



EDITORIAL / ANALYSIS

# Spanish science funding: Low and inefficient

The team of Editors



In 2010, the *Science magazine* published an article stating, “Times are changing in *España*”, announcing that “there is a feeling of excitement that Spain is on its way to take a place on the world stage of science” [Levine 2010]. This optimistic prediction was based on solid ground: The investment of the Spanish Government in science had grown to reach a historical maximum in 2008, which in 2010 was still maintained, with only a slight decay. Novel, regionally driven and funded initiatives had led to the creation of new research institutes; more Spanish scientists were returning

and foreign scientists were recruited. However, since then the national funds dedicated to R+D have been systematically and dramatically decreased year after year, reaching a 12.8% descent in 2014 as compared to 2008 (see accompanying Graph, [Mingarro 2016]). Sadly, the positive progression predicted by *Science* was stopped in its tracks.

The *golden years* of funding (2008-2011) had really worked: a tendency towards increased scientific production had been created. However, this powerful scientific truck, the one foreseen by *Science* in 2010 [Levine 2010], could not go very far with flat tires. Ironically, it may even have contributed to worsen the present scenario, as the favorable situation during that golden period fostered an increase in the number of researchers in the country, who must now ferociously compete for steeply decreasing funds. Naturally, this grown and well-prepared scientific work force managed to keep a high level of production for some time (Graph, [Mingarro 2016]). But, as we are already seeing, poorly loaded batteries cannot last for long.



R+D investment in Spain against scientific productivity. Graph kindly provided by I. MINGARRO [Mingarro 2016].

Spain's scientific production has shown a decrease in 2015 for the first time in the last ten years (Graph, [Mingarro 2016]). We are fooling ourselves if we think that this fact is accidental. This is a real and dangerous trend, which will move Spanish science away from where it could and should be.

**But, is it all about the amount of funding?** The decrease in national investment is a major factor that is threatening the future of Spanish science, but unfortunately it is not the only one. There are other important aspects that need to be taken into account to evaluate the quality of our funding system. For a competitive funding process to be efficient, three main pillars need to be cared for:

1. The amount of public funding dedicated to R+D.
2. The quality of the evaluation system.
3. The efficiency of grant management by the recipient research groups and institutions.

Ideally, grants should be well funded monetarily, fairly evaluated to international standards, and excellently managed by the institutions. This would warrant that the time invested in the specific research is used optimally to achieve the most important goal: to advance scientific knowledge.

**The organization of the funding system: help or hindrance?** In Spain, there are two major agencies that provide public funding destined to R+D: the *Instituto de Salud Carlos III – ISCIII* and the *Subdirección General de Proyectos de Investigación – SGPI*, both ultimately managed by the *Ministerio de Economía y Competitividad – MINECO*. These two agencies *provide mutually exclusive funding*. In other words, once a research group is bound to a funding agency, it cannot apply to the other one. In recent years, the ISCIII has been more focused towards clinically-oriented research, performed in Hospitals and Research Institutes from the National Health System, whereas the SGPI has remained more prone to fund basic research in Research Institutes, CSIC and Universities. Following the EU model, there are two programs from the SGPI, which are again mutually exclusive: *Retos* and *Excelencia*. In theory, the first one funds research with clear translational goals, whereas the second is meant to fund excellent groups, doing research directed to the advance of knowledge in their research fields. However, this distinction is in practice blurry and confusing to some extent. Most Spanish scientists seem to apply quite arbitrarily to one or the other, yet the evaluation criteria appear to be equal for both.

**Scientists in Spain have a single bullet for funding, but they never know which of the few options is the best target**

When to apply? It depends. The call for proposals is annual (most of the times), but the dates are variable. Thus, scientists in Spain have a single bullet for funding, all available programs being mutually exclusive, but they never know when that bullet will be fired or which one of the few options is the best target. All these facts affect negatively the efficiency of the funding system. In other countries highly active in research, like the United States (US) or France, the calls for proposals are published at the exact same dates every year. In the US, funding agencies often issue more than one call for proposals per year. In Germany, one of the countries leading scientific research in Europe, the call for proposals of the German Research Foundation (DFG) is open all year long. Moreover, in Germany, Denmark and the US, scientists can apply to multiple research funding programs, public and private, which are a priori not mutually exclusive. Thus, fixed dates for application (or open calls) and the

possibility to apply to multiple funding entities point us to a possible and, actually, efficient model to imitate.

**Scientists: a critical factor.** Another important aspect affecting the efficiency of the Spanish funding system relates to the status and duties of the Spanish research personnel. In the *Science* article (2010) mentioned above [Levine 2010], Miguel Beato stated: “the civil servant mentality was -and still is- the main obstacle to Spanish Science”. The same article points out that, “In public Universities, the institutional focus is on teaching as opposed to original research”.

