Comparative Economic Research. Central and Eastern Europe
Volume 26, Number 3, 2023
https://doi.org/10.18778/1508-2008.26.20

Intersectoral Flows in the Economies of the Visegrad Group Countries

Michał Przybyliński https://orcid.org/0000-0002-1909-3687
Ph.D., Associate Professor at the University of Lodz, Department of Theory and Analyses of Economic Systems
Lodz, Poland, e-mail: michal.przybylinski@uni.lodz.pl

Joanna Trębska https://orcid.org/0000-0002-0398-5867
Ph. D., Assistant Professor at the University of Lodz, Department of Theory and Analyses of Economic Systems
Lodz, Poland, e-mail: joanna.trebska@uni.lodz.pl

Abstract

We present a comparative study of flows between institutional sectors in the economies of Czechia, Hungary, Poland and Slovakia, with particular emphasis on the role of the foreign sector. The purpose of our study is to determine the strength and nature of inter-sectoral ties in the analyzed countries and point out the similarities and differences between them. The research method is based on the sequence of all transactions included in the System of National Accounts (SNA): product transactions, primary income generation and allocation, income distribution, and financial instrument transactions. The study is distinguished by its consistency and balance within the SNA. The method used to transform data into a payer-payee matrix guarantees the preservation of these properties. It creates a new perspective for assessing the sensitivity of economies to external processes.

It is the first such comprehensive comparative study, providing unambiguous and replicable results based on a standardized accounting system that operates in all European countries. The period covered by the study (2000–2020) allows us to draw interesting conclusions about the processes that took place during and after the accession to the European Union. The results indicate, inter alia, an increase in the involvement of the foreign sector, primarily in production processes (import, export) and investment. Particularly noteworthy is the high degree of financialization of the Hungarian economy.

Keywords: Visegrad Group Countries, flow of funds, system of national accounts, institutional sectors

JEL: E01, F4, P52

Received: 28.08.2022. Verified: 8.02.2023. Accepted: 5.06.2023

Introduction

The Visegrad Group (V4), which includes Czechia, Hungary, Poland, and Slovakia, has been the subject of many comparative studies. On the one hand, it is a group that is fairly homogeneous in terms of economic development and geopolitical location, and they experienced similar systemic transformations. The example of this group can therefore be used to highlight the mechanisms of economic transformation in Central and Eastern Europe compared to highly developed and poorly developed countries. On the other hand, by moving to a greater degree of detail, it is possible to point out some differences within the group itself.

After the Second World War, all the V4 countries functioned under the communist regime, and after 1989, they underwent a similar system transformation. All of them became members of the European Union in 2004, and this moment was preceded by a long preparatory period. Therefore the analysis of many aspects of accession does not indicate the breakthrough nature of the changes that occurred in that particular year. The integration overlapped with the globalization taking place in the world economy. Together with the political transformation that took place in the early 1990s, this led to the gradual opening of these economies, signifying an increase in their dependence on the rest of the world.

The purpose of our article is to examine the differences in the links between institutional sectors in the economies of the V4 countries, with particular emphasis on the role of the rest of the world, which is considered an external institutional sector in the System of National Accounts (SNA). This is the first comparative study of this kind. We try to indicate the differences in the degree and nature of interconnections between the household sector, the government sector, the non-financial enterprises sector and the financial enterprises sector in each country. We also aim to ascertain how economic relations with foreign countries, reflected in the SNA, affect the functioning of individual national institutional sectors.

As mentioned, since it was first defined about 30 years ago, the V4 group has been subjected to many analyses aimed primarily at tracing the economic transformation in general (e.g., Ambroziak et al. 2020; Błaszczyk 2022) and in selected aspects such as catching up in terms of GDP (e.g., Lengyel and Kotosz 2018), innovation (e.g., Dworak and Grzelak 2018; Jabłońska 2020), competitiveness and shaping comparative advantages (e.g., Molendowski 2021), and sustainability (e.g., bio-based production, Lazorcakova et al. 2022). The V4 is also subject to research on political issues (e.g., Zapletalová and Komínková 2020; Strnad 2022). Those analyses, apart from the pure macroeconomic studies, were carried out at the regional (Lengyel and Kotosz 2018) or branch level (Jabłońska 2020). The processes taking place between institutional sectors have not been analyzed so far.

The method we propose, thanks to its simplicity, has three undoubted advantages: interpretative clarity, consistency within the current statistical reporting system, and the replicability of the research, which is thanks, in part, to the first two advantages. The available statistical material, which covers the years 2000–2020, is appropriate for tracing the dynamics of changes resulting from the accession.

The starting point for our analysis is the SNA, which presents the data in the form of flow of funds (FoF) tables. They track the flow of funds throughout the economy and cover both real and financial transactions. This layout is presented in section 2. Section 3 presents the method we use to convert the national accounts to payer-payee matrices. For a detailed description of the calculation procedure, see the Appendix. We consider this new application of the social accounting method to be the most important added value of our article. The results obtained in this way constitute interesting statistical material that describes intersectoral transactions. Changes in the structures of these transactions in the analyzed countries are described in section 4. We present and discuss data on aggregate flows and, in the case of the rest of the world sector, flows divided into four categories. We also present selected observations regarding individual transactions, but due to the volume of the material, we cannot present them in full. Detailed tables for 23 types of transactions are available upon request. The last section presents the main conclusions.

Flow of funds accounts

The basic concept of the FoF accounts comes from the Moneyflow Accounts by Copeland (1949). His study answered the following questions: "When total purchases of our national product increase, where does the money come from to finance them? When purchases of our national product decline, what becomes of the money that is not spent?" These two questions fully reflect the need to present data in the form of FoF accounts. The economy is composed of units grouped into institutional sectors. Units make and receive payments to and from other units that can be classified in the same or another institutional sector. Each payment is classified by the sector making it and its purpose – the type of transaction. Each transaction is simultaneously shown as an outflow of funds for one sector (payer) and an inflow for another (payee). The first official statistics based on Copeland's idea were the Flow of Funds in the United States 1939–1953, published in 1955. Now (since 2013), these data have been published as *Financial Accounts of the United States* (e.g., Federal Reserve Statistical Release 2021). This document is organized into sections: tables of transactions made by institutional sectors, levels tables, and balance sheets for assets and liabilities, as well as integrated macroeconomic accounts (the sequence of transactions is largely in accordance with The System of National Accounts).

Various ways of presenting FoF can be considered depending on the analytical purpose of their application and the level of detail in the published data. The simplest FoF accounts represent transactions of major importance made by institutional sectors. Complex FoF accounts consist of three-dimensional matrices, where the first two dimensions describe institutional sectors involved in transactions (payer-payee), and the third presents various forms of transactions. These matrices show who (which sector) pays to whom and by means of which form of transaction. In other words, these matrices indicate where the money comes from, where it goes and what 'kind' of money it is (Klein 2003).

