COMPETITIVENESS OF NEW ENTRANTS IN THE ENLARGED EU – SOURCES AND POLICY IMPLICATIONS

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Abstract

The paper presents analytical approaches to evaluation of competitive advantage with emphasis on qualitative positions of countries at different levels of economic development within EU-25. Competitive advantage is assessed according to its sources, i.e. as cost-based or quality-based, and according to the sources of technology knowledge or the level of innovation capacity. These criteria make a clear distinction between groups of developed and less developed EU members. The example of the Czech Republic, as to the export performance, productivity and R&D intensity of the so-called hi-tech activities, has been used to present a more detailed analysis of competitive advantage sources. A major part of hi-tech production and export in new EU members comes from FDI affiliates. The analysis therefore emphasizes the criterion of (in)completeness of the multinational value chain, which continues to consist mainly of segments with lower quality intensity (assembly operations) in these countries. This aspect plays a crucial role in international comparison of competitiveness within EU-25, and in assessment of success and political support of transition to knowledge-based economy.

Key words: *competitive advantage, innovation performance, technology capacity*

1 Introduction

A quality-based competitive advantage is a source of long-term sustainable growth and, consequently, of economic prosperity. Its formation and development is conditional on the availability of an adequate range of qualitative factors, i.e. technology, human resources and appropriate institutional environment, and on comprehensiveness and sophistication of business operations and strategies allowing the efficient factor employment. In addition, in the globalized economy, also country or company position in the multinational value chain gains greater importance. The position is characterised by the completeness of the value chain, i.e. whether it also includes the more quality intensive segments (R&D, marketing and distribution, sales under renowned brand), or whether it is limited to the less technology and skill intensive activities.

In the case of EU members, the above-mentioned characteristics of the competitiveness are first presented in terms of competitive advantage matrix distinguishing between the qualitative and cost factors, and between internal and external sources of technology knowledge. The following section presents the export performance of hi-tech activities, which demonstrates a relatively favourable position of the new entrants within the enlarged EU. More detailed specification of this position follows in terms of productivity, export, R&D and patent intensities. This specification points to the importance of the country positions in the multinational value chain according to which their competitiveness is to be assessed and the related political support formulated and realized..

2 Competition advantage matrix

A cross-sectional assessment of competitive advantage is presented in terms of its sources and the level of innovation capacity. This assessment is based on the concept of the global competitiveness index presented by Sala-i-Martin and Artadi (2004) with a reference to Porter (2003). This concept identifies qualitatively different sources of competitiveness (of countries and firms) prevailing in three development stages. Economic success based on lower development stages of competitiveness ultimately leads to its loss due to growing input costs, in particular wages. Long-term sustainable growth performance therefore requires gradual transition to qualitatively higher sources of competitive advantage, i.e. more intensive in internal innovation capability.

In the initial *factor-driven development stage*, firms compete mainly in price, i.e. with the advantage of cheap inputs using technology invented elsewhere. In the *efficiency-driven stage*, the productivity is determined mainly by the product quality (no longer solely by the price) and efficient production practices. The technology capacity, i.e. access to the best available technology even adopted from abroad, makes for the key qualitative characteristic of competitiveness in this stage. In the *innovation-driven stage*, i.e. the qualitatively highest, the innovation capacity (the ability to produce new products and processes using the most advanced methods of production and organisation) becomes the key characteristic for a competitive advantage.

