SCIENCE FOR POLICY BRIEFS

Brains and gains: innovation and income distribution in Europe*

Headlines

- The JRC conducted a systematic empirical analysis that sheds light on the **innovation–inequality nexus** in the European Union over the period 2004-2014.
- **Innovation** is associated with **lower levels** of **overall income inequality**.
- At the same time, **innovation disproportionately benefits** those with **high incomes.**

Policy context

Building a more inclusive and fair European Union is a key priority for the European Commission (COM(2017) 250). In 2017 the new European Pillar of Social Rights enshrined a commitment to fairness and social convergence in European policy.

Technological innovation could potentially contribute to the fairer distribution of income and growth across society. However, we know that the productive forces of innovation are not equally advantageous to everyone: indeed, they may seem to benefit only a limited portion of society. The actual relationship between technological change and the distribution of income in Europe has to date not been well studied.

## Hotspots of innovation and inequality in Europe

Levels of innovation can be measured by hotspots of patenting activity. Figure 1A plots the **number of patents per million inhabitants** in Europe from 2004 to 2014, showing that innovation activities were mostly located in **Northern Italy**, **Austria**, the **BENELUX** countries, **Western Germany, Scandinavia** and the **London** metropolitan area.

Figure 1. Patents and inequality in the EU (2004-2014)

A: Patents (per million inhabitants), average value over the period 2004-2014
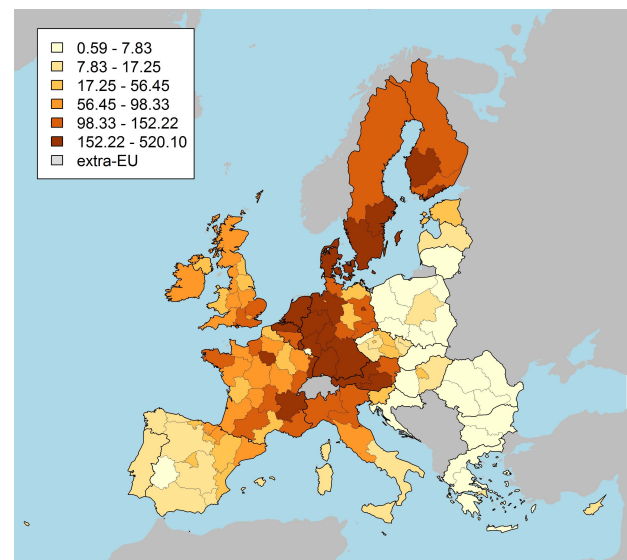
B: Gini index, average value over the period 2004-2014
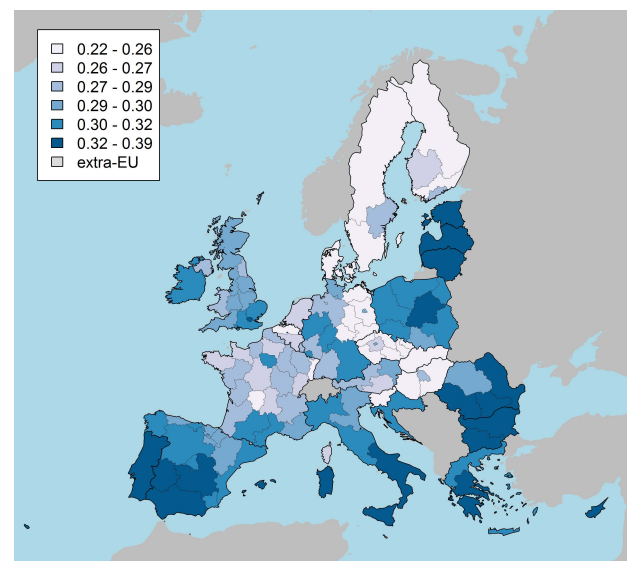
*This brief is based on the JRC Technical Report, *Innovation and inequality in the EU: for better or for worse?,* Claudia De Palo, Stylianos Karagiannis, and Roman Raab, (2018): http://publications.jrc.ec.europa.eu/repository/handle/JRC112623.
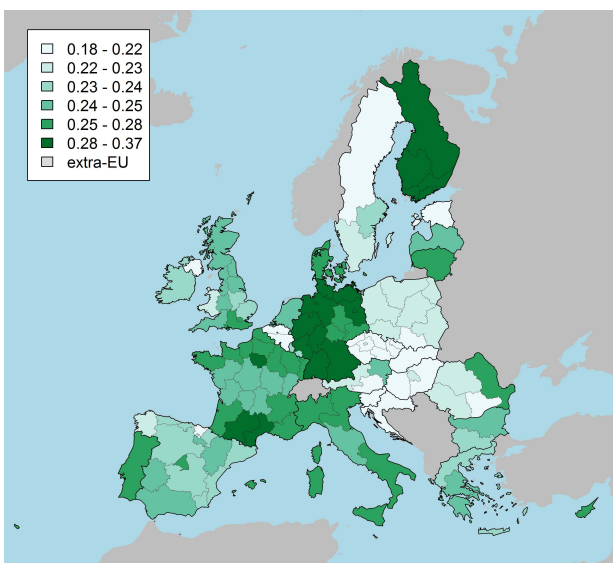This brief can be downloaded from https://ec.europa.eu/jrc/en/research/crosscutting-activities/fairness

Joint Research Centre

C: Top 10% income share, average value over the period 2004-2014

Source: Authors' calculations based on EU-SILC, BHPS & GSOEP.

