The Effect of Innovation on Productivity: Evidence from Turkish Manufacturing Firms

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Abstract

The role of innovation on economic outcomes has long been studied within the framework of industrial economics. Just as firms are the main economic actors in production processes of economies, in order to investigate the dynamics of development it is crucial to understand whether innovation behavior of firms create productivity gains. Benefits from innovative efforts in terms of the firm performance gains importance especially for developing regions of the world, as innovation activity is costly for such countries due to their scarce resources of technology and human capital. Motivated by these facts, this paper focuses on the effects of firms' innovation activities on their productivity changes for Turkey. Particularly, we dissect the effects of product and process innovation on Turkish manufacturing firms' productivity.

The linkage between characteristics of the products that firms produce and their productivity is important for competition in domestic and global markets. Consequently, we conjecture that product and process innovations play different roles. However, there is limited theoretical and empirical evidence on the differential impact of product and process innovations on firm productivity. Further, both economic intuition and stylized facts suggests that different modes of innovation are endogenous. Our contribution to the regarding literature on innovation-productivity nexus is twofold. First, apart from the most of the studies, when estimating the influence of innovation on firm productivity we explicitly consider the endogeneity of product/process innovation. Next, to the best of our knowledge this study is the first attempt to explore the effect of innovation on productivity for Turkish firms.

We utilize a recent and comprehensive firm level dataset for Turkish manufacturing firms over the period 2003-2014. For the analyses, two different sources of data that collected by TURKSTAT have combined. The first one is Structural Business Statistics (SBS) giving detailed information on firms' income, input costs, and employment and investment expenditures. While SBS is a representative sample for firms less than 20 employees, it is a census for more than 20 employees. The second source of data is Community Innovation Surveys that covers information on innovative activities of firms, the sources of information and costs for these activities. We use the 2005, 2008, 2011 waves of the Community Innovation Surveys (CIS) which includes information regarding the firms' innovation activities and allowing for the distinguishing between different modes of innovation. The variables in CIS characterize the treatments within the framework of our empirical investigation and they correspond to three-year periods. For instance, the 2005 wave of the survey reveals information on whether the firm introduces new processes and/or new products during the period from 2003 to 2005. CIS data covers whole population of firms with more than 250 employees whereas it is a representative sample for firms with 10-250 employees.

In order to conduct our analyses on the innovation-productivity relationship for Turkish firms, we utilize an endogenous switching technic, providing us to exploit the richness of our dataset as well as to control for endogeneity and selection bias issues. In this methodology, the factors enhancing firms' probability to innovate have analyzed firstly, and then, the productivity gains from process and/or product innovation have investigated. This model is widely used in many different areas (see among others Lee, 1978; Adamchik & Bedi, 2000; Ohnemus, 2007). While one way of avoiding selection

bias arose by firms' innovation decision is to employ Heckman's (1979) selection model, we choose to use an endogenous switching model. In our case, the switching model is appropriate where some nexus between innovation and firm level productivity alters across discrete regimes of innovation. The high productivity performance of a firm affects on her innovation decision and vice versa. Accordingly, given this endogenous relationship between firms' productivity and innovation activity, the unobserved behavior must also take into account, with the estimation of an auxiliary regression (Dutoit, 2007). In this setup, we are particularly interested in characteristics of firms that innovate and, the productivity differentials between firms that undertake innovative activities with respect to those that do not dissecting different modes of innovation.

The main findings of our study can summarize in the following way. First, both process and product innovations have positive effects on the productivity of firms with respect to non-innovating firms. Further, we find robust evidence for the differential impact of innovation firm productivity across different innovation types. In particular, our results indicate that there exists a more pronounced effect in terms of product innovation on productivity with respect to process innovation.

Keywords : Product Innovation, Process Innovation, Firm Productivity.

JEL Classification Codes : D22, L25, O30.