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

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1. R&D and productivity in OECD firms and industries: A hierarchical meta-regression analysis

Ugur M, Trushin E, Solomon E, Guidi F (2016). R&D and productivity in OECD firms and industries: A hierarchical meta-regression analysis. Research Policy 45(10):2069–2086.

- The paper presents evidence on firm-level private returns and within-industry social returns to R&D investment.
- Private and social returns to R&D are found to be positive but smaller and more heterogeneous than what is reported in prior reviews.
- The paper calls for contingent public support to R&D investment, paying attention to evolving evidence and the scope for knowledge spillovers.

The paper aims to provide a systematic synthesis of the evidence on the relationship between R&D investment and firm/industry productivity, which has been investigated widely following the seminal contributions by Griliches and others from the late 1970s onwards. The paper uses 1253 estimates from 65 primary studies. In line with prior reviews, the study reports that the average elasticity and rate-of-return estimates are positive. In contrast to prior reviews, however, the paper reports that: (i) the estimates are smaller and more heterogeneous than what has been reported before; (ii) residual heterogeneity remains high among firm-level estimates even after controlling for moderating factors; (iii) firm-level rates of return and within-industry social returns to R&D are small and do not differ significantly despite theoretical predictions of higher social returns; and (iv) the informational content of both elasticity and rate-of-return estimates needs to be interpreted cautiously. The study recommends further research on: 1) market power, scale effects and complementarity (or substitution) between different R&D types; 2) the lag structure of R&D investment with a view to estimate long-term returns to R&D; and 3) how to disentangle knowledge spillovers from un-observed common factors, product-market rivalry and creative destruction.

2. The long-run growth effects of R&D policy

Minnitia A, Venturini F (2016). The long-run growth effects of R&D policy. Research Policy 46(1):316-326.

- The paper assesses the long-run growth effects of public support to business R&D using data for US manufacturing industries.
- The analysis indicates that R&D tax credits foster productivity growth over the long-term horizon.
- Increasing R&D tax credits by 10% is found to raise the growth rate of labour productivity by 0.4% per year.

This paper assesses the long-run growth effects of public support to business R&D using data for US manufacturing industries and taking Schumpeterian growth theory as the guideline. The

analysis indicates that R&D policy in the form of R&D tax credits fosters the rate of productivity growth over the long-term horizon. This effect is quantitatively significant: increasing R&D tax credits by 10% raises the growth rate of labour productivity by 0.4% per year. The authors show that the findings are robust to controlling for several policy instruments, growth determinants and econometric issues. The overall evidence is found to be consistent with the predictions of second-generation fully-endogenous growth models.

3. Sectors and the additionality effects of R&D tax credits: A cross-country microeconometric analysis

Freitasa I B, Castellaccib F, Fontanac R, Malerbad F (2017). Sectors and the additionality effects of R&D tax credits: A cross-country microeconometric analysis. Research Policy 46(1)57-72.

- The paper examines if the additionality effects of R&D tax incentives vary across sectors, based on a microeconometric analysis for three countries: Norway, Italy and France.
- It finds that the additionality effects of R&D tax credits vary across sectors, depending on industries' degree of R&D orientation and market concentration.
- Additionality effects are found to be stronger in industries with higher R&D orientation.

The paper examines if the additionality effects of R&D tax incentives vary across sectors. It presents a micro-econometric analysis for three countries: Norway, Italy and France. The authors use a panel of firm-level data from three waves of the Community Innovation Survey carried out in these countries for 2004, 2006 and 2008. The study estimates input and output additionality effects of R&D tax incentives in each of these economies, and it investigates how these effects differ across sectors characterised by different R&D orientations and competition conditions. The results point out that firms in industries with high R&D orientation, i.e. the extent to which formal R&D activities represent the main innovation strategy adopted by innovative companies, have on average higher propensity to apply to R&D fiscal incentives schemes and stronger input and output additionality effects.

4. The effectiveness of tax incentives for R&D+i in developing countries: The case of Argentina

Crespi G, Giuliodori D, Giuliodori R, Rodriguez A (2016). The effectiveness of tax incentives for R&D+i in developing countries: The case of Argentina. Research Policy 45(10):2023-2035.

