

IT Intensity, Firm Organizational Structure, Agglomeration Economies and Productivity Change: A Firm-Level Analysis.

William R. LATHAM

Contact : latham@udel.edu

Many recent studies have investigated the effects of changes in the use of information technology (IT) as a factor of production on changes in firm productivity. Some of these studies point out that successful applications of IT require complementary factors of production including aspects of firm organization. For example, (Brynjolfsson and Hitt (2000) find that firm organizational factors significantly affect the productivity of IT investments). Others studies have emphasized the critical importance of urbanization and agglomeration economies in increasing firm productivity. Our basic hypothesis is that not only is IT's effect on productivity affected by organizational structure (OS) (see in particular Brynjolfsson and Hitt, 2000), but IT's effect on productivity is affected by OS AND agglomeration effects (knowledge spillovers and/or urbanization and other forms of agglomeration). Ours is a new approach: we assess the independent and joint effects of IT, firm organizational structure, and agglomeration economies on firm productivity growth. The novelty of our approach is that we include estimators for each of these effects in the same productivity growth equation at the firm level. In order to avoid problems linked to industrial heterogeneity we make separate estimates for four detailed industries: (1) an industry strongly identified as IT-producing, (2) an industry weakly identified as IT-producing (3) an industry strongly identified as IT-producing and (4) an industry weakly identified as IT-using. We find that the effects of organizational structure and agglomeration economies are different for different IT intensity industries. We consider productivity in a firm in an industry to be partially determined by productivity factors such as: (a) the firm's labor force characteristics, (b) the density and size of the region in which is located, (c) the density and size of its market size, and (d) fixed effects for (i) the industry, (ii) the location in which it lies, and (iii) the time period. We measure the influence on productivity of three additional kinds of variables related to *organizational structure*: (1) *industry organizational structure*, as measured by an index of industrial concentration, (2) *firm organizational structure*, as measured by a number of indicators such as (a) the flatness of the management structure, the employment size distribution, (b) the number of establishments per firm, (c) the age of the firm, (d) whether the firm's shares are traded on an exchange, and (e) the diversity of the products produced as measured by the number of SIC codes and/or their degree of separation from each other, and (3) *spatial organizational structure* as measured by the agglomeration economies associated with the productivity or size of the industry in the same county or surrounding contiguous counties .