Significance of the Knowledge Production Function for Industrial Clustering

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Abstract: The nature of the knowledge production function as a factor differs from the conventional factors like labour, capital and land. Whilst the economic value of the conventional factors is relatively certain, the nature of knowledge is amorphous and its potential value is asymmetric compared to the rest of the economic factors. The most important, although not the only source of new knowledge, is considered the R&D. Other key factors for creating new knowledge are: high level of qualified human resources; labour force experience and concentration of scientists and engineers in the structure of the corporate formations.

Keywords: knowledge clustering, comparative advantage, knowledge production function.

Anotação: По своята същност производствената функция на знанието като фактор е различна от традиционните фактори като труд, капитал и земя. Докато икономическата стойност на традиционните фактори е относително сигурна, знанието по своята природа е аморфно и неговата потенциална стойност, съпоставена с останалите икономически фактори, еасиметрична. За най-важен, макар и неединствен източник на ново знание, се счита НИРД. Други ключови фактори, които създават ново знание са: висока степен на обученост на човешките ресурси; опит на работната сила и концентрирано присъствие на учени и инженери в структурния състав на корпоративните формирования.

Ключови думи: Кластер на знанието, сравнително преимущество, производствена функция на знанието.

I. Introduction

A major issue like the global division of countries into high and low income ones is both an attractive and convenient modelling approach. Most of the possible policy issues, including also elements of the localisation theory are of a fairly modest scale. A few are aware that the closer integration of the European market could lead either to the disappearance of the industrialization or to its isolation in the periphery or core of the continental economy. On the other hand, there are real problems that influence the impact of the lower market prices as a reason behind the positioning of industries. For example, Europe has

I. Въведение

Един голям въпрос, като този за световното разпределение на страните с високи доходи и такива с ниско заплащане на труда е привлекателен и удобен подход за моделиране. Много от вероятните проблеми на политиката, включващи и елементи на локализационната теория, са много по-скромни в своя мащаб. Малцината имат, че по-близката интеграция на европейския пазар може или да доведе до изчезване на индустриализацията или до изолирането й в периферията или в сърцето на континенталната икономика. От друга страна, съществуват реални проблеми, които засягат въздействието на по-ниските пазарни цени като причина за разполагането на
been maintaining several clearly recognised national production centres in many branches of the high technology and conventional industry, from space technology to economic activities with processes for electrochemical and conversion coatings for functional and decorative application (PECCFDA), while in the USA there are only predominant production areas. Would the bigger integration of the European market cause the polycentric localisation of its industries to lose its boundaries giving way to the American type of concentration? Would the hi-tech industries concentrate in a European Silicon Valley? Would the PECCFDA sector keep its existing polycentric character or concentrate either in Jönköping or in Ruse? These questions are related to the issue of the dissemination of organizational knowledge through the industrial cluster; and they outline circumstances that require correct interpretation by applying a similar basic approach to the industrial localisation.

II. Industrial clusters: Evidence

There is plenty of evidence that industries are concentrated in clusters to a higher extent than the conventional theories of comparative advantages could define. We have already mentioned the Silicon Valley and some of the PECCFDA European centres; and other good examples are the industrial agglomerations in Japan and Korea with the concentration of productions of colour liquid crystals displays (LCD) in the 1990s or of flat panel displays with condensed data content (FPD) in 1998-2002. The localisation of industries in clusters is M. Porter’s (1990) core idea of the competitive advantage. He uses specific formations from selected industrial clusters, e.g. German printing equipment, Italian ceramic pots, Japanese robotics, American medical tools and equipment, and documents the concentration of internationally competitive industries in a number of countries.

Statistical evidence on territorial concentration has been presented by Krugman (1991, 2005) who uses data collected in the USA to define industries location. He

industries. Namely, Europe is beginning to take over a critical role in the world economy, with the USA leading the way. He uses M. Porter’s (1990) core idea of the competitive advantage. He uses specific formations from selected industrial clusters, e.g. German printing equipment, Italian ceramic pots, Japanese robotics, American medical tools and equipment, and documents the concentration of internationally competitive industries in a number of countries.

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has calculated Gini coefficients for location for a threedigit number of industries in different States in the USA and discovered unexpectedly high levels of concentration. Taking the American automotive industry as a benchmark (half of the production still in Detroit region) nearly half of the other industries have higher Gini coefficients. Kim (2005) has examined a longer time-period, 1860 – 1997, and points out that the fast expansion of the regional industrial specialisation happened before World War I, i.e. at the time when the USA developed their transport infrastructure and turned to be an integrated national economy. Since the War the regional specialisation has started to decline. This study finds analogues in articles on European data and assumes that the continuous European integration, the regional concentration of industries and the agglomeration of the countries' industrial structures expand (Amiti 2007; Brullhart and Torsternsson 2006).

However, any theory on interregional and international specialisation is likely to prove that the regions and countries have different industrial structure and that the research on the above does not provide an explicit examination of the regional clustering theory on the grounds of another theory, although Glaeser and Ellison (2005) actually explore agglomeration and probability. They specify that an occasional chance could mean that the industries are concentrated if there are no concentration determining forces – especially, if the internal growth of the deconcentration trend is such that there is a small number of enterprises in the given industry. However, using official data for the USA, they have found out that the actual model of enterprise location there is considerably more concentrated than it could be explained with an occasional choice.

Therefore, assuming that the territorial industrial cluster is an important empirical phenomenon, let’s develop a theory that will show how this phenomenon could manifest itself. The model will be appropriate when comparing two industries from


Следователно, приемайки, че индустриалният териториален клъстър е важно емпирично явление, нека преминем към изграждане на теория, за да покажем...
the areas of high and conventional technologies in order to evaluate the importance of the labour factor that is presented by the payment levels for R&D, skills and experience of scientists and engineers – a measure for the organisational knowledge and an indicator of innovation.

More and more scientists today raise issues about the knowledge-based connection between geography of economic activity and the manifestation of the economic processes. [1] The first element is related to the level to which the spatial entities participating in the international division of labour change. The share of the regional component in the economic activity also grows with the increased significance of the global market. Globalisation moves away the comparative advantage of the leading industrial countries towards economic activities of local significance.

The other issue is related to the globalisation and its impact on the macro- and micro-regions. Statistical data shows that the prosperity of the macroregions improves due to the innovation policy on a micro-level [9]. This conclusion is in a certain relation with the fact that spatial clusters are vital for the creation of innovations, i.e. innovation is mainly a local activity [10].

In the knowledge-based economy direct foreign investment becomes a key tool for strategic decisions. Multinational corporations establish trade companies within knowledge-based clusters in third countries. They aim to gain access to information that will be communicated back to their own countries or at least to the mother company. An important consequence from the change of the nature of comparative national advantage is the fact that a great part of the production and commercialisation of the new knowledge is less related to the independent multinational corporations and more closely depends on the regional hi-tech innovation clusters like, for example, the Silicon Valley; Route 122; Tokyo; Shannon Free Zone and the Limerick Technology Park in Ireland. The aim of the global political and economic factors is how to make it feasible. The model of the scale has a significant advantage over the regional agents on the global market. The aim of the model is to communicate back to their local agents.

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to create new “silicon valleys”. It reveals the significance of the geographic proximity and the regional spatial formations. The growing importance of the idea-generation process shifts public policy as a whole towards business by moving it away from activities that restrict companies’ freedom to negotiate and focus it on using new tactical decisions implemented on regional and local level.

