



**Corvinus University of
Budapest**

**Doctoral School of
Business and
Management**

Summary of Thesis

Zoltán Fülöp

**Difficulties of catching-up in Central-
Eastern Europe**

Supervisor:

Dr. Dávid István Losonci

Budapest, 2023.

Department of Business Economy

Summary of Thesis

Zoltán Fülöp

**Difficulties of catching-up in Central-
Eastern Europe**

Supervisor:

Dr. Dávid István Losonci

©Zoltán Fülöp

Table of contents

1.	Research background and rationale	2
1.1	Research background	2
1.2	Structure of the dissertation	5
1.3	Rationale of the topic	6
2.	Applied methods	12
3.	Results of the dissertation	12
4.	Key references	14
5.	List of own (or co-authored) publications related to the topic	21
6.	Acknowledgment and testimonial	23

1. Research background and rationale

1.1 Research background

The beginning of my research career dates back to my master's studies. During this period, I started working with György Boda and Dávid Losonci. I became involved in their existing research on labour force and employment, as well as on national economic performance. Subsequently, a digitalisation research area was added to the research. Inspired by this research, I formulated my own ÚNKP research, for which I won a grant. The title of the resulting study was "Future trends in labour demand and labour supply and their impact on organisation and organisational strategies". My thesis supervisor was György Boda. The research was not published as a journal article, only as a study.

The research consisted mainly of secondary data analysis, literature review, and interviews with managers. I felt it was important to examine the unfolding labour market changes (mainly domestic but also global ones). Technological developments, changes in market structures and demographic changes are closely shaping labour demand and supply, as well as training needs. I soon realised that, overall, this is a large and complex topic, and that to understand it, its individual components need to be examined in detail. My next major research unit was built around digitalisation and Industry 4.0, but also included 'Work 4.0' and labour market research. When applying for PhD studies, I designed my research plan around this. This resulted in my first independent journal publication, in the *Labour Review*, in 2018, entitled "The impact of Industry 4.0 on employment". During the research, I reviewed a wide range of literature related to digitalisation and employment, as well as company databases.

At the same time, I was also involved in a growth rate research project, during which Tamás Révész joined the team. The research provided me with a high-level understanding of the

system of the sectoral linkages balance sheet, the so-called input-output tables (IOT), and the related input-output analysis methodologies. This brought research issues at the national economy and sectoral level to the centre of attention. In the course of the research, the total GDP balance sheet was studied, both from the production and consumption side. In addition, macro-level indicators were linked to results from a firm-level database.

The methodological skills I learned here and the research questions I was able to answer inspired me further, and my initial research plan changed direction somewhat. In particular, I was attracted by the World Input-Output Table/Database (WIOD) and its potential for modelling the world economy. The complexity and scope of the system is rather daunting for most researchers, but its consistency and potential were rather motivating for me. My attention soon turned to the sectoral problems and how to address them. With this approach, I continued my research and my work with my peers, which gave me the opportunity to understand the importance of supply chains and the smile curve framework that expresses their characteristics. By this time, the structural issues were already evident, as indicated by the positions held within supply chains (global value chains). This prompted the integration of the analytical database with a sectoral analysis, which also accommodates my original interest in the IT field.

The thought process of the smile curve flows through my entire dissertation, so a detailed description can be found in the methodology section and related articles. It should be emphasised that the framework is used by most researchers as a guideline or a guideline for thinking. Many studies cite its lessons. After a detailed literature review, I found that there are very few researchers who conduct quantitative analyses of the smile curve framework (at the sectoral level), so by combining known and accepted methodologies and supplementing them with my own results, I have developed an analytical framework

to analyse the WIOD database in a consistent way, with a quantifiable measure of the global value chain. During the research, I prepared several methodological descriptions and workshop studies with the aim of including them in my dissertation. In addition, two manuscripts of articles were produced, also with an emphasis on the approach and methodological framework. These are presented in the introductory section. In my background research, I analysed the related methodology of Antràs et al. (2012; 2013) and quantified the upstreamness and downstreamness values of the WIOD database countries. I also compared the sectoral rankings for both indicators and examined the rank correlation coefficient between them. I examined how common the characteristic "U" shape of the smile curve is across countries and time periods. Based on calculations, I have identified the "cut-off values" according to which sectors can be classified as upstreamness, manufacturing or downstreamness based on their upstreamness or downstreamness index. This exact categorisation is not common among researchers, although I think it is important that if simplifying classifications are used, there must be a robust, derived methodology that can be consistently repeated over time on other data sets. The details of these are set out in the introduction, as these background studies have not been published, only in simplified form, integrated into the individual articles.