Originally, FoF accounts were conceived as a set of data on financial assets acquired by institutional sectors and the liabilities incurred by them. The tables in the "from-whom-to-whom" form are constructed as balance sheets. They make it possible to answer questions like "Who is financing whom, in what amount, and with which type of financial instrument?" (Shrestha, Mink, and Fassler 2012). Data in this form are published officially, but only for stocks of financial assets and liabilities, not for transactions in financial instruments or any other types of transactions (see Eurostat database, financial accounts: counterpart information).

The financial crisis of 2008 highlighted the need to link the financial and "real" sphere of the economy through the connections between financial savings and tangible investments. In this context, many authors notice the need to fully integrate the financial balance sheet and the accumulation account (see Palumbo and Parker 2009; *The Financial…* 2009; Shrestha, Mink, and Fassler 2012). The importance of this problem increases with the growing degree of global financial integration that speeds up the spread of financial shocks around the world (Tsujimura and Tsujimura 2011).

Economic processes taking place in the real economy are reflected in the SNA – a sequence of non-financial accounts (production accounts, generation and allocation of primary income, secondary distribution of income, the use of disposable income, and capital accounts), while the financial sphere is presented by financial accounts. The difference between the total sum of resources and uses recorded on the capital account (saving, capital transfers, non-financial accumulation) is net lending or net borrowing – the balancing item of a whole sequence of non-financial accounts in the SNA. The net lending/net borrowing is also calculated by subtracting the net incurrence of liabilities from the net acquisition of financial assets. The financial accounts are fully integrated with the capital account since, in theory, the capital account and financial account measures of net lending/net borrowing should be the same. However, in practice, they are almost never equal because of the different sources of data, the timing of recorded flows, and many other sector-specific reasons (see, e.g., Rostadsand 2004; Abad 2005; Cagetti et al. 2012). Statistics for many countries show a persistent lack of consistency in the derived relationship between the resources generated by disposable income and borrowing on the one hand, and the consumption and accumulation

expenditures on the other, which raises the value of the discrepancy between the non-financial and financial accounts. The lack of integration of non-financial and financial accounts is a significant limitation in conducting analysis that combines these two spheres of the economy, especially based on the system of intersectoral flows.

In response to criticism that the classical FoF analysis (asset-liability matrix based on the balance sheet) only accounts for the financial system, and so the effects on the real sphere of the economy (e.g., production) are overestimated, Tsujimura and Tsujimura (2018; 2021) proposed the expanded FoF matrix. While the asset-liability matrix covers only the stock of financial instruments, the expanded FoF matrix (payer-payee matrix) includes transactions recorded on both the financial and non-financial accounts.

Intersectoral flows matrices

Matrices of intersectoral flows are constructed based on the uses (**P**) and resources (**R**) tables for each form of transaction. Tables **P** for payments and **R** for receipts consist of n columns for institutional sectors and m rows for transactions distinguished in the SNA. In this study, $n = 5$ for four domestic institutional sectors (non-financial corporations, financial corporations, general government, households & non-profit institutions serving households) and the rest of the world sector (RoW). The number of rows is $m = 23$ for transactions listed in Table 1.

Table 1. The list of transactions distinguished in the flow of funds table

Group of transactions	Transaction	*i*
Transactions of products	Intermediate consumption	1
	Final consumption and capital formation	2
	Exports of goods and services	3
	Imports of goods and services	4
Transactions of generations and allocation of primary income	Compensation of employees	5
	Other taxes on production less other subsidies on production	6
	Property income	7

Group of transactions	Transaction	*i*
Transactions of secondary distribution of income and capital transfers	Current taxes on income	8
	Net social contributions	9
	Social benefits other than social transfers in cash	10
	Other current transfers	11
	Adjustment for the change in pension entitlements	12
	Capital taxes	13
	Investment grants	14
	Other capital transfers	15
Transactions of financial instruments	Special drawing rights	16
	Currency and deposits	17
	Debt securities	18
	Loans	19
	Equity and investment fund shares	20
	Insurance, pensions and standardized guarantees	21
	Financial derivatives and employee stock options	22
	Other accounts receivable/payable plus discrepancy	23

Source: own elaborations based on the sequence of accounts in SNA.

Table 2. The scheme of the flow of funds matrix for the *i*-th transaction

sector / sector	*j*	Σ	y_{ik}	z_{ik}
k	$\mathbf{Z} = [z_{ikj}]$ Flows from sector *j* to sector *k* in terms of transaction *i*	Sum of resources of sector *k* in terms of transaction *i*	Excess of uses over resources of sector *k* (if exists; 0 otherwise) in terms of transaction *i*	Sum of resources or uses of sector *k* (whichever is greater) in terms of transaction *i*
Σ	Sum of uses of *j* in terms of transaction *i*			
w_{ij}	Excess of resources over uses of sector *j* (if exists; 0 otherwise) in terms of transaction *i*			
z_{ij}	Sum of resources or uses of sector *j* (whichever is greater) in terms of transaction *i*			

Source: own elaboration.

The data presented in this layout are published by Eurostat (https://ec.europa.eu/eurostat/web/main/data/database). Specifically, we used the following datasets: Non-financial transactions – annual data (nasa_10_nf_tr), Financial transactions – annual data (nasa_10_f_tr), Supply table at basic prices incl. transformation into purchasers' prices (naio_10_cp15), and Use table at basic prices (naio_10_cp1610). We have rearranged the original data into payer–payee matrices (see Table 2). The transformation procedure is described in the Appendix. This method of transforming data into payer–payee matrices preserves the consistency and balance within the system of national accounts.

The table of total intersectoral FoF (payer-payee matrix Z) is the sum of matrices Z_i built for all transactions – see Table 3.

Table 3. The scheme of the aggregate flow of funds matrix

FoF	Uses of sector *j*	Total
Resources of sector *k*	$\mathbf{Z} = [z_{ikj}]$ Flows from institutional sector *j* to sector *k*	$\mathbf{z} = [z_k]$
Total	$\mathbf{z}^T = [z_j]$	

Source: own elaborations.

Transaction structures recorded in such tables are the basis for assessing intersectoral relationships. The analysis of tables constructed for the V4 countries is presented in the next section.

Intersectoral flow of funds in the Visegrad Group countries

FoF tables are a useful tool that enables the analysis of the structures of intersectoral connections in the economy. Below we discuss the results of the calculations described in the previous section. For the purposes of comparative analysis, we present the structures of flows instead of their values so as to omit the problem of different scales of economies. We start with the aggregate FoF matrix (see Table 3), then present the main insights regarding individual transactions (see Table 2) that comprise aggregate flows. The last part of this section focuses on identifying the role of the rest of the world sector.