III. Innovations and comparative advantage

The driving force of growth, the high level of employment and economic stability in all West European countries in most of the postwar economic period were provided by mature and technologically moderate industries like metallurgy, machine-building and automotive. This traditional comparative advantage has been lost in the expensive countries of Europe and North America in the last ten years due to two reasons. One of the reasons is related to the globalisation or the penetration of competitors not only from the Southeast Asia industries but also from the transforming economies of Central and Southeast Europe. The second factor comprises the basic innovations in the computer technologies and telecommunications. The new informational postindustrial society has given rise to a virtual spatial outburst with regard to the geography of production.

According to the Economist[3] “The death of distance as a determinant of the cost of communications will probably be the single most important eco-economic force shaping society in the first half of the 21st century”.

The globalisation has also set in motion the virtual spatial change regarding the production localisations. [3]The extremely low costs for the transfer of data throughout the geographic space have been reduced to zero. Facing the competition of the lower costs in other countries, the producers from countries with higher costs, apart from doing nothing and losing their share on the global market, have three options: (1) to reduce wages and the other

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production costs to an extent that would compete with the foreign producers with lower prime cost; (2) to increase productivity by replacing labour with equipment and technologies and (3) to move the production from the expensive location to a cheaper one.

Many European and American companies have reorganised themselves successfully by applying the last two options. The replacement of labour with capital and technologies, together with the new production localisations requiring low costs, caused waves of corporate mergers all over Europe and North America and thus, kept a lot of the large corporations viable. As shown by the record levels of the European and American commodity indexes, the large companies have not been affected. For example, between 1979 and 1995 over 43 million jobs in the USA were cut down as a result of corporate mergers. [4] During most of the 80s about one out of twenty five people lost their jobs in the EU. In the 90s this indicator changed to one out of twenty employees. Nowadays, towards the end of the first decade of 21st century the ratio has been reduced to one out of fifteen employees.

It would be a mistake to blame the corporations for the mergers and staff reductions. They just try to survive in an economy of global competitors who have access to lower cost outputs.

A great part of the expert discussions on the revolution in the telecommunications and the growing globalisation is around a single dilemma – whether to maintain lower payment levels and have greater unemployment in return, or keep higher levels of employment and have lower wages in return. However, there is another option. It neither makes it necessary to sacrifice wages for opening new jobs nor prompts to jobs reduction in order to maintain the payment levels and social insurance system. This option suggests shifting of the economic activity outside the conventional industries where the European and North American countries with bigger costs have lost the comparative advantage, as well as the penetration in areas of economic ac-

и да изгубят своя дял от глобалния па-
зар, имат три възможности: (1) да нама-
лят надниците и другите производстве-
ни разходи дотолкова, че да конкурират
чуждестранните производители с ниска
себестойност, (2) да увеличат произво-
дителността чрез замяна на труда с обо-
рудване и технологии и (3) да премес-
тят производството от също съществуващото
мествало в такова, което изисква
малки разходи.

Много европейски и американски фирми
се преустроиха успешно, като приложи-
ха последните две възможности. Заме-
нянето на труда с капитал и технологии,
заедно с новите локализации на произ-
водствата, изискващи малки разходи,
породиха вълни от корпоративни слива-
ния в цяла Европа и Северна Америка
като това съхрани жизнеспособността
на много от големите корпорации. Както
показват рекордните нива на европей-
ските и на американските стокови ин-
декси, големите компании не са постра-
dали. Например, между 1979 и 1995 г.
pовече от 43 милиона работни места в
САЩ са съкратени в резултат от корпо-
ративно слиwanе.[4] През по-голямата
част от 80-те години около един от два-
dесет и пет души е загубил работата си в
ЕС. През 90-те този показател е счоqел
на един от двадесет работникa. Сега в
края на първото десетилетие на XXI век
съотношението се свежда до един на
всеки петнадесет.

Би било грешка за сливанията и съкра-
щенията да бъдат обиняни корпора-
циите. Те просто се стремят да оцеляват
в една икономика на глобални конку-
ренции, които имат достъп до мощности с
по-малки разходи.

Голяма част от дебатите на експертите
пo повод революцията в телекомуника-
циите и нарастващата глобализация се
върти около една дилема - дали да се
поддържа по-високо ниво на заплаща-
ние за сметка на по-голяма безработица
или по-високо ниво на трудова заетост
за сметка на по-ниски възнаграждения.
Има обаче и друга възможност. Тя не на-
лaga да се жертват възнаграждения за
създаване на нови работни места, нито
подтиква към по-малко работни места,
за да се поддържа нивото на заплащане
и системата за социална сигурност. Тази
възможност предполага известване на
икономическата дейност извън традици-
онните индустрии, в които страните
tivity where the competitive advantage is comparable to the higher wages but also to the higher levels of employment, and namely – the knowledge-based economy.

The globalisation has made the comparative advantage of the conventional moderate-technological industries incompa-

ble with the high levels of wages. At the same time, the competitive advantage based on high wages is on the grounds of innovations. For example, between 2002 and 2006 employment in the Silicon Valley grew up by 15% although the average income was 50% higher compared to the rest of the USA. [5]

The global demand for innovative products in the knowledge-based industries is big and rapidly increasing. However, the number of employed people who could contribute to the production and commercialisation of new knowledge is restricted only to several regions in the world. There is a number of indicators that show the shift of the comparative advantage from the countries with high levels of payment to countries with increased importance of the Research and Development activities (R&D). Kortum and Lerner (2007): I) have documented an unprecedented growth of patenting in the USA, evidenced by the outburst of registration applications of American inventors in 2005. For the whole of the 20th century the number of patents varied between 40,000 and 80,000 per annum, and in 2005 there were over 120,000 patent applications. Identically, Berman, Bound and Machin (2007) showed that the demand for less qualified employees had gone down in all OECD countries while the demand for qualified staff has increased.

IV. Knowledge production function

The starting point of most theories on innovation is the company. In these theories companies are defined as exogenic and the quality of their operation in creating the technological changes - endogenic. (Arrow, 1962). The model of the knowledge production function as formulated mathematically by Zvi Griliches (1979) defines that companies are exogenic and they embark on looking for new knowledge as
a factor in the process of creating innovations.[8] The nature of the knowledge production function as a factor differs from the conventional factors like labour, capital and land. While the economic value of the conventional factors is relatively certain, the nature of knowledge is amorphous and its potential value compared to the rest of the economic factors is asymmetric. [6] R&D is considered the greatest, although not the only source that generates new knowledge. Other key factors for creating new knowledge are: high level of qualified human resource; labour force experience and concentration of scientists and engineers in the structure of the corporate formations.

The empiric link between the knowledge factors and the knowledge creation process obviously gets stronger when the observation unit is more complex. For example, when the object is a country, then the R&D/registered patents ratio is very high. In the most developed countries in terms of innovations like the USA, Japan and Sweden there is a trend for making big investments in R&D. On the contrary, the weak patent activity is related to the countries in transition that spend very little on research and development. The R&D/innovations relation measured by patents or innovations in new products is also very stable when the observation unit is the industry. In the majority of cases the most innovative industries like optoelectronics, photonics, digital media, biotechnologies and sustainable technologies are also the most active in research and development. Audretsch (2005) has found a coefficient ratio of 0.74 between the R & D factors and innovations, that is used in the Standard Industrial Classification (SIC).