In the same period, **high levels of inequality**, as measured by the Gini index (see the Quick Guide), are observed mainly in **Eastern** and **South-Eastern Europe** and the **Mediterranean** countries (Figure 1B).

Conversely, **high levels of top 10% income shares** (the share of overall income held by the top 10% of earners) in the same period occur mainly in **North-Western Europe** (Figure 1C).

In general, the range of inequality and the dispersion of patenting activity across regions in Europe are large.

The dual effects of innovation on income distribution

As a first indication of the link between innovation and inequality, Figure 2 plots the innovation variable against the two inequality measures. These scatter plots show two different associations: first, a **negative link** between **innovation** and the **Gini coefficient** (Figure 2A); second, a **positive relationship** between
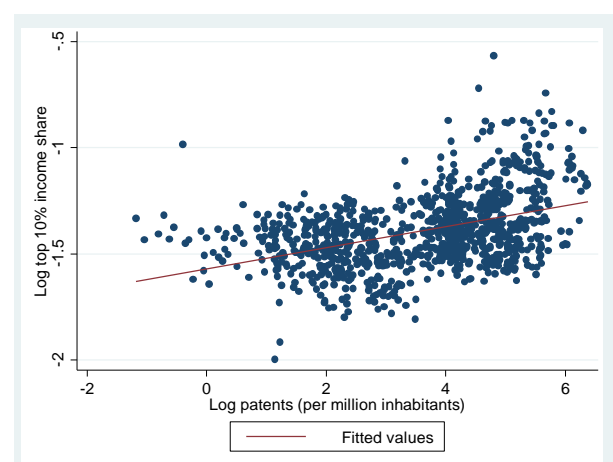
innovation and the **top 10% income share** (Figure 2B).

Figure 2. Dual effects of patenting on inequality in EU (2004-2014)

A: Patents and Gini coefficient
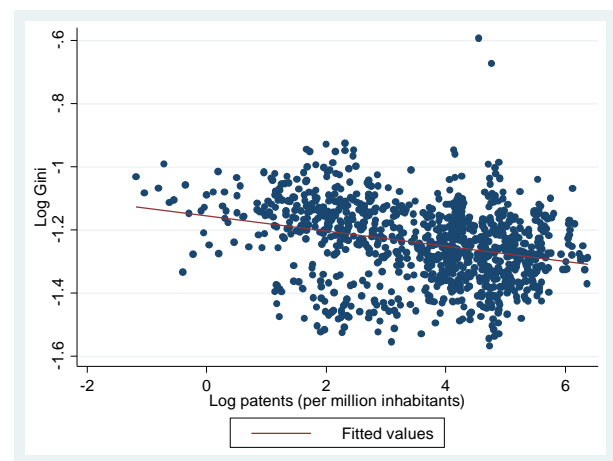
B: Patents and top 10% income share

Note: Each point refers to a spatial entity in a given year during the period 2004-2014 (see Quick Guide).
Source: JRC calculations based on EU-SILC, BHPS & GSOEP.

These bivariate correlations suggest two preliminary findings: **innovation decreases overall income inequality** while it **increases the income accruing to the richest 10%** of the population.

Multivariate analysis has been carried out in order to assess the robustness of the associations displayed in Figure 2A and Figure 2B. More specifically, levels of income inequality were related to a set of variables representing the environment in which inequality forms.

Further analysis confirms that **innovation** has a **dual effect** on income inequality. **Innovation** strongly **benefits top earners**, pushing up their share of overall income. At the same time, it generates widely shared benefits for society and makes **the overall income distribution more equitable**.

Innovation has been accorded a central role in explanations of wage inequality (Scizerro and Tisdel, 2003). Although the literature is rather scarce and inconclusive, there have been some attempts to explain the mechanism governing the relationship between innovation and inequality.

First**, innovation may raise overall productivity** and, in turn, benefit workers in the form of higher wages. Subsequently, when new knowledge enters wider circulation it may raise the productivity of other enterprises through so-called spillover effects. In other words, the overall income distribution becomes more equal.

Second, according to the skills-based technological change theory, it is possible that **innovation displaces low-skilled labour** and increases the productivity of highly skilled labour. Furthermore, areas of innovation may simply attract highly skilled and highly paid workers. The latter two mechanisms are likely to increase top incomes.

Related and future JRC work

The research outlined in this brief will be followed up by deeper investigation into the nature and quality of the innovation process.

The JRC pursues an active research agenda in the areas connected with the determinants and the effects of income inequality in the EU. This work addresses *inter alia* the following issues: (i) post-crisis inequality in Europe, (ii) Chinese trade expansion and income inequality in EU15 regions, (iii) preferences for redistribution and regional inequalities, and (iv) income distributions in the European Union.

This brief is one of a **series of science for policy briefs** reporting on recent JRC research on various aspects of fairness. A **comprehensive report on fairness** will be published in 2019.

The European Commission's science and knowledge service
Joint Research Centre

EU Science Hub: *ec.europa.eu/jrc/en* @EU_ScienceHub Joint Research Centre
EU Science Hub – Joint Research Centre EU Science Hub