

**Economic Impact of the R&D Related to Defense:
A Comparative Analysis**
DIVIALLE Frédéric, NEGASSI Syoum,
LASI, University of Paris I – PANTHEON-SORBONNE
Frederick.Divialle@malix.univ-paris1.fr

The explanation of the deficit of effectiveness of "defense's research" would lie in differences in behavior related at the same time on the objectives and the constraints. Defense would be ready to spend of the significant sums for very pointed objectives and with economic and commercial low value. In addition, the form of its budgetary constraint would be particular, and its decision would not depend on a traditional calculation of optimization. In the case of the United States, the empirical estimates tend to confirm the low economic effectiveness of the military expenditure of research (Griliches and Lichtenberg, 1984; Lichtenberg and Siegel, 1997). As for the effects of ousting of the expenditure of R&D related to defense, they still were recently highlighted at the level of the 17 OECD countries by Guellec and van Pottelsberghe (2000). They would come essentially from a wage increase of researchers consecutive to the increase in request in public R&D (cf Hartley and Singleton (1990) for a description of the various mechanisms at the origin of this effect of ousting). This general diagnosis seems however in contradiction with certain observations, which testify to a considerable impact of military research. One can initially observe that data-processing technologies (computers) and of the Internet, which are at the base of a "general purpose technological changes", were initiated by American defense. The same applies to the procedures of cost-benefit evaluation, guarantors of effectiveness in the decision-making process. In the French case, essential sectors for the growth and the specialization of the productive apparatus, such as aeronautics and professional electronics, depend on the soldier for a significant share of their R&D. Moreover, the results of this research tend to disseminate with time. Lastly, research defense can, at least partially, to be interpreted like a form of government aid to the innovation. However, of many empirical work show that the beneficial effects of the government aid to research are far from being negligible: Irwin and Klenow (1996) for the United States, Griliches and Regew (1998) for Israel, Guellec and van Pottelsberghe (1999) for the 17 OECD countries (see also the reviews of literature of Griliches, Klette and Moen, 1999). The same diagnosis of a very positive impact, passing by many channels, was operated for public research (cf the article survey of Martin and Salter, 2001). In fact, research related to defense shows two significant characteristics, which could result in under estimate of its economic impact: (i) the essence of its influence takes place by "spillovers" (De Bondt, 1997) related on the technological externalities and the effects of carryforwards in the broad sense which it generates. However, these effects are multiform not easily detectable (Salter and Martin, 2001). (ii) These effects could be spread out over one long period because of time necessary to the collecting of the innovations related to research defense, which would obstruct their estimate. The problems and the analysis suggested the object of the thesis is to analyze, theoretically and empirically, (i) the impact of research in the sectors directly related to defense (called "defense sector ") on the innovation, the productivity and the growth in the other sectors, and (ii) the conditions of a collecting by these sectors of the innovations of the defense sector. The impact of research in the defense sector can take several forms: (i) Of the externalities: the innovations produced by the defense sector increase the performances of the close sectors vertically (upstream and downstream) and horizontally, either by transfers of knowledge, or by transfers of instruments and methods of analysis. (ii) Of the complementarities: joint research can be undertaken, which concerns at the same time the defense sector and other sectors. (iii) Of the transfers of qualification: the researchers resulting from the sector defense transmit, when they are employed by other sectors, knowledge (new technologies, knowledge to make, knowledge "tacit" etc.) acquired in their former research. The collecting of the externalities generated by the innovation in the defense sector and the role of the qualifications in this collecting are in the center of the analysis suggested. From the theoretical point of view, work aims at building, on the firm level: (i) a production function integrating technological knowledge (Romer, 1990), which could take the form of the total productivity of the factors; (ii) a production function of technological knowledge which would depend on the effort of R&D and the collecting of the externalities, in particular of the innovations resulting from defense; (iii) a function of collecting of the externalities, defining the conditions of their internalisation, which even depends it, inter alia factors, of the qualifications used by the firm and the researchers resulting from the sector defense which it employs. The empirical exercise will consist in econometrics estimations, on individual data (firms and individuals), a simplified form of the model builds theoretically. This work will make it possible to analyze and estimate (i) the impact of "defense research" on the performances of the sectors except defense, and (ii) the influence of the factors of collecting of the externalities, in particular of the qualifications.