However, in a study on knowledge production function in the observation unit - a company, the link between the factors of knowledge and the new products turns to vary from a quite weak or slightly positive trend in some studies to a negative or even nonexistent one in others. The model of knowledge production function appears to be particularly weak when small companies (SMEs) are included in the sample. This is not surprising, as the official R&D deﬁnition, that the ﬁrms can be seen in the transition to a new knowledge and the new products turns to function in the observation unit - a company.

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is concentrated in the big corporations. A series of new studies, however, (Acs and Audretsch, 2008) unambiguously document a disproportionate share of innovations in new products in the small companies, which could be explained with their low costs on research and development.

V. Knowledge spillovers

The low efficiency of the production knowledge function on a company level puts the following question: How do companies with weak or no R&D form an innovative knowledge factor? This question is particularly up-to-date with the small and start-up companies which have limited R&D but at the same time contribute to important innovations in the modern industries such as biotechnologies and software (Audretsch 2005). One of the recently published answers is that this is possible through a third party – another company, research institute or university. Knowledge can spill over from a company doing research and development or from a research laboratory of a certain university. (Baptista, 2007).

Why does knowledge spill over from its generation source? At least two main channels or spillover modes can be recognised, both related with the new knowledge acquisition issue. The logic of Cohen and Levinthal (2009) is that the companies develop a capacity to adapt new technology or ideas worked out in other companies. Therefore, they are capable of acquiring some of the profitability elements deriving from investment in new knowledge made elsewhere.

Contrary to this assumption, Audretsch (2005) suggests moving the observation unit from exogenic companies to individuals, e.g. scientists, engineers or other knowledge master minds – creative talents of new knowledge. When the focus shifts from the company to the individual as an applicable observation unit, the acquisition issue still remains, but then the question is: How do creative people with certain sense of novelty respond to the effect of acquired knowledge? If the scientist or the engineer can implement the new idea in the organisational structure

оказва особено слаб, когато в изводката се включат малки фирми (МСП). Това не е участващо, защото офшорната НИРД е съсредоточена в големите корпорации. Една поредица от по-нови проприятия обаче (Acs и Audretsch, 2008) независимо документира един незаинтересован дел на иновации в нови продукти при малките фирми, което може да се обясни с техните ниски разходи за изследване и развитие.

V. Изтичане на знанието

Ниската ефективност на производствената функция на знанието на ниво фирма поставя въпрос: Как фирми със слаба или без НИРД формират новаторски фактор знание? Този въпрос е особено актуален при малките и новосъздадени фирми, които извършват ограничена НИРД, но същевременно допринасят за значителни нововъведения в модерните индустрии като биотехнологии и компютърни програмни продукти (Audretsch, 2005). Един от отговорите, появил се неочаквано в литературата е, че това става чрез трета страна - друга фирма, изследователски институт или университет. Знанието може да изтеке от фирма, извършваща изследване и развитие, или от изследователска лаборатория на даден университет. (Baptista, 2007).

Защо знанието изтича от своя източник на генериране? Могат да бъдат разположени поне два основни канала или начин на изтичане, свързани с проблема за усвояване на ново знание. Логиката на Cohen и Levinthal (2009) е, че фирмите развиват капацитета да приспособят нова технология или идеи, разработени в други фирми. Следователно, те са способни да усвоят някои от елементите на доходност, произтичащи от инвестициите в ново знание, направени отвън.

Противно на това предположение, Audretsch (2005) предлага преместване на единицата за наблюдение от екзогенно приетите фирми към отделни личности, например ученци, инженери, или други двигатели на знанието – творци, притежаващи дарба за ново знание. Когато лупата се премести от фирмата към личността като приложима единица на наблюдение, проблемът за усвояването все пак остава, но въпросът тогава е: Как креативните личности с определен
of the company that develops knowledge, and are able to acquire the expected value of this knowledge, they have no reason to leave the company. However, if the creator adds higher value to his/her ideas than the decision making administrators in the organisation then he/she may decide to establish a new business unit in order to acquire the knowledge value. With this channel of knowledge spillovers, the knowledge production function is actually turned the other way round. Knowledge is exogenic and it is embodied in an individual. The company is set up endogenically with the individual’s efforts to acquire the value of his/her knowledge through innovative activity.

VI. Significance of location

When examining the importance of the external knowledge factors in order to explain geographical concentrations of economic activities, Krugman (1991, 2005) et al. [14] do not bring in question the existence of any such knowledge spillovers. According to them the external factors are so important and powerful that there wouldn’t exist any forced reason for the geographic border to limit spatially the level of knowledge spillovers. By announcing “...the death of distance” the Economist illustrates the surprising and even paradox statement that the process of knowledge spills over to the innovative activity in a world of e-mail, telecommunication and cyberspace.

In the age, when the digital telecommunications reduce drastically the communication costs, the solution of the paradox is in the distinction between knowledge and information, established at the places of knowledge spillovers. Information such as the price of gold at New York Commodity Exchange, or the value of the Yen in London can be easily systematised and has only a single meaning and interpretation, i.e. the marginal cost of transferring information through the geographical area can already be estimated as constant, due to the telecommunications revolution. Knowledge is difficult to be systematised and often its variants, such as undocumented knowledge [10], are distinguished only by

устют към новото, усвояват ефектите от придобитото знание? Ако учението или инженерът могат да осъществят новата идея в организационната структура на фирма, разработваща знанието и да придобият очакваната стойност на това знание, те нямат причина да напуснат компанията. Ако творците обаче, придаят по-голяма стойност на своите идеи, отколкото това правят администраторите, вземащи решения в организацията. Той може да реши да основе нова бизнес единица, за да усвои стойността на знанието. При този канал на изтичане, производствената функция на знанието, всъщност е обрната обратно. Знанието е екзогенно и е въплътено в индивид. Фирмата се създава ендогенно с усилия на индивида да усвои стойността на знанието си чрез новаторска дейност.

VI. Значимост на местоположението

Като разглеждат важността на някои фактори на знанието, за да се обясни географската концентрация на индустриална дейност, Krugman (1991,2005) и други автори [14] не поставят под съмнение съществуването на такова изтичане на знание. Те твърдят, че някои фактори са толкова важни и мощни, че не би могло да съществува принудителна причина географската граница да ограничава пространствено степента на изтичане на знанието. Като обявява “…съмртта на пространството” Economist илюстрира изненадващото и дори парадоксално твърдение, че географското местоположение е важно, за да бъде свързан процесът на изтичане на знанието с новаторската дейност в един свят на електронна поща, телекомуникационни връзки и киберпространство.

В една епоха, когато електронните телекомуникации драстично намаляват разходите за общуване, решението на пардокса лежи в разграничението между знание и информация, установено на местата на изтичане на знание. Информация, като например цената на злато на Ню Йоркската стокова борса, или стойността на йената в Лондон, може лесно да се систематизира и има едно единствено значение и тълкуване, т.е. пределния разход за предаване на информация през географското пространство вече може да бъде оценяван като непроменлив, благодарение на революцията в телекомуникациите. Знанието е
happy coincidence. Therefore, the marginal cost of knowledge transfer, undocumented knowledge in particular, increases by the distance.