During my research, I was interested in the question of how Hungary and the Central and Eastern European region are moving along the road to catching up. Exploring the parallels between the region's middle-income trap situation and its economic structure emerged as a goal, one of the less discussed aspects of which is the examination of the linkages to global value chains.

1.2 Structure of the dissertation

The article-based dissertation is compounded of five main chapters: an introduction with methodological extension and four study. The elements are already published articles:

Article 1: *“On the possibilities of increasing the growth rate and employment”*

Article 2: *"Productivity and profitability"*

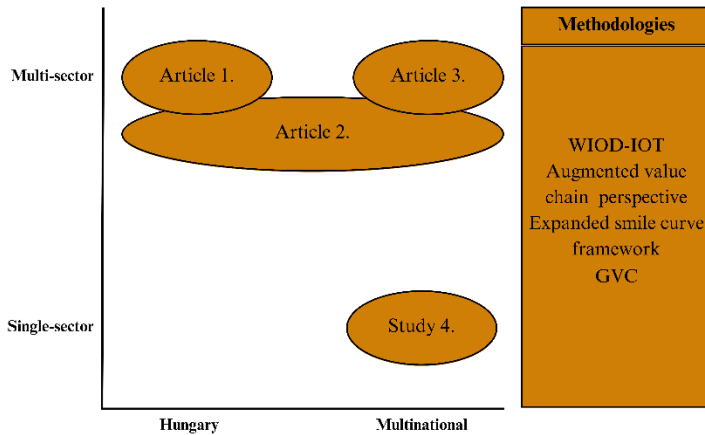
Article 3: *"Evolution of global value chain positions in the Central – Eastern European countries – A new dimension in catching up?"*

Study 4: *“International analysis of the IT sector based on GVCs”*

This table summarises the dissertation and the included articles with their key methodologies and findings:

	Introduction	Article 1	Article 2	Article 3	Study 4
Focus of analysis	Economic growth and GVCs	Economic growth rate and GVCs	Productivity and profitability analysis, GVC	Position of sectors in the GVC, catching up	IT sector in the GVC
Emphasis	Theoretical introduction and methodological extension	Methodological, empirical analysis	Methodology, empirical analysis	Literature introduction and methodology	Empirical analysis
Geographic focus	Global	Hungary	Central and Eastern Europe	CEER countries	Global
Methodology 1	WIOD		Input-output methodology, IOT, WIOD		
Methodology 2	Downstreamness, UMD	National accounts	Hungary territorial IOT	Methodologies related to the smile curve framework (upstreamness, AV ratio)	
Methodology 3	Rank correlation	Enterprise database analysis	FIGARO IOT	UMD	Cluster analysis
Main findings	Even after a trap situation has been identified, a thoughtful way out must be chosen	Apparent growth, trap situation, influence of foreign capital	Hungary is a GEEI-exposed economy, while its internal development is also burdened by regional tensions.	Global value chain positions not moving in the direction of Western trends	The IT sector is not a way out of the income trap in all countries
Conclusion	The majority of Central and Eastern European countries are in the income trap, which can be identified from the GVC position. There are several break-out paths, one of which is upgrading and pursuing higher value added and developing sectors (e.g. IT) that can be well positioned.				

This figure helps to understand the connections between the articles.



1.3 Rationale of the topic

There is a lot of literature dealing with the catching up. Researchers often employ a high-level measurement to evaluate the progress of these countries in catching up to their more developed counterparts. For instance, studies by EU (2023) and Jones and Klenow (2016) and Smith et al. (2018) highlight the significance of GDP growth, technological advancement, and human capital investment as crucial components of the catch-up process. This study also focusses on high-level measurements and macro data, but it opens new aspects via the production and the GVC connections.

The problems of possible underperformance or inefficient development of the economy are mainly to be found in the structure of production. In addition, the structure of production, driven by foreign direct investment (FDI), which does not serve convergence effectively, also has a significant impact (Lux [2017], Gorynia et. al. [2015]). To mitigate this, countries need to undertake internal upgrading (Lin et. al., 2008; Lin, 2017). One pillar of this is to change the structure of the economy. Sector upgrading should emphasise sectors with higher value-

added ratio and with higher knowledge intensity. More specifically, the set of activities carried out by each sector should be directed in this direction.

The concept of upgrading has been used several times, but it is worth clarifying here that this thesis is mainly concerned with the economic dimension of upgrading, which is generally defined as 'moving into higher value-added (ratio) stages', i.e. a move to a higher value-added level, often resulting from some positive technological or productivity improvement. A recent cornerstone work in the GVC literature, Marcató-Baltar, 2020, has also highlighted this definition.