2.1 Sources of competitive advantage

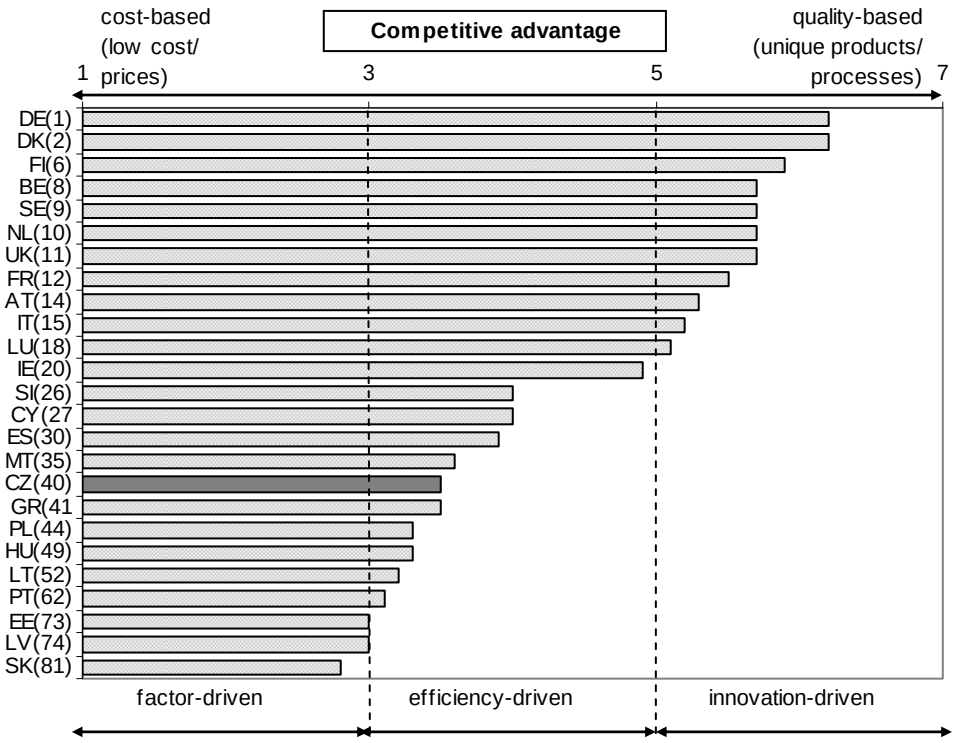
The starting assessment of country positions within EU-25 is based on an indicator delineating two extreme *sources of a competitive advantage* – on the one hand, low costs or local natural resources (sensitive to the price competitiveness or price changes), on the other hand, unique products and processes that are difficult to imitate. Movement between the two extreme positions can also be described as transition from a cost/price-based competitive advantage to a quality-based advantage. A scale from 1 (the worst result) to 7 (the best result) can be used to identify the three development stages of competitiveness (or its qualitative segments, see Figure 1).[1]

The EU country positions (within 104 countries in total) are identified using the results of expert survey undertaken by the World Economic Forum (WEF 2004). EU members are assigned either to the efficiency-driven stage, or to the innovation-driven stage. Application of this criterion to EU-25 makes for relatively clear identification of two country groups. The first twelve countries (including the borderline Ireland)[2] can be described as countries with an innovation-driven competitive advantage, while the remaining thirteen countries (including the borderline Slovakia) can be described as countries with an efficiency-driven competitive advantage. The competitive advantage in the first country group can be assessed as predominantly quality-based, while the competitive advantage in the second group as mainly cost-based. Differences between individual EU countries are considerable not only in the very assessment, but also in the final ranking within the group of 104 countries.

New EU members (together with Spain, Portugal and Greece) form a group (EU-13) with a competitive advantage that can be assigned to the efficiency-driven development

stage, nonetheless still based mainly on relatively lower costs (prices). The transition to an efficiency-driven and rather quality-based competitive advantage therefore presents a great challenge. In these countries, at the same time, considerable differences in the economic performance between domestic and foreign business sectors show up. The question remains whether the differences in the economic performance are also reflected in the qualitative levels of their competitive advantage.