Aggregate flows

The aggregate structures of transactions carried out for 2020 are presented in Tables 4–7. Significant changes in national transaction structures that have taken place since 2000 are marked with arrows. As the tables show, most transactions in Poland,

Czechia, and Slovakia are carried out by non-financial corporations (over 30% of total flows in 2020) and households, together with non-profit institutions (over 20%). About 1/3 of transactions involving non-financial corporations are transfers between entities included in this sector, and they are primarily related to intermediate consumption. Flows between the non-financial corporations sector and the RoW sector include mainly product transactions, i.e., exports of goods and services produced by non-financial corporations (11–16%) and their imports (8–11%). In turn, flows from non-financial corporations to households are mainly compensation of employees (over 10%). The flows between households and the general government sector are also noteworthy (6,6–8,8%) – they are mainly current transfers. The role of RoW in V4 countries is negatively correlated with the size of the economy. For Poland, this share is 15.9%, for Czechia – 19.7% and for Slovakia – 21.2%.

Hungary is the noticeable exception. The role of the RoW sector is particularly high (over 30%). The country also seems to be dominated by the financial sector. It is involved in over 23% of transactions, while in the other countries, it is less than 7%.

Table 4. Structure of FoF matrix for Poland in 2020

Resources of the *k*-th sector	Uses of the *j*-th sector					Total
	Non-financial corporations	Financial corporations	General government	Households & NPISH	Rest of the world	
	S11	S12	S13	S14_S15	S2	
S11	10.7% ↓	0.6%	3.1%	6.9% ↓	11.6% ↑	32.9%
S12	1.6%	1.0%	1.3%	2.4%	0.6%	6.9%
S13	2.8%	2.8%	2.2%	8.8%	0.9%	17.5%
S14_S15	10.2%	0.9%	8.5%	4.3%	2.9%	26.7% ↓
S2	7.7% ↑	1.6%	2.3%	4.3%	0.0%	15.9% ↑
Total	32.9%	6.9%	17.5%	26.7% ↓	15.9% ↑	100.0%

↑ ↓ increase or decrease of the share by at least 2.5 pp. compared to 2000
Source: authors' own calculations based on Eurostat database: nasa_10_nf_tr, nasa_10_f_tr, naio_10_cp15, naio_10_cp1610 (last update: 8.02.2022).

Table 5. Structure of FoF matrix for Czechia in 2020

Resources of the *k*-th sector	Uses of the *j*-th sector					Total
	Non-financial corporations	Financial corporations	General government	Households & NPISH	Rest of the world	
	S11	S12	S13	S14_S15	S2	
S11	12.4% ↓	1.0%	3.1%	5.9%	14.7% ↑	37.1% ↓
S12	1.7%	0.7%	0.6%	1.7%	1.8%	6.5%
S13	2.6%	1.1%	1.6%	7.5%	1.4%	14.2%
S14_S15	10.2%	1.3%	6.6%	2.5%	1.8%	22.4% ↓
S2	10.2% ↑	2.4%	2.4%	4.8%	0.0%	19.7% ↑
Total	37.1% ↓	6.5%	14.2%	22.4% ↓	19.7% ↑	100.0%

Source: authors' own calculations based on Eurostat database: nasa_10_nf_tr, nasa_10_f_tr, naio_10_cp15, naio_10_cp1610 (last update: 8.02.2022).

Table 6. Structure of FoF matrix for Slovakia in 2020

Resources of the *k*-th sector	Uses of the *j*-th sector					Total
	Non-financial corporations	Financial corporations	General government	Households & NPISH	Rest of the world	
	S11	S12	S13	S14_S15	S2	
S11	10.8% ↓	0.7%	2.4% ↓	4.8%	16.2% ↑	34.9% ↓
S12	1.4%	0.2%	1.8%	1.6%	1.6%	6.5%
S13	2.6%	2.1%	2.0%	7.3%	1.5%	15.5%
S14_S15	8.8%	1.1%	6.7%	3.3%	1.9%	21.9%
S2	11.3% ↑	2.4%	2.6%	5.0%	0.0%	21.2% ↑
Total	34.9% ↓	6.5%	15.5%	21.9%	21.2% ↑	100.0%

Source: authors' own calculations based on Eurostat database: nasa_10_nf_tr, nasa_10_f_tr, naio_10_cp15, naio_10_cp1610 (last update: 8.02.2022).

Table 7. Structure of FoF matrix for Hungary in 2020

Resources of the *k*-th sector	Uses of the *j*-th sector					Total
	Non-financial corporations	Financial corporations	General government	Households & NPISH	Rest of the world	
	S11	S12	S13	S14_S15	S2	
S11	5.4% ↓	0.7%	1.9%	2.6%	11.5%	22.1% ↓
S12	1.6%	4.3% ↑	0.8%	1.0%	15.6% ↑	23.4% ↑
S13	1.7%	1.3%	1.5%	5.0%	1.3%	10.8%
S14_S15	5.3% ↓	0.6%	4.0%	1.4%	2.1%	13.4% ↓

Resources of the *k*-th sector	Uses of the *j*-th sector					Total
	Non-financial corporations	Financial corporations	General government	Households & NPISH	Rest of the world	
	S11	S12	S13	S14_S15	S2	
S2	8.1%	16.4% ↑	2.5%	3.4%	0.0%	30.4% ↑
Total	22.1% ↓	23.4% ↑	10.8%	13.4% ↓	30.4% ↑	100.0%

Source: authors' own calculations based on Eurostat database: nasa_10_nf_tr, nasa_10_f_tr, naio_10_cp15, naio_10_cp1610 (last update: 8.02.2022).

In all four countries, the importance of the non-financial corporations sector has decreased significantly in favor of the RoW sector. Comparing the structures in 2020 and 2000 (see arrows in Tables 4–7) shows a progressive relative decline in trade in intermediate products between domestic enterprises, and a simultaneous increase in this type of trade with foreign firms. This means greater involvement of domestic companies in global value chains. This process can't be noticed for micro-enterprises belonging to the households sector. In Hungary, the strengthening relationship between the economy and the RoW occurs in the financial sector.

Selected results for the four groups of transactions

A more in-depth analysis based on 23 tables for each transaction shows that in Poland, Czechia, and Slovakia, product transactions (total supply) account for over 60% of all transactions. In Hungary, this share in 2020 was only 40%. In the RoW sector, the dominance of product transactions is even greater. Imports account for 77–85% of all revenues of the RoW in Poland, Czechia, and Slovakia, and exports account for 70–81% of this sector's uses. In Hungary, this share in 2020 was only 36%.

The non-financial corporations sector is the main producer of goods and services manufactured for domestic use and for export, respectively. The former mainly covers intermediate consumption (mainly corporate expenditure, including micro-companies classified as households), final consumption (household and government expenditure) and accumulation (expenditure of all domestic sectors), while the latter is expenditure from the rest of the world. In the analyzed countries, over 35% of product expenditures in 2020 were the expenditures of non-financial enterprises, more than 25% of foreign expenditures (only slightly less in Poland), more than 20% of household expenditures (almost 30% in Poland only), while government expenditures do not exceed 15%. In the structure of revenues, the dominance of non-financial corporations is much more visible – their revenues constitute approximately half of the total revenues in terms of product transactions.

