



MONTHLY REVIEW OF ACADEMIC LITERATURE ON RESEARCH AND INNOVATION AS SOURCES OF GROWTH

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1. Public subsidies, TFP and Efficiency: a tale of complex relationships

Bernini C, Cerqua A, Pellegrini G (2017). Public subsidies, TFP and Efficiency: a tale of complex relationships. *Research Policy*. <http://dx.doi.org/10.1016/j.respol.2017.02.001>

- This paper evaluates the impact of subsidies on the different components of TFP for firm's long-term growth.
- Results show that capital subsidies negatively affect TFP growth in the shorter term, whereas positive effects appear after 3–4 years.
- The positive impact of subsidies comes through technical progress and not through scale impact change.

A growing amount of literature investigates the contribution of subsidies to productivity growth and increase in competitiveness of firms. Understanding of the impact of the subsidies on regional productivity growth is essential for the assessment of the effectiveness of public policy. This paper evaluates the impact of subsidies on technological progress, allocative efficiency and economics of scale of granted firms. Authors used a quasi-experimental approach (Multiple RRD), which allowed capturing the causal effect of the subsidies on TFP and its components. The research is based on the data collected from firms, which were subsidised through the Law488/92, a key policy instrument for reducing territorial disparities in Italy during the period 1996–2007. The main findings indicate that capital subsidies negatively affect TFP growth in the short term. Positive effects appear only after 3–4 years. Furthermore, the positive impact comes through technological change and not through scale impact change, as may have been expected. The main channel of the impact of capital subsidies on TFP is through increasing the technological content of the new capital, which comprises the technological upgrade of the subsidized firm. This evidence supports Schumpeterian effects of subsidies on regional growth.

2. Schumpeterian and semi-endogenous productivity growth explanations

Fedderke J W, Liu Y (2017). Schumpeterian and semi-endogenous productivity growth explanations. *Economics of Transition*, 25(1): 111–137.

- This paper examines the nature and sources of productivity growth from an international comparative perspective. The empirical evidence supports Schumpeterian explanations of productivity growth (i.e. knowledge growth is subject to constant returns to scale) for a panel of countries, which includes both developed and developing countries.
- Semi-endogenous productivity growth (i.e. decreasing returns to scale) is supported for a panel of 6 OECD manufacturing sectors. The findings confirm that innovation is more important and shows higher rates of return in advanced economies.

According to Schumpeterian growth models, knowledge growth is subject to constant returns to scale and is a key driver of sustainable productivity growth. In contrast, semi-endogenous growth

theory claims that knowledge growth will decrease as the knowledge stock increases, limiting prospects of innovation for improvement of real per capita GDP. This paper compares the two theoretical frameworks using panel data for South Africa and six OECD countries' manufacturing sectors. For developed and transition countries and South Africa, results favour the Schumpeterian model of productivity growth. For six OECD country manufacturing sectors results favour the semi-endogenous productivity growth model. The findings suggest that returns to scale to knowledge are higher in more developed than in emerging economies. The panel data results also provide evidence of sector heterogeneity, suggesting that both semi-endogenous and Schumpeterian innovation processes may be present across sectors in an economy.

3. Does innovation promote economic growth? Evidence from European countries

Maradana R P, Pradhan R P, Dash S, Gaurav K, Jayakumar M, Chatterjee D (2017). Does innovation promote economic growth? Evidence from European countries. *Journal of Innovation and Entrepreneurship*, 6:1.

- This study examines the long-run linkages between innovation and per capita economic growth using time-series data for 19 European economies. It finds a back-and-forth relationship between innovation and per capita economic growth, which to a large extent depends on the countries analysed.
- The paper concludes that in order to increase per capita economic growth, policymakers should pay attention to policy strategies that promote innovation through funding public research or encouraging private investment in research and innovation.