Future economists give clear statements on the content of structural change (Boda-Virág [2010], Boda [2017a], [2017b], Brynjolfsson-McAfee [2014], McAfee-Brynjolfsson [2016], Ford [2017], Marosán [2017]), as well as empirical labour market (Frey-Osborne [2013], Hanushek et al. [2017], Trąpczyński [2013]) and other industrial organisation research (Szalavetz [2016], [2017], Gorynia et. al. [2014]). In the context of structural change, these authors mainly refer to and urge the rapid unfolding of the knowledge economy. They are mostly agreeing on that the knowledge intensive sectors should be encouraged.

To see the problem from a bit higher perspective, we can claim that for decades, the development of national economies has been the subject of continuous research by eminent experts, and many theories have been put forward in economics as to why sectors in some countries can develop successfully while the same sector in another country stagnates or even declines. (Vakhal, 2021) There are many complex reasons for this. Vakhal (2021) has also argued that neither economic history nor modern science can provide satisfactory answers to these questions. One reason is that economies are taking increasingly complex and integrated forms. Many earlier theories have been transformed as the quantitative description of phenomena has

become more complex, but fortunately the analytical tools have also become more sophisticated.

It is also clear from the discourse of György Boda and Andrea Szalavetz (2022) that statements such as "the economic structure is fundamentally a function of the consumption structure" are no longer entirely correct, since nowadays, in the era of global value chains, this is not the case, or more precisely, it is not enough to observe the consumption of a country or a region, since the whole world is involved. This is also illustrated by the crisis linked to the coronavirus that started in the 2020s and then to the Ukraine-Russia war. Global and regional issues have drawn attention to how integrated economies are and the huge importance of foreign trade. Vakhil (2021) also mentions a phenomenon highlighted by the situation in the 2020s: 'The organisation of firms, and thus indirectly of countries into production networks, has redrawn dependency relations, and it can no longer be said that the direction of dependence is clearly from the smaller country to the larger.' (p 9.) I have experienced an example from my own corporate practice (2022 and 2023) in the context of the Ukraine-Russia war which illustrates this. Eventually, suppliers from Western (mainly German) companies, or even capacity at the end of the supply chain, failed, causing serious problems at the end of the chain. The companies concerned began to look for alternative solutions at a rapid pace, and this is how, for example, production and even the value-added share in metalworking in Hungary, at least for a significant number of companies in the sector, increased. Even if only temporarily, the West was left in a situation of dependence and was forced to open to any alternative solution. In this situation, the question of the network of links between domestic companies and sectors, their role in the supplier network, their development path and direction, the opportunities they can and cannot exploit, has come to the centre of attention. This is also a kind of market knowledge, which is also discussed in Boda et al. 2021 (and some basic elements in Boda et al.2009). Not all companies have been able

to take advantage of this, and often it is only temporary, with the West pushing the value-added content down again. The lack of knowledge capital and knowledge management capabilities have a major impact on the performance of a value chain firm (Boda et. al. 2021; Szalavetz 2011), but I do not elaborate on this in this dissertation. Instead, I will focus on the phenomenon itself and its characterisation. In the CEE region, it is typical that companies and policymakers take advantage of the opportunities offered by outsourcing and input sourcing, but these are often associated with low added value, which is likely to reduce growth rates and cannot be the sole basis for strategy in the long run.

The definition of a middle-income trap has been formulated by several people. This is well summarised in Glave-Wagner (2020). In a research project with György Boda, we reviewed a wide range of these and ultimately formulated a definition that is aligned with the analytical framework of my dissertation, which can be also derived along the logic of the smile curve. According to our interpretation, a country is said to be in a middle-income trap if its production and resource structure is essentially concentrated in the sectors that generate the least 'income' in specific terms, i.e. those in which the value added per unit of output is low. Three main trap paths can in fact be identified here:

The first is where the smile curve is at a relatively low level so that even if the familiar "U" shape persists in some groups of sectors, it is still at a lower level with a lower value-added ratio than in other countries.

The second, often occurring phenomenon is that the curve also persists, but that a large part of production is concentrated in the middle, in manufacturing, where the value-added ratio is the lowest. In the past, researchers have mainly used this variant to illustrate the problem of individual economies.