The teaching load of active researchers is very high when compared to other countries, like the US, where there is a clear research career path. This path in Spain

**The research career path in Spain is, to say the least, fuzzy**

is, to say the least, fuzzy. We do have competitive programs to incorporate excellent research scientists, such as the “*Ramón y Cajal*”, but these programs yield a very low number of positions. Success rates are below 10%, leading to saturation and frustration. In most cases, young (and not so young) scientists struggle for a long while until they get a proper place to perform research. Public Universities interpret these positions as the future teaching force, so researchers must soon accept large teaching loads in order to ensure their continuity in the system. This fact affects significantly not only the growth of emergent research, but also the efficacy of the funding in principle directed to facilitate the creation and consolidation of independent groups.

In addition, there is another load that Spanish scientists inevitably face: project management. The proportion of time that researchers need to invest in all kinds of paperwork, to justify expenses, financial project reports, internal reports... is a real menace. Specially when combined with a high teaching load, it diminishes to a dangerous level the time and effort actually dedicated to what researchers are trained for and to the goals of their funded projects, i.e., to produce high quality science. Countries like Switzerland, for example, have learned that it is actually more efficient to combine control with trust, reducing paperwork to bearable amounts both at the application and reporting stages. Other countries have successfully implemented increased grant indirect costs to fund teaching positions that can free the PI from heavy teaching loads.

With the caveats mentioned, it is obvious that Spanish researchers are under strong time constraints in order to fulfill their grant goals. Until very recently, however, the duration of grants was usually of 3 years (but see below), which in many cases is much too short, especially if the project has translational perspectives. The short duration of grants is aggravated by the fact that all funding programs potentiate reorientation of the project for each new application. In other words, continuation of a previous project is judged as negative and scientists are pushed to propose new lines of research if they want to be funded again. This important aspect, which influences the efficacy of the science funding system, is again handled differently in other countries like the US, where the grants are effectively *renewed*. Successful research lines should be periodically evaluated, but their progress should not suddenly cease due to mere bureaucratic reasons.

**Success rate: Does it reflect reality?** Currently, around 30-40% of projects are funded in national project calls, which some may argue is not a despicable number when compared to other countries.

However, these figures may give a deceitful view of reality since retry after failure in one application (one year later) is highly discouraged and the population of researchers without access to funding, who effectively become disconnected from the system, is large. On the other hand, low success rates are not necessarily associated to higher scientific production, as proven by many studies in the US [Wahls 2016]. Moreover, the amounts granted in Spain to individual projects are small, and in most cases do not include salaries for students or post-doctoral researchers, who need to find their own funding from other (almost inexistent) programs.

There is no obvious solution to this, especially with low funding budgets. Grants must be higher to warrant that the researchers get the equipment and personnel needed to achieve the project goals. However, with the

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actual investment in public funding, this measure would inevitably result in a lower success rate, which in turn would lead to a decrease in the quality and quantity of the total scientific production. Furthermore, it is common practice in the national funding system to significantly cut the budget requested by those projects that are finally granted owing simply to budgetary reasons (in order to fund as many projects as possible), and still require that the objectives of the original proposal are achieved. A right balance between the amount of grants and the quantity granted to individual projects is crucial and may be among the reasons behind the decrease in scientific production observed for Spain in 2015 (Graph, [Mingarro 2016]).

**A robust reviewing system to build on.** A clear strength of the Spanish funding system is its fairly robust grant reviewing process, which is supported by a well-established, wide network of experts and dedicated panels. Good reviews are essential, *not only* as a mechanism of selection. They can help the applicant scientists to improve and better orient their projects, identifying weak points and consolidating strong ones. However, in Spanish calls the extensive reviews provided by experts are not forwarded to the applicants, which is difficult to understand, contributing to discouragement and distrust in the system. Access to reviewing reports by the applicants is very useful for both, successful and unsuccessful projects. For the latter, it can help to limit frustration and find and appropriate tune for the project in the next call, thus increasing the retry rate. Moreover, reviewing feedback from national grant applications will increase the chances of success in the extremely competitive -but much better funded- international calls, which is highly desirable.

In summary, the current Spanish funding system for scientific research presents serious problems that need to be solved. Some aspects should be relatively easy to correct, and therefore should be rapidly addressed, such as establishing fixed dates for the national grant calls, facilitating renewal for well justified cases, providing extensive reviewing reports to grant applicants, or increasing the duration of projects to 4-5 years. Proving that such implementations can be fast, the last national call of *Retos* and *Excelencia* (2016) allows for the first time 4-year duration grant applications. Additionally, some of the goals of the recently established *Agencia Estatal de Investigación* are pointing in the right direction, for instance enabling carry over budget. Other measures, although difficult to implement, must at least be debated to find an acceptable solution. Some involve the establishment of a true scientific career, which in Universities may be associated to teaching, but not the other way around.

Others involve the generation of structures that help researchers to face the huge administrative load or, even better, reducing such load by modernizing many existing procedures and introducing a certain level of trust in them. Finally, and overall, the national investment in science must be substantially increased. Only six years ago we were on the path towards being an international scientific leader. Today, we struggle to make ends meet. We must use our potential to retake a position from which we can plan, innovate and progress.

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