Figure 1: Sources of competitive advantage, 2004



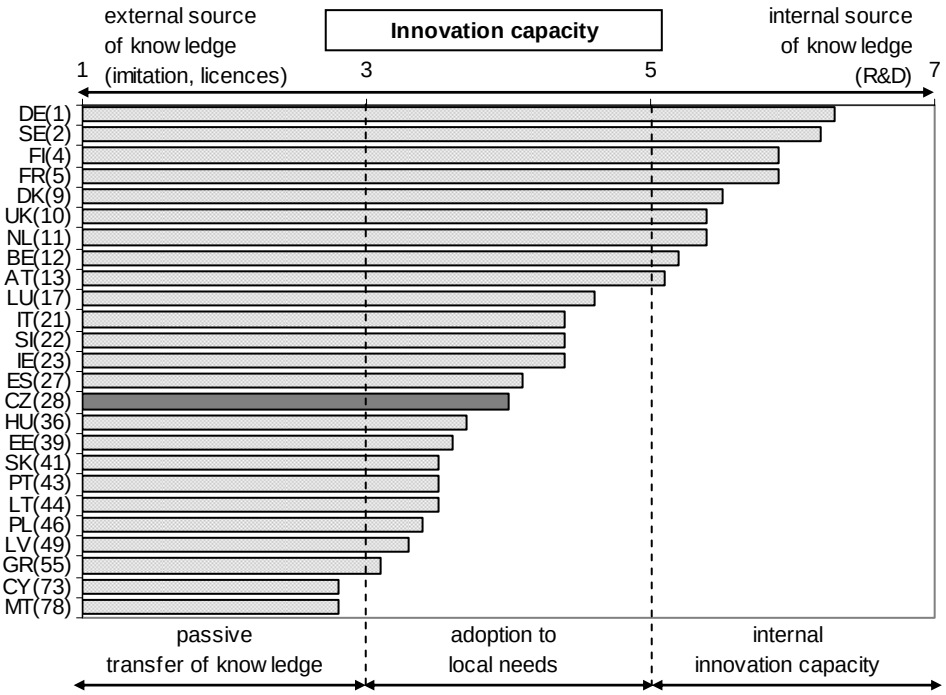
Note: Ranking within 104 countries; 7 – the best result, 1 – the worst result.
Source: WEF (2004), own modifications.

2.2 Sources of technology knowledge and level of innovation capacity

A closely related aspect of competitive advantage assessment is that of sources of technology knowledge or the level of (internal) innovation capacity. Two opposite positions are identified also in this case – on the one hand, knowledge acquired mainly through licences and imitation of foreign technology, and, on the other hand, through internal research activities leading to the creation and introduction of new products and processes. Understandably, certain intermediate stages, reflecting the development of local knowledge base, can be identified between the two extremes (see Figure 2).

Although this comparison shows that both the new and less developed EU members continue to depend mainly on external sources of technology knowledge, they are able to adapt it to the local needs, though in environments still characterised by mainly cost-based competitive advantage. The question is how to encourage the technology transfer effectiveness on this qualitative level and gradual development of internal innovation capacity. Innovation strategies of FDI affiliates play crucial role in this regard.

Figure 2: Sources of technology knowledge and level of innovation capacity, 2004



Note: Ranking within 104 countries; 7 – the best result, 1 – the worst result
Source: WEF (2004), own modifications.

The fundamental precondition for successful technology transfer lies in the very technology openness of the local economic agents, i.e. knowledge of new technology and intense interest in its acquisition. The effectiveness of technology transfer decisively depends on the development of the local knowledge base. Its level understandably gains increasing importance with growing role of internal innovation capacity. However, even passive adoption of foreign technology requires adequate (minimum) level of knowledge. The importance and level of these prerequisites increases in the next development stage, allowing adoption of imported technology to the local needs.

