market outcomes. This limits both comparability across studies and the ability to capture what innovation policy is increasingly expected to deliver. Relatedly, there is a lack of research tracking longer-run outcomes such as intergenerational mobility, career trajectories of disadvantaged groups, or job quality and stability. On a broader level, the governance of R&D priority-setting, meaning who shapes funding decisions, through what processes, and with what distributional consequences, remains largely unexamined. Understanding how research agendas are set, and how participation in that process might be broadened, is important for ensuring that the social returns to R&D are more equitably realised.

What does this mean for future research opportunities?

The evidence reviewed highlights how while R&D generates substantial social returns, their realisation is neither automatic nor evenly distributed. Spillovers from public R&D extend well beyond direct recipients, generating benefits across sectors, regions, and generations that private investment alone would not capture. Yet, the distribution of these gains is shaped by funding design, institutional context, and structural barriers to participation that operate long before individuals enter the labour market. Innovation policy that fails to account for these dynamics risks endangering the very inequalities it is seeking to address.

This points to a significant opportunity for researchers wanting to explore this question. New datasets and methodologies are increasingly available to evaluate the impact of these investments - from machine learning approaches to mapping R&D directionality, natural language processing for tracking knowledge spillovers, and large-scale administrative data linkage. Applying these methodologies to understand the social (and not only economic)

returns of R&D is a promising opportunity. Doing so would allow researchers and policymakers to move beyond aggregate return estimates toward a more granular understanding of how R&D funding shapes social outcomes. It would also reframe the fundamental question from whether public R&D pays off, to who it pays off for, and how policy design can ensure those benefits are more widely shared.

Case Study: A Calculation of the Social Returns to Innovation (Jones and Summers 2020)

The research by Jones and Summers (2020) provides an important economy-wide framework for thinking about how national R&D funding translates into benefits for society, which is directly relevant to the goal of measuring the social impact of its R&D funding. Instead of trying to track the effects of individual grants or projects, the research takes a high-level, aggregate approach that captures the wide range of spillovers from innovation, including imitation by other firms, benefits to users, and gains that accumulate over time.

Their central method is a “thought experiment” based on economic growth. They compare actual historical growth in GDP per capita with a hypothetical counterfactual world in which investment in innovation is switched off and technological progress stops, so living standards remain flat. The difference between these two paths of GDP per capita represents the overall gains from past innovation. They then relate these gains to the total amount spent on R&D, allowing them to estimate an average social return to innovation across the whole economy.

The study finds that the social returns to R&D are very large, even under cautious assumptions that allow for delays in diffusion and the costs of new capital. Their baseline estimate suggests that \$1 of R&D investment generates around \$13.30 in economy-wide benefits, and this can rise above \$20 when the analysis includes health improvements and international spillovers. Importantly for policy interest in outcomes beyond traditional economic measures, the paper also develops a way to value improvements in life expectancy as a direct return to innovation. The authors argue that scientific and technological progress has been a major driver of longer and healthier lives, and that excluding these benefits would substantially understate the true social value of R&D.

This research might be particularly relevant because it provides a clear and credible way of linking public R&D spending to broader social welfare. It shows that innovation investments more than pay for themselves through higher incomes and better living standards. The study also highlights that standard measures such as GDP may understate the benefits of innovation, because official statistics often struggle to capture quality improvements and new products. Applying this framework would help

policymakers communicate that the social return to R&D remains high, largely because most of the benefits flow to society through spillovers rather than to individual firms. This reinforces the case for public investment in areas like basic research and health, where the private sector is unlikely to capture all of the benefits on its own.

