

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

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### 1. The effectiveness of R&D subsidies: A meta-regression analysis of the evaluation literature

Dimos C, Pugh G (2016). The effectiveness of R&D subsidies: A meta-regression analysis of the evaluation literature. *Research Policy* 45(4):797-815.

- The paper studies the effectiveness of R&D subsidies, by conducting a meta-regression analysis of the existing evaluation literature.
- Both theory and empirical evidence are inconclusive regarding subsidy effects.
- The study finds no crowding out of private investment by public subsidy but also no evidence of substantial additionality.
- Research practices, in particular the treatment of unobservable firm heterogeneity, affect largely the heterogeneous effects reported in the literature.

The widespread and increasing public subsidy for research and development (R&D) has given rise to a large and growing number of evaluation studies. While economic theory identifies market failures that justify public support, theory also suggests reasons why returns might be disappointing. Similarly, the empirical literature investigated – 52 micro-level studies published since 2000 on either input or output R&D – reports a wide range of findings. This Meta-Regression Analysis (MRA) contributes to policy debate by identifying a representative subsidy effect: after controlling for publication selection bias and for a wide range of sample and study heterogeneities, the MRA findings reject crowding out of private investment by public subsidy but reveal no evidence of substantial additionality. In addition, the study finds that among the research practices explaining the heterogeneous effects reported in the literature, those related to the treatment of unobservable firm heterogeneity are particularly important.

### 2. More labour market flexibility for more innovation? Evidence from employer–employee linked micro data

Wachsen E, Blind K (2016). More labour market flexibility for more innovation? Evidence from employer–employee linked micro data. *Research Policy* 45(5):941-950.

- The paper analyses the relationship between labour market flexibility and innovation.
- The relationship depends on the type of innovation and the innovation regime.
- Labour market flexibility does not influence innovation in an entrepreneurial innovation regime characterised by high competition, low market entry barriers and generally available knowledge.
- Labour market flexibility reduces the likelihood of innovation in a routinised innovation regime with leading innovators and high entry barriers.
- Technological change requires a level of security and stability in labour relations.

This paper examines labour market flexibility in various definitions and its impact on innovation. The results demonstrate that the relationship strongly depends on the type of innovation as well as the predominant innovation regime in which a company operates. Thereby, labour market flexibility does not influence innovation in an entrepreneurial innovation regime characterised by high competition, low market entry barriers and generally available knowledge. That, the authors argue, might explain why the Silicon Valley has been successful despite having a labour market with a strong hire and fire mentality. In contrast, labour market flexibility significantly reduces the likelihood of innovation in a routinised innovation regime with leading innovators and high entry barriers similar to the US automobile industry and steel districts that did not succeed. These findings emphasise that the currently discussed structural labour market reforms might hamper innovation as technological change still requires a level of security and stability.

### 3. The determinants of productivity in Chinese large and medium-sized industrial firms, 1998–2007

Ding S, Guariglia A, Harris R (2016). The determinants of productivity in Chinese large and medium-sized industrial firms, 1998–2007. *Journal of Productivity Analysis* 45:131–155.

- This paper examines total factor productivity (TFP) and its determinants in China, using a firm-level dataset.
- The average TFP growth in Chinese industries is estimated to be 9.6% per annum during the period 1998–2007.
- The paper finds that this rapid productivity growth is mainly driven by firm entry rather than reallocation among existing firms.
- Younger firms and firms with no political affiliation are found to have higher TFP, and firms with state ownership are found to have lower TFP.

This paper examines TFP and its determinants in Chinese industries over the period of 1998–2007, drawing on a large firm-level dataset. When estimating TFP, the authors use the system GMM estimator to capture firm-level fixed effects and to deal with the endogeneity of regressors. Besides the factor inputs, the authors include in the production function several China-specific variables such as firms' political affiliation and ownership, along with some other general variables such as firm age, export behavior, intangible fixed assets (proxied by R&D), liquidity, and geographic location. TFP is estimated separately for each industry to allow for heterogeneity in technology. The production function estimation indicates increasing returns to scale in most industries and significant technical change. Younger firms and firms with no political affiliation are found to have higher TFP, and firms with state ownership are found to have lower TFP. Heterogeneous evidence among industries is found on the effect of high political affiliation and private ownership (individual investors and corporation investors/legal entities). Neither export behavior nor R&D are found to impact strongly on TFP among most industries, but the authors find evidence of positive agglomeration spillovers. The estimated average TFP growth in Chinese industries is 9.6 % per annum during the period of 1998–2007. The paper finds that this rapid productivity growth is mainly driven by firm entry rather than reallocation among existing firms. The positively contributing inter-firm resource reallocations are more prominent across industries than across provinces.