The third case, which is common in Central and Eastern European countries, is that the base of the curve is not "U" but "/" or "r" or, in the worst case, "^". This would not be a problem, but coupled with the first case, the level in the middle of the curve, where value added is higher, does not exceed (or does not significantly exceed) the level in other developed countries. The focus shifts here to the middle, but this alone is not enough to catch up. We need to mention here that, from different aspects, there are different paths within manufacturing sectors. Based on the connection between supply chain position and the extent and type of services offered dominant business models are identified both in Eastern and Western Europe (Szász-Demeter, 2011).

In the examination of middle-income trap and GVC relations, Csontos (2023a) Using world-system analysis and the smile curve framework, he develops the model of participation and self-reliance, and within this new framework, interprets the trap of moderately developed countries. The goal of the participation strategy is described as to attain production, consumption, and institutional factors that facilitate catching up through engagement in global labour division. The self-reliance strategy involves efforts to neutralize factors hindering catching up through participation. The author agrees that the most Central-Eastern European country is in middle income trap. In connection with the author's other parallel work (Csontos, 2023b), he examines that in the Central-Eastern European countries there are several catching-up models (or strategies). As this dissertation will show, it can be confirmed, that there are lot of different GVC position models in this region, and the catching up process is ongoing, but it always reaches somehow a peak, and the economic distance is not decreasing significantly anymore. These findings are also consistent with Bohle – Greskovits (2012).

To maintain the trap situation (or to remain in trap), it is important to note that it is also necessary that, due to some

external influence or internal problem, the country in the supply chain is unable to increase the share of higher value-added activities/sectors and it is forced to engage in lower value-added activities. It is important to note that the fact of income trap is linked to the evolution of some selected economic indicators, for example by Magdolna Csath (2019, 2020), but I do not use them in my dissertation, so I will explain the definition used in detail in the relevant section.

Given that one of the central elements of the study is the smile curve, in this chapter I will describe in detail what I mean by it and what methodological elements are associated with it. I will also organise the terminology here so that it is consistent later in the dissertation and in the articles included.

I use the term "smile curve" to describe the phenomenon in its entirety, and I have included in this terminology, for simplicity, the method of calculating the two dimensions of the coordinate system (value added ratio of production and upstreamness/downstreamness). I have also used the groupings associated with the upstream, manufacturing, downstream (UMD) sector groups and the economic context that can be discerned in the picture that emerges. It is in fact a mixture of several methodologies and analytical tools. These are explained in detail in the methodological description. I use the term smile curve essentially as an analytical framework. Many researchers use the smile curve to describe the phenomenon without quantifying the horizontal axis (upstreamness/downstreamness) in an exact way. To do this, I introduced Antràs' methodology, which per se measures the proximity and distance of the consumer to the end-use. I have also included the value-added ratio used in the smile curve and, ultimately, the size of each sector. The third innovation linked to the study (mainly in Article 3, but also covered in the introductory methodological description) is that the classification of sectors into UMD categories is based on a direct, detailed derived and calculated methodology. Together, these three elements give rise to a

specific 'methodology', which I will refer to simplistically in English as 'smile curve theory' but prefer to call it 'smile curve framework' on several occasions.

2. Applied methods

The dissertation and the included articles primarily conduct exploratory investigations, followed by synthesising the results to draw conclusions. In the dissertation and in the article, I apply numerous quantitative methods. Mostly, they are connected to the input-output table systems. The balance of inter-sectoral relations (BIR) plays a central role in the targeted connection. The research applied other data analysing tools and databases, such as processing the company level reporting data which were linked to the system of national accounts. In this way I was able to organise different data sources of the National Tax and Customs Administration and the Hungarian Central Statistical Office to a consistent system.

Beside and strongly connected to the input-output table system, the sectoral level interpretation of the smile curve framework involves other methodologies. The key methodology is the adaptation of Antràs (2013) methodology for calculating upstreamness and downstreamness index.

3. Results of the dissertation

Throughout my research, the question that lingered was how Hungary and the Central-Eastern European region are progressing on the trajectory towards catching up (or, conversely, falling behind). The exploration of parallels between the region's characteristic state of a middle-income trap and its economic structure emerged as an objective, with one less-discussed aspect being the examination of engagement with global value chains.

Results in bullet points:

1. The apparent trap situation, and the economic growing in the Central-Eastern European region is highly influenced by foreign capital.
2. Value-added production and efficiency increase with firm size. In Hungary the firms which were upsizing, have problems with the contributions to added value increase.
3. Hungary is a Western Europe-exposed economy, its internal development is also burdened by internal regional tensions.
4. The trap situation described between the West and Hungary is also present within Hungary among the regions and Budapest.
5. Even if a trap situation is identified, a thoughtful way must be chosen for the way out. Improving a sector which has globally good potential might even hold the risk to get into a trap situation.
6. Global value chain positions are varying how each countries' industries catch any positions.
7. In the Central-Eastern European region there are several forms of value chains, but we can claim that the shifting in the past fifteen years is not running as in the Western trends.
8. Central-Eastern European countries are catching up to the West, but they have not yet caught up entirely.
9. Economic development is a complex process influenced by disparities between sectors and the interrelation of industries within value chains.