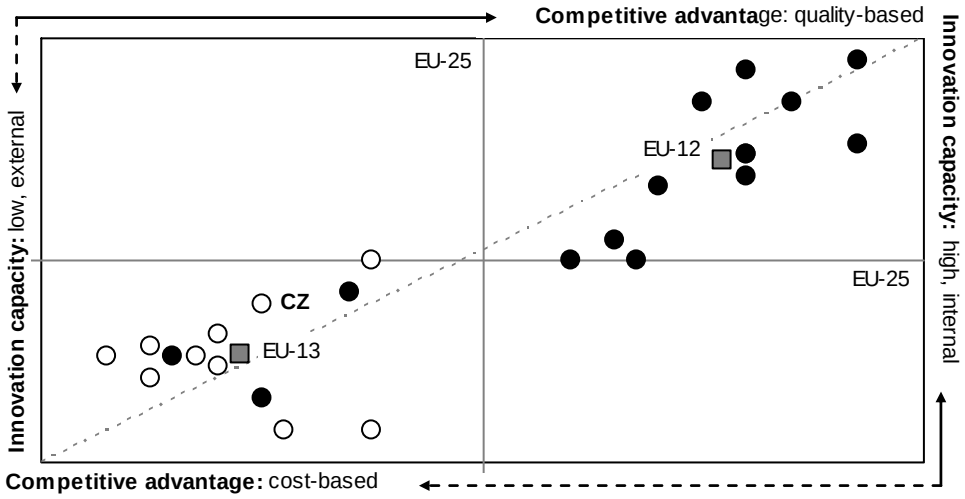
The most important sources of external technology knowledge (technology transfer) include import (especially import of technology intensive machinery – capital assets), foreign direct investment (developing technology intensive production activities in the host country) and export (through the competitive pressure of other exporters and sophisticated demand on demanding markets). The technology transfer intensity through foreign direct investment depends on the position of affiliates in the multinational value chain and this position is in turn influenced by the development of the local knowledge base referred to above. However, the position in the multinational chain also influences the technology transfer intensity through import and export activities.[3]

2.3 Competitive advantage matrix

Country positions within EU-25 can be identified in the *competitive advantage matrix* (see Figure 3) based on a combination of indicators of competitive advantage sources and technology knowledge sources (level of innovation capacity). This matrix relatively

clearly identifies the lagging behind of the group of new and less developed EU members (EU-13) as compared to the more advanced members (EU-12).

Figure 3: Competitive advantage matrix



Source: WEF (2004), own modifications.

The lagging behind is demonstrated by the predominantly cost-based competitive advantage, i.e. by low importance of unique products and processes, while the competitiveness is mainly driven by efficiency. The lagging behind can also be clearly observed in the persisting dependency on external sources of technology knowledge, i.e. by low importance of internal knowledge sources (research and development activities). Although internal innovation capacity of these countries is still insufficiently developed, they are able to adopt external technology knowledge. Quite remarkable differences in individual country positions in the competitiveness matrix indicate the necessity of specifying policy tools for support of competitiveness at country levels.[4]

3 Export performance of hi-tech activities

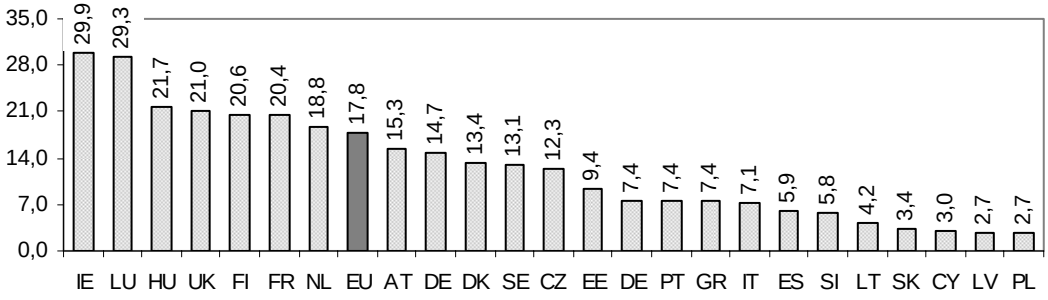
The share of hi-tech export is a closely observed and prestigious indicator of a competitive advantage in the so-called knowledge-based economy. According to the European Commission definition, this indicator reflects the ability to exploit commercially the results of R&D and technology innovation on international markets (Kaderabkova et al. 2005). Therefore, the high-tech export or its growth in time can also demonstrate effective functioning of national innovation system, which supports the transformation of innovation inputs into innovation outputs with measurable economic benefit.