### 4. Global technology leadership: The case of China

Huang C, Sharif N (2016). Global technology leadership: The case of China. *Science and Public Policy* 43(1):62–73.

- This paper argues that China is positioning itself to assume global leadership in technology within the coming few decades.
- Three sources of competitive advantage for China's ascent are identified:
  - 1) its massive domestic market
  - 2) its centralised power and willingness to employ state-sponsored industrial policy and government support
  - 3) the process of globalisation that continues to transform markets worldwide

Over the last century and a half, global technological leadership has shifted from Great Britain to the USA. In this paper the authors argue that China is positioning itself to assume global leadership in technology within the coming few decades. They identify three sources of competitive advantage for China's ascent in the global technology stakes: its massive domestic market, its centralised power and willingness to employ state-sponsored industrial policy and government support, and the process of globalisation that continues to transform markets worldwide. After acknowledging skeptical views of China's capacity to achieve global technology leadership, the authors survey the present state of affairs and assess its prospects for growth based on statistical evidence and multiple examples. The study argues that the three sources of competitive advantage offer China a path to imminent global technological leadership.

## 5. Growing fast or slow?: Understanding the variety of paths and the speed of early growth of entrepreneurial science-based firms

Miozzo M, DiVito L (2016). Growing fast or slow?: Understanding the variety of paths and the speed of early growth of entrepreneurial science-based firms. *Research Policy* 45(5):964-986.

- The paper contributes to the understanding of how fast growth of entrepreneurial science-based firms occurs.
- It conceptualises the speed of early growth as the time it takes for the assembly of three types of critical resources:
  - 1) a functionally-diverse management team
  - 2) early fundraising
  - 3) development of technology
- It shows how the variety of paths to access critical resources and speed of early growth is influenced by the national institutional setting.

The paper explores the process of early growth of entrepreneurial science-based firms. Drawing on case studies of British and Dutch biopharmaceutical R&D firms, the authors conceptualise the speed of early growth of science-based firms as the time it takes for the assembly (or combined development) of three types of critical resources—a functionally-diverse management team, early fundraising and development of technology. The development of these resources is an unfolding and interrelated process, the causal direction of which is highly ambiguous. The authors show the variety of paths used by science-based firms to access and develop these critical resources. The picture that emerges is that the various combinations of what the authors call “assisted” and “unassisted” paths combine to influence the speed of firm growth. The paper shows how a wide range of manifestations of technology development act as signaling devices to attract funding and management, affecting the speed of firm development. The paper also shows how the variety of paths and the speed of development are influenced by the national institutional setting.

## 6. R&D tax incentives: design and evidence

Criscuolo C, Bajgar M, Appelt S, Galindo-Rueda F (2016). R&D tax incentives: design and evidence. Organisation for Economic Co-operation and Development. DSTI/IND/STP(2016)1

Many governments increasingly rely on fiscal incentives, in addition to providing grants and buying R&D services (“direct” support). These can take the form of advantageous tax treatment of innovation inputs (R&D expenditures), as well as preferential treatment of R&D outputs (incomes from licensing or asset disposal attributable to R&D or patents). This paper discusses the rationale, aggregate trends, design features, empirical evidence as well as policy implications related to such incentives. A number of key messages come of the synthesis:

- R&D tax incentives should be carefully designed to take into account the heterogeneity among potential R&D performers and the position of ‘stand-alone’ firms without cross-border tax planning opportunities, as well as those of young, innovative firms without the profit-generating capacity on which to realise allowances or credits.
- Small or young firms react more strongly to R&D tax incentives than large firms, and they are less likely to shift their profits abroad to avoid taxes. R&D tax incentives should include carry-

forward provisions, cash refunds or reductions in social security and payroll taxes, so that they fully benefit also small and young firms and projects involving basic research.

- Policymakers should consider balancing indirect support for business R&D (tax incentives) with the use of direct support measures to foster innovation where the market is less likely to deliver it on its own.
- The effectiveness of R&D tax incentives depends upon the broader regulatory environment, in particular the broad taxation regime, and its stability and predictability over time. Stable and predictable incentives are likely to have a stronger impact on R&D investment.
- Income-based incentives should be treated with caution, given the lack of evidence of their effectiveness and the risk that they will disproportionately benefit established, large firms, MNEs and innovations susceptible to protection by patents.
- Using fiscal incentives with the sole purpose of attracting potentially mobile R&D by MNEs is likely to have only limited effects, and it can lead to a dangerous "race to the bottom" among countries.
- Governments should ensure that R&D tax incentive policies provide value for money, through effective ex-post evaluation linked to the ex-ante assessment of reforms and new initiatives.

