Smart Decentralization of Innovation Policies

This policy brief discusses the decentralization of innovation policies and reviews some national–regional coordination tools that may be used to improve their efficiency. The brief focuses not on whether to decentralize, but rather on how to do it right through “smart decentralization.” This involves searching for the right division of labor while avoiding wasteful duplications and ensuring that devolution of competencies is accompanied by capacity building in regional governments.

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Introduction
Influenced by theories of fiscal decentralization, regional innovation systems, and industrial clusters, regions1 in most countries around the world are becoming increasingly capable of designing and implementing innovation policies. Top-down devolution has been accompanied by bottom-up demands and regional mobilization (Perry and May 2007). As a result, innovation policies are increasingly recognized as a shared responsibility of national and regional governments, albeit with significant differences across countries.

Traditionally, regions have been involved in innovation policies only in some federal countries, such as Germany, Switzerland, and the United States. But regions in more centralized countries, such as France, Sweden, Poland, Japan, and South Korea, among others, have progressively gained new competencies in this area. Notably, in Europe, the “smart specialization” framework launched in the early 2010s represents a new push toward decentralizing innovation policies, since it encourages European regions to formulate regional innovation strategies to access structural funds (European Commission 2012; Ritzen and Soete 2011). Smart specialization strategies are becoming the cornerstone of industrial and innovation policies in Europe and beyond to support the emergence and consolidation of competitive clusters by better identifying and exploiting regional technological strengths.
While the decentralization of innovation policies is positive in many respects, national governments continue to play a key role in developing their countries’ science, technology, and innovation systems. Concluding that the regional level is replacing the national level would be misleading; the two tiers should be conceived, rather, as interdependent and complementary. Furthermore, competencies in science and technology policy have also increased at the multilateral level of governance, particularly in the European Union, leading to complex multilevel governance systems that require efficient coordination mechanisms (Kuhlmann 2001).

Under these circumstances, how should national governments deal with the decentralization of science and innovation policies? What is the appropriate division of labor and competencies between the different levels of government? What kind of national–regional governance systems are more efficient? What lessons can be drawn from international experiences?

**Challenges in the analysis of decentralization**

Fiscal decentralization theory deals with the proper location of various taxes, spending programs, grants, and regulations, by level of government. Searching for the appropriate degree of decentralization involves balancing two competing forces: the welfare gain from taste differences, which argues for decentralization, and the welfare gain from economies of scale and burden sharing, which argues for large jurisdictions (Oates 1997). On the positive side, decentralization is assumed to lead to welfare gains from taste differences, because smaller jurisdictions are better able to match spending allocations to the preferences of their constituents. Thus, welfare would be maximized if public services were supplied by the jurisdiction covering the smallest area over which benefits are distributed (under the assumption that public officers respond to the desires of their constituents). Furthermore, fiscal decentralization may improve governance by strengthening social capital, encouraging political participation, enhancing accountability, and creating healthy competition among centers of authority (Bardhan 2002; Mello 2000).

On the negative side, decentralization may lead to wasteful duplications across regions, fragmentation, and lack of critical mass to undertake large investments. Indeed, economies of scale sometimes make the national level more cost efficient. Decentralization is also likely to lead to more inequality across regions, and it may generate governance problems if the responsibility for policy outcomes becomes more dispersed, governments become less accountable, and gaps in the allocation of responsibilities result in policy areas neglected. Clearly defining the responsibilities of different levels of government is important to ensure that national–regional transfers are determined based on objective and open criteria and are not subject to hidden political negotiation.

**Vertical imbalances and spillovers**

Because the national government needs to collect a sufficient proportion of taxes to be able to fulfill its redistribution and macroeconomic stabilization responsibilities, the optimal expenditure–decentralization ratio tends to be higher than the optimal tax–decentralization ratio (Prud'homme 1995). This often results in a negative vertical imbalance, whereby regional
governments collect insufficient taxes to finance their expenditures, justifying the need for steady central transfers to enable them to fulfill their competencies. In other instances, when regions collect large proportions of taxes, a positive vertical imbalance leads to regional–central transfers—and, often, to complaints that the regions don’t get equal value in services back from the central government.