V.Hippy (1994) proves that the high context and insecure knowledge, which he calls *amorphous knowledge*, is best transferred in direct interaction and repeated personal contacts. The geographical proximity is significant when knowledge is transferred, as pointed out by K.Arrow (1962) more than four decades ago, and as further developed by other authors [10], such knowledge (tacit, undocumented) has no competitor in the nature of knowledge. Specific application knowledge can easily spillover and may have economic value in many different variants. Glaeser et al. (2002: 1126) point out that "The intellectual scientific breakthroughs must cross hallways and streets more easily than oceans and continents".

The significance of localisation of the spillover knowledge may be observed in a different context. It is pointed out [7] that: "Business is a social activity, and you have to be where important work is taking place". A study conducted among nearly a thousand administrative leaders, working in the 60 biggest urban areas, rank Durham and Raleigh as top towns for knowledge creators and innovations.[8] The reason is that many smart people, who have come to Raleigh/Durham, have been attracted by the three best research universities. Analogical examples exist in Europe – the "Optics Valley" in the region of Jena, Erfurt, Ilmenau; high value engineering and energy – Newcastle; aerospace, ICT - Nottingham, healthcare and environment technologies– Yorkshire. Companies, especially those, whose success depends on staying atop of new technologies and processes, increasingly want to be where the new ideas are filtered out. The presence of brainpower centres, e.g. Aalborg, Denmark (mobile communications), pays off in new products and new ways of making business. This explains the dozens of small biotechnology and software operations, starting up each year

trudno za sistematizirane i često raznovидностите му, например, необявено
to знание[10] се разпознават само по щастлива случайност. Затова и предел
ният разход при предаване на знание, особено на необявено знание, нараства с разстоянието.


Значението на локализацията на изтичащото знание може да се разглежда в различен контекст. Посочва се(7), че "бизнесът е социална дейност и всеки трябва да бъде там, където се извършва важна дейност". Едно изследване на почтени хиляди административни ръководители, работещи в 60-те най-големи гранични райони в Америка наредят Рейли и Дъръм като най-добри градове за творци на знание и за новаторска дейност. [8] Причината се корени в това, че много химиора, дошли в Рейли/Дъръм, са били привлечени от трите най-добри изследователски университети. Аналогични примери има и в Европа – "Оптичната долина" в региона на Йена, Ерфурт, Илменау; инженерни технологии с висока стойност и енергетика – Нюкъсъл; космически, информационни и комуникаци	онни технологии – Нотингхъм; здравни и екологични технологии – Йоркшир. Компании, особено онези, който успяха зави	си от задържането на върху на новите технологии и процеси, все повече искат да бъдат там, където се филтрират най-
новите идеи. Присъствието в мозъчни центрове като Олборг, Дания (мобилни комуникации) се възвръща под форма	та на нови продукти и нови начини за извършване на бизнес. Това обяснява десетките малки биотехнологични и про-
and growing like kudzu in the fertile business climate.[7]

Krugman (1991: 53, 2005) does not only have doubts that knowledge spillover is geographically limited, but he even points out that it is something impossible to measure since "the knowledge flows are invisible, and they do not leave traces on paper to allow being measured and traced". However, the available publications (Jaffe, Trajtenberg and Henderson 2003) overcome the limitations for the data, when it comes to measuring the level of knowledge spillovers and relates it to the geography of innovations. Jaffe (2009), Audretsch and Feldman (2006) remake the model of the knowledge production function in order to include clearly expressed specification about both distance and product dimensions:

\[ I_s = \text{IRD}_1 \beta^s (\text{URsi})_2 \beta^s [\text{URsi}^* (\text{GCsi})_3 \beta^s \text{ESi}, \]  

(1)

where \( I \) is innovation factor; \( \text{IRD} \) are private corporate expenses on R&D; \( \text{UR} \) are the costs for study, incurred by the universities, and \( \text{GC} \) measures the geographical match between the university and corporate study. The evaluated observation unit is at distance level \( s \), and industry level is marked by \( i \).

The result of the equation (1) essentially moves the model of the knowledge production function from observation unit "company" to "geographical unit". The consecutive empirical evidence that \( \beta_s \geq 0, \beta_r \geq 0, \beta_i \geq 0 \) is in favour of the idea, that knowledge spills over to third parties from university research laboratories, the industrial research and development centres. This empirical evidence prompts that location and proximity are of particular significance when spillover of knowledge is exploited. The companies tend to cluster only in a few locations. The significance of geographical location is definitely determined by the scientist’s role. When the relation includes transfer of new knowledge, it is more likely that the scientist is found in the same region as the company. When the scientist provides a service to the

gramni операции, които стартират всяка година и израстват като цвete в благо-
приятен климат.[7]

Krugman (1991: 53, 2005) не само се съмнява, че изтичането на знание не е географски ограничено, но дори твърдя, че е невъзможно да се измери, за-
щото "...поготите на знанието са неви-
dими, те не оставят следи върху хартия,
че които да бъдат измерени и просле-
deni". Появялата се литература (Jaffe,
Trajtenberg и Henderson 2003) обаче,
преодолява ограниченията за данните
при измерване на степента на изтича-
не на знанието и го свързва с географията
на новаторската дейност. Jaffe (2009),
Audretsch и Feldman (2006) преработват
модела на производствената функция
на знанието, за да включат ясно изра-
зена спецификация както за измерени-
йата на пространството, така и на тези за

кудето \( I \) е фактор за иновации; \( \text{IRD} \) са частни корпоративни разходи за НИРД;
\( \text{UR} \) са разходите за изследвани направени в университети, а \( \text{GC} \) измерва ге-
ографското съвпадение между университетското и корпо-ративно изследвание. Оценъчната единицата за наблюдение е на ниво пространство \( s \), а ниво инду-
стрия се означават с \( i \).

Оценката на уравнението (1) същест-
вено измества модела на функцията за произвеждане на знание от едини-
цата за наблюдение - фирма към това
на географска единица. Последова-
tелното емпирично доказателство, че
\( \beta_s \geq 0, \beta_r \geq 0, \beta_i \geq 0 \) подкрепя идеята,
че знанието изтича за ползване към тре-
ти страни от университетски изследова-
tелски лаборатории и от индустриалните
центрове за изследване и развитие. Тези
емпирични доказателства подсказват,
че местоположението и близостта опреде-
лено имат значение при експлоатиране-
tо на изтичащото знание. Фирмите имат
tенденция да се събират в къстери само
в няколко местоположения. Важността
на географската близост се определя
tвърдо от ролята, която играе ученни-
yat. Когато взаимоотношението включва
предаване на ново знание по-вероятно е
ученит да се намира в същия район като
фирмата. Когато обаче, ученит оказ-
ва услуга на компанията, невключваща
company, which does not include transfer of knowledge, then local proximity loses its significance.

A conceptual issue for the economies arises when the concentration in one place occurs due to the transfer of knowledge. If a certain industry and innovation cluster is formed in a town, a region or a state, why should it lose the advantage of the first comer? The answer, given by Audretsch and Feldman (1996), says that the relative significance of the local proximity and the related concentration effect depend on the stage of industry life cycle.