In terms of product transactions, FoF occurs mainly between non-financial corporations and RoW, households and RoW, and inside the non-financial corporations sector. Therefore, it seems that the role of RoW is particularly important and is still growing.

Allocation transfers are mainly flows between non-financial corporations and households as compensation of employees. They account for nearly half of the total transfers recorded on the allocation of primary income accounts of V4 countries in 2020 (slightly less in Hungary). The other flows are compensation of employees paid by the general government sector, mainly to households, and property income. While compensation of employees is income primarily of households and, to some extent, the rest of the world, property income comprises flows between domestic sectors and the rest of the world. Financial institutions are involved in around 20% of property income transactions (even more in Hungary). They are mainly flows from non-financial corporations, inside the financial sector, and from/to RoW.

The cross-sectoral structure of flows of current and capital transfers is dominated by flows between government institutions and households in all V4 countries. They are mainly transfers related to pension security, i.e., social security contributions and social security benefits, as well as taxes on income. Over 40% of all income redistribution flows are the general government sector's revenue, while households are the main payers.

The flows of financial instruments take place mainly through the intermediation of financial institutions. In 2020, over 30% of transactions of this type were revenues and expenditures of this sector (50% in Hungary). The role of other sectors is different in the V4 countries. In Poland and Slovakia, the government sector is also an important beneficiary (around 30% of transactions of this type), while in Hungary, the importance of this sector was marginal. In Slovakia, the government sector is also an important financial investor (over 20% of transactions of this type). In Poland and Czechia, household expenditures accounted for approximately 20% of flows. In Czechia and Hungary, transfers between domestic sectors and abroad are particularly significant.

The role of the RoW sector

The expenditure of the rest of the world sector in terms of product transactions is the export of goods and services produced by domestic institutional sectors. In 2020, these expenditures accounted for over 20% of the total supply (see Figure 1). This share increased significantly after joining the EU – by 5 percentage points in Hungary (2020 compared to 2000), by 8 p.p. in Czechia and Slovakia, and by 10 p.p. in Poland. These expenses contributed most to the increase in revenues of the non-financial corporations sector, the main producer of goods and services manufactured for export. In Poland, the share of the household sector is larger

than in the other V4 countries, which means a greater share of micro-enterprises in the economy.

The resources of the rest of the world sector, recorded in the product transaction account, are imports of goods and services that meet intermediate and final demand. In 2020, imports accounted for less than 20% of the supply in Poland, 22% in Czechia, and more than 25% in Slovakia and Hungary (see Figure 1). Compared to 2000, this share increased in each of the countries – by 4–5 p.p. in Poland, Czechia, and Hungary, and by 8% in Slovakia. This growth is lower than in the case of exports, which shows that the trade balances of the V4 countries are improving.

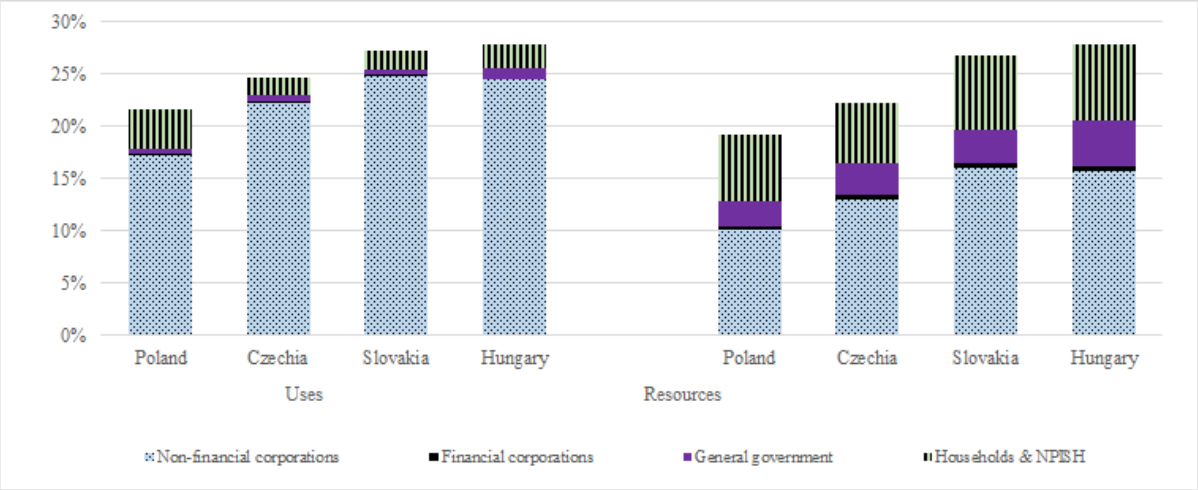

Figure 1. Uses/resources of the rest of the world sector in terms of transactions of products (i = 1, 2, 3, 4) as the resources/uses of domestic institutional sectors (structure in 2020)

Source: own elaborations based on Eurostat database: nasa_10_nf_tr, naio_10_cp15, naio_10_cp1610 (last update: 8.02.2022).

Foreign trade is dominated by the sector of non-financial corporations. This sector's transactions with RoW account for 80–90% of exports and slightly more than 50% of imports. About 30% of imports are expenditures of household sector (mainly final consumption). In Poland, this sector has relatively high share also in exports.

The involvement of RoW in primary income transactions is mainly related to expenditures that constitute household sector income in the form of compensation of employees. This is observed in all V4 countries (see Figure 2). In turn, revenues of RoW are generated mainly by the non-financial corporations sector – mainly property income (distributed income of corporations). The aforementioned strong ties between Hungary's financial sector and the RoW are revealed by, among others, the allocation of primary income account. They mainly concern property income in the form of interest payments and reinvested earnings on direct foreign investment.

Between 2000 and 2020, in each of the analyzed countries, the importance of the rest of the world in the intersectoral flows increased in the area of allocating primary income. Meanwhile, the share of RoW revenues increased more than the share of expenses in the total of transactions of this type.