Even in the absence of vertical imbalances, a transfer system is necessary to account for the positive spillovers of regional investments on other regions (Gramlich 1993). The underlying idea is that outsiders who benefit from regional public spending should pay some of the cost. If regional governments only consider the beneficial effects of a public investment on their own territories, then some objectives seen as vital by the national government may end up being underserved. To address this challenge, the national government can provide matching grants to regions to help fund public goods with positive spillovers.

**Different modes of decentralization**

The appropriate division of competencies between central and regional governments can be based on different considerations regarding benefit spillovers, economies of scale, economies of scope (grouping of related public services to improve efficiency), proximity to beneficiaries, and consumer preferences. Beyond the large differences across countries, even within a single country decentralization is sometimes asymmetric, reflecting regional differences in size, industrial structure, fiscal capacity, and regional desires or aspirations.

Note also that certain policy instruments can be co-financed and jointly managed by regional and central governments. Often, the central government exercises a policy design role, and the lower levels of government are responsible for service delivery. Thus, budget allocation (fiscal decentralization) does not necessarily coincide with decision-making power (political decentralization) because budgets may be decentralized while decisions remain at the central level. In other words, the role of regions may be a passive one, limited to the implementation of nationally defined policy initiatives, or an active one, with the regions acting as partners in national policy processes and co-financiers of policy initiatives, or even as independent policymakers who devote their own resources to projects they select.

**Lack of conclusive empirical evidence**

The analysis of decentralization calls for extreme caution, given the lack of clear empirical evidence as to its benefits and drawbacks. Empirical studies to assess the effect of decentralization on outcomes like economic growth, innovation, or governance and corruption show very mixed results (Garman et al. 2001; Martinez-Vazquez 2003; Rodríguez-Pose and Ezcurra 2011; Taylor 2007). One of the biggest challenges to empirical analysis of decentralization is the lack of comprehensive and comparable statistical data. Moreover, available indicators—such as share of regional expenditure in national budget—obscure different ways of administering national–regional transfers because, as discussed above, decentralization of budgets and implementation does not necessarily coincide with a delegation of decision-making powers.
Decentralization of innovation policies: benefits and risks

The classic rationale for innovation policies is based on the presence of market failures related to the nature of knowledge as a quasi-public good, to the risk and uncertainty of research and development (R&D) investments, and to the presence of indivisibilities and externalities (Nelson 1959). A national government may be better positioned to address some of these problems because it benefits from economies of scale and from the potential to diversify its portfolio of R&D projects. It is also better positioned to enact legislation for the protection of intellectual property rights. Regional governments, on the other hand, may be better able to tackle information asymmetries, under the assumption that they hold better information about local technological strengths and needs than national governments.

Beyond market failures, according to a systems-of-innovation approach, public intervention is further justified by systemic failures, such as inefficient flow of information, insufficient collaboration among firms, lack of university-industry collaboration, and so forth (Chaminade and Edquist 2008). According to theories of regional innovation systems and industrial clusters, a regional government may be better suited than a national one to tackle systemic failures as an animator of a public-private process of interactive and mainly incremental learning, with a focus on bringing scientific knowledge closer to local industrial needs (Cooke 2001; Koschatzky and Kroll 2009). Furthermore, the notion of smart specialization supports a process of bottom-up discovery of national technological strengths and priorities by bringing together regional strategies (European Commission 2012). As a result of these developments, awareness of the importance of regions in the design and implementation of innovation policy is growing.

