European Research Area

EUROPEAN POLICY BRIEF

SPINTAN – Policy Brief No. 5

The research output of universities and its determinants: quality, intangible investments, specialisation and inefficiencies[1]

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SUMMARY

Objectives of the research

Increasing research output is a fundamental challenge for the well-being of European citizens. This study analyses the research productivity in Higher Education Institutes (HEIs) in the European Union (EU) and its sources: differences in efficiency within each field of science; field specialisation across countries; output quality; and resources per researcher.

Scientific approach / methodology

This study develops a DEA non-parametric 5-step methodology that explicitly considers the quality of scientific output and the fields of science EU universities are specialized in to explain and decompose the differences in output per university teacher.

New knowledge and/or European added value

The methodology produces estimates of relative levels of inefficiencies and their contribution to HEIs research productivity for all EU countries. It takes into account the fields of science they are specialized in and not only the quantity of research but also output quality.

Key messages for policy-makers, businesses, trade unions and civil society actors

There are substantial differences in countries' levels of efficiency in using inputs for research activities.

Research output is conditioned by the amount of resources allocated.

[1] This Policy Brief is based on the SPINTAN Working Paper No. 5: Pastor, J.M. and L. Serrano (2016): 'The research output of universities and its determinants: quality, intangible investments, specialisation and inefficiencies', available on the SPINTAN website http://www.spintan.net/c/working-papers/.

However, with the same resources used, output could increase by around 18% in the EU if all the inefficiencies were removed.

Increasing efficiency, especially in those countries that are further away from best practices, is a challenge that must be taken up if higher levels of well-being are to be achieved in Europe.

Objectives of the research

It is widely accepted that a country's capacity to generate wealth and achieve high standards of well-being is closely linked to its capacity to generate knowledge. In the EU the generation and transmission of knowledge mainly lie with higher education institutions (HEIs).

This study has analysed the research output of the EU HEIs with a methodology which allows to break down the differences in scientific output per researcher among the HEIs of each country in terms of a) differences in efficiency within each field of science and technology (FOS), b) differences in FOS specialisation of the HEIs in each country, c) differences in quality and d) differences in allocation of resources per researcher.

Scientific approach / methodology

In order to analyse what determines the differences in scientific output per researcher in the HEIs of EU countries we develop a methodology that specifically considers the quality of scientific output from universities and their different specialisation according to the FOS.

This is a 5-step frontier approach based on a DEA non-parametric methodology. As a result it is possible to break down the differences in scientific output per researcher among the HEIs of each country in terms of: a) differences in efficiency within each field, b) differences in FOS specialisation of the HEIs in each country, c) differences in quality and d) differences in allocation of resources per researcher.

New knowledge and European added value

This analysis allows obtaining estimates of the comparative levels of productivity in scientific research across European university systems taking into account both quantity and quality of output, the fields of science they are specialized in, resources per capita and inefficiencies.

On average, given the actual use of inputs and taking into account quality, the research output of the HEI in the EU could increase by around 18% if all the inefficiencies were removed. However, in some countries research output could be doubled or more.

Most of the inefficiency comes from inefficiencies within each specific field of science (87.6% of total inefficiency). The inefficiency associated with the field of science composition is much less significant (12.3% of total inefficiency).

Room for improvement varies greatly across countries. Our results uncover large differences among countries in this subject. Inefficiency is a particular problem in some countries, but much lower in countries like the United Kingdom, Sweden, Netherlands or Germany, where research is carried out more efficiently.

Relative inefficiency has a direct impact on the differences in research productivity among countries. One sixth of the heterogeneity in research output per capita would be due to the specialisation and the intra-field inefficiencies. Removing all inefficiencies, both intra-field inefficiencies and those due to the particular specialisation, would lower the deviation coefficient of output per capita from around 0.47 to around 0.39.

The amount of resources is also important. The results confirm that in the case of the EU countries research output per capita tends to increase with the volume of resources per researcher. A large part of the differences in research output per capita across EU countries is associated with differences in this area and would persist even if all the countries were capable of completely removing their inefficiency.

Key messages for policy-makers, businesses, trade unions and civil society actors

Increasing the research output of the EU HEIs is fundamental to attaining smart development in Europe, which can provide its citizens with higher levels of well-being.

The possibilities for improvement are conditioned by the economic resources devoted to this activity. The amount of resources is important and explains most of the differences across countries.

However, there is considerable room for improvement in the efficiency with which these resources are used. EU countries should take advantage of this to increase their research output, especially in those countries that are further away from best practices.

Fostering this improvement in efficiency is especially important now given today's complicated economic and budgetary contexts.

SPINTAN – Smart public intangibles

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