So, let’s try to add to the inputoutput structure of the economic analysis by focusing on the development of models with two or more industrial sectors. This enables us to study the agglomeration forces in every individual type of industry and inside the production sector as a whole. Thus, we can pass from “Where the production will concentrate (if this happens)?” to “Where and what production will be concentrated?” Our basic method of simplification is the overlapping of symmetry in both industries’ parameters and the created matrices of the intersector connections equilibrium. We assume the existence of complete industrial economies; the agricultural sector with its low constant return is excluded from the system.

The analysis is based on a modification of Heckscher-Ohlin model, so that it can cover many industries. We assume that all industries are symmetrical and that the number of the industries is \( H \). We determine the elements along the diagonal of the investment and production matrix, \( \gamma=0 \), so that there are internal industry connections only, \( \alpha > 0 \), and \( \alpha + \beta = 1 \). This assumption is not necessary for the results, but it simplifies a lot the formulations that follow. With these assumptions the price, established in the “Home” country in industry \( i \) is \( i = 1 \) for each industry \( ... H \),

\[
p^{i} = (\alpha^{i})^{\beta}(G^{i})^{\alpha}.
\]

We can express differently the price indices and equations for remuneration, as follows:

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\[ \text{Ние може да изложим по различен начин ценовите индекси и уравненията за възнагражденията като} \]
\[ G^i = \left[ \lambda^i (\omega^i)^{1-\beta}(G^i)^{-\alpha} + \tilde{\lambda}^i (\tilde{\omega}^i)^{1-\beta}(\tilde{G}^i)^{-\alpha} \right]^{\frac{1}{1-\alpha}}, \]  
(3)

and

\[ \left[ \omega^i \beta(G^i)^{\alpha} \right]_{h} = \beta \left[ E^i (G^i)^{\alpha-1} + \tilde{E}^i (\tilde{G}^i)^{\alpha-1} \right], \]  
(4)

for each \( i = 1 \ldots H \). The costs for each industry are obtained from equations (5) and (6)

\[ E^1 = \left[ \omega^1 \lambda^1 + \omega^2 \lambda^2 \right] \left[ \frac{\alpha \omega^1 \lambda^1 + Y \omega^2 \lambda^2}{\beta} \right], \]  
(5)

\[ E^2 = \left[ \omega^1 \lambda^1 + \omega^2 \lambda^2 \right] \left[ \frac{\alpha \omega^2 \lambda^2 + Y \omega^1 \lambda^1}{\beta} \right], \]  
(6)

and get the form

\[ E^i = \frac{1}{H} \sum_{j=1}^{H} \omega^i \lambda^j + \frac{\alpha \omega^i \lambda^j}{1-\alpha}, \]  
(7)

where consumers spend \( 1/H \) from their income for every production of the industry, and the sum is the total amount of the remunerations in the domestic economy.

We focus on the sustainability equilibrium, where each industry is located in one country. We allow division of industries among the countries and check whether it is sustainable. Let’s assume that the industries are divided into group I and group II, located in the Home country and in the Host country. The number of the industries in group I is marked by \( h \), and in group II - by \( \tilde{h} \), so that \( h + \tilde{h} = H \). I and II are put above \( \lambda \), in order to mark the variables for the industries from each group, for example \( \lambda^i \) is the hire of staff in the Home country in one industry in group I. Every economy fully hires the possessed share of one unit of labour in its group of industries, so the division shows that:

<table>
<thead>
<tr>
<th>( h )</th>
<th>( \lambda^I = 1/h )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \tilde{h} )</td>
<td>( \lambda^{II} = 0 )</td>
</tr>
<tr>
<td>( 1/\tilde{h} )</td>
<td>( \lambda^{II} = 1/\tilde{h} )</td>
</tr>
</tbody>
</table>

The first line shows that the Home country does not have hiring of staff in industries in group II, and all its labour force (per unit) is equally distributed among the industries \( h \) in group I. The second line gives the corresponding levels of hiring staff in the Host country.

The second line gives the corresponding levels of hiring staff in the Host country.

Първият ред показва, че страната „Домакин“ няма наемане в индустриите в група II и че нейната цяла работна сила (за единица) е равномерно разпределена между индустриите \( h \) в група I. Вторият ред дава съответните нива на наемане в „Гостоприемник“.
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Please note that, if \( h > \tilde{h}, \) then \( \lambda^I < \lambda^{II}. \) Therefore, if the Home country owns more than half of the world industry, then the hiring of staff in any of the Home country industries is less than it is in the Host industries.

How does the equilibrium look like depending on this distribution of the industries? Firstly, it is easy to deduce the relative share of the remunerations in the industries that are active in each country, \( \omega^I / \tilde{\omega}^{II}. \) Every industry takes equal share of the world revenue and holds the same share of remunerations costs, indicating that the costs for labour pay is equal in all industries. The staff hire levels depend on the distribution of the industries, so that the remunerations vary in inverse proportion, which means that

\[
\frac{\omega^I}{\tilde{\omega}^{II}} = h / \tilde{h}.
\]

(9)

So, if Home has twice as many industries as Host, then it has got twice as many wages; the high wages correspond to the low staff hire levels in the industries, in order to get equal value of the production in all industries.

These relations permit certain simplification of the formulations of the production costs, which become

\[
E^I = \omega^I \left[ \frac{1}{H} + \frac{\alpha}{(1-\alpha)h} \right],
\]

\[
E^{II} = \frac{\omega^I}{H},
\]

\[
\tilde{E}^{II} = \tilde{\omega}^{II} \left[ \frac{1}{H} + \frac{\alpha}{(1-\alpha)\tilde{h}} \right],
\]

\[
\tilde{E}^I = \frac{\tilde{\omega}^{II}}{H}.
\]

(10)

Formulations for the price indices are also needed. Since every industry is operated in one country only, the equations of the price index (3) are

\[
G^I = \omega^I \left( \lambda^I \right)^{1/[1-\alpha(1-\alpha)]}, \quad G^{II} = T\tilde{G}^{II},
\]

\[
\tilde{G}^{II} = \tilde{\omega}^{II} \left( \lambda^{II} \right)^{1/[1-\alpha(1-\alpha)]}, \quad \tilde{G}^I = T\tilde{G}^I.
\]

(11)

Now, we can test the sustainability of our presumable division of the industry. To be able to do this we need to compare the remunerations in the industries, using wages, which can be paid by a company from

\[ \text{Забележете, че ако } h > \tilde{h}, \text{ тогава } \lambda^I < \lambda^{II}. \]

Следователно, ако „Домакин“ притежава повече от половината от световната индустрия, то тогава наемането във всяка от индустриите на „Домакин“ е по-малко отколкото във всяка от тези на „Гостоприемник“.

В зависимост от това разпределение на индустриите, как изглежда равновесието? Първо, лесно е да се извлече относителният дял на възнагражденията в индустриите, активни във всяка страна, \( \omega^I / \tilde{\omega}^{II}. \) Всяка индустрия взема еднакъв дял от световния доход и притежава същия дял от възнагражденията в разходите, означавайки, че разходите за заплащане на труда е еднаква във всички индустрии. Нивата на наемане зависят от разпределението на индустриите (равенство 8), така че възнагражденията варират обратно пропорционално, което означава, че

\[ \frac{\omega^I}{\tilde{\omega}^{II}} = h / \tilde{h}. \]

(9)

И така, ако „Домакин“ има два пъти повече индустрии от „Гостоприемник“, тогава тя има два пъти повече надниц; високите надници са в съответствие с ниските в нивата на наемане в индустриите, за да се получи еднаква стойност на производството във всички индустрии.

