

**An Empirical Analysis of Knowledge Production Function:
What differs among the OECD countries including Turkey?**

by

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To my wife Nalan, to my daughter Ecem Sude

and

To my brother Cem Guney

Declaration of Originality

This thesis does not contain any material which has been presented for a degree at the University of Sydney or any other university. Furthermore, it does not contain any copy or paraphrase which is published by another person, except it is explicitly acknowledged in the thesis.

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Abstract

Since the 1950s, economic growth has been one of the main topics of economic discipline. In this context, the sources of economic growth have been analysed by different economic theories. These theories can be decomposed into two groups, namely modern neoclassical theory and evolutionary economic theory.

In the modern neoclassical economic theory, the technological progress is considered as the main determinant of the long-run economic growth. In this regard, the sources of economic growth differences among countries are analyzed by using various types of models. In the earliest studies, it is assumed that technological progress is exogenous (Solow-Swan model). Constant returns to scale and perfectly competitive market structure assumptions are the main characteristics of these studies. After the developments in the economic theory, technological progress has been taken into account in a different way by a new line of models, namely endogenous growth models. More specifically, technological progress is endogenously determined process in these models. Contrary to the previous models, increasing returns to scale, which stem from externality and the monopolistic market structure, play a significant role in endogenous growth models. We have reached to the conclusion that, although it suffers from some weaknesses, endogenous growth model proposes a more realistic explanation for the economic growth process.

In the evolutionary economic theory, technological progress is also considered as the main determinant of economic growth. However, this theory deals with empirical issues by focusing on observed facts instead of constructing theoretical models, and provides both guidance and interpretation regarding technological progress. In this theory, variables and relationships that are considered have many practical implications. In that respect, its structure is very much realistic and it avoids certain logical gaps and inconsistencies.

One of the aims of this thesis is to examine developments in economic theory by focusing on technological progress. For this purpose, we compare formal and evolutionary theories. Our theoretical review reveals that both the endogenous growth models in the tradition of modern neoclassical theory, and the important insights of the evolutionary economic theory help to analyze technological progress and/or economic growth.

Furthermore, this thesis aims to measure technological progress. The measurement of technological progress is vital for the nations' development strategies and the firms' innovation policies. In this regard, we use patent statistics as a proxy of technological progress.

The empirical parts of the thesis involve a number of applications of endogenous growth theory by taking into account the propositions of modern neoclassical economic theory. In this regard, the growth rate differences across countries are examined by using the frameworks of both the modern

neoclassical and evolutionary theories. The results show that both theories have reasonable power to explain why growth rate differs across countries. In addition, we conclude that patenting activities rather than R&D activities more suitably represent innovative activities.

Moreover, this thesis empirically tests the knowledge generation process in the framework of endogenous growth approach. We employ the knowledge production approach for this purpose. It is found that both domestic and international stocks of knowledge as measured by granted patent statistics, R&D activities, human capital and openness measures are significant factors in explaining productivity growth.

Furthermore, product variety and quality improvement dimensions of technological progress are empirically analyzed by using patent statistics. It is found that both dimensions of technological progress significantly affect creation of new technologies. Finally, the findings indicate that technological capability of Turkey is far away from other developed countries covered by this study.