If properly managed, decentralization of innovation policy can stimulate healthy competition among regions which in turn can improve aggregate innovation performance. It can also, however, lead to unhealthy competition among regions characterized by a wasteful duplication of public investments in R&D, implemented separately and without coordination. If all regions fight to reach the frontier of science and innovation, the majority will miss the goal due to the absence of economies of scale and the need for critical mass (Ritzen and Soete 2011). The flurry of regions trying to achieve research excellence may lead to an inefficient allocation of public investment as well, with the creation and subsequent decline of overambitious research infrastructure in locations with weak endowments (leading to “cathedrals in the desert”). Risks of this kind associated with decentralization are higher in smaller and less developed countries, while in large and high-income countries like the United States, R&D efforts can more realistically be expected to reach critical mass in many different regions simultaneously (Lacroix and Martin 1988).

Moreover, despite the advantages of a bottom-up strategic priority-setting process, the central government still needs to coordinate an R&D agenda to provide public goods at the national level. As argued earlier, investments whose benefits expand beyond the regional constituencies will tend to be underprovided for if the central government does not intervene. For example, a public research center in a region may collaborate with firms from other regions in the country. Similarly, a university in a region may accept students from any region on an equal basis and its
graduates may move on to work in different regions. Such investments call for national–regional co-financing through matching grants. In theory, the proportion of financing from the central government should be determined by the expected spillovers in other regions of such regional investment, but in practice this calculation is plagued with uncertainties.

Under a decentralized scenario, the central government should also be attentive to possible gaps in combined regional strategies that may result in policy areas neglected at any level of government. For example, if no region plans to specialize in medical technology, the central government might consider necessary the creation of at least one public research center in this sector and launch a national competition to fund it.

Towards a smart decentralization of innovation policies

Smart decentralization is used here to refer to the optimal national–regional division of competencies in innovation policies, as well as to the use of efficient, flexible, and transparent multilevel governance systems.

A first requirement for smart decentralization is to recognize that the right degree of decentralization is different for different innovation-related policy instruments, as well as for different regions within a country, and may even change with time. In other words, decentralization should be conceived of as a flexible and asymmetric process across policy instruments and regions. In addition, given the complexities of multilevel governance of innovation policies, transparent and efficient monitoring and evaluation systems are critically important. Building on theory and international experiences, this section elaborates further on these general elements of smart decentralization.

It should be stressed again, however, that decentralization is very context specific and, unfortunately, there is no such thing as clear-cut rules to be followed across the board. The extent and scope of decentralization vary greatly from nation to nation depending on their particular institutional frameworks and historical trajectories, so identifying common trends or good practices is hard. For example, a study by the Organization for Economic Co-operation and Development (OECD) found that the subnational share of public expenditure in R&D in 2009 varied greatly, from around 5 percent in Austria or Denmark to around 20 percent in Spain or South Korea, 50 percent in Germany or China, and almost 80 percent in Belgium (OECD 2011).

Asymmetric decentralization across regions

Even within a single country, regions vary in size, economic strengths, institutional settings, and governance abilities. In particular, innovative efforts within a country tend to be concentrated in a few regions. This concentration is hard to overcome due to the cumulative nature of technological capabilities, economies of scale, and indivisibilities, and central governments allocating innovation funding face the difficult challenge of managing a tradeoff between regional convergence and national excellence (Crespy et al. 2007).
Regions within a single country may follow very different technological trajectories and have different technological needs. Even those with similar levels of technological development may adopt completely different innovation strategies as a result of their industrial characteristics or historical path dependencies (Sanz-Menendez and Cruz-Castro 2005). Moreover, depending on their circumstances, some regions may be more likely to develop an interest in science policy than others. These regional variations call for flexible strategies of national–regional interaction, avoiding a one-size-fits-all approach.

In addition, different regions have different administrative capacities to implement innovation policies. Unlike policies associated with some other kinds of public services, innovation policies require a high degree of technical and managerial expertise. Even if regions have sufficient budgets and competencies, some may lack public sector employees with the required skills and experience, a problem that is especially acute in developing countries (Hankla 2009). Conversely, central governments may be more likely to operate closer to the knowledge frontier, given their size, international linkages, and capacity to attract qualified workers. But returns to scale may also decrease, and, especially in large countries, the center may get overwhelmed. The key, then, is to match competencies with administrative capacities.

