International Technology Transfer to Bulgaria after its European Union Accession

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Summary:

The international flow of systematic knowledge and its successful utilization and absorption into domestic production and management processes are a key determinant for the ability of catching-up economies to compete in the global market and to narrow the technological gaps with developed economies. One of the most important dynamic effects of regional economic integration is the enhanced possibility of international technology transfer among participating countries. The European integration provides such an opportunity for the technological laggard Bulgaria. The objective of the paper is to provide an analysis of market-mediated international transfer of technology to Bulgaria after its European Union accession through the following major channels: foreign trade, foreign direct investment, licensing. The results show that the process of technological catching-up is not an automatic one and Bulgaria does not leverage its EU membership sufficiently to embark on a sustainable path of technological upgrading.

Key words: technology transfer, FDI, foreign trade, licensing, EU

JEL Classification: O30, F10, F15, F21

1. Introduction

The international flow of systematic knowledge and its successful utilization and absorption into domestic production and management processes are essential for the ability of catching-up economies to compete in the global economy, to improve productivity and promote export growth. Card and Krueger (1995, p.349) argue that there is "broad evidence that differences in technology, rather than differences in resources, are the most important determinant of the pattern of comparative advantage". Basically, there are two major drivers for achieving economic viability of countries - technological development based on the potential of the economy to generate innovation or to its ability to absorb and adapt new technologies created abroad (technology transfer). Given the technological backwardness of Bulgaria and its constrained innovative capacity[1] it is crucial for the country to absorb foreign technologies which worldwide are developed and owned by firms from a limited number of developed countries. In comparison with domestic development of new technologies, their introduction from abroad is cheaper, less risky and faster. As a technology-follower, the main challenge for Bulgaria is to utilize existing technologies at a rate faster than their renewal to prevent

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[1] According to expert estimates the domestic research and development potential is able to provide no more than 10-15% of the essential innovations for economic development (Angelov, I., 2006)

getting away further from the technological frontier. In the present stage of economic development it is not so important whether the technology is developed in the country or imported from abroad, the immediate task for Bulgarian firms is to acquire and use the best available technologies.

One of the most important dynamic effects of regional economic integration is the enhanced possibility of technological transfer among participating countries. The European integration provides such an opportunity for Bulgaria, which after the collapse of the Eastern bloc is facing the need to bridge the technology gap with developed economies by modernizing and replacing the outdated capital stock. Removing barriers to trade and allowing free movement of production factors stimulates the flow of new technologies. However, as noted by UNCTAD (2003, p.6), using new technologies is not a simple process -it entails the conscious building of "technological capabilities", a mixture of information, skills, interactions and routines that firms need in order to handle the tacit elements of technology. Contrary to the traditional neoclassical assumption, technology is not a freely available good and cannot be transferred as a physical product. Considering the cost, risk, duration and information deficits, firms on the free markets will tend to invest relatively less in new technologies requiring costly and risky long periods of absorption, which in turn affects negatively the process of technological modernization of the economy. This implies that Bulgaria's accession to the EU, although fostering international technology transfer, does not automatically guarantee the timely technological catch-up of our country.

The aim of the article is to observe the impact of the EU accession on the international transfer of technology to Bulgaria. A major problem for the analysis is the difficulty in accurately measuring the flows of technologies that are absorbed through the spill-over effects, trade, movement of people, imitation, etc. However, despite its imperfection as indicators, the paper presents data for the three key market-related international technology transfer channels - *foreign trade*, *foreign direct investment* and *licensing*[2] - that offer useful insights on the trends in technology diffusion in the country.

The article rests on commonly accepted research methods including analysis of statistical data, synthesis, abstraction, generalization, induction and deduction. The comparative approach has been widely used analyzing Bulgaria's performance and that of other similar countries. The study has employed relevant statistical data from various major sources – the Bulgarian National Bank, UNCTAD, Eurostat and the World Bank among others.

2. Foreign trade as a channel of international transfer of technology

A major channel through which technology may be transferred across international boundaries is foreign trade. Increased trade openness lowers the barriers to technology adoption. Imports bring new products embodying new ideas and knowledge to a country, hence, firms may gain insights from these innovative products and improve and adapt them for the local situation. While all imports bear some potential for transmitting technological information for they may be studied for design characteristics and reverse engineered, trade in capital goods can directly improve productivity by being placed into production processes. There are two different types of technology that capital goods may embody: technology as hardware,

[2] These are the three major market-related international technology transfer channels as identified in the economic literature – see: (Kneller, et al., 2009), Maskus (2004), UNCTAD (2012), Keller (2004)

represented by capital goods themselves and technology as information, represented by the knowledge content that capital goods may carry (UNCTAD, 2012, p. 15).