4. Key references

In my dissertation there were more than 140 pcs. literature referenced. Here I just highlight some of the most important ones.

1. Acemoglu, D.–Robinson, J. [2013]: *Miért Buknak El Nemzetek? A Hatalom, A Jólét És A Szegénység Eredete.* Hvg Kiadó, Budapest, <https://doi.org/10.1556/Tarskut.32.2014.2.7>.
2. Ambroziak, Łukasz (2018). The CEECs in global value chains: The role of Germany. *Acta Oeconomica*, 68(1), pp. 1-29.
3. Andrásfi Zoltán–Borsi Balázs–Farkas László–Némethné Pál Katalin–Papanek Gábor–Viszt Erzsébet [2009]: *A Mikro-, Kis- És Közepes Vállalatok Növekedésének Feltételei.* GKI Gazdaságkutató Zrt., Budapest.
4. Antràs, P. (2013) *feldolgozásában: Grossmann-Hart (1986) Goes Global: Incomplete Contracts, Property Rights and the International Organization of Production; Journal of Law, Economics and Organization.*
5. Antràs, P., Chor, D., Fally, T., & Hillberry, R. (2012). *Measuring the Upstreamness of Production and Trade Flows. American Economic Review: Papers & Proceedings*, 102(3), pp. 412-416.
6. Antràs, P.–Chor, D. (2013). *Organizing the global value chain. Econometrica*, 81(6), pp. 2127-2204.
7. Antràs, P. (2013) *adaptation. Grossmann–Hart (1986). Goes Global: Incomplete Contracts, Property Rights and the International Organization of Production. Journal of Law, Economics and Organization*, 30(1), pp. 118-175.

8. Antràs, Pol–Chor, Davin (2013): Organizing the global value chain, *Econometrica*, Vol. 81, No. 6 (November, 2013), 2127–2204.
9. Árvay János [1973]: Nemzeti Termelés, Nemzeti Jövedelem, Nemzeti Vagyon. Magyarország Népgazdasági Mérlegrendszer. Közgazdasági És Jogi Könyvkiadó, Budapest.
10. Augusztinovics Mária (Szerk.) [1979]: Népgazdasági Modellek A Távlati Tervezésben. Köz- Gazdasági És Jogi Könyvkiadó, Budapest.
11. Augusztinovics Mária [1968]: Az Ágazati Kapcsolati Modell Általánosításához. Közgazdasági Szemle, 15. Évf. 5. Sz. 583–599. O.
12. Baldwin Richard (2006): Globalisation: the great unbundling(s); Prime Minister’s Office, Economic Council of Finland
13. Baldwin, R. and Robert-Nicoud, F., (2014): Trade-in-goods and trade-in-tasks: An integrating framework. *Journal of International Economics*, 92(1), pp.51-62.
14. Baldwin, R. E., & Evenett, S. J. (2015): Value creation and trade in 21st century manufacturing. *Journal of Regional Science*, 55(1), 31-50.
15. Baldwin, R. E., (2016): *The Great Convergence: Information Technology and the New Globalization*, Harvard University Press.
16. Baldwin, R., and A. Venables (2013): “Spiders and Snakes: Offshoring and Agglomeration in the Global Economy,” *Journal of International Economics*, 90 (2), 245–254.
17. Békés Gábor–Muraközy Balázs [2012]: *Magyar Gazellák*.

A Gyors Növekedésű Vállalatok Jellemzői És Kialakulásuk Elemzése. Közgazdasági Szemle, 59. Évf. 3. Sz. 233–262. O.