**Asymmetric decentralization across policy instruments**

The level of decentralization depends on the type of policy instrument. For example, the national level may be more appropriate for increasing the quality and productivity of scientific research, although this does not exclude the participation of some regions in this area. By the same token, the regional level may be more appropriate for creating policies to foster technology transfer, knowledge diffusion, public–private partnerships, networking, support to startups, and other soft support measures and training activities to promote innovation in firms, but most national governments are also engaged to some extent in devising these kinds of policy instruments.

Based on a review of the literature, Table 1 provides a tentative classification which may be useful as a framework to evaluate a country’s multilevel division of competencies in innovation policy. Note, however, that in light of the large differences across countries, this classification does not intend to be prescriptive or indicative of the most efficient approach.

**Table 1: National vs. Regional Competencies in Innovation Policy**

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<th>More often national</th>
<th>More often regional</th>
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<td><strong>Modes of innovation</strong></td>
<td>Basic research, generation of new knowledge</td>
<td>Applied research, knowledge adoption and diffusion, technology transfer</td>
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<tr>
<td><strong>Target groups</strong></td>
<td>Public research labs, universities, large firms</td>
<td>Universities, small- and medium-sized enterprises (SMEs), startups, spinoffs</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td>Public universities, public R&amp;D labs</td>
<td>Business incubators, science and technology parks, technology transfer offices</td>
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In any case, drawing clear lines of separation between national and regional competencies in innovation policy would be counterproductive. Indeed, certain policy instruments may be best executed if shared among different levels of government—a more cooperative approach that may benefit from the complementary strengths on a single public policy issue.

A survey of OECD countries reveals the lack of a clear division of competencies between national and regional innovation policies and a large overlap in the kind of instruments used (OECD 2011). Overlapping national–regional policy instruments creates synergies if both levels complement one another. This complementariness can arise in the way the instruments are structured, in terms of their target actors or across their range of service needs. Overlapping instruments lead to negative results, however, if they create redundancies by failing to distinguish among target groups or topics.

Moreover, the proliferation of public support programs at different levels may lead to higher transaction costs, bureaucracy greater bureaucratic burden, and confusion for target firms. To reduce the risks of overlap, national and regional governments should develop mutually acceptable eligibility criteria for R&D funding, clear mechanisms to co-finance policy instruments, and clear systems for continuous information sharing.

**National–regional coordination**

A typical approach to fostering national–regional coordination in innovation policies is to set up institutional bodies to ensure regular dialogue, consultations, and information sharing. These vary from country to country and may take the form of policy councils with high-level representatives from the national and regional governments, regional development agencies, or territorial representatives of relevant ministries. National–regional coordination in innovation policies should be fostered at all stages of the policy cycle, from the agenda-setting process (through consultations and dialogue), to policy design, implementation (for example, using national–regional contracts), and monitoring and evaluation. According to the OECD (2011), most countries use four or more national–regional governance tools for innovation policy, some of which are discussed in detail in the rest of this section.

**National–regional contracts**

Many countries rely on contracts or bilateral agreements between central and regional governments concerning their mutual commitments, the assignment of decision-making powers,
the distribution of financial contributions, and the mechanisms to monitor and enforce the contracts (OECD 2010). Contracts are a necessary tool for the co-financing and joint programming of innovation policy instruments, and, if properly designed, they may commit levels of government beyond political mandates, contributing to the continuity and stability of innovation policy strategies regardless of the political cycle.

Contracts to channel national financing to regions may take many forms. Sometimes they are used for financing specific large-scale R&D infrastructure or institutes whose benefits spill over regional borders. In other instances, they are used to finance broader innovation policy strategies when regions lack finances to do so. Central governments also often co-finance a limited number of investments shared across national–regional levels of government, which are then executed through a contract.