Тези отношения позволяват известно опростяване на формулировките за производствените разходи (7), което става,

\[
E^I = \omega^I \left[ \frac{1}{H} + \frac{\alpha}{(1-\alpha)h} \right], \quad E^{II} = \frac{\omega^I}{H},
\]

\[
\tilde{E}^{II} = \tilde{\omega}^{II} \left[ \frac{1}{H} + \frac{\alpha}{(1-\alpha)\tilde{h}} \right], \quad \tilde{E}^I = \frac{\tilde{\omega}^{II}}{H}.
\]

(10)

Нужни са ни също формулировки за ценовите индекси. Тъй като всяка индустрия действа само в една страна, уравненията за ценовия индекс (3) стават

\[
G^I = \omega^I \left( \lambda^I \right)^{1/[1-\alpha(1-\alpha)]}, \quad G^{II} = T\tilde{G}^{II},
\]

\[
\tilde{G}^{II} = \tilde{\omega}^{II} \left( \lambda^{II} \right)^{1/[1-\alpha(1-\alpha)]}, \quad \tilde{G}^I = T\tilde{G}^I.
\]

(11)

Сега можем да изпробваме за устойчивост нашето предполагаемо разделение на индустрията. За да направим това, трябва да сравним възнагражденията в индустриите, действащи с надница, ко-
another industry. Thus, for the “Home”
economy we need to compare the wags
paid by group I industries with those,
which would be paid by the potentially in-
coming company from a group II industry.
From (4) the ratio of the equations for the
wages in group I industries and group II
industries is:
\[
\left(\frac{\omega^I}{\omega^I}\right)^{\beta^\sigma} T^{a^\sigma} = \left(\frac{G^I}{G^II}\right)^{1-\alpha (1-\sigma)} \left[\frac{E^IT^{1-\alpha} + E^II T^{\sigma-1}}{E^I + E^II}\right]
\]  (12)

Using the equations (8) - (11) this can be
brought to:
\[
\left(\frac{\omega^I}{\omega^I}\right)^{\beta^\sigma} = T^{a^\sigma} \left(\frac{h}{h^\sigma + h^\alpha T^{1-\alpha} + (1-\alpha) h T^{\sigma-1}}\right)^{1/\sigma}
\]  (13)

If this expression is smaller than one, then
\(\omega^I < \omega^I\), so that the workers in group I in-
dustries would not like to move to group II
industries.

The structure of this condition is similar to
that of other sustainability conditions and
when \(h = \tilde{h} = H/2\), it shrinks again to a
simple sustainability condition\(^1\). The form
of this relation is illustrated by the solid
curved line on Figure 1, where the trans-
port costs lie on the horizontal axis and
the world industry share of country 1 on
the vertical axis, and the values of the var-
iables, at which the equation (13) is unity,
are indicated. At values of \(h/H\) above the
line none of the companies from group II
industries would like to penetrate into the
Home economy \((\omega^I < \omega^I)\), while under the
solid line, \(h/H\) is unsustainable \((\omega^I > \omega^I)\).

The curve gets its form from the follow-
ing forces. The first term on the right-hand
side of (13), \(T^\alpha\), typically covers the for-
ward connections; the potential moving
industry has to import all its intermediary
goods from Host’s suppliers and pay the
transport costs for this. The final term in
the square brackets covers the backward
connections and increases in \(h\); if there are

\[1 - \left(\frac{\omega^I}{\omega^I}\right)^2 - \tilde{h}^{\sigma-1} \left[\frac{1 + \alpha - \sigma}{2} \right] \tilde{h}^{\alpha-1} \left[\frac{1 + \gamma - \sigma}{2} \right] \tilde{h}^{\gamma-1}\] (14)

Equation (14) expresses \(\omega^I / \omega^I\) as a function of pa-
rameters, and agglomeration of industry 1 in Home is
sustainable if industry 2 does not pay higher wages,
that is, if \(\omega^I \leq \omega^I\).

и то биха могли да се платят от фирма, влизаща в друга индустрия. За икономи-
kата в „Домакин” трябва следователно да
срвним надниците площани от индус-
триите в група I с тези, която биха били
платени от потенциално влизаща фирма
от индустрия от група II. От (4) съотно-
шението на уравненията за надниците в
индустриите от група I и група II е

\[\text{Използвайки уравненията (8) – (11), можем да сведем това до}\]

\[\left(\frac{\omega^I}{\omega^I}\right)^{\beta^\sigma} = T^{a^\sigma} \left(\frac{h}{h^\sigma + h^\alpha T^{1-\alpha} + (1-\alpha) h T^{\sigma-1}}\right)^{1/\sigma}.\]  (13)

Ако този израз е по-малък от единица, тогава \(\omega^I < \omega^I\), така че работниците в ин-
dустриите от група I няма да искат да се
преместят в индустриите от група II.

Това условие има структура подобна на
други условия за устойчивост и когато
\(h = \tilde{h} = H/2\), то се свежда до просто
условие за устойчивост\(^1\). Формата на
tова отношение е илюстрирано от плът-
nата крива на Фигура 1, където имаме транспортни разходи върху хоризон-
талната ос и дълж на страна 1 от све-
tовната индустрия върху вертикалната
ос, и са посоченистойноститези тези
променливи, при които уравнение (13)
е равно на единица. При стойности на
\(h/H\) над линията, никоя фирма от ин-
dустриите на група II няма да иска да
влеze в икономиката на „Домакин”
\((\omega^I < \omega^I)\), докато под плътната линия
\(h/H\) не е устойчиво \((\omega^I > \omega^I)\).

Кривата получава своята форма от след-
nите сили. Първият период в дъясната
страна на (13), \(T^\alpha\), улавя както обик-
новено връзките напред; потенциал-
ната премествация се индустрия трябва
da внася всички свои междинни стоки
от доставчици от „Гостоприемник” и да
плати транспортните разходи за това.
Последният период (в средните скоби)
alва връзките назад и нараства в \(h\);
more industries, the revenue is increased, the market expands and this makes it more attractive for companies from group II industries to settle in the Home Country. But the middle term \((h/h)\) reflects the relative wages in both locations (see equation 9) and reduces in \(h\); the bigger number of industries in Home increases the wages by thus making the market entry for other industries less attractive. By combining these effects the right part decreases in \(h\), so that the bigger the \(h\), the smaller the probability another industry to settle in Home.

To have a sustainable equilibrium we need to prove that the entry of group II industries in Home is not advantageous, nor is the entry of group I industry companies in Host. Therefore, a second sustainability equation is to be extracted for Host; it is similar to (13) but gives \(\tilde{\omega}/\tilde{\omega}^{ii}\), and has interchangeability of \(h\) and \(\tilde{h}\). This is illustrated by the dotted line on Fig.1, above which the wages in Host are sufficiently low, so that the entry of a group I industry company is advantageous at \(\tilde{\omega}/\tilde{\omega}^{ii} > 1\).

