

The Use of Financial Instruments for Small Business Innovation: A Review of Policy Outcomes and Structural Gaps.

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Extended Abstract

1. Introduction: The Strategic Importance of Innovative SMEs

Small and medium-sized enterprises (SMEs) form the foundation of contemporary economies, accounting for over 90% of businesses worldwide, providing 60-70% of jobs, and producing approximately 50% of the global GDP. Within this diverse population, innovative SMEs—those dedicated to research and development (R&D), new product creation, or the incorporation of advanced technologies—play a particularly critical role in driving technological progress, productivity growth, and economic competitiveness. However, the nature of innovation creates inherent financing challenges, characterized by high uncertainty, long development horizons, information asymmetries, and a reliance on intangible assets. These characteristics generate systematic market failures that lead to underinvestment in R&D. Firms often cannot fully appropriate the social returns of their innovations due to knowledge spillovers, while financial markets frequently struggle to assess and price innovation risk effectively.

Innovative SMEs thus face a persistent funding gap, which is particularly evident during early development and scaling phases. The COVID-19 pandemic crystallised this vulnerability, dramatically intensifying financing constraints as access to finance became a "very grave" problem for many small businesses. Governments responded with unprecedented interventions; for instance, the UK government guaranteed 90% of loans in the quarters following the pandemic. At the European level, programs such as NextGenerationEU and Horizon Europe (2021-2027), with a combined budget of €95.5 billion, represented massive public commitments to sustaining innovation capacity. This systematic review synthesizes evidence on the effectiveness of these programs during the post-pandemic period (2020-2026), an era further complicated by monetary tightening and high interest rates.

2. Methodology: Systematic Review and AI-Assisted Screening

This systematic literature review follows the PRISMA 2020 guidelines to ensure transparency, replicability, and rigor. The search was conducted across Web of Science and Scopus databases to provide a thorough review of the literature. To mitigate selection bias and enhance efficiency, the screening process utilized ASReview LAB, an active learning tool that combines human expertise with machine learning—specifically a Naive Bayes classifier—to prioritize potentially relevant studies.

The final analysis includes 42 peer-reviewed articles from the 2020-2026 period. To ensure high analytical standards, each included study underwent a systematic quality assessment evaluating research design, sample quality, reporting transparency, and theoretical contribution. Studies were scored from 0-8 points, with 26 studies (61.9%) classified as "High quality" and 14 (33.3%) as "Medium-high quality". While all 42 studies were included, higher-quality research was weighted more heavily when drawing conclusions and resolving contradictory findings.

3. Narrative Synthesis of Public Financing Instruments

3.1. Grants and Direct Subsidies: Survival and the Certification Effect

Grants and direct subsidies are the most extensively studied instruments in the review. These non-repayable funds, awarded competitively, alleviate short-term financial constraints and help innovative businesses survive. In Spain, subsidies have been found to increase survival rates by 9.3% and stimulate asset growth. The effectiveness of these grants varies systematically with market failure severity; the greatest impact on additional R&D investment is observed among younger, smaller firms and those in regions with less developed financial markets.

A critical mechanism identified is the certification effect. Receiving a competitive government grant signals firm quality to private investors, reducing information asymmetry and catalyzing follow-on investment from venture capitalists and banks. This "crowding-in" effect multiplies the impact of public funds. However, in transition economies or institutional environments with weak governance, large discretionary grants may signal political connections rather than merit, potentially leading to the crowding-out of private investment. Successful grants are typically those that require matched private investment, ensuring that firms maintain "skin in the game".

3.2. R&D Tax Incentives and Policy Bundles

R&D tax incentives allow firms to deduct qualifying expenditures from corporate tax liability, reducing the cost of innovation. These are now offered by 86.8% of OECD countries. Properly designed tax credits, particularly those that are refundable or offer carry-forward provisions, create substantial behavioral additionality by improving cash flow and risk resilience. In the USA, beneficiaries have experienced significant increases in patents and STEM employment.

Despite their success, tax incentives are often "directionally neutral," meaning they stimulate R&D broadly but do not necessarily steer it toward areas with the highest social returns, such as green technologies. This has led to the emergence of "policy bundles," where public support is a strategic combination of incentives. Research indicates a "conditional complementarity" where subsidies and tax incentives promote high-quality invention patents. Certification-based bundles, such as China's "Little Giants" program, demonstrate that rigorous selection can trigger significant increases in productivity and R&D inputs.

3.3. Credit Access Support and Government Venture Capital (GVC)

Public support has increasingly focused on financial market interventions, including soft loans, public guarantee schemes (PGSs), and government venture capital (GVC). Guarantee programs are effective as counter-cyclical tools during crises, preventing reductions in employment and investment for highly indebted SMEs. However, empirical evidence suggests that a 100% coverage ratio can eliminate bank incentives to monitor borrowers, potentially funding non-viable "zombie" companies. Partial guarantees (typically 30–60%) are recommended to maintain market discipline.

GVC involvement offers social legitimacy and access to unique non-financial resources. In South Korea, GVC-backed AI startups have shown higher productivity and survival rates because they can utilize government-provided infrastructure, such as proprietary databases and testbeds. This indicates that public support is most effective when it addresses broader ecosystem deficits rather than just providing liquidity.

