DRIVERS OF INNOVATION IN AN EMERGING MARKET CONTEXT: EVIDENCE FROM TURKEY

by
Nursel AYDINER AVSAR
and
M. Burak ONEMLI

MOTIVATION OF THE STUDY

- In a rapidly changing international economic environment, innovation has become the pathway to increasing international competitiveness and enhancing economic development especially for emerging market economies.
- The competitive conditions have significantly changed in the EU market especially after the increasing importance of China in those markets with the phase-out of MFA.
- Turkey is a particularly interesting case to investigate with its proximity to EU as its main trading partner.

OBJECTIVE OF THE STUDY

- This paper aims to study the determinants of innovation in the case of Turkey using micro data.
- We first present the descriptive picture of the innovation activities decision of firms located in Izmir, Turkey.
- We then set out the econometric framework for firms' decision to innovate using the overall Turkish sample based on data from 2010 Turkey Innovation Survey.

OUTLINE OF THE PRESENTATION

- Innovation Concept
- Theoretical Framework
- Izmir Development Agency Field Analysis of the Regional Innovation Strategy
- Major Findings
- Extensions to the Analysis

INNOVATION CONCEPT

- Schumpeter (1942) defines innovation as a process of “creative destruction”:
  - not only the creation of a new product but also the *commercialization* of the product, the creation of a new *system*, the *improvements* in the existing products and the *application* of an existing product, service or process to another field or sector. Therefore, it covers the whole stage from the introduction of the idea to the introduction of the product to the market.

INNOVATION CONCEPT

- Innovation takes two major forms as (OECD, 2005):
  - Technological product innovation
  - Technological process innovation

INNOVATION CONCEPT

- A **technological product innovation** refers to the implementation/commercialization of a product with improved performance characteristics.

❖ either a technologically new product or a technologically improved product.

- A **technological process innovation** refers to the implementation/adoption of new or significantly improved methods of production or product delivery.

❖ either changes in equipment, production organization, human resources, working methods or combination of these; or they can be derived from the use of new knowledge.

INNOVATION – THEORETICAL FRAMEWORK

Both internal and external processes that are ingredients to the creation of innovation capability:

- Internal factors refer to training, learning by using and learning by searching (Dosi, 1988)
- External factors refer to learning by interacting (Lundvall, 1988).

INNOVATION – THEORETICAL FRAMEWORK

- Governments play an important role by stimulating the development of industrial technological capacity through establishing the required institutional environment, strengthening access to financial institutions as well as reducing risks and transactions costs involved in the process (Hallberg, 2000).

INNOVATION – THEORETICAL FRAMEWORK

Internal processes are captured by firm-specific factors while external processes are measured by industry-level factors:

- Internal processes include firm-specific factors such as firm size, firm age, labor force qualifications including the skill level of the workforce, as well as the use of ICT in the firm.
- External processes refer to sector-level measures such as market structure, firm's participation in international markets, and potential learning sources including subcontracting relationships, technology outsourcing or agglomeration economies (Başçavuşoğlu, Moreau & Çolakoğlu, 2011).

INNOVATION – THEORETICAL FRAMEWORK

- **Firm size** is expected to influence a firm's decision to innovate positively:
  - Large firms can spread the fixed costs related to innovation activities over a larger volume of production.
  - They have more resources at their disposal and they have easier access to capital market to finance their spending on innovation.
  - They are more likely to be able to employ highly-qualified employees needed for innovation activities

INNOVATION – THEORETICAL FRAMEWORK

- **Market structure** is cited as an important factor affecting innovative activities (Arrow, 1962):
  - Firms with greater market power are more likely to be able to finance their R&D activities and to appropriate the returns from innovation (Schumpeter, 1942).
  - In case of collusion between firms, oligopolistic market structure may negatively affect innovation behavior (Pamukçu, 2003).

INNOVATION – THEORETICAL FRAMEWORK

- **Profit** is another factor that may affect a firm's decision to innovate in two different ways (Pamukçu, 2003):
  - Higher profits mean higher internal resources, which in turn, may imply a higher probability for a firm to innovate.
  - However, lower profits may act as an incentive mechanism for firms that are facing the likelihood to lose their market share (Kumar & Saqib, 1996).

INNOVATION – THEORETICAL FRAMEWORK

- Absorbing existing technologies is a common practice in developing countries in their innovation activities:
  - The stock of **skilled labor force** is an important measure in different stages of absorbing, transferring and assimilating existing technologies from developed countries.
  - Hence a firm with a higher level of highly-qualified labor force may have more innovative capacity.

INNOVATION – THEORETICAL FRAMEWORK

- Agglomeration externalities and institutional environment are two important external factors that are likely to affect a firm's decision to innovate:
  - No clear relationship in the literature as to whether more specialized or more diversified structures foster innovativeness.
  - Institutional environment refers to different aspects of economic and social development including factors such as human capital endowment, infrastructures and public investments (Başçavuşoğlu-Moreau & Çolakoğlu, 2011).