- The paper studies the impacts of tax incentives for R&D&I in Argentina.
- The results suggest that the elasticity of R&D&I is greater than 1 in absolute terms.
- Effects vary depending on the type of the industrial sector and size of the firm, and according to the type of R&D&I being supported.
- After subtracting investments in capital goods, the absolute value of pure R&D elasticity is less than 1.

The paper studies the effectiveness of tax incentives aimed at encouraging private investment in research, development, and innovation (R&D&I). As the evidence on the effectiveness of such schemes in achieving policy goals in weak innovation systems contexts is still very scarce, the paper aims at narrowing the knowledge gap by focusing on the effects of a tax incentive scheme for promoting firm-level innovation investment in Argentina. The analysis applies dynamic panel data techniques to a novel dataset, merging several waves of the National Innovation Survey collected by the National Institute of Statistics and Censuses. The results suggest that the elasticity of R&D&I investment to its user cost of capital is greater than 1 in absolute terms. However, effects are found to vary depending on the type of innovation investment being subsidised, industrial sector, and size of the firm. Moreover, when innovation investment is divided into innovation related capital goods expenditures and R&D, the results suggest that the absolute value of the elasticity for the R&D component of the innovation investment is less than 1. The authors suggest that these heterogeneous effects should be exploited for further policy design.

5. Does government support for private innovation matter? Firm-level evidence from two catching-up countries

Szczygielskia K, Grabowskib W, Pamukcuc M T, Tandoganc V S (2017). Does government support for private innovation matter? Firm-level evidence from two catching-up countries. Research Policy 46(1):219–237.

- The study assesses the efficiency of grants for innovation activities in Turkey and Poland.
- Grants for R&D activities are found to contribute to better innovation performance by firms in both countries.
- EU-funded innovation measures in Poland, focused on capital upgrading and technology absorption, were found to be inefficient in fostering innovation.

This paper assesses the efficiency of grants for innovation activities in Turkey and Poland, two technology-follower countries that are found to represent a similar level of economic development. The governments in both countries are trying to improve the innovation performance of companies by increasingly offering grants for innovation activities. The authors analyse the institutional frameworks in which these policies were formulated and implemented and assess their efficiency by looking at data from the 2010 innovation surveys. They find that government aid for R&D activities contributed to better innovation performance by firms in both countries. By contrast, EU-funded grants for physical and human capital upgrading in Poland were found to be inefficient in fostering innovation; in fact the authors find that they may have actually impeded it. Policy conclusions for "technology-follower countries with relatively well-developed institutions" are suggested.

6. Contract enforcement and R&D investment

Seitz M, Watzinger M (2017). Contract enforcement and R&D investment. Research Policy 46(1): 182-195.

- The paper analyses the influence of rule of law on R&D investment across industries and countries.
- It finds that the quality of the rule of law is a first order determinant for research investment.
- 24% of the gap in R&D between the Italian and German automobile industry is found to be due to rule of law.

This paper evaluates the role of contract enforcement for R&D investments, trying to explain the differences in innovation across countries. The authors find empirical evidence that weak contract enforcement is associated with lower R&D investment: R&D intensity in an industry increases with the quality of the judicial system. This effect is particularly strong in industries that cannot buy inputs on competitive markets and thus depend more on contracts to acquire inputs. In line with this, the authors show that contract enforcement is particularly important in industries in which vertical integration is not a viable option.

7. Skills and social insurance: Evidence from the relative persistence of innovation during the financial crisis in Europe

Filippetti A, Guy F (2016). Skills and social insurance: Evidence from the relative persistence of innovation during the financial crisis in Europe. Science and Public Policy 43(4):505-517.

- The paper examines how the stock of skilled labour affects the persistence of investment in innovation during a macroeconomic downturn.
- The strongest sustained investment in innovation is found to be associated with a combination of high participation in vocational education and training programmes with either strong employment protection or strong unemployment insurance.
- The supply of skills is found to make an important contribution to innovation and social insurance is found to encourage socially beneficial risk-taking in educational choices.