When summing up the curves, every division of industries between the countries is sustainable provided that it is in between these curves and to the left from their intersection. The value \(T\), at which the curves intersect, is exactly the typical sustain point, as it can be seen, when half of ако имаш повече industriи, доходът се увеличава и пазарът разширява и това го прави по-привлекателен за фирми от индустриите в група II да се установят в страната „Домакин“. Но средният период \((h/h)\) отразява относителните надници в двете местоположения (вж. уравнение 9) и намалява в \(h\); по-голям брой индустрии в „Домакин“ повишават надниците, като правят по този начин влизането на други индустрии по-малко привлекателно. Съчетавайки тези ефекти, дясната страна като цел намалява в \(h\), така че колкото по-голямо е \(h\), толкова е по-малка вероятността друга индустрия да се установи в „Домакин“.

За да бъде равновесието устойчиво, трябва да установим, че влизането на фирми от индустрия II в „Домакин“ не е изгодно, а също и че влизането на фирмите от индустрия I в „Гостоприемник“ е неизгодно. Следователно трябва да се извърше второ уравнение за устойчивост на „Гостоприемник“; то е подобно на (13), но дава \(\tilde{\omega}/\tilde{\omega}^{ii}\), и има взаимозаменяемост на \(h\) и \(\tilde{h}\). Това (фиг. 1) се илюстрира от пунктирания линия, над която надниците на „Гостоприемник“ са достатъчно ниски, така че влизането на фирма от индустрия I е изгодно при \(\tilde{\omega}/\tilde{\omega}^{ii} > 1\).

![Figure 1. Groups of sustainable equilibria](image)

Фигура 1. Групи устойчиви равновесия
the world industries is provisionally given to each country, and comparing equation (13) with (14), as it is in the Heckscher-Ohlin model. At transport costs above this point, clustering is impossible. At the other end, when \( T = 12 \), the factor prices need to be equalized and this requires the equal number of industries in each country. The scale of the clustering is the largest in the interim values of the market costs, and the equilibrium span scale that can be maintained, is the biggest.

At a certain level of transport costs, the stronger the connections inside the industry \( a \), the bigger the span of sustainable locations of the industries, and hence, the differences in comparison with the international wages is. Figure 1 shows calculations at \( \alpha = 0.4 \). A larger value for \( a \) expands significantly the sustainability span: At \( a = 0.67 \) one economy may have three times as many industries as the other. To summarize the model and in order to obtain positive connections between the industries (\( \gamma > 0 \)), it can be demonstrated that a sustainable concentration would require \( \alpha - \gamma > 0 \) and that the wider the span of sustainable locations, the bigger \( \alpha - \gamma \).

Although the model does not say anything on what determines the factual division of the industries, there is a clearly expressed potential conflict of interests between the countries, as far as each of them may wish to attract disproportional part of the industries. By doing this, a country will increase its nominal wages and will reduce the share of its consumption that would incur transport costs. But two forces act in another direction. One such force is that the number of options produced by every industry in the Home country goes down, when more and more industries are included. The other one is that by shrinking Hosts’ economy the volume of trade goes down and the sales profit is lost. To put it in another way, the decline in the demand level with regard to Home’s production in Host makes the market conditions deteriorate.

dadi условно половината от световните
индустрии и се сравни уравнение (13) с
уравнение (14), както е в класическата
модел на Heckscher-Ohlin. При транс-
портни разходи над тази точка, изобщо
не е възможна кластеризация. В другия
край, когато \( T = 12 \), факторните цени
тръбва да се изравнят и това налага бро-
ят на индустриите във всяка страна да
бъде еднакъв. Мащабът на формиране
на кластери е най-голям в междуполитни
стойности на пазарни разходи, а също
тук най-голяма е широтата на обхвата на
равенствата, които могат да бъдат
поддържани.

При данни ниво на транспортни разхо-
ди, широтата на обхвата на устойчиви
местоположения на индустриите, и сле-
дователно на различи с международни-
те надници, е по-голяма колкото са по-
силни връзките вътре в индустрията \( \sigma \).
Фиг. 1 показва изчисления при \( \alpha = 0.4 \).
По-голяма стойност на \( \alpha \) разширява зна-
чително обхвата на устойчивост: При
\( \alpha = 0.67 \) една икономика може да има три
пъти повече индустрии от другата. Об-
общавайки модела, за да имаме положи-
телни връзки между индустриите (\( \gamma > 0 \)),
може да се каже, че за да бъде едно
струване устойчиво, тръбва \( \alpha - \gamma > 0 \) и
колкото обхвътът на устойчиви местопо-
ложения е по-широк, толкова по-голямо
е \( \alpha - \gamma \).

Макар, че моделът не казва нищо от-
носяно това, кое определя фактическото
разделяне на индустриите, има ясно
изразен потенциален конфликт на ин-
тереси между страните, доколкото вся-
ка една може да желае да привлече
dиспропорционална част от групите ин-
дустрии. Като направи това, една страна
ще повиши своите номинални надници и
ще намаля съотношението на своето по-
требление, върху което трябва да прави
транспортни разходи. Но две сили те-
гъват в другата посока. Едната е, че бро-
ят на вариантите, произведени от всяка
индустрия в страната „Домакин“ спада
колкото повече индустрии са включени;
другата е, че със свиването на икономи-
ката на „Гостоприемник“ обемът на тър-
говията спада и печалбите от продажби
се губят. Ако трябва да изложим това по
друг начин, пазарните условия започват
da se влошават със спадането на нивото
на търсенето в „Гостоприемник“ на про-
изводство от „Домакин‖.
What is the total effect of industry attraction over the real revenue? We have extracted an explicit formulation for the real revenue as a function of the industry division between the countries. However, the simulation in two countries points out that within the span of sustainable equilibriums the real revenue of each country definitely increases within its share of manufacturing industry. In other words, although in general a certain country may not be interested in supporting strongly a policy of “industry attraction”, our simulations in two countries show that within a relatively small span it is useful to attract as many industries as possible.

As stated before, unlike the information, the undocumented knowledge can be transferred unofficially, and, therefore, it requires direct and repeated contacts. Most probably the role of the undocumented knowledge in triggering innovation is strongest during the early stages of the industry life cycle before product standards and final design have been established. Audretsch and Feldman (1996) classify 210 industries, being at four different stages of the life cycle. The results provide significant evidence that the propensity of the innovative activity to spatial concentration depends on the stage of the industry life cycle.

On one hand, the new economic knowledge of the qualified workers increases the propensity of innovation towards spatial concentration in all stages of the industry life cycle. On the other hand, some sources of new economic knowledge, such as university research, increase the propensity of innovative activity towards spatial concentration during the early stage of the life cycle and during the stage of decline, but not in the stage of growth.

Probably most surprising is the result that the bigger geographic concentration of manufacture actually leads to higher rather than lower innovation distribution. Obviously, the innovative activity is assisted by the knowledge spillovers within certain geographic region, especially in the early

Кажък е цялостният ефект от привличане на индустрии върху реалните доходи? Ние извъншваме категорична формулировка за реалния доход като функция от разпределението на индустриите между страниите. Обаче, симулацията в две държави посочва, че в рамките на обхвата на устойчивите равновесия, реалният доход на всяка страна определено се повишава в своя дял на производителната индустрия. С други думи, макар че по принцип може да не бъде в интерес на една страна да подкрепя политика на „привличане на индустрии“ прекалено много, нашите симулации в две държави показват, че в рамките на относително малък обхват, има ползи от това да приключиш колкото се може повече.