4. Cross-Instrument Synthesis: The Additionality Puzzle

Transversal evaluation of the 42 studies reveals that public financing success is governed by structural regularities regardless of the specific instrument. There is a fundamental conflict between horizontal reach and information signaling. While tax incentives allow for broad innovation with low marginal costs, they are often unable to relieve pressing cash constraints or generate the certification impact required to solve information asymmetry. In contrast, competitive grants and GVC provide both resources and sociocognitive legitimacy that attract private equity.

Evidence indicates that additionality follows an inverted U-shaped curve relative to the grant amount and coverage. Very small grants often fail to generate impact as they are insufficient for meaningful R&D projects. Conversely, coverage above 70-80%—including 100% guarantees—disconnects funds from market discipline and risk-sharing, leading to inefficient projects. Efficiency appears maximized when co-financing levels range from 30% to 60%, ensuring firms maintain "skin in the game".

5. Extensive Research Gaps and Future Research Agenda

The current research landscape is significantly constrained by a lack of granular, firm-level longitudinal data that links specific public support to long-term performance outcomes across multiple countries. Researchers frequently cite the absence of administrative datasets capable of tracking an individual firm's support history alongside detailed performance metrics over extended periods. Furthermore, data regarding applicants who were rejected for public support are generally unavailable, which hinders the ability of authors to conduct more robust analyses such as Regression Discontinuity. This scarcity of data makes it difficult to disentangle the effects of multiple concurrent interventions or to measure long-term impacts beyond the typical three-to-five-year observation windows. Future research requires systematic efforts to create linked administrative-survey datasets that are accessible to researchers under appropriate privacy protections.

Another profound gap is the "black box" of non-financial support mechanisms, such as advisory services, management coaching, and networking facilitation. These services are critical for building the absorptive capacity of a firm, yet methodologies to jointly assess financial and non-financial support remain underdeveloped. There is a lack of understanding regarding the optimal sequencing of these different support modalities and the specific mechanisms through which coaching might enhance the effectiveness of financial resources. Future studies should employ mixed methods that combine quantitative impact analysis with qualitative process tracing to uncover these underlying mechanisms.

The structural funding gap for European companies seeking to expand remains a critical area of concern, often referred to as the "scale-up gap". The contrast between the levels of capital available to European firms in later stages of growth compared to their counterparts in the United States is substantial, leading to a "brain drain" where successful startups relocate abroad to secure funding. While initiatives like the European Tech Champions Initiative aim to bridge this gap, empirical evidence regarding their effectiveness is still in its infancy. Future research must identify the institutional causes of these venture capital differences and the role public schemes can play in attracting private late-stage funds.

Finally, there is a persistent conceptual misalignment between dominant innovation models and policy frameworks. Most research and policy implicitly assume the "Science, Technology, and Innovation" (STI) mode, which focuses on formal R&D and patents. However, many SMEs innovate through the "Doing, Using, and Interacting" (DUI) mode, characterized by learning-by-doing and customer-supplier interaction. Public financing instruments and evaluation metrics are currently poorly aligned with the needs and outputs of DUI innovators. A fundamental rethinking is required to design support and capture metrics that accurately reflect the effectiveness of practice-based innovation versus science-based innovation. Theoretical frameworks must also evolve to integrate financial and non-financial support, specifying the conditions under which combined support provides superadditive returns.

6. Policy Implications and Final Conclusions

The synthesis of evidence from the post-pandemic period strongly advocates for a transition from volume-based policy toward a quality-centered design that prioritizes information dissemination and accessibility over simply increasing fund volumes. Barrier studies consistently identify a lack of awareness and administrative complexity as primary obstacles, particularly for micro-enterprises. Policy should therefore emphasize dedicated outreach, simplified application procedures, and "once-only" principles that reduce documentation requirements. This simplification must be supported by an investment in evaluation infrastructure, including administrative datasets that enable long-term analysis and a dedicated funding stream for independent evaluation research.

Effective program design must recognize and adapt to the structural diversity of the business sector, moving away from "one-size-fits-all" solutions. Instruments should be

tailored to match different firm lifecycle stages and constraints, such as designing refundable tax credits and small grants for micro-firms while utilizing soft loans and public venture capital for high-growth scale-ups. The impact of these tailored instruments can be significantly amplified by a supportive entrepreneurial ecosystem where financial aid is linked to advisory services. Policymakers must recognize that coaching and networking build the absorptive capacity necessary for firms to effectively utilize financial support.

Public selection should be explicitly leveraged as a meritocratic form of certification. Because the certification effect can equal or even exceed the value of direct financial support, programs should be designed with transparent and rigorous selection processes based on independent technical reviews. Increasing the public recognition of awardees and making support databases accessible to investors can further empower this signaling effect. Furthermore, the maintenance of partial firm co-investment (typically 30-60%) is essential to preserve market discipline and act as a filter against the zombification of structurally insolvent firms.

In conclusion, well-designed public financing is a powerful and necessary tool for correcting market failures and stimulating innovation without crowding out private funds. The central challenge for policymakers is not whether to intervene, but how to ensure that interventions are efficient, targeted, and dynamically aligned with structural transformation goals. While this review acknowledges limitations related to publication bias and the narrative nature of the synthesis, it provides a solid foundation for both evidence-based policymaking and a future research agenda focused on longitudinal analysis and the integration of financial and non-financial support.