The interest of companies and governments in hi-tech activities is motivated by a number of positive effects, which include especially the creation of high skill intensive jobs and their continuous development, high wages, fast growth in trade and productivity, high profits, high intensity of research and development activities and innovation, and high incidence of related positive externalities (OECD 2005). Technology intensity of production attracts related quality intensive inputs and supports their further development. Business demand for research and development and high skills stimulates the creation of their corresponding supply and the interest of private sector in its support.

Hi-tech products compete in quality at relatively high prices. Hence their quality-based competitive advantage as opposed to an advantage based mainly on low costs and prices. Higher prices of products mean higher income for the expended production factors, i.e. high evaluation of inputs. What's more, life cycles of products in these industries tend to be short and this results in enormous pressure on the speed of their replacement with new, technologically comparable or preferably superior varieties. This pressure drives further investment into research and development, and training. This virtuous circle drives development of knowledge intensive activities in a knowledge-based economy.

According to the recent EUROSTAT statistical data (Figure 4), new EU members with the highest share of hi-tech products in the total export are (disregarding the specific case of Malta) Hungary, and, with a remarkable distance, the Czech Republic (with an increase by 4.5 percentage point in hi-tech export share compared to 1999). Hungary holds the third position within the EU. Although the share achieved in the Czech Republic remains lower than the (weighted) average for EU-25, it is only slightly below the levels achieved by Sweden or Denmark.

Figure 4: Share of hi-tech export in total export of EU members, 2003 (in %)



Source: EUROSTAT (2005).

Can the increasing shares of hi-tech exports in new EU members be evaluated as demonstration of their successful transition to the knowledge-based economy? Can it be seen as increasing importance and economic effect of a quality-based competitive advantage? Could this development even justify, for example, more intensive public support for development of the hi-tech industry, including industry-specific investment incentives? Answering these questions is complicated due to the limited explanatory value of the exploited indicators as they fail to take into account positions of the exporting countries in the global value chain. Multinational corporations are the most important exporters of hi-tech products in new EU members at the corporate level. However, their affiliates in less developed countries with low production costs mostly only assemble imported parts and components.

4 Quality intensity of position in multinational value chain

Classification of products with the relevant SITC code produced in FDI affiliates as hi-tech is justified. However, this classification is based on the criteria of a complete value chain, which contains not only production itself, but also research and development segments and other, knowledge-intensive activities. However, these quality intensive

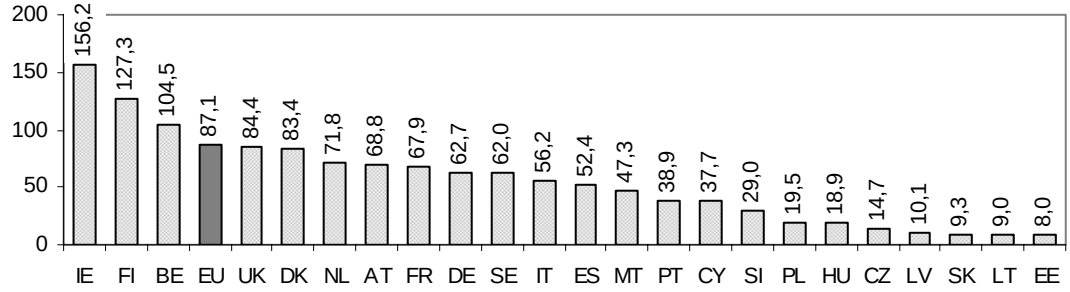
segments remain located mainly in home countries of foreign investors with adequately developed local knowledge base. On the other hand, the quality more intensive segments are not represented in the host economy (with less developed knowledge base) or their occurrence is very limited (Kaderabkova 2005a, 2005b).

4.1 R&D intensity and productivity

A more detailed analysis of hi-tech activities in new EU members does not reveal any significant differences compared to other industries regarding the intensity in qualitative inputs (research and development and high skills), or regarding the level of productivity or unit values. On the other hand, the group of hi-tech industries in developed countries is (mostly much) more productive and more intensive in research and development and skills compared to other, technology less intensive industry groups.