Coe, Helpman, and Hoffmaister (1997) established empirically that foreign R&D embodied in traded goods has a significantly positive impact on total factor productivity (TFP) of importing countries. This impact is greater the more open the countries are, the more skilled is their labour force, and in the case of developing countries, the more trade is with developed countries. In particular, a one-percent increase in the share in GDP of imports of machinery and equipment from OECD countries tended to boost TFP in developing countries by 0.3 percent per year. Xu and Wang (1999) find evidence of large productivity spill-overs through imports of capital goods, which presumably offer both a direct improvement in technology and indirect gains through demonstration impacts and reverse engineering.

In the course of European integration Bulgaria has oriented and strongly bound its foreign trade with the EU. Although today a significant part of Bulgarian import originates in technologically advanced countries (according to the National Statistical Institute 59.7% of it comes from the EU in 2013 and another 8.9% from other OECD countries), its technological intensity is rather low.

As figure1 shows, the leading product group in total Bulgarian imports during the recent years invariably is raw materials, which in 2013 have a share exceeding 35%. While these goods also contribute to TFP growth of the Bulgarian economy their technological content is extremely low and they cannot be conducive to technological progress. This is also true for the energy resources that in 2007 accounted for 19.7% of Bulgaria's imports and in six years have managed to increase their share to 23.4%.

At the same time investment (capital) goods, which to the greatest extent embody highly skilled labour and new technologies, have gradually reduced their importance in Bulgaria's imports from the world. In the years of full-fledged EU membership their share has fallen from nearly 28% in 2007 to 22.3% in 2013. With such a relatively low share of capital goods in its imports Bulgaria cannot rely on large-scale transfer of technology from abroad to bring its economy closer to the technological frontier.

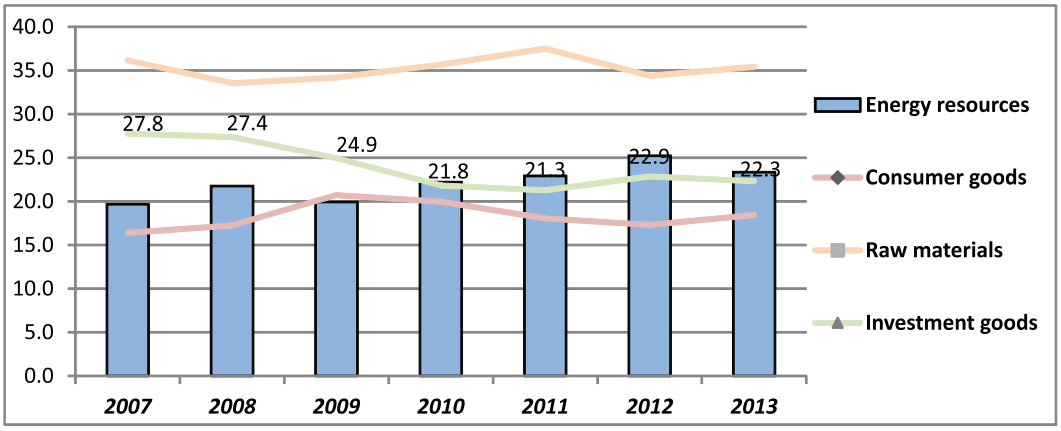

Fig. 1. Bulgarian imports from the world by end-use (2007-2013, %) *Source: Bulgarian National Bank*

Besides imports, exports also provide a channel for learning, taking into account the need for exporters to offer technical