18. Békés Gábor–Muraközy Balázs [2016]: Beszállítói Termékek A Magyar Feldolgozóiparban. Mta Műhelytanulmányok, Mt-Dp–2016/19, <Http://Real.Mtak.Hu/38165/1/Mtdp1619.Pdf>.
19. Benedecki Jánosné [1968]: A Nemzeti Jövedelem És Tényezői. Közgazdasági És Jogi Könyv-Kiadó, Budapest.
20. Berend T. Iván [1999]: Terelőúton. Közép- És Kelet-Európa, 1944–1990. Vince Kiadó, Budapest.
21. Bertóti László [1969]: A Nemzeti Jövedelem És Értéktöbbletráta. Közgazdasági Szemle, 16. Évf. 9. Sz. 1078–1088. O.
22. Boda György — Juhász Péter — Matyusz Zsolt — Stocker Miklós (2021): A fenntartható gazdasági növekedés és a tudástőke; Közgazdasági Szemle; LXVIII. évf., 2021. november (2—35. o.), DOI:10.18414/KSZ.2021.k.2, Különszám 2021
23. Boda György–Koósné Balsay Éva–Molnár István [1989]: Az Ágazati Kapcsolatok Mérle- Gének Összeállítása Magyarországon. Statisztikai Szemle, 67. Évf. 6. Sz. 584–598. O.
24. Boda, György (2020). Smile curve: trap or opportunity? New Labour Review, 1(2). Original language reference: Boda György (2020). Mosolygörbe: csapda vagy lehetőség? Új Munkaügyi Szemle, 1(2).
25. Chor, D., Manova, K., & Yu, Z. (August 28-29 2014). Global production Line Position of Chinese Firms

- [Conference presentation]. Stockholm, Sweden.
26. Cieřlik, E., Biegańska, J., & Środa-Murawska, S. (2016). The intensification of foreign trade in post-socialist countries and their role in global value chains. *Acta Oeconomica*, 66(3), pp. 465-487.
 27. Csath M. (2019): Közepes jövedelmi csapda vagy fejlettségi csapda és a költségvetési hatások; *Pénzügyi Szemle*, 2019/1
 28. Csath M. (2020): A közepes fejlettség és a tudásvagyon kapcsolata, *Magyar Tudomány* 182(2021)4, 462–473 DOI: 10.1556/2065.182.2021.4.3
 29. Csontos Tamás (2023a): Részvétel és önerő: A közepes jövedelmi csapda egy lehetséges újraértelmezése Participation and Self-Enforcement: A Possible Reinterpretation of the Middle-Income Trap, *Köz-gazdaság*, Volume 18, Number 1, Spring 2023, Review of Economic Theory and Policy, <https://doi.org/10.14267/RETP2023.01.02>
 30. Fally, T. (2012): On the Fragmentation of Production in the US. 2131,2162.
 31. Gereffi G. and Fernandez-Stark K. (2016): Global Value Chain Analysis: A Primer; Duke, Center on Globalization, Governance and Competitiveness, at the Social Science Institute
 32. Ghosh, A. (1958). Input-Output Approach in an Allocation System. *Economica* 25(97), pp. 58-64.
 33. Glawe, Linda - Wagner, Helmut (2020): China in the middle-income trap?; *China Economic Review*, Volume 60, April 2020, 101264
 34. Gorynia, Marian; Nowak, Jan; Trapeczyński, Piotr; Wolniak,

- Radosław (2014): Should governments support outward FDI? The case of Poland; *Institutional Impacts on Firm Internationalization* (pp. 120-145), Palgrave Macmillan UK
35. Gorynia, Marian; Nowak, Jan; Trąpczyński, Piotr; Wolniak, Radosław (2015): Outward FDI of Polish firms: The role of motives, entry modes and location factors; *Journal of East European Management Studies* (pp. 328-359)
36. Hagemeyer, J.–Ghodsí, M. (2017). Up or Down the Value Chain? A Comparative Analysis of the GVC Position of the Economies of the New EU Member States. *Central European Economic Journal*. 1(48), pp. 19-36. DOI: <https://doi.org/10.1515/ceej-2017-0003>
37. Trąpczyński, Piotr (2013): Determinants of foreign direct investment performance—a critical literature review; *Oeconomia Copernicana*, Instytut Badań Gospodarczych
38. Hatásелеmzés Multiplikátor Modellekkkel. Széchenyi István Egyetem, Győr, 255 O.
39. Koppány Krisztián–Kovács Norbert (2011): Fundamentális elemzés; Széchenyi István Egyetem, Győr
40. Leontief, W. [1941]: *The Structure Of American Economy 1919–1939: An Empirical Application Of Equilibrium Analysis*. Oxford University Press, New York, <https://doi.org/10.1017/S0022050700054899>.
41. Marcato M. B. – Baltar C. T. (2020): Economic upgrading in global value chains: concepts and measures; *Revista Brasileira de Inovação*; ISSN 2178-2822; DOI: <https://doi.org/10.20396/rbi.v19i0.8654359>
42. Miller, R. E.–Blair, P. D. (2009). *Input-Output Analysis Foundations and Extensions*. Cambridge, UK: Cambridge

University Press.