INNOVATION – THEORETICAL FRAMEWORK

- Globalization: trade liberalization & FDI
  - Increased foreign competition is likely to induce firms to innovate in order to gain or at least protect their market shares.
  - Foreign direct investment may foster innovation by increasing access to technology that may be otherwise difficult; on the other hand, if the technology gap between local and foreign firms is deep, then it may even generate a negative effect on local firms by putting intense pressure on them and leading to loss of their market share (Pamukçu, 2003).

INNOVATION IN TURKEY

- Although Turkey lags behind EU-27 countries in innovation activities, it is among the catching-up countries and is a moderate growing country (European Innovation Scoreboard, 2009).

INNOVATION IN TURKEY

- Using data for 1995-1997, Uzun (2001) finds that innovation is more common in large firms and it is mainly driven by in-house R&D.

- Özçelik & Taymaz (2002) find that process innovation and R&D activities play an important role in increasing the international competitiveness of Turkish firms.

- Using data for 1989-93, Pamukçu (2003) shows that trade liberalization had a positive impact on innovation decision of firms mainly through technology embodied in imported machinery.

INNOVATION IN TURKEY

- Yurtseven and Tandoğan (2012) find that Turkish firms are more inclined towards process innovations rather than new product innovations; and reduced labor cost and reduced energy and material consumption play an important role in process innovations.
- Studying the 1995-2000 period, Lenger and Taymaz (2006) find that vertical spillovers from FDI are significant for innovativeness only in high-tech industries. Similarly foreign ownership plays a significant role for innovativeness of a firm only in high-tech industries.

IZMIR DEVELOPEMENT AGENCY FIELD ANALYSIS OF REGIONAL INNOVATION STRATEGY

Based on the 2010 business records of 760 firms from 24 sectors which can be categorized under 4 groups:

- Information and Communication
- Electricity, gas, steam and air conditioning
- Manufacturing
- Water supply, sewerage, waste management and remediation

IZMIR DEVELOPEMENT AGENCY FIELD ANALYSIS OF REGIONAL INNOVATION STRATEGY

- The survey attempts to shed light on innovation performance of a large number of enterprises.

- There are questions regarding enterprise characteristics including their legal status, age, location, sectoral distribution, whether they have an R&D department or not, the share of R&D staff in the average number of employees and the share of R&D expenditures in the average revenue.

- The survey also includes questions asking enterprises to evaluate their innovation performance. The objective is to determine the drivers and barriers of new product development and innovation.

The enterprise characteristics reveal following facts (continued)

- 62% of the firms are less than 10 yeas old.
- 42% of the firms are family enterprises.
- Most of the firms are located inside the city residential area.
- Only 15 % of the firms have an R&D department.

The enterprise characteristics reveal following facts (continued)

- The share of R&D employees in total employment is only 4.5%.

- The share of R&D expenditures in total revenue is only 4.7%.

- The share of firms that introduced new/significantly improved / developed goods or services is 24.8%.

- The share of new goods and services for the market in total revenue is 26%.

The enterprise characteristics reveal following facts (continued):

- 106 out of 760 firms received financial support in innovation activities.

- The share of firms with successful innovation or R&D activities is 81%.

- 43% of those that were not successful listed lack of equity capital; 26% listed economic crises and 11% listed lack specialized labor force and knowledge as the main reasons behind their failure.

Overview of R&D and Innovation Strategy of Enterprises:

- The share of firms with entirely new product innovation is 35.3%.
- The share of firms with product improvements is 44.3%.
- The share of firms with process improvements is 41.4%.
- However 25.3 % of the enterprises do not find their innovation and R&D performance satisfactory.

Overview of R&D and Innovation Strategy of Enterprises (Continued):

- The share of firms that finance their innovation activities through equity capital is 41.3 %.

- The share of firms that implement innovation oriented performance system for their employees is 32%.

- The share of firms that state the government implement an effective and easily accessible support system for innovation is only 15.8%.

IZMIR DEVELOPEMENT AGENCY FIELD ANALYSIS OF REGIONAL INNOVATION STRATEGY

- Barriers to Innovation and R&D Activities of Enterprises:

- Not having sufficient knowledge on innovation management: 36.5% of enterprises.

- Not having knowledge on intellectual property management : 41.5% of enterprises.

- Having weak relationship and network with universities: 45% of enterprises.

Barriers to Innovation and R&D Activities of Enterprises (Continued):

- Not having sufficient knowledge R&D and innovation support: 46.4 % of enterprises.
- Having difficulties in finding qualified labor force: 52.4%.
- Having difficulties in access to supports for R&D and innovation projects: 52.8% of enterprises.
- Having insufficient financial resources for innovation: 63.5% enterprises.

What is next?

- Our next step is to econometrically test the determinants of successful innovation activities. In this respect, we will test following logit model:

$$\text{logit}\,(\pi_i) = \log\left(\frac{\pi_i}{1-\pi_i}\right) = X'\beta + \varepsilon$$

or, equivalently

$$\frac{\pi_i}{1-\pi_i} = \exp\left(X'\beta + \varepsilon\right)$$