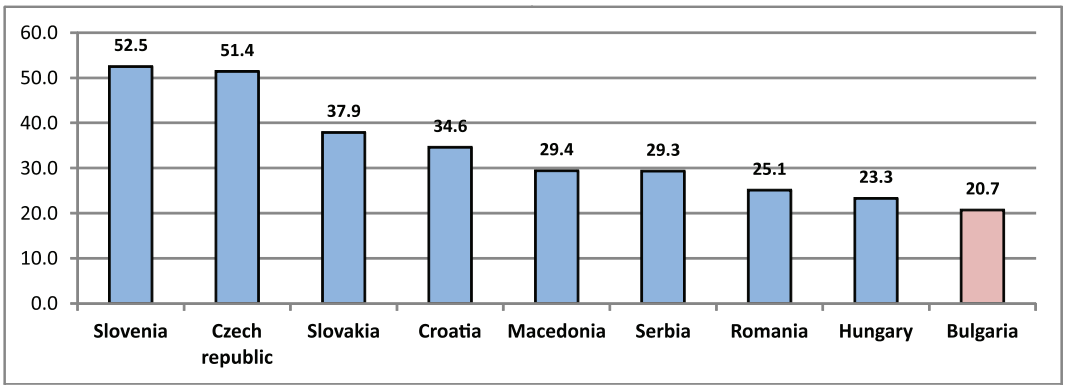

Fig. 2. Percent of manufacturing firms in Bulgaria and selected CEECs exporting directly or indirectly (at least 1% of their total annual sales) in 2013

Source: The World Bank, Enterprise Surveys

characteristics and quality levels that meet international standards. As stated by Kneller et al. (2009, p.4), interactions with foreign competitors and customers provide information on new products and technology that allows exporters to reduce costs and to improve quality. Foreign customers might offer technical assistance to exporting firms to adapt their products and technology to the requirements of international markets.

In Bulgaria the share of manufacturing firms that have a ratio of exports to sales of more than 1%, is significantly lower than in comparable countries from Central and Eastern Europe like the Czech Republic, Slovakia, Croatia and even the candidates for EU membership Serbia and Macedonia. According to the World Bank Enterprise surveys in 2013 only less than 21% of Bulgarian companies are exporting directly or indirectly some of their production abroad (fig. 2). Thus, it is conceivable that the relatively low export orientation of Bulgarian business limits the role of exports as a channel for international technology adoption in the economy.

Exports can serve as an important channel for technology absorption, where suppliers convey the knowledge of buyers from technologically advanced countries. International experience suggests that knowledge transfer is higher for transactions involving a larger number of

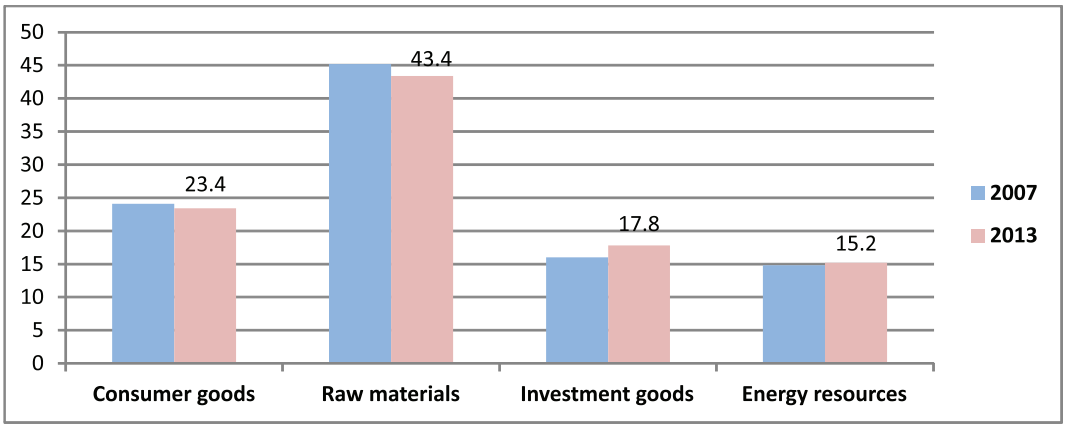

Fig. 3. Bulgarian exports to the world by end-use (2007, 2013, %) *Source: Bulgarian National Bank*

technologically complex processes or products. Although the majority of Bulgaria's exports are destined for more technologically advanced countries in the EU (60% in 2013), most of them (nearly 60%) consist of raw materials (43.4%) and energy resources (15.2%). These types of goods are not targeted at the high-quality market segments where the relationship with foreign buyers is more sustainable and based on knowledge sharing. Investment goods where one can expect the highest intensity of technology transfer still have a small share in total Bulgarian exports - less than 18% in 2013 (fig. 3).

Thus the worsened international specialization of the country in the years of transition to a market economy and the existing structural weaknesses in the Bulgarian economy do not enable it to make full use of its active trade relations with technologically advanced European partners and to realize a massive influx of new knowledge and technologies.