43. Miller, R. E.–Temurshoev, U. (2015). Output Upstreamness and Input Downstreamness in Industries/Countries in World Production. *International Regional Science Review*. DOI: 0.1177/0160017615608095.
44. Mudambi, Ram (2008), 'Location, control and innovation in knowledge-intensive industries', *Journal of Economic, Geography*, 8, pp. 699-725.
45. Reszegi László–Juhász Péter [2014]: A Vállalati Teljesítmény Nyomában. Alinea Kiadó, Budapest.
46. Reszegi László–Juhász Péter [2017]: Gátak A Magyar Vállalati Növekedésben. *Vezetéstudomány*, 48. Évf. 6–7. Sz. 27–38. O. <https://doi.org/10.14267/Vesztud.2017.06.04>.
47. Révész Tamás [2019]: Makromodellezési Esettanulmányok A Többszektoros Alkalmazott Makrogazdasági Modellek Köréből. Egyetemi Jegyzet. Budapesti Corvinus Egyetem, Buda- Pest, <http://web.uni-corvinus.hu/~trevesz/mme>.
48. Rodrik, D. [2015]: *Premature Deindustrialization*. Nber Working Paper Series, No. 20935. Cambridge, <https://doi.org/10.3386/W20935>.
49. Rungi, A.–Del Prete, D. (2017). The 'Smile Curve': where Value is Added along Supply Chains. *IMT Lucca EIC Working Paper Series*
50. Sass Magdolna (2021): FDI-based models and what the future may have in store for them; *WiiW, Special Issue, 30th Anniversary of the Visegrád Agreement*, The Vienna Institute for International Economic Studies Wiener Institut für Internationale Wirtschaftsvergleiche

51. Shih, Stan (1992). The Smile curve of GVCs.
52. Stöllinger, Roman (2019): Testing the Smile Curve: Functional Specialisation in GVCs and Value Creation, wiiw Working Paper, No. 163, The Vienna Institute for International Economic Studies (wiiw), Vienna
53. Szász, Levente – Demeter, Krisztina (2011): Supply chain position and servitization efforts of companies in Eastern and Western Europe, *Journal of International Business & Economics* pp. 104-112
54. Szász, L., Demeter, K., Csiki, O., & Horváth, R. (2023). Technology, lean, quality and human resource practices in manufacturing: how does size as a contingency factor matter?. *Journal of Manufacturing Technology Management*, 34(2), 234-264.
55. Szász, L., Demeter, K., Rácz, B. G., & Losonci, D. (2021). Industry 4.0: a review and analysis of contingency and performance effects. *Journal of Manufacturing Technology Management*, 32(3), 667-694.
56. Timmer, M. P.–Dietzenbacher, E.–Los, B.–Stehrer, R.–De Vries, G. [2015]: An Illustrated User Guide To The World Input–Output Database: The Case Of Global Automotive Production. First Published: *Review Of International Economics*, Vol. 23. No. 3. 575–605. O. <https://doi.org/10.1111/Roie.12178>.
57. Vakhal Péter (2021): A globális értékláncok hálózatelméleti vizsgálata; Doktori értekezés-tervezet; Budapesti Corvinus Egyetem, Gazdálkodástudományi Doktori Iskola