The above given diverse characteristics of hi-tech activities as to their productivity and quality intensity can be illustrated on the example of the Czech Republic (CZSO 2004). The share of hi-tech industries in research and development expenditure in this country is low and even lower as compared to 1995 (with the drop from 18.2 % to 17.2 % in 2002). The labour productivity in hi-tech industries does not differ significantly from the manufacturing average or from groups with lower technology intensity. In 2002, the hi-tech productivity reached mere 112 % of the average for the Czech manufacturing. In general, in broader international comparison, the labour productivity in hi-tech industries in less developed EU countries is very low (Figure 5) and without any significant differences compared to the productivity in the manufacturing (EUROSTAT 2005).

Figure 5: Labour productivity in hi-tech industries in the EU, 2001-2002 (in thousand EUR)



Source: EUROSTAT (2005) and own calculations.

The actual technology intensity of the Czech hi-tech industries (the share of R&D expenditure in value added) has been low and even decreases in time (from 7 % in 1995 to 5 % in 2002). The R&D intensity in hi-tech industries with the most important export activities is even lower, less than 4 % in electronics and only 0.14 % in computers. The R&D intensity in hi-tech industries in developed EU countries usually exceeds 20-25 %. In addition, the share of professions with high skill intensity in hi-tech industries in the Czech Republic is also low, as it is reflected in the share of R&D employees in total employment (2.6 %). Other less developed EU countries also achieve low levels of R&D intensity of hi-tech industries.

4.2 Hi-tech assembly in FDI affiliates

The prevalence of the quality less intensive segments, such as assembly operations, in hi-tech activities in the knowledge less intensive countries is reflected also in the high import intensity of so called hi-tech exports (the trade balance of hi-tech products has been significantly passive on a long-term basis) and their high geographical concentration and product specialisation. This means that intermediate products (components and parts) are imported for inward processing and a very limited product range is exported to a very small number of countries (often one or two only). The low level of internal innovation capacity is also documented by the low level of patent activities in international comparison (see below).

The given characteristics are well illustrated by the following data for the Czech Republic. According to the CZSO data (2004), the share of FDI affiliates in the total export of hi-tech products from the Czech Republic in 2002 reached 91 % and their share in import 88 % (with a share in value added of 49 % and a share in research and development expenditure only 33.1 %). The Czech trade with hi-tech products is therefore considerably dominated by foreign companies. The most significant share of this trade is achieved on a long-term basis in two closely connected product groups, specifically in computers and electronics (these groups accounted for 70 % of hi-tech import and 78 % of export in 2003).

The assembly character of activities in the above mentioned product groups is also documented by the very high share of processing trade regime (export after inward processing accounted for 94 % of the total export in computers and 73 % in electronics). Closer examination of the range of foreign markets and the type of traded products is also revealing. Mainly components and parts are imported from Asian countries and final products are exported to the Western Europe.

