Patterns of innovative behavior of Russian manufacturing firms: analysis of firm-level data.

Vitaliy Roud[1] (vitaliy.roud@gmail.com)

For MEIDE Conference, 2008

Introduction

This abstract presents the preliminary information on the firm-level data research on innovative activities in Russian manufacturing sector. Major purpose of this research is to address the complexity and heterogeneity of the innovation process under the conditions of the economy of transition in order to identify the correspondence between patterns of innovative behavior and economic effectiveness of the firms.

Two decades of extreme economic shocks greatly affected structure of all the sectors of Russian economy. Even within a single industry enterprises are highly heterogeneous. Legacy companies, established before the dismantle of the Soviet Union, newly created private firms, the increasing sector of state-owned enterprises and international corporations operate simultaneously but differ significantly in terms of business process organization, networking behavior, risk management and, eventually, innovative activities. While experiencing this degree of heterogeneity, it is important to outline the dominant patterns of agents' behavior and address different types of agents distinctively in order to understand the internal mechanics of national innovation system. To the author's opinion, analysis of non-aggregate results of Russian survey of innovative activities of enterprises could contribute to the topic described.

[1] Research Assistant of Institute for Statistical Studies and Economics of Knowledge,

State University – Higher School for Economics, Moscow, Russian Federation.

Literature background

While developing a new typology, this study uses the taxonomy of innovative firms introduced by Pavitt (1984) as a reference and sanity check. This study also takes into account the results of R. Evangelista (2000) on the sectoral patterns of technological change in Italian service sector firms. However, because of high degree of heterogeneity of firms within industries, this study concentrates on firm-level analysis instead of working with industry- or sector-level data.

The immediate background for this research is a series of studies on the innovation patterns in Sweden (Arvanitis, Hollenstein, 1998, Hollenstein, 2002). These studies utilize the cluster analysis technique to find the dominant types of innovative behavior. The distinction of this research is usage of intermediate level of clustering in order to elucidate not only the final typology of innovation but also to get the patterns of firms' behavior in certain areas, such as innovation expenditure distribution, networking and cooperation activity within and outside national borders and others, while resulting typology is constructed on the basis of these intermediate classes via second level of clustering.

The Data

This study is based on the results of the series of annual Russian surveys of innovative activities of enterprises. The dataset used in this study covers time horizon of years 2002-2005 and the companies of the manufacturing sector (NACE C, D and E). The number of observations varies each year from roughly 25000 to 29000 enterprises. In terms of sales total in current prices, the dataset available for this study covers nearly 70% of overall sales total in the sector of manufacturing registered by Russian State Statistical Bureau.

The Procedure

At the first step of the analysis, the initial set of 167 variables was divided into several blocks that were clustered separately, forming the intermediate level of classification.

The first step of clustering resulted in the following qualitative variables, describing certain aspects of innovative activities:

- Strategy of financing innovation
- Strategy of innovation expenditure distribution
- Utilization of sources of information for innovation

- Strategy of intellectual property protection
- In-country cooperation activity
- Cooperation activity with organizations outside Russia
- Knowledge distribution activity inside Russia
- Knowledge distribution activity outside Russia
- Results of innovative activities
- Organizational innovations
- Factors that slow down innovations

Firms from different years were clustered separately. Inspiring by the moment is the fact, that clustering demonstrates robustness in sense of centroids stability in a cross-year perspective and also in sense of algorithm selection: simple k-means clustering and expectation maximization technique showed nearly identical results.

Separating these qualitative variables provides a great flexibility of the further analysis. Much attention is paid to the investigation of knowledge distribution and cooperation activity diversion inside and outside the country. It is crucial in order to describe and evaluate the dominant players in the knowledge import and export flows and in the in-country knowledge distribution. Also, careful analysis of innovation expenditure and financing strategies might contribute to explaining the differences in propensities to innovate between state-owned, private and foreign companies that can be observed at the aggregate level.

The next level of clustering exploits the results of the procedure described above. At this step, the final taxonomy of innovative firms is being constructed. Special attention is planned to be paid towards the analysis of economic outcome of different types of firms. Also, a test of statistical difference in the effectiveness of firm's internal innovative mechanics via CDM-type model (Crepon, Duguet, Mairesse, 1998) is planned.

References

- Arvanitis, S., Hollenstein, H., (2001) Innovative Activity and Firm Characteristics – A Cluster Analysis with Firm-level Data of Swiss Manufacturing. In: OECD, Innovative Networks: Co-operation in National Innovation Systems. OECD, Paris, pp. 48-76.
- Crepon B., Duguet E., Mairesse J., (1998), Research, Innovation and Productivity: An Econometric Analysis at the Firm Level, Economics of Innovation and New Technology 7, 115-158.
- Evangelista, R., (2000), Sectoral patterns of technological change in services, economics of innovation. Economics of Innovation and New Technology 9, 183-221
- Hollenstein, H., (2003), Innovation modes in the Swiss service sector: a cluster analysis based on firm-level data. Research Policy 32, pp. 845-863
- Pavitt, K., (1984), Sectoral patterns of technological change: towards a taxonomy and a theory. Research Policy 13, 343-373