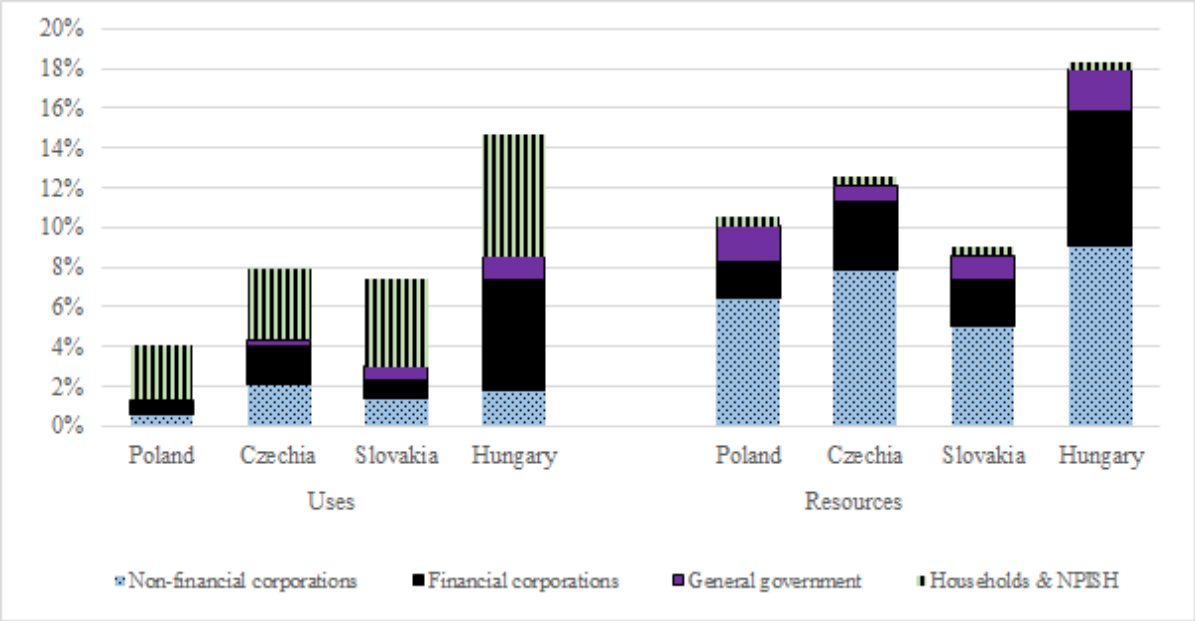

Figure 2. Uses/resources of the rest of the world sector in terms of allocation of primary income (i = 5, 6, 7) as the resources/uses of domestic institutional sectors (structure in 2020)

Source: own elaborations based on Eurostat database: nasa_10_nf_tr (last update: 8.02.2022).

The cross-sectoral structure of flows in terms of current and capital transfers differs significantly in the analyzed countries (see Figure 3). In Hungary, the expenditures of the RoW sector are mainly allocated to households, while in Poland, they are allocated primarily to the government sector (mainly investment grants and miscellaneous current transfers). These transfers play the smallest role in Slovakia, where their balance is negative. The importance of foreign countries in financing investments increased significantly after the V4 countries joined the European Union (EU). In 2020, transfers from RoW accounted for over 75% of investment grants, although in Hungary they were much less – only 42%.

In Poland, transfers from the government sector (mainly VAT and GNI – based EU own resources) dominate. The importance of this sector is also relatively high in Hungary. Czechia, Slovakia, and Hungary are dominated by other current transfers paid by all institutional sectors with different intensities. So, it is difficult to find regularities in the cross-sector structure of RoW revenues.

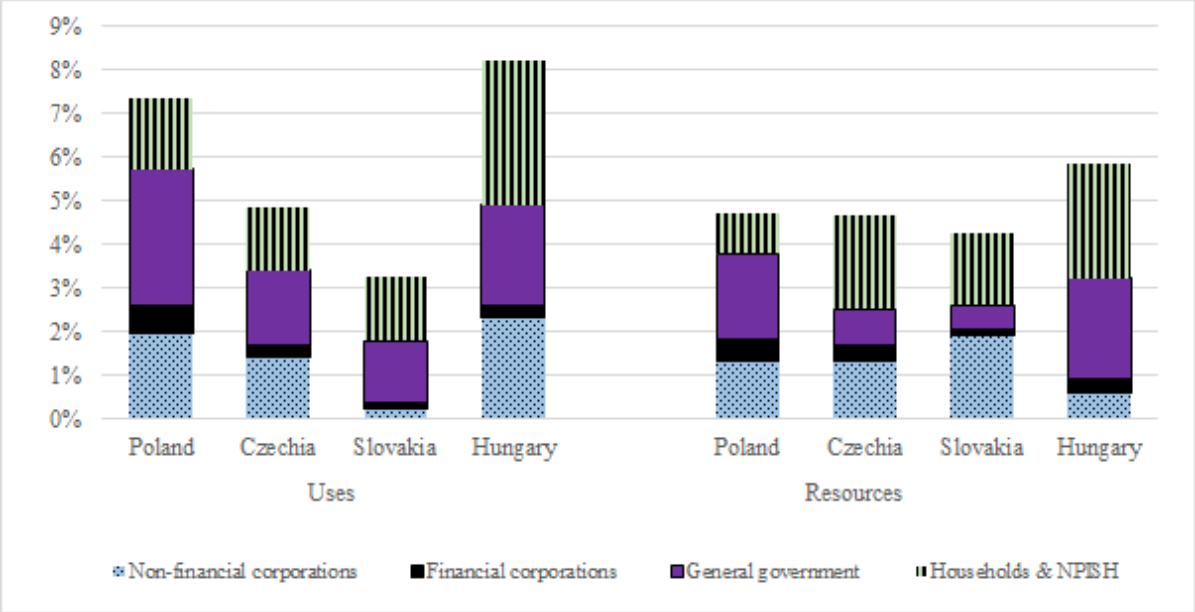

Figure 3. Uses/resources of the rest of the world sector in terms of secondary distribution of income and capital transfers (*i* = 8, ..., 15) as the resources/uses of domestic institutional sectors (structure in 2020)

Source: own elaborations based on Eurostat database: nasa_10_nf_tr (last update: 8.02.2022).

International flows in financial instruments focus on links with the financial corporations sector, and their scope is very volatile over time and space. This is mainly due to the dominance of transactions in terms of equity and their dependence on the situation in the capital markets. As shown in Figure 4, in 2020, financial transactions with foreign countries played a particularly important role in Hungary, accounting for over 40% of all these transactions. It is related to property income flows (see Figure 2). Such a high share results from the particularly high activity of the financial sector (see Table 7), which is a consequence of the high interest of foreign investors. Poland is at the other extreme. RoW expenditure (acquiring financial assets and repaying liabilities) constituted only 8.4% of all financial instrument transfers, of which more than half were purchases of instruments issued by non-financial corporations.

The activity of the financial sector as an issuer was surprisingly low in Poland, resulting in net lending of domestic institutional sectors to the rest of the world. However, 2020 was exceptional. In 2019, the share of foreign expenditure on financial instruments was 14.1%. However, a decreasing tendency is apparent – in 2000, this share was 25.7%, while in 2010, it was 22.0%. In Czechia and Slovakia, RoW expenditure accounted for over 20% of all transfers in financial instruments. In these countries, a relatively large share of the general government can be indicated, resulting from acquiring debt securities issued by this sector. In the case of RoW revenues, only in Czechia do the non-financial sectors play a noticeable role.