3. Foreign direct investment as a channel of international transfer of technology

Foreign direct investment (FDI) is widely considered as the most important, and often the cheapest, channel of international technology diffusion. According to UNCTAD (1999, p. 317) transnational corporations can bring new technologies to the host economy, some of which may not be available without FDI, and they can raise the efficiency with which existing technologies are used. They can also adapt technologies to local conditions, drawing upon their experience in other countries. Moreover, foreign investors can stimulate technical efficiency in local firms, suppliers, clients and competitors, by providing assistance, acting as role models and intensifying competition.

The realization of a foreign direct investment in a host country involves a range of activities which have a direct relation to technology transfer. These include acquisition of detailed engineering designs, importation of equipment, acquisition of key technology licences, recruitment and training of workers, hiring of external experts, and installation of machinery, among others. FDI is often accompanied by training, advice and support to the affiliate. In addition, the affiliates themselves may provide technology, training, advice and support to their suppliers and distributors in the country. The affiliate may also undertake R&D activities to adapt its products and services to meet local standards and needs, such as operating conditions and consumer preferences. It may also develop or adapt new production processes that might not even exist in the parent firm (UNCTAD, 2012, p.14).

From a theoretical standpoint FDI offer the potential for accessing all these benefits, but the process of diffusion of technologies, skills and innovation is not a mechanic consequence of foreign capital inflow. According to Lall (2000, p.30), the technology that TNCs deploy in any location depends on the ability of that location to absorb that knowledge - to provide the 'immobile elements'. Those with low capabilities receive the simplest operational know-how, entailing the risk that their competitive base remains static. Moreover, while TNCs may be interested to promote knowledge transfer to local suppliers, they have an incentive to prevent leakage of knowledge to their competitors in the host economy. In some cases TNCs isolate their subsidiaries from local firms and suppliers which may involve limiting national production to particular product lines and complementing them with imports, or importing parts and components just for final assembly. Thus it cannot be taken for granted that the mere presence of inward FDI flows in an economy will generate sufficient externalities and will accelerate the technological catch-up. It should be analysed on country-by-country basis.

Table 1. Inward FDI flows to Bulgaria and selected CEECs (US Dollars at current prices and current exchange rates per capita)

Economy/ year	1997	2002	2007	2008	2009	2010	2011	2012	2013
Bulgaria	59.8	117.2	1638.1	1313.3	454.6	206.3	252.1	189.0	200.8
Czech republic	126.2	830.4	1010.3	619.6	279.1	581.8	218.4	749.0	466.3
Hungary	404.2	294.4	392.7	629.6	198.8	219.8	629.3	1401.7	310.5
Poland	127.6	107.7	616.9	388.6	338.6	363.2	539.6	158.6	-158.0
Romania	53.5	51.3	450.6	633.2	221.1	134.5	115.6	126.3	166.7
Slovakia	42.9	1088.5	743.1	898.9	-1.1	325.7	641.8	518.9	108.4
Slovenia	168.2	814.2	749.6	958.2	-322.2	175.3	483.8	-28.7	-327.5

Source: UNCTAD

FDI have started to flow massively in Bulgaria since 1997 when a currency board was introduced and macroeconomic, financial and political stability was secured. Gradually the country have turned into a largely favoured destination for foreign investments and the year of accession to the EU saw FDI inflows accounting to almost 30% of GDP. Hence with $ 1 638 per capita Bulgaria became a leader among the countries of Central and Eastern Europe in FDI inflows in 2007, maintaining its leading position in the next two years as well (table 1).

The quality and quantity of technologies transferred by TNCs to host countries however is not necessarily related to the volume of FDI inflows. What is more important than the amount of FDI attracted is their sectoral allocation, as various sectors have varying potential for achieving technical progress and productivity growth. Specific studies show that it is countries with relatively higher share of manufacturing in inward FDI stock compared to services that have achieved the highest improvement in export competitiveness, technological catch-up and increased share of technology intensive industries in exports (Sohinger, 2004).