For example, in Spain since 2009, the central government has relied on contracts (“convenios”) to improve national–regional coordination in support of R&D and innovation in areas of common interest (Heijs 2013). Through them, the Spanish government provides preferential loans at low interest rates for regional investments in science and innovation to be executed up to 2015, with the loans to be returned in ten years. About ten such regional contracts were signed from 2009 to 2011, representing a total funding of around 800 million euros (the remaining seven regions did not engage, either because they were not interested or because they had already reached the maximum debt levels under the commitments made by regions toward the country’s fiscal stabilization program). Within the contract, each region commits to its own quantitative objectives for meeting the national plan’s 2015 targets. Progress is monitored by a Joint Monitoring Commission with representatives from both levels. These bilateral contracts are flexible, allowing for an asymmetric decentralization across regions. To improve coordination across the regional innovation strategies, however, a national program selects a limited set of so-called “singular technical-scientific installations” in the regions that are co-financed with national funds. These comprise large investments to build unique public research labs and equip them in specific technological areas to engage in frontier scientific research. In 2007, the regional and national governments agreed to create 24 new “singular technical-scientific installations” during the period 2007–15, to be added to the 37 existing ones. A major advantage of the selection process is that it fosters information sharing to avoid overlaps.
In France, relationships between the regional authorities and the central government are organized by seven-year contracts called State–Region Project Contracts (“Contrat de Projet État–région”). These broad contracts cover all policy areas and set out the financial transfers provided by the central government to meet regional policy objectives. The contracts have a chapter dedicated to research and innovation, including the continued deployment of research capacities in regions with strong university potential and the preservation of the influence and international competitiveness of large scientific centers. These contracts also regulate the development of the Poles of Competitiveness program (“Pôles de Compétitivité”) to support research-intensive clusters throughout the country. Within this program, clusters are deemed of international significance (and hence a priority for the national government) or of national significance (a priority for the region). In general, although French regions previously had very few competencies relating to R&D and innovation, since the mid-2000s they have become increasingly involved in this policy area (Crespy et al. 2007).

**Performance-based funding systems and excellence programs**

Many countries rely on performance-based research funding systems for universities and public research institutes, in which incentives are introduced to reward excellence (Hicks 2012). Though not explicitly designed for the purpose, they have a strong influence on the regional distribution of national investments in R&D. The equalitarian system of national–regional transfers providing baseline funding to universities and public labs is complemented, under these programs, with enhanced funding to introduce incentives and reward research excellence. While the policy framework is centrally defined, regions must respond with proposals and initiatives to receive funding, meaning that the design of specific policies is left to independent decision-making at the regional level.

In Germany, for example, the Excellence Initiative was launched in 2005, comprising three funding lines: (1) graduate schools to promote early-career researchers, (2) clusters of excellence to promote top-level research, and (3) institutional strategies to promote top-level university research. Following the second call for proposals, in 2012 a total of $3.5 billion for a five-year period was awarded to 45 graduate schools, 43 clusters of excellence, and 11 institutional strategies.

In South Korea, the Brain Korea 21 program was launched in 1999 to build world-class research universities and promote regional university–industry collaboration. From 1999 to 2005, around $1.4 billion was granted as special research funding to 67 selected universities with PhD programs, mainly in the area of science and engineering (Shin 2009). Since 2005 other, similar programs at the national level have provided competitive funding to universities with a focus on promoting university–industry collaboration. In 2009, the national government introduced a new program to nurture talented people needed for regional industry in each large economic region which allocated around $86 million to 20 universities (Ko 2012).
Monitoring, evaluation, and learning

To foster mutual learning and information sharing in the area of innovation policy, national and regional governments should be committed to rigorous monitoring and evaluation. Designers of monitoring and evaluation systems need to formulate precise objectives, identify relevant indicators, set realistic targets, and, if needed, devise appropriate incentive mechanisms. The system must also be sufficiently flexible to allow for the redesign of programs during their life cycles based on interim assessments and user feedback. Indeed, evaluations are a critical element of policy experimentation, as they identify successful programs with a view toward transferring them to other sectors of activity or regions (European Commission 2006).

Indicator systems should help inform both short-term decisions and long-term strategies. Although measuring the long-term outcomes of innovation policy programs is a challenging task, given the intangibility and delayed nature of many of their returns, indicator systems should ultimately be oriented toward these outcomes. They also need to produce information on inputs, processes, and outputs relevant for ongoing monitoring activities (OECD 2009).