The study analyses the relationship between innovation and growth in European countries. It is based on recent and comprehensive data set for 19 European countries from 1989 to 2014, which makes it more up-to-date than any existing study in the field. Drawing upon a basic endogenous technical change model with six distinct types of innovation, authors test the causal relationship between innovation and growth. Empirical results acknowledge mixed evidence on the relationship between the innovation and per capita economic growth both at the individual country level and for the whole panel. In some cases, per capita economic growth leads to innovation, whereas in others, it is innovation that drives the level of per capita economic growth. There are also circumstances, where innovation and per capita economic growth are mutually interdependent. The study suggests that in order to increase per capita economic growth, policymakers should pay attention to policy strategies that promote innovation. Given the possibility of reverse causality, policies that aim to increase economic growth would stimulate more innovation.

4. Quantile regression for Panel data: An empirical approach for knowledge spillovers endogeneity

Aldieri L, Vinci C P (2017). Quantile regression for Panel data: An empirical approach for knowledge spillovers endogeneity. MPRA Paper No. 76405, University Library of Munich, Germany.

- This paper investigates to which extent knowledge spillover effects are sensitive to different levels of innovation, based on a quantile regression approach. The dataset consists of firms' profiles and financial statements from EU R&D Investment Scoreboards 2002-2010.
- Empirical results suggest that R&D spillovers positively affect firm's innovation. Firms with lower range of innovation activities exhibit higher returns from R&D spillovers, while innovation intensive firms have lower return.

This paper investigates the link between the firm's innovation activity, measured by patents, and knowledge spillovers. For this purpose, authors apply quantiles regression technique. The panel data sample consists of 5951 firms in three economic areas (the USA, Japan and Europe) during the period 2002-2010 from the EU R&D Industrial Scoreboard, guided by DG RTD and the JRC-Seville. Empirical results prove the crucial role of R&D spillovers in innovation process. The spillover effects appear to have a bell shaped pattern along the innovation conditional distribution, with firms whose innovation ranges between values of about 10% and 20% (lowest quartile of innovation distribution) exhibiting higher returns from R&D spillovers, while returns are found to be lower for successive quantiles.

5. Do R&D activities matter for productivity? A regional spatial approach assessing the role of human and social capital

Bengoa, M, Martínez-San R V, Pérez P (2017). Do R&D activities matter for productivity? A regional spatial approach assessing the role of human and social capital. *Economic Modelling*, 60:448-461.

- The paper investigates the long run contribution of R&D to TFP for Spanish regional economies from 1980 to 2007. Findings suggest that public R&D is positively related to TFP growth in the long term, while no effect is found for private R&D.
- A positive relationship holds also for human and social capital. Human and social capital spillovers are found to negatively affect regional TFP. This may be due to agglomeration effects with regions attracting human capital having a draining effect on the others.

Research and development are acknowledged as fundamental engine of economic growth in the long term, through their effect on productivity. The economic literature on the topic is abundant and while findings largely support the above argument, results may differ when considering public versus private R&D, with the latter usually understood as the main driver. The study deepens the investigation of the impact of R&D on productivity in two directions. First, the analysis is set at the regional level, allowing to spot heterogeneity in research and innovation systems, as well as in the conditions favouring both knowledge creation and economic growth, which are usually lost when the country is the main unit of analysis. Second, the study accounts for the influence of human and social capital on the capacity of economies in absorbing knowledge and transforming it in productivity gains. Results show that while overall R&D is positively related to TFP, contrary to expectations only its public component has a significant impact. Human capital and public infrastructure are positively related as well, and the order of magnitude is higher than for social capital. For what concerns spatial dynamics, the level of human and social capital in other regions negatively affect regional TFP, i.e. negative spillovers are in place. This may be due to agglomeration effects with regions attracting human capital having a draining effect on the others.

6. Innovation Effects on Employment in High-Tech and Low-Tech industries: Evidence from Large International Firms within the Triad

Aldieri L, Vinci C P (2017). Innovation Effects on Employment in High-Tech and Low-Tech industries: Evidence from Large International Firms within the Triad. MPRA Paper No. 76398.