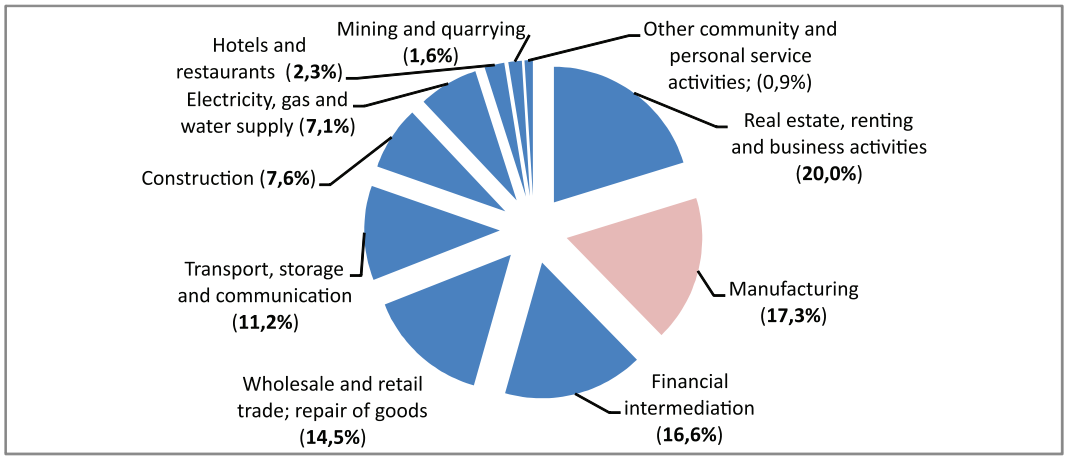

Fig. 4. Allocation of inward FDI stock in Bulgaria by economic activity (2013, %)

Source: Bulgarian National Bank

Note: Agriculture, hunting and forestry; Not allocated; Health and social work; Fishery; Education; Public administration and defence together account for the rest 1%.

Unlike some of the more advanced at present CEECs, in the years of transition to a market economy and European integration Bulgaria has adopted a non-selective approach to attracting FDI. This has led to extremely unfavourable sectoral distribution of FDI in the country. The data indicate that the majority (over 60%) of the inward FDI stock are in the non-tradable sectors - real estate, financial intermediation, construction and wholesale and retail trade (fig. 4). To a great extent some of these investments had a speculative character and did not contribute to technological modernization, export competitiveness and sustainable economic growth. Due to their strong dependence on easy access to credit, after the global financial and economic crisis unfolded in 2008 they withdrew from the country very fast and accordingly the FDI inflow has significantly declined (table 1).

Manufacturing, the sector where technological advancement is most heavily concentrated, has managed to attract just 17.3% of Bulgaria's inward FDI stock (38.3 billion EUR). Furthermore, the volume (6.6 billion EUR) of the attracted investments in manufacturing per se could be misleading for conclusions on the technological absorption performance of the economy. Hence it is essential that the motivations for investing in the sector are determined. Unfortunately, the vast majority of foreign investors are attracted by the low labour costs in Bulgaria and not by presumed availability of qualified personnel and high scientific potential. Indicative of the quality of the incoming FDI is the data presented in figure 5 on the research activity of the foreign subsidiaries in the country. In 2011 enterprises controlled by foreign companies in Bulgaria incurred R&D expenditures, amounting to only € 3.6 per capita, while in the Czech Republic the corresponding figures were 25 times higher, in Hungary - 13 times, and in Slovakia - 7 times higher (fig. 5).

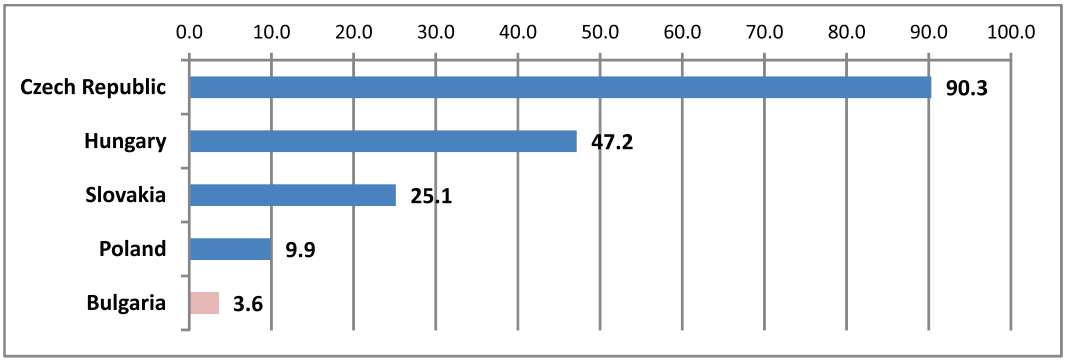

Fig. 5. R&D expenditures of foreign controlled enterprises in Bulgaria and selected CEECs (2011, € per inhabitant)

Source: own calculations, based on Eurostat data

Unfortunately, despite the EU membership and the established macroeconomic stability over the past decade, Bulgaria failed to attract significant strategic investments in industries with high value added and intensive R&D. Therefore, as a result of its passive policy towards FDI, the country missed the opportunity to fully use them as a major channel for international technology transfer. That finding is also confirmed by the World Economic Forum in its global competitiveness ranking, where Bulgaria's performance according to the indicator "FDI and technology transfer" has significantly deteriorated – from 98th place in 2007 the country fell to the unenviable 107th place in 2013.