Както беше посочено, именно необявеното знание, разликата от информацията, може да се предава неофициално като логично изисква директни и повтарящи се контакти. По всичка вероятност ролята на необявеното знание да поражда новаторска дейност е най-голяма през ранните етапи на индустриалния жизнен цикъл, преди установяването на стандартите за продукта и преди налагането на окончателен дизайн. Audretsch и Feldman (1996) класифицират 210 индустрии в четири различни стадия на жизнения цикъл. Резултатите предоставят значителни доказателства, че склонността на иновационната дейност към пространствено структура не се оформя от стадия на индустриалния жизнен цикъл. От една страна, новото икономическо знание, въплътено в квалифицирани работници, повишава склонността на новаторска дейност към пространствено структуриране във всички фази на индустриалния жизнен цикъл. От друга страна, някои други източници на ново икономическо знание като университетски изследвания повишават склонността на новаторска дейност към пространствено структуриране през началния стадий на жизнения цикъл и през стадия на спад, но не през стадия на просперитет.

Най-изразителен е може би резултатът, че по-голямата географска концентрация на производството възможност води до повече, а не до по-малко разпространяване на иновативността. Очевидно новаторската дейност се подпомага от изитицето на знание, което става в рамките на определян географски регион, особено в ранните стадии на ин-
stages of the industry life cycle. With the development of the industry towards maturity and decline, the innovative activity may be expanded by the additional increase of the concentration of production created within the same region. Hence, there exists at least some evidence, that the spatial concentrations like other organisational units of the economic activity are vulnerable with regards to technological barriers. Under the given circumstances this would bring the necessity of new space for new ideas. When the barrier of the technologies becomes sufficiently solid, evidence on the need of new space for new ideas appears.

**VII. Main conclusions**

Globalisation crucially reduces the geographical distance transfer costs not only of tangible and intangible services but also of those related to information. The high wages are yet more incompatible with the information-oriented economic activity, since it can easily be relocated to a new place at a lower cost. However, the creation of new ideas based on undocumented knowledge cannot be easily transferred across the distance. Therefore, the comparative advantage of the rich North American and West European countries increasingly depends on innovative knowledge-driven activity. The spillover of knowledge from a company or a university in order to create knowledge in another company – a third party, is essential for the innovation activity. Such knowledge spillover is usually limited by the distance. Therefore, one of the paradoxes of globalisation is that even when the relevant geographical market of most of the goods and services becomes larger, the increased significance of the innovative activity in the leading developed countries brings into the foreground the significance of the region as a key source of competitive advantage.

Since the competitive advantage in West Europe and North America is increasingly based on new knowledge, the public policy on business responds in two basic ways. The first way is by changing the focus from industrial to knowledge-oriented economic activity, wages are yet more incompatible with the information of those related to information. The high geographical distance transfer costs not only of tangible and intangible services but also of those related to information. The high wages are yet more incompatible with the information-oriented economic activity, since it can easily be relocated to a new place at a lower cost. However, the creation of new ideas based on undocumented knowledge cannot be easily transferred across the distance. Therefore, the comparative advantage of the rich North American and West European countries increasingly depends on innovative knowledge-driven activity. The spillover of knowledge from a company or a university in order to create knowledge in another company – a third party, is essential for the innovation activity. Such knowledge spillover is usually limited by the distance. Therefore, one of the paradoxes of globalisation is that even when the relevant geographical market of most of the goods and services becomes larger, the increased significance of the innovative activity in the leading developed countries brings into the foreground the significance of the region as a key source of competitive advantage.

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**VII. Основни изводи**

Глобализацията драстично снижава разходите за пренасяне през географското пространство не само на материални стоки и нематериални услуги, но и на информация. Високите надници са все по-неспокойни с информационно-сочената икономическа дейност поради това, че тя може лесно да се пренесе на ново място с по-малки разходи. Създаването обаче, на нови идеи на база на необявено знание, не може лесно да се пренесе през пространството. Следователно, сравнимото предимство на богатите страни в Северна Америка и Западна Европа все повече зависи от иновационната дейност, движен от знанието. Изтичането на знание от фирмата или университета, създаващо знание за фирма - трета страна, е съществено за новаторската дейност. Такова изтичане на знание, обикновено е ограничено в пространството. Следователно, един от парадоксите на глобализацията е, че дори когато съответният географски пазар за повечето стоки и услуги става все по-масовен, неразделна значимост на новаторската дейност във водещите развити страни извежда на преден план значимостта на региона като ключов източник на конкурентно предимство.

Тъй като сравнимото предимство в Западна Европа и Северна Америка се основава все повече върху ново знание, публичната политика по отношение на бизнеса отвлича по два основни начина: Първият е промяна на фокуса от традиционната триада политически
the traditional triad of policy instruments - rules, competition policy and antitrust legislation, all restricting the freedom of the companies to contract, to public ownership of business. The approach within the barrier policy is reasonable as far as the main issue is how to restrict the independent multinational corporations from acquiring considerable power over the markets. This triggers a wave of actions to remove some of the existing rules together with yet lighter emphasis on competition policy in all OECD countries. The new policy approach is found, where the focus is on knowledge creation and commercialisation. Examples of such approaches are fostering R&D and risk capital in startup companies.

The second basic way of public policy reaction alludes to changing the place of its implementation, more and more often found at local or regional level.

During the past decade we are witnessing the appearance of a wide spectrum of rights and political initiatives, which remain outside the authority of the traditional regulatory agencies. The success of a number of high-tech concentrations, connecting some developed countries, is an outcome from authorizing policies that provide risk capital or support the R&D. Such authorizing policies typically implemented at local or regional level, are part of the tacit revolution in politics conducted nowadays. The growing significance of the regional innovation clusters as a driving force of the economic growth compels the decision makers to wonder: “What type and where the next Silicone Valley will be?”

инструменти – правила, политика на конкурентицата и антитръствово законодателство, ограничаващи свободата на фирмите за договоряне към публична собственост върху бизнеса. Подходът при политиката на бариери е разумен, доколкото главният проблем е как да бъдат ограничавани необвързаните мно- гонационални корпорации при придобиване на значителна власт върху пазарите. Това поражда вълна от действия за премахване на някои съществуващи правила едновременно с все по-затихващ акцент върху политиката на конкурентицата навсякъде в страните на ОИСР. Наблюдава се поява на нов политически подход, който се фокусира върху създаването и комерсиализацията на знанието. Примери за такива подходи са по-ощърване на НИРД и рисковия капитал в новосъздадените фирми.

Вторият основен начин, по който реагира публичната политика, визира промяна на мястото на нейното осъществяване, локализирано във-често на местно или регионално ниво.

През последното десетилетие сме свидетели на появлата на широк спектър от права и политически инициативи, които остават извън правомощията на традиционните регулаторни агенции. Успехът на редица различни високотехнологични структури, свързващи някои развити страни, е пряк резултат от даващи правова политики, които осигуряват рисков капитал или подпомагат НИРД. Такива даващи права политики, обикновено осъществявани на местно или регионално ниво, са част от негласната революция в политиката, провеждана днес. Нарастащата значимост на регионалните инновационни кълстери като двигател на икономическия растеж, кара тези, които вземат решенията, да възкликват: “Ка-къв ще бъде следващият тип Силиконо- ва долина и къде?”
Reference / Литература

[14] Антонова, Д. и кол. (2003), Инновационна политика и пазарен дял, стр. 5-8