- The paper investigates the role of shocks, such as the recent financial and economic crisis, in the reallocation process of employment flows. The authors analyse to which extent the economic crisis affects the sensitivity of employment with respect to R&D spillovers, own and outside innovation of firms in high-tech and low-tech industries.
- The empirical results show that there is a positive correlation between knowledge spillovers and the rate of employment after the crisis. Findings suggest that surviving firms might aim to improve competitiveness by investing in innovation, supporting job creation.

Innovation and employment are two strategic objectives for many industrial countries, especially after the recent financial and economic world crisis. This paper investigates the role of the economic crisis in the reallocation process of the employment flows in high-tech and low-tech industries using a dataset of 879 large international firms observed for the period 2002-2010 and localized in three economic areas: USA, Japan and Europe. The information on company profiles and financial statements stems from EU R&D investment scoreboard. Empirical analysis shows that firms' own innovation negatively impacts employment both before and after the crisis, with the exception of European low-tech firms before the crisis. In contrast, knowledge spillovers were found to have negative impact on employment before the beginning of the crisis, and became positive and significant after 2006, particularly for American high-tech firms. The findings suggest that an economic crisis might be an opportunity for surviving firms to improve their own competitiveness by increasing investment in innovation. The positive correlation between knowledge spillovers and employment after the crisis suggests that employment benefit from the creation of the new stock of external knowledge.

7. Uncertainty, flexible labour relations and R&D

Di Cintio M, Grassi E (2017). Uncertainty, Flexible Labour Relations and R&D. *Macroeconomica*, 68(1):91-120.

- This paper investigates the effects of uncertainty in the product market and of labour contracts flexibility on firms R&D intensity for a panel of Italian manufacturing firms.
- The results from the econometric analysis suggest that uncertainty is negatively correlated with firms R&D intensity.
- Increasing the flexibility of labour relationships is correlated with higher R&D when the degree of flexibility is low but only up to a threshold, after which excessive deregulation is found detrimental to R&D investments. The interaction between the two variables suggests that a degree of flexibility may reduce the negative effect of uncertainty on R&D intensity.

R&D investment is a risky activity, especially since it is often considered as an investment with low or null reversibility. Hence, uncertainty in the product market is detrimental to R&D investment and firms may react by reducing the latter. Differently, while it is often argued that flexible labour markets may be beneficial to research and innovation, empirical evidence is contradictory. On the one hand, flexible labour relationships may allow a more efficient allocation of workers among different activities and sectors, reduce the non-reversibility burden on firms and be used as a screening device by employers. On the other hand, shorter and uncertain labour contracts may reduce investment in human capital because of short term work expectations and weaken the knowledge accumulation process within firms (and economies). The study uses the standard deviation in past sales as a measure of uncertainty and the share of temporary contracts as a proxy for flexible labour relations to investigate their effect on R&D intensity for Italian manufacturing firms from 1998 to 2003, adopting a random-effect Tobit model for panel data. Results confirm the negative effect of uncertainty, while an inverted-U relationship arises for flexible labour markets: temporary contracts are linked to higher R&D intensity up to a threshold after which excessive deregulation is detrimental to R&D investment. Interestingly, the interaction between the two variables suggests that a certain degree of flexibility may reduce the negative effect of uncertainty on R&D intensity.

8. Solving the knowledge filter puzzle: absorptive capacity, entrepreneurship and regional development

Qian H, Jung H (2017). Solving the knowledge filter puzzle: absorptive capacity, entrepreneurship and regional development. *Small Business Economics*, 48(1):99–114.

- This paper examines the barriers to commercialisation of new knowledge, also known as a "knowledge filter". The authors complement earlier studies by introducing an absorptive capacity theory of reducing the knowledge filter.
- They identify two types of absorptive capacity: cognitive capacity and technical capacity. The results show that both cognitive capacity and entrepreneurship contribute to the commercialisation of new knowledge.