This study explores private sector investments in innovation in the early days of the financial crisis (between mid 2008 and mid 2009), using a survey covering more than 5,000 firms across 21 European countries. The paper examines how the stock of skilled labour affects the persistence of investment in innovation during a macroeconomic downturn. It infers differences in skill from national levels of participation in vocational education (VET) and training programmes interacted with levels of employment protection (EP) and unemployment insurance (RR). These forms of insurance should lead VET students to undertake training for skills which are more risky as human capital investments, but potentially more productive. The authors find that the strongest sustained investment in innovation is associated with a combination of high VET with either strong EP or strong RR. The result supports the view that the supply of skills makes an important contribution to innovation, and that social insurance can encourage socially beneficial risk-taking in educational choices.

8. Product market regulation, innovation, and productivity

Amable B, Ledezma I, Robin S (2016). Product market regulation, innovation, and productivity. Research Policy 45 (10):2087–2104.

- This paper examines the influence of product market regulation (PMR) on innovation and productivity.
- It tests for a differentiated effect of PMR depending on the distance to the world technological frontier.
- The authors do not find support for the innovation-boosting effects of liberalisation policies at the leading edge.

This paper analyses the innovation–productivity relationship at the industry-level for a sample of OECD manufacturing industries. The authors examine in particular the influence of product market regulation (PMR) of key input sectors of the economy on the innovative process of manufacturing and its consequences on productivity. These input sectors include: (i) network services such as energy (electricity and gas), transport (air, rail and road transport) and communications (post and telecommunications); (ii) retail distribution and professional services; and (iii) finance. The authors test for a differentiated effect of PMR depending on whether countries are technological leaders or laggards in a given industry and for a given time period. Contrary to the most widespread policy claims, the innovation-boosting effects of liberalisation policies at the leading edge are systematically not supported by the data. The findings question the relevance of a research and innovation policy based on product market liberalisation.

9. Unions, collective relations laws and R&D investment in emerging and developing countries

Balsmeier B (2017). Unions, collective relations laws and R&D investment in emerging and developing countries. Research Policy 46(1):292-304

- This paper explores the relationship between between unionisation and R&D investment, based on firm-level cross-country data.
- Unionisation is found to be negatively associated with R&D spending.
- Strong collective relations laws are found to enable strong unions to 'tax' the returns to successful inventions.

Research finds that workforce unionisation leads to a reduction in R&D investment because unions appropriate a share of the returns to successful inventive efforts. On the other hand, it is widely acknowledged that unions may encourage investment in R&D because of increased cooperation between workers and management. The empirical analysis on cross-country firm-level data from 23 emerging and developing countries reveals a negative association between workforce unionisation and firms' R&D investment. This association is particularly pronounced when unions are protected by strong collective relations laws, supporting the notion that strong unions 'tax' the returns to successful inventions. The findings have implications for policy makers who seek to improve emerging countries' chances of catching up to the technological frontier, and for firm leaders concerned about the appropriation of returns to their R&D investments.

10. University–industry collaboration and firms' R&D effort

Scandura A (2016). University–industry collaboration and firms' R&D effort. Research Policy 45(9):1907-1922.

- This paper explores the impact on firms of a policy for University-Industry research collaboration.
- The results show a positive and significant impact on the share of R&D employment and a positive effect on R&D expenditure per employee.
- The findings emphasise the role of universities to support businesses and the economy.

This paper investigates the impact of publicly funded university–industry collaboration on UK firms' R&D effort. The authors test the hypotheses that project participation has a positive effect on firms' R&D expenditure per employee and on their share of R&D employment. The paper exploits a novel source of data made up of a set of University–Industry projects funded by the UK Engineering and Physical Sciences Research Council between 1997 and 2007 and firm-level data available through the UK Office for National Statistics. The author employs propensity score matching to select an appropriate control group of untreated firms on the basis of the probability that they participate to University–Industry partnerships and then estimates the impact of participation on firms' R&D effort in two points in time via ordinary least squares regression. The results show a positive and significant impact on the share of R&D employment two years after the end of projects. A positive effect on R&D expenditure per employee is found both at the end of the project and two years later.