Research Proposal

Firm innovation in the Defense Industry, and Spill-over Effect

Introduction

These projects aim at understanding better the innovation system of the Defense industry in France, and its connection to the civilian industry.

Project A : Defense R&D and Private R&D : mechanisms of crowding-in

This first work has for objective to develop a clear analysis of the mechanisms of crowding-in of the defense R&D as identified in the literature (Pallante, Russo, and Roventini 2023; Moretti, Steinwender, and Van Reenen 2025).

We propropose to explore different mechanisms of crowding-in effect:

- A first channel is **dual-uses goods** produced by firms. Most of the firms operating in the military industry also evolve in the civilian industry, and the high level of R&D they support in the military component of their business may translate into civilian goods (Ruttan 2006; Mazzucato and Penna 2015). In that case, crowding-in effect might be due to additional researches necessary to transfer military technology to marketable goods.
- A second channel might come from credit constraint effects, that limit investment capacities (Garicano and Steinwender 2016). Given that the **credit constraint** effect is stronger in the defense industry than in the civilian industries (Belin and Guille 2006) military funding might play a crucial role in alleviating the constraint. This relax can be explained by the positive signal of obtaining a grant — "certification effect". It might ease the access to classical banking credit. May also rise from a "funding" effect, being fund allows to develop prototypes of product, facilitating then further funding. However, the sense of the causality is not clear, credit constraint could also be explained by demand side factors (i.e. military firms evolve in a concentrated and monopsonistic market limiting future profits for innovative technology). Alternatively, another popular narative is bank discrimination due to conservative interpretation of CSR criteria (Moura 2011) would punish investment in military sector.
- A third channel is the **local spillover effect**. If firms evolving in close technological industries expect to benefit from other firms innovation they may invest to either secure their own position or integrate other firms innovation in their own product or processes. In that case, local spill-over effect due to technological clusters are to be expected. The transformative effect of defense R&D are well documented in the U.S. cases, noticeably their crucial role in building technological clusters and orienting American innovation toward initially military products — *spin-off* (Gross and Sampat 2023).

Project B : Spin-in & Spin-off in the Military sector

A focus on the opening of early financing for firms with dual uses goods product. In 2021 the governement has started financing the Defense Investment Fund (*Fonds Innovation Défense*) specialy targeted to innovative dual-uses firms in their early development stages and industrialization process.

Project C : Anticipated Demand, Investment and Growth in the Military Industry

An important aspect of the question is **anticipated demand** that firm will face in their investment choice. If firms obtaining government grant consider it as a future signal of demand for a specific good from the MoD then winning government fund is the same as facing "guaranteed demand. They are incentivize to top-up government fund to secure future procurement contract (Belenzon and Cioaca 2024). Further research have showed that demand for experimental product is crucial so that new technology can grow to maturity and survive against more mature incumbant technology. Historically the MoD by their procurement in innovative equipments has played this "consumer in first resort" role to forster innovation (Malerba et al. 2007; Mowery 2010).

Project C : Credit Constraint, R&D, and firm's growth in the Defense Industry

An explanation for the R&D crowdin-in effect can be the cred

Draft

Our first objective is to understand how the direct spending in military activities circulate in the defense economy, resulting in innovation. We provide an extra-focus on the role of public labs and subcontracting firms in the innovation process, since given the market structure, large dominating firms are mainly technological integrator.

Second, we want to understand by a patent analysis the mechanisms that favorise the transmission of military innovation to the civilian industries (*spin-off*), and conversely the channels of transmission of the civilian industry to the military (*spin-in*). This last channels stay largely not discussed by the literature. Is it due to hiring researchers, subcontracting with public labs, or building research facilities, or more mechanical regional spill-over effect.

A sensical, follow up question is to compare these direct spending efficiency to more classical tax credit incentives. Tax credit and direct spending do not answer to similar issues faced by firms, especially credit constraint. Firms that are credit constraints are limited by the amount of money they can borrow, leading them to rely on the state for investment. A subquestion is whether firms with credit constraint are constrained because of demand factors (small market monopsonitic market & highly concentrated) or due to bank discrimination/lack of investment of SME of the defense industry.

A complementary question but maybe not to be tackled here is the question of the impact of demand on learning-by-doing and then TFP growth vs innovation impact on TFP growth.

Another paper might consider using the creation of the Fond d'Innovation Défense, a public fund focused on dual technology firms, to assess the importance of venture capitalist investment in firm growth trajectory.

Data

Methods

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