National governments play an important role in fostering information sharing and collaboration among regions. They can also build on the information compiled about the regional policy instruments in use to create information platforms or “one-stop shops” for grant applicants. These may include, for example, government websites that list all national and regional R&D grants, all regional initiatives to develop clusters and science parks, or all incentives to attract foreign talent, among other possibilities.

The central government should also aim to streamline and simplify the application process for grants, with the objective of reducing transaction costs for firms and researchers. For example, regional–national coordination should seek to harmonize the templates to be filled up by firms or research institutes requesting R&D incentives at different levels. Moreover, the national government should contribute to efforts to accompany the devolution of competencies with capacity development in the regions, for example by providing specific training and advice or by matching regions to share best practices.

Conclusions

The benefits of the decentralization of innovation policies stem from the potential of regional governments to better identify local technological strengths and opportunities, respond to the desires and aspirations of their constituents, and mobilize intra-firm networking and public–private partnerships, and so improve their ability to overcome systemic inefficiencies and information asymmetries. The process carries serious risks from a national perspective, however, since decentralization may lead to duplications, lack of critical mass, and fragmentation of limited resources, as well as other kinds of inefficiencies and governance problems.

Thus, a critical role of central governments in an increasingly decentralized scenario is to ensure coherence of regional innovation strategies by searching for economies of scale while reducing fragmentation and regional tendencies to set overambitious and unfocused goals.
National governments should also act as information brokers, helping regions share good practices and reducing transaction costs for firms and researchers that apply for public funding at different levels.

Through their financing role, central governments influence the regional allocation of public funds to promote innovation. In doing this they face the challenge of balancing the tension between promoting scientific excellence through regional competition and concentration of resources, on the one hand, and contributing to some extent to convergence and equality among regions, on the other.

Smart decentralization requires building flexible, multilevel governance systems that allow for an asymmetric decentralization across regions and policy instruments, and policymakers are well advised to experiment with new tools to improve national–regional coordination in innovation policy. As discussed above, some of the main coordination tools at hand include the following:

- The creation of new institutions for national–regional dialogue and agenda setting in the field of innovation policy, such as policy councils with high-level representatives from national and regional governments, adapted to the specificities of each country and building on existing institutional frameworks.
- The use of national–regional contracts that determine clearly the mutual commitments, the assignment of decision-making powers, the distribution of financial contributions, and the mechanisms to monitor and enforce the contracts. Despite the need for clear commitments, contracts should also be flexible enough to accommodate changes in the environment and allow for experience-based learning.
- The use of performance-based funding systems and excellence programs to concentrate national resources based on scientific excellence, while at the same time allowing regions to design their own innovation strategies when applying for national funding.
- The implementation of sound monitoring and evaluation systems of regional innovation policies to foster information sharing and mutual learning and to inform future decisions on policy design and resource allocations.

In any case, decentralization of innovation policies should be conducted sequentially and with the greatest caution, avoiding duplications and introducing methods to ensure that devolution of competencies is accompanied by capacity building in regional governments. Experience shows that the risks associated with national–regional political tensions should not be underestimated (Perry and May 2007), and open and transparent national–regional consultation and consensus-building processes are critically important.

In the future, greater efforts are needed at the international level to identify and share good practices in organizing the decentralization of innovation policies, with countries’ specific circumstances and institutional profiles always taken into careful consideration.
Endnotes
1. In this policy brief, the term “regions” is used to refer to all subnational administrative levels, including localities.
2. This is also an important argument in support of a more multilateral approach to the allocation of public R&D resources, especially for those technologies that address such global social challenges as malnutrition or climate change.
3. For example, both in France and Spain three regions (out of twenty-five and seventeen regions in the countries, respectively) account for around 60 percent of total R&D expenditure.

Useful links
European Commission, Smart Specialization Platform http://s3platform.jrc.ec.europa.eu.

References