5. List of own (or co-authored) publications related to the topic

1. Fülöp, Zoltán (2023): *Evolvement of Global Value Chain Positions in the Central - Eastern European Countries - a New Dimension in Catching Up?*, CENTRAL EUROPEAN BUSINESS REVIEW 12 : 3 pp. 1-34. , 34 p. (2023), DOI: 10.18267/j.cebr.326
2. Boda, György; Fülöp, Zoltán; Losonci, Dávid; Révész, Tamás (2019): *A növekedési ütem és a foglalkoztatás növelésének lehetőségeiről*, KÖZGAZDASÁGI SZEMLE 66 : 4 pp. 376-417. , 42 p. (2019) , DOI: 10.18414/KSZ.2019.4.376
3. Boda, György; Fülöp, Zoltán; Révész, Tamás; Thék Regina (2023): *Termelékenység és jövedelmezőség*, STATISZTIKAI SZEMLE, 101. ÉVFOLYAM 6. SZÁM 479–521. OLDAL DOI: 10.20311/stat2023.06.hu0479
4. Hajdu, Roland; Fülöp, Zoltán (2023): *VERSENYKÉPESSÉG ÉS TÁRSADALMI TŐKE*, Munkaügyi Szemle, 2023 / FEBRUÁR
5. Hajdu, Roland; Fülöp, Zoltán (2022): *AUTOMATIZÁCIÓ ÉS A MUNKAHELYEK : Összefoglaló a Magyar Közgazdasági Társaság Munkaügyi Szakosztály online konferenciájáról*, ÚJ MUNKAÜGYI SZEMLE, 5 p. (2022)
6. Fülöp, Zoltán (2019): *MILYEN LESZ A JÖVŐBEN A MUNKA VILÁGA? : Gondolatok az „Arbeiten 4.0” című white paper alapján*, MUNKAÜGYI SZEMLE 62 : 2 pp. 15-19. , 5 p. (2019)
7. Fülöp, Zoltán (2018): *Az Ipar 4.0 munkaerőpiacra gyakorolt hatása*, MUNKAÜGYI SZEMLE 61 : 6 pp. 56-64. , 9 p. (2018)
8. Fülöp, Zoltán (2018): *Digitalizáció és foglalkoztatás*, MUNKAÜGYI SZEMLE ONLINE 2018 : 7 pp. 1-3. , 3 p. (2018)
9. Fülöp, Zoltán (2022): *Examination of the sectoral input-output relations of the post-communist countries among the smile curve = A poszt-kommunista országok ágazati kapcsolatainak vizsgálata a mosoly görbe mentén*, In: Molnár, Dániel; Molnár, Dóra (szerk.) XXV. Tavasz Szél Konferencia 2022. Absztraktkötet, Budapest, Magyarország : Doktoranduszok Országos Szövetsége (DOSZ) (2022) 799 p. pp. 339-340. , 2 p.

10. Fülöp, Zoltán (2020): *Changes in the employment structure in Europe*, In: Horváth, Bálint; Földi, Péter; Kápolnai, Zsombor (szerk.) VI. Winter Conference of Economics PhD Students and Researchers : Book of Abstracts, Gödöllő, Magyarország : Szent István University, Doktoranduszok Országos Szövetsége, Közgazdaságtudományi Osztály (2020) 128 p. p. 46
11. Fülöp, Zoltán (2018): *Az IT-hoz kapcsolódó foglalkozások átrendeződése az ágazatok között* , In: [Budapesti, Corvinus Egyetem] (szerk.) *Intelligens szakosodás az innováció és a versenyképesség elősegítése érdekében* [Intelligent specialization to enhance innovation and competitiveness] : Tudományos konferencia [Academic conference], Budapest, Magyarország : Budapesti Corvinus Egyetem (2018) 39 p. p. 12
12. Boda, György; Révész, Tamás ; Losonci, Dávid; Fülöp, Zoltán (2019):*A növekedési ütem és a foglalkoztatás növelésének lehetőségeiről. A Közgazdasági Szemle 2019. áprilisi számában megjelenő – megegyező című – cikk háttér tanulmánya*, Budapest, Magyarország : Boda and Partners Kft. (2019) , 65 p. ISBN: 9786158024020
13. Fülöp, Zoltán (2019):*The connection between innovation theorem – productivity factors – Industry 4.0 and employment*, In: Bálint, Horváth; Zsombor, Kápolnai; Péter, Földi (szerk.) V. International Winter Conference of Economics PhD Students and Researchers : Conference Proceedings, Gödöllő, Magyarország : Doktoranduszok Országos Szövetsége (DOSZ) (2019) 149 p. pp. 67-76. , 10 p.

6. Acknowledgment and testimonial

I dedicate my thesis in honor of my "two fathers"!

I dedicate it in honor of my father, **László János Fülöp**, who constantly motivated me during my PhD studies and persistently believed in my progress!

I dedicate it in honor of my scientific father, **György Boda**, from whom I have learned the most in my scientific life!

Acknowledgments

I would like to thank my family and close friends, especially Mrs. Fülöp Éva Maródi, Dóra Dani, László Fülöp, Ágnes Fülöp-Szabó, Noémi Krátki, Roland Hajdu, Tamás Herceghalmi, Zsuzsanna Barna, András Kamenszky, Anikó Török, Dalma Petróczki for their continuous support and encouragement during my PhD studies.

I would like to thank my colleagues, fellow researchers, and other friends, Bence Pistruí, Zsolt Matyusz, Miklós Stocker, Erzsébet Czakó, Tamás Révész, Vanda Harmat, Aranka Szabó, József Bagó, but most of all my supervisor, István Dávid Losonci, for supporting my professional development and scientific work.

I am grateful for the opportunities the Corvinus University of Budapest provided, especially for my involvement in the EFOP and ÚNKP programmes.