

# Dark Clouds over Spanish Science

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Spain's controversial 2013–2020 research and development (R&D) strategy (1), and the 2013–2016 national R&D plan that implements it (2) aim to (i) slim down public support for basic science and education and move it toward market-driven, applied research and (ii) foster private participation in technology transfer by redirecting public funds toward private enterprises. The plan's performance indicators focus more on technology transfer and innovation than on research quality (2). Improved private R&D would be welcome, but redirecting public funds toward private, target-based R&D, coupled with major budget cuts (3), and without addressing underlying issues in the Spanish production and funding systems, risks undermining efforts to sustain and improve basic research.

Private sector innovation in Spain is hampered by the small size and low innovative culture of most firms, the small high-tech sector and marginal growth of emerging sectors, the lack of financial system culture for funding innovation, the lack of collaboration between firms, and insufficient internal demand to drive innovation (4). About 59% of public R&D funding in Spain in 2012 was allocated to loans. But insufficient take-up from the private sector contributed to large portions of these funds being unused, making actual public research spending at least 3.01 billion less than allocated in the parliamentary budget (5).

Instead of drastically diverting public funds to market-driven research and to a private sector that may be ill-positioned to utilize the funds, the Spanish plan would benefit from more balanced distribution of public investments in research and innovation and improved monitoring and evaluation of public investments in the private sector (in terms of knowledge generation and economic output). More efficient systems of incentives to attract larger investment of private funds



could build on successful examples of public-private partnerships. Such elements appear in the European Union's Horizon 2020 scientific strategy for 2013–2020 (6).

In the Spanish innovation system, mismatch between commercial or societal needs and academic research, the lack of critical mass, and the small number of academic spin-offs from technology-focused firms make it difficult for knowledge to circulate, which hampers multiplier effects (4). Financial restrictions and cuts in R&D expenditure may asphyxiate fragile synergies between private and public sectors, rather than foster competitiveness by pruning less productive elements. This situation is not unique to Spain; other European countries face the challenge of sustaining growth through innovation amid the economic crisis (7).

To be certain, there remains a critical need to build on successes and improve the Spanish public basic-research enterprise as well (4), by reducing bureaucratic red tape needed to obtain and spend R&D funds, providing institutional support for internationalization, and addressing unequal distribution of R&D expenditure among regions (8). Evaluation systems must be improved to link funding to results, given the lack of meritocracy of its human resources system [dominated by cronyism, the lack of performance-based incentives and penalties for tenured staff, and the absence of codes of scientific integrity and policies to handle misconduct (4)]. Such policies could boost R&D quality and mitigate the drain of young talent away from Spain.

Spanish R&D policy should capitalize on the levels of basic research excellence built during the last decade.

As emerging economies increase investment in R&D (9), their scale and speed will be hard for Spain to match. Reversing budget cuts and optimizing how funds are used is critical. Basic research can translate into new technologies, and have greater social and economic long-term impact than market-oriented research (10); excessive emphasis by governments and universities on agenda-driven research can jeopardize those benefits. Spanish policy-makers should capitalize on human and structural resources built during the last decade, as effective innovation only comes when applied research builds on foundations of basic science.

## References and Notes

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