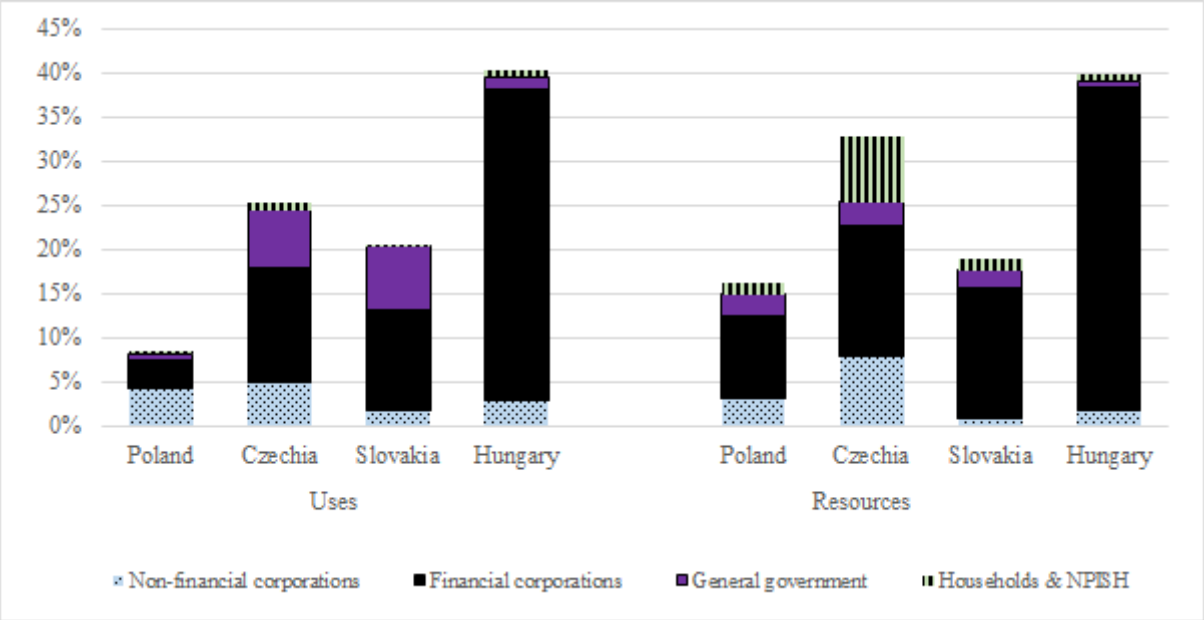

Figure 4. Uses/resources of the rest of the world sector in terms of financial instruments (i = 16, ..., 23) as the resources/uses of domestic institutional sectors (structure in 2020)

Source: own elaborations based on Eurostat database: nasa_10_f_tr (last update: 8.02.2022).

Conclusions

In general, the structures of transactions are very similar in Poland, Czechia and Slovakia. In these countries, the non-financial corporations sector plays a dominant role; the share of the rest of the world sector is also quite significant and negatively correlated with the size of the economy, but currently, it does not exceed 22%. The structure of inter-sectoral links in the Hungarian economy is clearly different. The share of the RoW sector exceeds 30%, and the financial sector (over 23%) dominates the structure of flows between domestic sectors. Transactions between these two sectors account for approx. 16% of all transactions, while in the other V4 countries, it ranges from 0.6% to 2.4%. This difference is also visible when analyzing the generic structure of the transaction. The share of product transactions in Hungary is approx. 20 pp. lower than in other countries. The high degree of financialization of the Hungarian economy is the most striking national characteristic that results from our calculations. The latest analysis of this phenomenon was presented by Piroska (2021) and Karas (2022). However, Hungarian structures are highly volatile, which may result from the low stability of the financial system (capital market in particular). The high involvement of the financial sector in Hungary is a relatively recent phenomenon.

In terms of product transactions, non-financial corporations play the most important role. In Poland, the importance of the household sector in production activity is clearly

greater, which results from the relatively large number of micro-enterprises. Distribution transactions are dominated mainly by general government institutions and households in all V4 countries. Transactions on financial instruments are dominated by the financial corporations sector, but in this case, there is a clear differentiation in the role of other sectors.

The role of RoW in the economies of the V4 countries is growing, and this sector's share in product transactions (exports and imports) between 2000 and 2020 increased by about 5 to 10 p.p., with a slight advantage on the export side, generally improving the foreign trade balance. This upward trend concerns mainly the relationships between RoW and the non-financial corporations sector; it was less noticeable for households. The opening up of economies did not cause a significant increase in the role of consumer imports, but it manifested itself in an increase in involvement in production. This tendency was most pronounced in Poland.

The share of RoW in the allocation of primary incomes also increased, but the share of revenues increased more than the share of expenses. The increase in foreign involvement was mainly due to the increasing mobility of the labor force and transfers related to property income.

The importance of foreign countries in financing accumulation through investment grants and foreign direct investment grew. The latter is visible in transfers of property income and flows of financial instruments.

The cross-sectoral structure of flows in terms of financial instruments, as well as their scope, are very volatile over time and space in the V4. In general, the structures of RoW connections with domestic sectors are very similar in Poland, Czechia and Slovakia. In 2020, in Hungary, the RoW sector's links with financial corporations were much stronger than in other Visegrad countries. The high volatility of these structures may result from the low stability of the financial system (in particular, the capital market) in this country.

The goal of our article has been achieved. The use of a new method of social accounting made it possible to assess the sensitivity of economies to external processes. However, due to the size of the study, we limit ourselves to presenting the results of our calculations and indicating the main observations regarding the structure of inter-sectoral links and their dynamics. An in-depth consideration of the causes of the described processes is beyond the scope of this article due to the word limit.

The developed set of tables may become a starting point for building a model based on the input-output approach, which would make it possible to conduct scenario analyses, in particular, to assess how dependent economies are on the RoW sector. Such research becomes particularly important in the context of analyzing the effects of imposing various types of economic sanctions.

Constructing tables for product transactions disaggregated simultaneously by institutional sector and CPA (Classification of Products by Activity) would significantly increase the cognitive value of simulation analyses. This task requires more extensive activities, preferably involving support from statistical offices.

References

Abad, P. (2005), *Compiling the flow of funds of the Spanish economy*, "IFC Bulletin", 21, pp. 43–60, https://www.bis.org/ifc/publ/ifcb21.pdf (accessed: 24.08.2022).

Ambroziak, Ł., Chojna, J., Gniadek, J., Juszczak, A., Miniszewski, M., Strzelecki, J., Szpor, A., Śliwowski, P., Święcicki, I., Wąsiński, M. (2020), *The Visegrad Group – 30 Years of Transformation, Integration and Development*, Polish Economic Institute, Warsaw, https://pie.net.pl/wp-content/uploads/2021/02/Wyszechrad-ENG.pdf (accessed: 24.08.2022).