The problem of "knowledge filter" or converting research to commercialized knowledge has drawn the attention of many scholars. It has been widely acknowledged that entrepreneurship is one of the most effective ways to introduce innovation to the product market. However, the role of the incumbent firms in transmitting knowledge spillovers has been unknown. Authors complemented earlier studies and introduced absorptive capacity theory into the research framework. The model is based on a novel data set, which is aggregated at the US metropolitan regions level and consists of physical capital (key input factor), total number of patents, composite knowledge index etc. The paper presents a new way to measure regional absorptive capacity in the discussion of the knowledge filter. Additionally, the authors create a new typology of the absorptive capacity: cognitive absorptive capacity and technical absorptive capacity. These variables represent occupational abilities and skills attributable to the regional human capital. Cognitive absorptive capacity includes social perceptiveness, coordination, oral comprehension, oral expression, problem sensitivity and active listening; whereas technical capacity comprises programming, technological design and operations analysis. The results show that absorptive capacity and more specifically, cognitive capacity, is an effective penetrator of the knowledge filter.

9. Corporate social responsibility and its effects on innovation and firm performance: An empirical research in SMEs

Martinez-Conesa, I, Soto-Acosta P, Palacios-Manzano M. (2017). Corporate social responsibility and its effect on innovation and firm performance: An empirical research in SMEs. *Journal of Cleaner Production*, 142:2374-2383.

- This paper aims to empirically establish the relationship between corporate social responsibility (CSR) and innovation at the firm level, based on a data set of 552 Spanish firms.
- Results suggest that CSR is positively associated with organizational innovation and firm performance
- Organizational innovation is found to mediate the relationship between CSR and firm performance.

This paper extends previous studies on CSR by measuring different dimensions of CSR in a single integrative construct. In addition, although the link between CSR and business value have been investigated, a significant research gap remains when considering the relationship between CSR and innovation. That is, there is little work on whether and how CSR can support organizational innovation. Using a target population of SMEs from the Region of Murcia, the study employs a measure of CSR which is made up of five dimensions: suppliers, customers, employees, the local community and environmental responsibility. The conceptual model to be tested links three interlinked hypothesis: 1) that CSR of SMEs is positively related to innovation performance, 2) that CSR of SMEs is positively related to firm performance and 3) that innovation performance mediates the relationship between CSR of SMEs and firm performance. The empirical testing of the model supports these hypotheses. It is argued that innovation can support a more sustainable and responsible business model, hence also providing backing for the Spanish Strategy on CSR (2014).

10. Econometric Evidence on the R&D Depreciation Rate

De Rassenfosse R, Jaffe A B (2017). *Econometric Evidence on the R&D Depreciation Rate*. NBER Working Paper No. 23072, National Bureau of Economic Research, Inc.

- This paper presents estimates of the R&D depreciation rate and the impact of patent protection on the R&D depreciation rate using survey data on Australian inventions.
- In contrast to previous similar studies, it relies on direct observation of the revenue streams of inventions.
- The empirical results suggest that (1) the yearly depreciation rate varies in a range of 1% to 5%, (2) the depreciation rate is stronger in the first two years of inventions averaging 8–9%, (3) patent protection slows down the erosion of profits by about 1–2%.

The depreciation rate of R&D is a key economic parameter, which provides information about the speed of technological change and is necessary for estimating the private returns to R&D investments. It has been considered to be “central unsolved problem in the measurement of the returns to R&D”. This paper presents novel estimates of the R&D depreciation rate using data from the Australian Inventor Survey, in particular the patent applications filed at the Australian patent office between 1986 and 2005. The dataset also includes unpatented inventions, which allowed the authors to study how patent protection affects the depreciation rate. The results suggest that the yearly depreciation rate for R&D is lower than expected and corresponds to 1% to 5%. At the same time, the depreciation rate is higher in the first two years, averaging about 8% to 9%. With regard to industry specification, the depreciation rate is lower than the average in the pharmaceuticals and medicinal chemicals industry. Otherwise, there is little degree of variation in the depreciation rate across industries. Importantly, patent protection allows to avoid the erosion of profits and to lower the depreciation rate by 1-2%. The estimates of this study is of importance for statistical offices, which aim to capitalise R&D investments in the systems of national accounts.