

**Paper prepared for the**  
***EY International Congress on Economics II***  
**"GROWTH, INEQUALITY AND POVERTY"**  
**Ankara, November 5-6, 2015**



**EKONOMİK YAKLAŞIM**  
Quarterly Peer-Reviewed Scientific Journal  
Department of Economics - Gazi University

**The Impact of R&D and ICT Investment on Innovation and  
Productivity: Firm-Level Evidence from Turkey**

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## **The Impact of R&D and ICT Investment on Innovation and Productivity: Firm-Level Evidence from Turkey**

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### *Abstract*

*Measuring the effects of innovative activities on firms' productivity has been an active area for research for several decades, both as a policy concern and as a challenge for econometric applications. This paper attempts to analyze the relationship among innovation input, output and productivity in Turkish manufacturing firms through CDM model by adding ICT investments together with R&D as an input to innovation. The evidence is based on a panel data sample of Turkish manufacturing firms in the 2003–2010 period, constructed from the waves of the 'Annual Manufacturing Industry Statistics' and the four consecutive waves of 'Community Innovation Surveys'. Regarding the model specification, the first step models the firm R&D decisions in terms of two equations: a selection equation and an intensity equation. The selection equation consists of R&D indicator variable that takes the value 1 if firm decides to perform R&D and explanatory variables affecting R&D decision. The intensity equation consists of firm's innovative effort and a set of determinants of R&D expenditure. These two equations are estimated by using Heckman selection method. The second step models the firm innovation activity by innovation equation including ICT investment intensity and the latent innovation effort proxied by the predicted value of R&D intensity from the first step model. This equation is estimated as a bivariate probit model, assuming that most of the firm characteristics that affect product and process innovation are the same, although of course their impacts may differ. The last step estimates the productivity equation that is specified as a simple Cobb–Douglas technology with constant returns to scale, and with labor, capital and knowledge inputs, where we have "labor productivity" (real sales per employee, in logs); "investment intensity" that is our proxy for physical capital and "knowledge inputs" that are proxied by the predicted probability of product and process innovation.*

*Keywords: R&D, ICT, innovation, productivity, Turkey*

*JEL classification: L60, O31, O33*