## **7. In-house versus external basic research and first-to-market innovations**

Dolores H D (2016). *In-house versus external basic research and first-to-market innovations*. *Research Policy* 45(4):816-829.

- This paper explores, based on a sample of Spanish manufacturing firms, to what extent in-house basic research, as opposed to external basic research, helps firms to bring new products to the market ahead of competitors.
- Performing internal basic research enhances the probability to bring new products ahead of competitors.
- Collaboration with universities also helps in introducing new products ahead of rivals; however, contracting scientific research to universities has no effect.

This paper explores to what extent conducting internal basic research, as opposed to external basic research (i.e. outsourcing and collaboration with universities) encourages firms to bring new products into the market ahead of competitors, and contributes to innovation performance. The analysis is based on a sample of Spanish manufacturing firms over the period 2006–2012. The findings suggest that conducting in-house basic research affects firm's propensity to introduce product novelties. Furthermore, performing this activity continuously affects the probability of being product-pioneer in low and medium–low tech sectors. Collaboration with universities also helps in introducing new products ahead of competitors, but contracting scientific research from universities does not lead to a pioneer strategy. Results also reveal the absence of complementarities.

## **8. Related and unrelated variety as regional drivers of enterprise productivity and innovation: A multilevel study**

Aarstad J, Kvitastein O A, Jakobsen S-E (2016). *Related and unrelated variety as regional drivers of enterprise productivity and innovation: A multilevel study*. *Research Policy* 45(4):844-856.

- The paper explores the role of related and unrelated variety as regional drivers of enterprise productivity and innovation.
- Specialised region (high level of related industrial variety) is a positive driver of enterprise productivity.
- Population density is another regional driver of enterprise productivity.

The paper conducts multilevel analyses of Norwegian data and finds that related industrial variety is a positive regional driver of enterprise innovation. Unrelated variety is a negative regional driver of enterprise productivity. This implies that regions with high levels of related variety and low levels of unrelated variety optimise enterprise performance. The authors argue that regional specialisation is a two-dimensional construct inversely associated with related and unrelated

variety. Thus, a specialised region (low in unrelated variety) is a driver of enterprise productivity. In addition, the paper finds that population density is another regional driver of enterprise productivity.

## 9. Does sector-specific experience matter? The case of European higher education ministers

Jacqmin J, Lefebvre M (2016). Does sector-specific experience matter? The case of European higher education ministers. *Research Policy* 45(5):987-998.

- The paper looks at the relationship between academic background of higher education ministers and the performance of the sector they govern, using a panel dataset with the characteristics of European higher education ministers.
- Academic experience makes higher education ministers more prone to introduce adequate reforms that makes the sector more attractive for top-researchers.
- However, this characteristic has no impact on the spending of the sector.

This paper looks at the relationship between higher education ministers and the performance of the sector that they govern. Using an original panel dataset with the characteristics of European higher education ministers, the paper finds that having an academic experience leads to a higher level of performance, as measured by ranking data. However, the study finds that this characteristic has no impact on the spendings of the sector. The authors argue that academic experience makes ministers more prone to introduce adequate reforms that make the sector more attractive for top-researchers. Furthermore, the study finds that this result is driven by ministers with both sector-specific and electoral experience, the latter measured by a successful election at the regional or national level.

## 10. Who becomes a tenured professor, and why? Panel data evidence from German sociology, 1980–2013

Lutter M, Schröder M (2016). Who becomes a tenured professor, and why? Panel data evidence from German sociology, 1980–2013. *Research Policy* 45(5):999-1013.

- The article contributes to a better understanding of the role of meritocratic and non-meritocratic factors in getting a permanent professorship, based on longitudinal data for German sociologists.
- Tenure is largely related to scholarly output, network size, individual reputation, and being female.
- Women are promoted earlier to tenure than men. Academic awards do not matter for men, but are the strongest predictor for women in increasing their chances for tenure.

Prior studies that try to explain who gets tenure and why remain inconclusive, especially on whether non-meritocratic factors influence who becomes a professor. Based on career and publication data of virtually all sociologists working in German sociology departments, the authors test how meritocratic factors (academic productivity) as well as non-meritocratic factors (ascription, symbolic and social capital) influence the chances of getting a permanent professorship in sociology. The findings of this study show that getting tenure in sociology is strongly related to scholarly output, as previous studies have shown. Furthermore, the paper shows specifically that each refereed journal article and each monograph increases a sociologist's chance for tenure by 10 to 15 percent, while other publications affect odds for tenure only marginally and in some cases even negatively. Regarding non-meritocratic factors, the authors show that network size, individual reputation, and gender matters. Women get their first permanent position as university professor with on average 23 to 44 percent fewer publications than men; all else being equal, they are about 1.4 times more likely to get tenure than men.