3. Licensing as a channel of international transfer of technology

A third major channel for international technology transfer is technology licensing. The technology diffusion in a country thus could be indirectly tracked through the country's payments to technology suppliers for the use of knowledge assets. Licensing of technology, particularly for process technology, has been historically very important in the cases of Japan, Korea, Taiwan Province of China and in general South and East Asian countries. Furthermore, an important feature of the last 20 years is the large increase in the volume and sophistication of commercial transactions that have an intellectual property component (UNCTAD, 2012, p.30).

In a typical licence agreement, the licensee is normally granted access to an invention that is protected by a patent. The licensee in turn makes a commitment to commercialize the invention and pay the agreed fees, and subsequently make royalty payments when the product reaches the marketplace. Technology licensing can take place either within related firms, such as in the case of a parent-subsidiary relationship or between unrelated firms at arm's length. There are important differences between intra-firm technology transfer and market-mediated licensing. In the first case the TNC retains proprietary control of the intellectual property and know-how, while in the second case access to these assets must be provided to the licensee. Mansfield (1994) provides survey evidence that US TNCs are less likely to transfer advanced technologies through licensing to unaffiliated companies compared to foreign-owned affiliates, especially in countries with weak intellectual protection rights. He finds that technologies transferred by US firms through licensing or joint ventures were older than those transferred to foreign affiliates.

The general determinants of decisions whether TNCs license or not are similar to those for FDI and include: market size, anticipated growth, proximity, the stock of human capital, the ability to repatriate licensing rents, the investment climate and political stability. Another important factor is a guarantee that technologies will not leak into the host economy through copying or personnel movement to potential competitors. To the extent that transferred technologies are easily copied, industrial espionage is common, or technical personnel can 'defect' to competitor firms, foreign firms may prefer FDI. Where this is not possible, firms may choose not to engage in licensing at all or transfer lagging technologies (Maskus, 2000).

Research has shown that a successful transfer of technology depends on the "capacity to learn and investments to apply technologies into local production processes". This is proven by the fact that countries in the possession of "substantial engineering skills and R&D programs for adaption and learning are greater recipients of licensing flows than others" (Yang and Maskus, 2001).

The full EU membership had a positive effect on intensification of licensing as a channel for international technology transfer in Bulgaria. Both license fees and royalties' payments and receipts have increased significantly in the period between 2007 and 2013. Within 6 years, Bulgaria's imports of technology through licensing and royalty payments saw an almost threefold increase - from $ 74 million in 2007 to $ 205 million in 2013 (table 2). Leading factors behind that include improved perceptions of the business climate and the protection of intellectual property rights in the country and the EU programmes' financial and technical support.

Table 2. ***Royalty and licensing fee payments and receipts by Bulgaria and selected other CEECs*** *(2006-2013, in million US $ at current prices)*

		2006	2007	2008	2009	2010	2011	2012	2013*
Bulgaria	*receipts*	10	10	11	10	16	13	22	27
	payments	69	74	96	116	115	137	184	205
Romania	*receipts*	39	41	240	190	463	246	350	123
	payments	227	249	351	361	446	481	449	860
Croatia	*receipts*	47	39	43	32	32	24	31	25
	payments	-	213	257	211	224	272	283	240
Czech Republic	*receipts*	31	36	57	98	105	108	199	248
	payments	549	686	771	736	771	994	818	975
Slovakia	*receipts*	90	149	164	92	45	4	4	4
	payments	106	124	183	155	147	149	130	145
Hungary	*receipts*	549	914	865	824	1 021	1 027	1 097	1 200
	payments	1 164	1 745	2 020	1 437	1 332	1 519	1 350	1 328

Source: UNCTAD

Despite the reported sizeable increase in payments for licensing fees and royalties in the years of EU membership, in a comparative perspective Bulgaria uses this channel for technology transfer significantly less than other similar countries. For example in 2013 Croatia's estimated imports of foreign technology through licensing are 17% higher than Bulgaria's imports, while imports in Hungary exceed those in Bulgaria by 6.5 times.