Błaszczyk, M.C. (2022), *Selected Aspects of European Integration of the Visegrad Group Countries*, "Comparative Economic Research. Central and Eastern Europe", 25 (2), pp. 81–97, https://doi.org/10.18778/1508-2008.25.14

Cagetti, M., Holmquist, E.B., Lynn, L., McIntosh, S.H., Wasshausen, D. (2012), *The Integrated Macroeconomic Accounts of the United States*, "Finance and Economics Discussion Series", Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, https://doi.org/10.17016/FEDS.2012.81

Copeland, M.A. (1949), *Social Accounting for Moneyflows*, "The Accounting Review", 24 (3), pp. 254–264, https://www.jstor.org/stable/240684 (accessed: 24.08.2022).

Dworak, E., Grzelak, M.M. (2018), *Innovativeness of the Polish economy in relation to the Visegrad Group countries*, "Economic and Environmental Studies", 18 (2), pp. 515–529, https://doi.org/10.25167/ees.2018.46.3

Federal Reserve Statistical Release (2021), *Financial Accounts of the United States*, https://www.federalreserve.gov/releases/z1/release-dates.htm (accessed: 24.08.2022).

Jabłońska, M. (2020), *Comparative Analysis of R&D in the Visegrad Group Countries in the Years 2004–2018*, "Comparative Economic Research. Central and Eastern Europe", 23 (4), pp. 31–44, https://doi.org/10.18778/1508-2008.23.26

Karas, D. (2022), *Financialization and state capitalism in Hungary after the Global Financial Crisis*, "Competition & Change", 26 (1), pp. 29–52, https://doi.org/10.1177/10245294211003274

Klein, L.R. (2003), *Some Potential Linkages for Input-Output Analysis with Flow-of-Funds*, "Economic Systems Research", 15 (3), pp. 269–277, https://doi.org/10.1080/0953531032000111772

Lazorcakova, E., Dries, L., Peerlings, J., Pokrivcak, J. (2022), *Potential of the bioeconomy in Visegrad countries: An input-output approach*, "Biomass and Bioenergy", 158, 106366, https://doi.org/10.1016/j.biombioe.2022.106366

Lengyel, I., Kotosz, B. (2018), *The Catching up Processes of the Regions of the Visegrad Group Countries*, "Comparative Economic Research. Central and Eastern Europe", 21 (4), pp. 5–24, https://doi.org/10.2478/cer-2018-0024

Miller, R.E., Blair, P.D. (2009), *Input-Output Analysis: Foundations and Extensions*, Cambridge University Press, Cambridge, https://doi.org/10.1017/CBO9780511626982

Molendowski, E. (2021), *The Competitive Position of the Economy of Poland (against the Backdrop of the Visegrad Group Countries and the Baltic States) – Changes and Determinants in the Post-accession Period*, "Comparative Economic Research. Central and Eastern Europe", 24 (1), pp. 85–102, https://doi.org/10.18778/1508-2008.24.05

Palumbo, M., Parker, J. (2009), *The Integrated Financial and Real System of National Accounts for the US: Does It Presage the Financial Crises?*, "American Economic Review", 99 (2), pp. 80–86, https://doi.org/10.1257/aer.99.2.80

Piroska, D. (2021), *Financial Nationalism and Democracy: Evaluating Financial Nationalism in Light of Post-Crisis Theories of Financial Power in Hungary. Financial Nationalism and Democracy: Evaluating Financial Nationalism in Hungary in Light of Post-Crisis Theories of Financial Power*, [in:] A. Pickel (ed.), *Handbook of Economic Nationalism*, Edgar Elgar, Cheltenham, https://doi.org/10.2139/ssrn.3846022

Rostadsand, J.I. (2004), *Net lending of households and non-profit institutions serving households: an analysis of discrepancies between financial and non-financial accounts*, "Norges Bank Economic Bulletin", 04, Q3, https://norges-bank.brage.unit.no/norges-bank-xmlui/bitstream/handle/11250/2504443/rostadsand.pdf?sequence=1&isAllowed=y (accessed: 24.08.2022).

Shrestha, M., Mink, R., Fassler, S. (2012), *An Integrated Framework for Financial Positions and Flows on a From-Whom-to-Whom Basis: Concepts, Status, and Prospects*, International Monetary Fund, https://www.nber.org/system/files/chapters/c12835/revisions/c12835.rev0.pdf (accessed: 24.08.2022).

Strnad, V. (2022), *Les enfants terribles de l'Europe? The 'Sovereigntist' Role of the Visegrád Group in the Context of the Migration Crisis*, "Europe-Asia Studies", 74 (1), pp. 72–100, https://doi.org/10.1080/09668136.2021.1976730

The Financial Crisis and Information Gaps – Report to the G–20 Finance Ministers and Central Bank Governors (2009), Financial Stability Board and International Monetary Fund, Washington, https://www.imf.org/external/np/g20/pdf/102909.pdf (accessed: 24.08.2022).

Trębska, J. (2018), *Polish households' savings in the financial intersectoral linkages*, "Equilibrium. Quarterly Journal of Economics and Economic Policy", 13 (2), pp. 307–329, https://doi.org/10.24136/eq.2018.016

Tsujimura, K., Mizoshita, M. (2003), Asset-*Liability-Matrix Analysis Derived from the Flow-of-Funds Accounts: the Bank of Japan's Quantitative Monetary Policy Examined*, "Economic Systems Research", 15 (1), https://doi.org/10.1080/0953531032000056936

Tsujimura, M., Tsujimura, K. (2011), *Balance sheet economics of the subprime mortgage crisis*, "Economic Systems Research", 23 (1), pp. 1–25, https://doi.org/10.1080/09535314.2010.523414

Tsujimura, K., Tsujimura M. (2018), *A flow of funds analysis of the US quantitative easing*, "Economic Systems Research", 30 (2), pp. 137–177, https://doi.org/10.1080/09535314.2018.1443908

Tsujimura, M., Tsujimura, K. (2021), *Flow-of-funds structure of the US economy 2001–2018*, "Economic Systems Research", 33 (3), pp. 385–416, https://doi.org/10.1080/09535314.2020.1795629

Zapletalová, V., Komínková, M. (2020), *Who is fighting against the EU's energy and climate policy in the European Parliament? The contribution of the Visegrad Group*, "Energy Policy", 139, 111326, https://doi.org/10.1016/j.enpol.2020.111326

Przepływy międzysektorowe w gospodarkach krajów Grupy Wyszehradzkiej

Przedstawiamy studium porównawcze przepływów pomiędzy sektorami instytucjonalnymi w gospodarkach Czech, Węgier, Polski i Słowacji, ze szczególnym uwzględnieniem roli sektora zagranicy. W naszym badaniu staramy się określić siłę i charakter powiązań międzysektorowych w analizowanych krajach oraz wskazać podobieństwa i różnice pomiędzy nimi. Badanie opiera się na sekwencji wszystkich transakcji zawartych w Systemie Rachunków Narodowych (SRN). Są to transakcje produktowe, tworzenie i alokacja dochodów pierwotnych, dystrybucja dochodów oraz transakcje w zakresie instrumentów finansowych. Badanie wyróżnia się spójnością i zbilansowaniem w ramach SRN. Zastosowana metoda transformacji danych do postaci macierzy płatnik-odbiorca gwarantuje zachowanie tych właściwości.