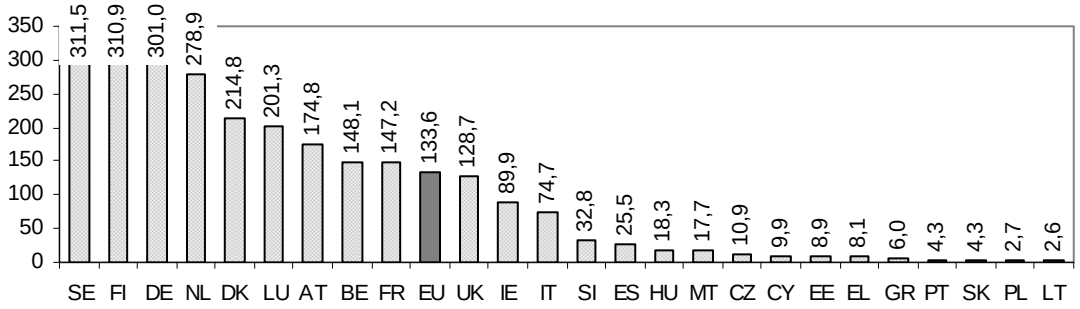
4.3 Low patent activity

New EU members lag far behind the more developed ones in the number of patent applications at the European Patent Office (EPO), see Figure 6, the Czech Republic ranks even lower than Slovenia and Hungary. The extent of the lagging in numbers of patent applications compared to the top EU countries in relation to the share of hi-tech export can be illustrated vis-à-vis Sweden. Although the difference in the position of the Czech Republic in hi-tech export is negligible, the number of patent applications per million inhabitants in 2002 reached only 11 in the Czech Republic compared to 312 in Sweden. (Moreover, it is necessary to point out that more than 55 % of these applications in the CR are based on inventions of foreign residents, while in Sweden only 27 %). Completely outside the game are EU members with less developed knowledge base in the so-called hi-tech patents. The number of applications at EPO for the CR (per million inhabitants) remains lower than one.

However, significant differences in patent activities can also be observed among EU members with similar levels of economic development. Comparison of indicators of shares of hi-tech export and numbers of patent applications at EPO (calculated per million inhabitants) is very revealing. For example, Ireland records a share of hi-tech ex-

port of almost 30 % with only 90 patent applications (of which 41 % is owned by foreign inventors). Finland reaches 21 % of hi-tech export and 311 patent applications (of which only 9 % is owned by foreign inventors).

Figure 6: Number of patent applications at EPO, 2002 (per million inhabitants)



Source: EUROSTAT (2005)

5 Conclusion

The level of internal innovation inputs and outputs in new EU members remains low, with prevailing dependence on external technology knowledge. This is mainly due to the persisting underdevelopment of domestic knowledge (technology) base. The question is what tools are to be used (given the limited availability of the quantity and quality of financial, technology and human resources) to encourage positive changes as effectively as possible or what agents may play the most important role in these changes .

Understandably, the low level of internal innovation capacity in less developed EU countries is closely associated with their quality non-intensive position in the multinational value chain. Low production costs remain the key factor for foreign investment localisation decisions. However, this advantage grows weaker with the increasing economic level and the question is how to encourage technology development toward increasing supply of unique products and processes and the increasing importance of localisation factors which are more quality intensive. Ideally, both of these supporting approaches should be combined. The benefit of the technology transfer of FDI activities will thus be maximised to ensure that they become an important and integral part of the national innovation system. In addition, the development of local knowledge base must be encouraged by measures that take into account specific needs of individual agents within the system as much as possible (business sector, higher education institutions, and government).

In most new members, the data on hi-tech activities only include a small segment of domestic economy and as the detailed analysis shows, only a very small part of this segment is based on internal national innovation capacity or at least creative use of technology transfer. This is why supporting a quality based competitive advantage based on “picking up winners” may be precarious. The increase of the role and quality intensity of hi-tech activities is a long-term process and its success (regarding export performance and the extent of positive knowledge spillovers) depends to a great extent on the development and the size of the local knowledge base across industries and groups of economic agents. Any support of innovation activities should therefore focus on eliminat-

ing or at least reducing the impact of factors causing the most companies in new EU members not to engage in any innovation activity (as indicated by CIS3 results in EUROSTAT 2005); in the Czech Republic this applies to 74 % of Czech and 60 % of FDI companies (CZSO 2005).

Notes

1. The concept used in Sala-i-Martin and Artadi (2004) distinguishes individual qualitative stages of competitiveness in terms of GDP per capita. In addition, the stages of transition are identified to the efficiency-driven and the innovation-driven competitiveness.
2. Ireland's position is borderline between the efficiency-driven and the innovation-driven stages. However, within EU-25 Ireland is closer to the group of countries in the innovation-driven stage. A borderline position may reflect a dual character of an economy with persisting dependency on external technology knowledge in the economically highly efficient segment of FDI companies.
3. A quality more intensive position also means higher technology intensity of imported machinery and exported products, and a broader range of undertaken activities (including international distribution and marketing), which allow closer contact with challenging demand and competition in technology more developed product segments.
4. Similar matrices can also be constructed at industry or regional levels. The different positions of constituent units can be (or should be) also used for the specification of political support.

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