Furthermore, it should be taken into account that royalty and licensing fees may not necessarily reflect the quantity of technology transferred, partly because most of the transactions are between related parties and include payments for, among others, the use of registered trademarks that do not necessarily represent knowledge transfer. Moreover, payments between related parties may hide other intra-firm transfers (for example, repatriation of profits). Considering the above, even though data shows that licensing has been gaining momentum in Bulgaria in recent years it cannot be inferred that this has been accompanied by some extraordinary influx of modern technologies.

3. Technological development in Bulgaria in the conditions of EU membership

The high interest in countries' technological development arises largely from the existing strong relationship between technology and productivity. This relationship is famously addressed by Posner (1961), who discusses the importance of innovation and technological diffusion to economic growth. Keller (2004) confirms that differences in productivity explain the divergence in income between countries and technology plays a key role in determining productivity. Therefore productivity growth could be seen as a good indicator of an increased inflow of new technologies and as a result of an achieved progress in technological development.

Table 3. **3 *Real labour productivity in Bulgaria, the EU and selected CEECs (2007-2013, in € per hour worked)***

Country / Year	2007	2008	2009	2010	2011	2012	2013
EU - 28	31.3	31.2	30.7	31.4	31.8	31.9	32.1
Bulgaria	4.3	4.3	4.3	4.5	4.7	4.8	4.9
Czech Republic	13.0	13.0	12.8	13.0	13.3	13.2	13.1
Estonia	10.3	10.0	10.3	10.9	10.8	11.2	11.4
Latvia	7.9	7.3	7.2	7.6	7.9	8.2	8.4
Lithuania	8.7	8.8	8.3	9.4	10.1	10.3	10.6
Hungary	11.1	11.3	10.9	11.0	11.0	11.3	11.5
Poland	8.8	9.0	9.1	9.8	10.2	10.4	10.6
Romania	5.2	5.6	5.4	5.3	5.4	5.4	5.6
Slovakia	11.8	12.1	11.8	12.3	12.6	12.8	13.2

Source: Eurostat

In Bulgaria labour productivity per hour worked has shown an upward trend during the years of EU membership. In 2007 it was 4.3€/hour, while in 2013 reached 4.9 €/hour, which is an increase of 14% within 6 years. At the same time, compared to the other EU countries it remains at the lowest level and far behind the EU-28 average (32.1€/hour). Labour productivity per hour worked in newly-acceded member states like the Czech Republic (13.1€/hour), Slovakia (13.2€/hour), Hungary (11.5€/hour), Estonia (11.4€/hour) are twice as high as the indicator in Bulgaria (table 3). This exposes a significant technology gap and a relatively slow pace of technology transfer from the more advanced European partners to Bulgaria's economy.

A country's technological development is often investigated by an analysis of its export structure. Changes in the structure of exports reflect the achievements of technological competences in the export-oriented industries. As we have seen above (figure 3), although there has been some improvement in recent years, Bulgaria has failed to significantly refine its international specialization and the share of capital goods is less than 18%, while raw materials are still by far the leading product group, boasting a share of over 43% of Bulgarian exports. Such a great importance of raw materials in total exports is typical of developing countries, not of EU member states, and exposes a low level of technological development. The Eurostat data on high-tech export confirm the conclusion for a weak technological advancement of Bulgaria. Although in 2007 the share of high-tech goods in Bulgaria's exports amounted to 3.5%, while in 2013 it already reached 4% of total exports, compared to the average EU level (15.3% for the EU-28 in 2013) the gap is 3.8 times. Bulgaria is also lagging behind the new member states according to this indicator – the corresponding value in the Czech Republic in 2013 was 15%, in Hungary - 16.1%, in Slovakia - 9.5%, in Croatia - 6.9 percent, and in Romania - 5.6%.

The technological development of the Bulgarian economy can be also assessed with the help of the annual ranking of countries provided by the World Economic Forum in its Global Competitiveness Report. In 2013 Bulgaria occupied the unenviable 108th place among 144 countries according

Table 4. ***Ranking of Bulgaria in the Global Competitiveness Report 2013-2014 according to the composite index "Technological adoption"***

Indicator / Years	*2006*	*2007*	*2010*	*2013*
Technological adoption	-	-	110	108
Availability of latest technologies	92	92	100	99
Firm-level technology absorption	110	119	127	113
FDI and technology transfer	82	98	98	107

Source: : World Economic Forum

to the composite index "Technological adoption", which is the weakest ranking among the EU Member States.

