# Chapter 19
# Competition and Product Innovation by Turkish Firms

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## ABSTRACT

*This chapter examines empirically the determinants of research and development (R&D) activities by Turkish firms. It focuses on the question of how competition affects product innovation, and not process innovation, in Turkey. In particular, we test if there is a non-linear relationship between R&D activities of a firm and the degree of competition in that industry. We use Turkish firm-level data from the Business Environment and Enterprise Performance Survey (BEEPS) and find strong support for an inverted-U relationship between the two variables.*

## INTRODUCTION

Turkey has been trying to enhance its export performance, particularly to the European Union (EU) market, but has been falling between two stools in this regard. The key question is what type of product to export. If it tries to promote relatively low-quality products such as textiles, it faces stiff competition from poorer countries where wage costs are much lower. If it tries to export high-quality products, then also it faces an uphill task as it cannot compete with other developed countries in terms of the level of quality (Lall, 2000). As a result, recent focus in Turkey has been to encourage product innovation in manufacturing industries in

order to compete more effectively at the high-end of the EU market (see, for example, Bozkurt (2013) for the effects of technological shocks on economic growth, Gökmenoğlu et al. (2012) for the factors affecting national competitiveness, Işık ve Kılınç (2012) and Müftüoğlu et al. (2009) for regional innovation challenges in Turkey, and Pamukçu et al (2009) for the effects of globalization on Turkish R&D). With R&D expenditures being 0.85% of GDP in 2010, Turkey is well below the EU-27 average of 1.91% and the U.S. figure of 2.90% (OECD, 2012). The Turkish government has recently started to increase its commitment to R&D. TEYDEB (Technology and Innovation Grant Programs Directorate) of the Technological

Research Council of Turkey (TUBITAK) administers R&D and innovation grant programs for industrial projects. The largest shares of grants are given to machinery and manufacturing, including the automotive sector, and information technologies and electronics. Some of the funded projects include developing air-bag technology for vehicles, development of electric vehicles, sustainable energy and environmental technologies (an example is the development of energy saving washers), advanced material technologies, industrial design, nanotechnology, medical/biomedical research (an example is the development of a new drug for high-blood pressure) (Tubitak, 2011). The purpose of these initiatives is to make Turkish manufacturing sector more competitive at the high-end of the EU market.

How does one encourage innovation by firms? Can industry-level competition policy affect product innovation by firms in the industry? It is the latter question that we try to address in this paper for the case of Turkey. The European Bank for Reconstruction and Development (EBRD) and the World Bank sponsored BEEPS (Business Environment and Enterprise Performance Survey) for the years 2002 and 2005 cover key manufacturing and service sectors and various measures for firms' characteristics such as age, ownership, employment size, financing, and business environment as well as explicit measures of competition and innovation. We use these data sets as well as some more aggregate level (industry level and regional level) data collected from Turkish sources to test for possible relationships between the degree of competition in an industry and product innovation by firms in that industry.

What type of relationship between the two variables one should expect *a priori*? This question has attracted the attention of many researchers, although the studies are about general R&D activities and not about product innovation in particular. The impact of market structure on innovation is mainly classified under the Schumpeterian view

or the Arrowian view. The Schumpeterian view is based on firm size and argues that the monopoly profits are like rewards to innovators so more competition decreases the incentives to innovate (see, for example, Spiegel & Tookes, 2008; Chen & Schwartz, 2010). The Arrowian view argues that a monopolist has fewer incentives to innovate than a competitive firm as the former's pre-invention monopoly power will act as a strong disincentive to further innovate. For the latter, the differential return on innovation will always be higher because it has no monopoly profits that are replaced (the "replacement effect" for monopoly; see Tirole, 1988). Aghion et al. (1998) present several theoretical cases where competition is conducive to innovation and growth. These divergent findings on, and channels in, the relationship between competition and innovation suggest a possible non-linear relationship, with different effects dominating at different levels of competition.

Gilbert (2006a) argues that innovation incentives should peak at moderate levels of competition, suggesting a U-shaped relationship. Aghion et al. (2005) use a patent race model and are able to establish an inverted U-shaped relationship between product market competition and innovation. While Askenazy et al. (2008) extend this model by taking into account the effects of size and cost, Castellacci (2011) argues that the escape-competition effect is more likely to be observed on the latter stages of the innovation chain, while Schumpeterian effect is more dominant in the earlier stages. Tishler and Milstein (2009) predict a U-shaped relationship between competition and product innovation in a two-stage oligopoly model. Belleflamme and Vergari (2011) extend Arrow's model for Cournot competition, and find that the profit incentive has an inverted-U shape if one firm is the only one to use innovation outcome in an oligopoly model with differentiated products. De Bondt and Vandekerckhove (2010) conclude that the relationship depends on the competition mode and R&D competition or cooperation, and

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