Jest to pierwsze tego typu kompleksowe badanie porównawcze, dostarczające jednoznacznych i powtarzalnych wyników na podstawie ustandaryzowanego systemu rachunkowości, funkcjonującego we wszystkich krajach europejskich.

Okres objęty badaniem (2000–2020) pozwala na wyciągnięcie ciekawych wniosków na temat procesów zachodzących w trakcie i po akcesji do UE. Uzyskane wyniki wskazują m.in. wzrost zaangażowania sektora zagranicy, przede wszystkim w procesy produkcyjne (import, eksport), a także inwestycyjne. Na szczególną uwagę zasługuje wysoki stopień finansjalizacji węgierskiej gospodarki.

Słowa kluczowe: Grupa Wyszehradzka, przepływy finansowe, system rachunków narodowych, sektory instytucjonalne

Appendix – The method of intersectoral flows estimation

The method of transforming the accounts in the transactions-sectors form into intersectoral flows (from-whom-to-whom) is analogous to the method of transforming the supply and use tables into the balance of inter-industry flows of goods and services (Miller and Blair 2009) or assets and liabilities tables (Trębska 2018; Tsujimura and Mizoshita 2003). Constructing the expanded FoF matrix (payer-payee matrix) is a multi-stage estimation procedure.

The first stage is to prepare tables of payments (**P**) and resources (**R**) in the following format, respectively:

$$\mathbf{P}_{m\times n} = \begin{bmatrix} \mathbf{p}_1 \\ \mathbf{p}_2 \\ \cdots \\ \mathbf{p}_m \end{bmatrix}, \quad \mathbf{R}_{m\times n} = \begin{bmatrix} \mathbf{r}_1 \\ \mathbf{r}_2 \\ \cdots \\ \mathbf{r}_m \end{bmatrix}. \tag{1}$$

Each element of matrix $\mathbf{P} = [p_{ij}]$ shows the value of the i-th type of transaction (i = 1, 2, …, m) paid by sector j (j = 1, 2, …, n). In turn, the rows ri of the matrix $\mathbf{R} = [r_{ij}]$ are the vectors showing the resources of sector j in the form an i-th type of transaction.

Two problems arise at this stage. The first problem is that the SNA presents the uses and resources of institutional sectors except for resources from transactions of products. Fortunately, these lacking resources might be determined residually, based on the equality between the sum of all resources ($r_j = \mathbf{i}_m^T \cdot \mathbf{R}$) and uses ($p_j = \mathbf{i}_m^T \cdot \mathbf{P}$) for each institutional sector. In this case, $\sum_{i=1}^{23} r_{ij} = \sum_{i=1}^{23} p_{ij}$ for each j, so the sum of resources from product transactions for each sector j is the difference between the total sum of payments and other resources:

$$\sum_{i=1}^{4} r_{ij} = \sum_{i=1}^{23} p_{ij} - \sum_{i=5}^{23} r_{ij} \quad , \; j = 1,\ldots,5 . \tag{2}$$

Separating the revenues resulting from intermediate consumption and final expenditures requires data recorded on the production account in the institutional sector according to NACE Rev.2, as well as supply and use tables. Cross-classification tables for output $\mathbf{O} = [o_{lj}]$ make it possible to identify which institutional sector (j) carries out a production activity in which industry (l). Unfortunately, these tables are available only for some countries on their national statistical offices' websites. For reasons of availability, this study used data at the section level (l = 1, …, 21). In turn, the elements of matrix Ϙ – co-

efficients $q_{lj} = o_{lj} / \sum_j o_{lj}$ determine the share of output in the *l*-th industry produced by the *j*-th sector.

This information should now be combined with the supply table S, also called the make or output matrix (Miller and Blair 2009, pp. 186–187). It shows the product composition of each industry's output. (S matrix aggregated to 21 industries and products) and makes it possible to determine which products (goods and services) are produced by each institutional sector. The supply table, by product and institutional sector, is the result of the following matrix operation: T = S · Ϙ. Each element t_{hj} (*h* = 1, 2, …, 21 for 21 products) shows the amount of product *h* produced by sector *j*.

Finally, applying use table (U) indicates how much of the output of each product is used to meet intermediate or final demand. Each element t_{hj} is divided into three parts, based on the share of intermediate consumption (1), final consumption and capital formation (2) and exports (3) in the total use of each product.

The transition from the "transaction-by-sector" matrices R and P to the "sector-by-sector" square matrix (payer-payee matrix) requires a sequence of calculations based on R and P:

n-element vectors $\mathbf{d}_i$ showing the shares of resources of sector *j* in terms of the *i*-th transaction ($\mathbf{d}_i \cdot \mathbf{i}_n = 1$):

$$\mathbf{d}_i = \frac{1}{s_i}\mathbf{r}_i,\ i = 1,\ldots,m, \tag{3}$$

where $s_i = \mathbf{p}_i \cdot \mathbf{i}_n = \mathbf{r}_i \cdot \mathbf{i}_n$ is the sum of flows in terms of the *i*-th transaction, $\mathbf{i}_n$ is the summing vector (*n*-element unity column);

n-element vectors $\mathbf{b}_i$:

$$\mathbf{b}_i = \mathbf{p}_i \cdot \hat{\mathbf{z}}^{-1}, \tag{4}$$

where $\hat{\mathbf{z}}$ is a diagonal matrix that consists of elements z_j, which are the sum of resources (equal to the sum of uses) of the *j*-th sector; the given element of vector $\mathbf{b}_i$ shows the share of the *j*-th sector's payments in terms of the *i*-th type of transaction in total uses of sector *j*;

the $n \times n$ matrix $\mathbf{C}_i = [c_{ikj}]$, whose elements show the shares of the *k*-th sector's *i*-th type of resources in z_j:

$$\mathbf{C}_i = \mathbf{d}_i^{\mathrm{T}} \cdot \mathbf{b}_i. \tag{5}$$

Finally, the $n \times n$ matrix $\mathbf{Z}_i = [z_{ii}]$ presents intersectoral financial flows in terms of the *i*-th transaction (see Table 1); each element z_{ikj} reflects the flow of the *i*-th transaction between sectors j and *k*:

$$\mathbf{Z}_i = \mathbf{C}_i \cdot \hat{\mathbf{z}} \,. \tag{6}$$

In the case of non-zero elements y_{ikj} reflecting the flows within the rest of the world sector, which are not recorded in SNA, the RAS method (Miller and Blair, 2009, pp. 276–292) was applied to eliminate them.