The negative picture of Bulgaria's ranking in the field of technology adoption becomes even gloomier when one considers the country's performance in dynamics. Paradoxically, in the years of EU membership the Bulgarian economy is losing ground in the global competition according to all sub-indices related to international technology transfer. While in the year prior to its EU accession Bulgaria ranked 92nd according to the *availability of latest technologies* sub-index, seven years later it fell to the 99th rank. According to the *firm-level technology absorption* sub-index the country slipped down in ranking from the 110th place in 2006 to the 113th place in 2013. The most dramatic however is the loss of positions in terms of technology transfer from FDI - in the year prior to joining the EU Bulgaria was 82nd in the global ranking but in 2013 collapsed to the 107th rank.

Conclusion

The results of the analysis hereby confirm through the case of Bulgaria, that despite its importance, openness of the economy and its participation in regional economic blocs with more advanced partners is not sufficient for achieving technological catching up. International technology transfer and innovation in the host country is not an automatic process and requires absorption capacity and ability to adapt foreign technologies, which in turn is contingent on the supply of human capital and investment in research-intensive activities. There still is a technological gap with more advanced countries not so much because of difficulties in finding out and accessing new technology but because of high costs of building know-how, skills and other technological capabilities to adopt, adapt and diffuse the technologies. As Maskus (2000) has established, countries are more successful in the process of international transfer of technologies if their firms undertake R&D activities, there are effective domestic research laboratories and universities, and a sound base of technical skills and human capital. These factors reduce the costs of imitation, adaptation and follow-on innovation.

In Bulgaria the process of utilization, adaptation and dissemination of new technologies is objectively limited by the critically low innovation and absorption capacity of the economy. In order to benefit more fully from the EU membership by absorbing foreign technologies more intensively, the country needs to develop and consistently implement an appropriate national strategy in this area. Particularly important herein are the policies aimed at creating an environment conducive to successful technology acquisition and diffusion and policies that directly encourage and actively support international transfer of new (for the country) technologies. They

involve mechanisms such as human capital development, public procurement, support for local R&D, promotion of partnerships and industrial clusters, attracting strategic FDI through specific incentives, building supporting infrastructure, etc. To narrow the technological and productivity gap with the other EU Member States it is essential for Bulgaria to start more aggressively fostering R&D and innovation capacity building in its firms, universities and research institutes to lay the grounds for a competitive knowledge-driven economy.

References

Angelov, I., (2006), Ikonomicheski aspekti na nauchno-tehnicheskata politika // Angelov, I. (et.al) Ikonomikata na Bulgaria i Evropeiskiya sayuz, Dogonvashto ikonomichesko razvitie – strategiya i realnosti, Sofia

Card, D., Krueger, A.B. (1995) Myth and Measurement: The New Economics of the Minimum Wage, New Jersey, Princeton University Press

Coe, D., E. Helpman, A. Hoffmaister (1997) North-South R&D Spillovers, *The Economic Journal* 107: 134-149

Keller, W. (2004) International technology diffusion, *Journal of Economic Literature* Vol. XLII: 752–782

Kneller, R., S. Pantea, R. Upward (2009) Which International Technology Transfer Channels are Effective in Raising Firm Productivity?, University of Nottingham

Lall, S., (2000) Selective Industrial and Trade Policies in Developing Countries: Theoretical and Empirical Issues, QEH Working Paper Series QEHWPS48

Mansfield, E., (1994) Intellectual property protection, foreign direct investment and technology transfer, International Finance Corporation Discussion Paper no. 19

Maskus, K., (2004) Encouraging International Technology Transfer, UNCTAD-ICTSD Project on IPRs and Sustainable Development, Issue Paper No 7

Maskus, K. (2000) Intellectual Property Rights in the Global Economy, Institute for International Economics, Washington DC

Posner, M. (1961), International trade and technological change, *Oxford Economic Papers*, 13: 232-341

Sohinger, J., (2004), Transforming Competitiveness in European Transition Economies: The Role of Foreign Direct Investment, University of California, Berkeley

UNCTAD (1999) World Investment Report 1999, NY and Geneva

UNCTAD (2003) Investment and Technology Policies for Competitiveness: *Review of Successful Country Experiences*, NY and Geneva

UNCTAD (2012) Transfer of Technology, Virtual Institute Teaching Material, UNCTAD/GDS/2011/4

Xu, B., J. Wang (1999) Capital Goods Trade and R&D Spillovers in the OECD, *Canadian Journal of Economics* 32: 1258-1274.

Yang, G., K., Maskus, (2001) Intellectual Property Rights, Licensing, and Innovation in an Endogenous Product-Cycle Model, *Journal of International Economics*, 53: 169-187