Case Study: Estimating Spillovers from Publicly Funded R&D (Myers and Lanahan 2021)

The research conducted by Myers and Lanahan (2021) into the US Department of Energy's (DoE) Small Business Innovation Research (SBIR) program provides a critical methodology to address the "bottleneck" of identifying unobserved social and economic impacts. The central insight of the study is the discovery of a substantial "multiplier effect" in public R&D: for every single patent produced directly by a grant recipient, an additional three patents are produced by other firms and inventors who benefit from the resulting knowledge spillovers. This suggests that original innovators capture only between 25 and 50 per cent of the total technological value generated by their work, with the remainder flowing to the wider innovation ecosystem. These spillovers are found to be highly pervasive across both geographic and technological space, with 60 per cent of the net patent output remaining within the domestic economy and many inventions appearing in technological areas substantially different from those initially targeted by the government grants.

Methodologically, the researchers used natural language processing (NLP) to link the unstructured text of Funding Opportunity Announcements (FOAs) to the Cooperative Patent Classification (CPC) groups assigned to patents. This allowed them to measure spillovers by identifying new patents that were topically similar to the funded research objectives even when no formal citation existed. The researchers demonstrate that relying solely on traditional citation data would miss approximately half of the actual spillovers generated by public R&D, making this NLP approach essential for a comprehensive evaluation of "latent" social returns. Furthermore, to isolate the causal impact of the funding, the study leveraged state-specific "windfall" matching policies, which provided exogenous variation in R&D investment unrelated to a firm's underlying productivity or specific technological demand.

This research can be highly relevant as it provides a technical blueprint for measuring the impact of R&D on social outcomes like regional "opportunity" and sectoral growth without being limited by the time lags inherent in citation data. Policymakers could implement this by using NLP to cross-reference the strategic objectives of their grants with broader patenting and firm-formation activity in specific regions. The study also reveals that geographic spillovers are heavily concentrated within the closest 10 per cent of regions

based on human travel costs, providing evidence that place-based R&D investments can successfully densify local innovation clusters. By adopting these mapping techniques, policy makers can move beyond measuring the performance of individual grantees to capturing the total "social return" of a program, accounting for the 75 per cent of technological output that typically occurs through spillovers to non-funded firms and inventors.

Case Study: Measuring the Directionality of R&D Investment (OECD 2025)

The OECD Science, Technology and Industry Working Paper (2025/25) uses an approach to assessing the directionality of public R&D investment by using the UN Sustainable Development Goals (SDGs) as a reference framework. Central to this methodology is the development of a machine learning classification model based on SciBERT, a transformer-based language model specifically trained on a large corpus of scientific literature. This model was fine-tuned using a unique domain-informed training set derived from the 2021 OECD International Survey of Science (ISSA2021), where approximately 2,000 researchers self-assessed their own work's relevance to specific SDGs. This probabilistic approach allows for "fractional allocation," meaning a single R&D project can be recognized as contributing to multiple interdependent goals simultaneously rather than being restricted to a single exclusive category.

Key insights from the application of this model to the OECD Fundstat database (which encompasses approximately 2.1 million government-funded R&D awards worth \$1.5 trillion) reveal that over 90% of government research, including foundational basic science, possesses latent societal relevance even when project descriptions omit explicit "goal" language. The findings show that R&D is heavily clustered around three primary themes: Prosperity (37%), Health (29%), and the Planet (15%). Furthermore, the methodology identifies critical synergies where projects targeting industrial innovation (SDG 9) frequently generate significant secondary benefits for environmental and health outcomes. This demonstrates that R&D investments are rarely single-purpose and often address complex, overlapping societal challenges and goals.

This framework provides a practical precursor to address the "critical evidence gap" regarding how R&D funding moves from budgetary appropriation to potential social utility. By applying this AI classifier to funding agencies, policy makers could generate a high-resolution "basemap" of how its current portfolio aligns with specific national

missions such as net-zero, health, or place-based inclusion. Unlike traditional economic metrics such as patents or citations, which may take years to appear, this NLP-based method offers timely science and technology intelligence based on initial project descriptions. Most importantly, it might allow policy makers to bridge the gap between "potential relevance" and "causal impact" by acting as a filter for administrative data linkage; once a grant's latent social relevance is identified, its actual causal effects on long-term outcomes - such as individual career trajectories of disadvantaged groups, wage progression, or regional opportunity - can be tracked by linking grant records to other available datasets.

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