

The crisis robustness of knowledge-intensive business services (KIBS) exports¹

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Abstract

The aim of this study is to examine the robustness, resilience, and vulnerability of knowledge-intensive business services (KIBS) exports to a crisis. The hypothesis tested is that KIBS exports are crisis-robust rather than crisis-resilient. The study covers the period from 2004 to 2023, divided into two crisis periods (the global financial crisis and the COVID-19 pandemic), three non-crisis periods, and two recovery years. The growth rates of exports for the KIBS sectors are calculated and compared for these periods and with other services sectors. The study is based on data from Eurostat and refers to Poland compared with the EU-27 averages. This study contributes to the literature by: (1) demonstrating that it is advisable to conduct sectoral research while studying the vulnerability of services trade to a crisis; (2) demonstrating how different modes of services delivery can affect the vulnerability of exports to a crisis, with reference to various KIBS categories; (3) examining the vulnerability of KIBS exports in the light of differences between two recent global crises; (4) indicating the areas of KIBS exports that are robust, resilient or vulnerable to the examined crises compared to the exports of other services. The empirical results demonstrate that KIBS steadily increased its shares in services exports during both the crisis and non-crisis periods. This upward trend was stronger in Poland than on average in the EU-27. As a result, the significant disparity between the shares of KIBS in exports in Poland and the EU-27 average nearly disappeared during the examined period. KIBS exports can be considered robust during both crises; but in Poland, this was the case only during the pandemic. On the other hand, Polish KIBS exports significantly increased their crisis robustness between 2009 and 2020, which was not the case for the EU-27 average. The robustness is visible mainly in the exports of those KIBS that are identified as "the leading exported services" in Polish exports, i.e. accounting, auditing, bookkeeping, and tax consulting services; busi-

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ness and management consulting and public relations services and computer services (during both crises); legal services; R&D services and engineering services (during the pandemic). The exports of most other services appeared to be crisis resilient rather than crisis robust, particularly during the COVID-19 pandemic.

Keywords: European Union, Poland, services, KIBS, exports, international trade, crisis, resilience, robustness, vulnerability to a crisis

Odporność na kryzys eksportu usług biznesowych opartych na wiedzy

Streszczenie

Celem artykułu jest zbadanie odporności na kryzys, rozumianej jako *robustness*, *resilience* lub *vulnerability*, eksportu usług biznesowych opartych na wiedzy (ang. *knowledge-intensive business services*, KIBS). W badaniu weryfikowana jest hipoteza, że eksport KIBS należy uznać raczej za *crisis-robust* niż *crisis-resilient*. Badanie obejmuje lata 2004–2023, podzielone na dwa okresy kryzysowe (globalny kryzys finansowy i pandemia COVID-19), trzy okresy pozakryzysowe oraz dwa lata odbudowy po kryzysie. Przedmiotem badania jest porównanie zmian w eksporcie w różnych sektorach KIBS w wyróżnionych okresach, w porównaniu z pozostałymi usługami. Badanie oparte jest na danych Eurostatu i odnosi się do Polski w porównaniu ze średnimi dla UE-27. Praca wnosi wkład w dotychczasowe badania poprzez: (1) pokazanie, że w badaniach dotyczących odporności handlu usługami na kryzys wskazane jest podejście sektorowe; (2) przedstawienie wpływu różnych sposobów dostarczania usług na zagraniczne rynki na odporność eksportu w różnych obszarach handlu usługami; (3) zbadanie odporności na kryzys eksportu KIBS w świetle różnic między dwoma ostatnimi globalnymi kryzysami; (4) zidentyfikowanie obszarów w eksporcie KIBS, które można określić jako *robust*, *resilient* lub *vulnerable* względem kryzysów objętych badaniem, w porównaniu z eksportem w pozostałych usługach. Wyniki badania empirycznego pokazują, że KIBS stale zwiększały swój udział w eksporcie usług zarówno w okresach kryzysowych, jak i pozakryzysowych. Trend wzrostowy był silniejszy w Polsce niż średnio w UE-27. W rezultacie istotna różnica między udziałami KIBS w polskim i unijnym eksporcie prawie zniknęła w analizowanym okresie. Eksport KIBS można uznać za *crisis robust*; w Polsce – tylko w okresie pandemii. Z drugiej strony, polski eksport KIBS znacząco poprawił swoją odporność na kryzys rozumianą jako *crisis robustness* w roku 2020 w porównaniu z 2009, co nie miało miejsca średnio w UE-27. *Crisis robustness* jest widoczna głównie w przypadku eksportu tych KIBS, które zostały zidentyfikowane jako "kluczowe usługi eksportowe" w polskim eksporcie, a mianowicie: usługi rachunkowe, księgowe, audytorskie i doradztwa podatkowego; usługi w zakresie doradztwa biznesowego, doradztwa w zakresie zarządzania i public relations oraz usługi komputerowe (podczas obydwu kryzysów); jak również usługi prawne; B&R i inżynierskie (podczas pandemii). Eksport większości pozostałych usług okazał się raczej *crisis resilient* niż *crisis robust*, szczególnie w okresie kryzysu pandemii COVID-19.

Słowa kluczowe: Unia Europejska, Polska, usługi, KIBS, eksport, handel międzynarodowy, kryzys, odporność (*crisis resilience and robustness*²), podatność na kryzys

² Zarówno *crisis resilience*, jak i *crisis robustness* tłumaczone są na język polski jako 'odporność na kryzys', choć nie są one tożsame, a różnica między nimi jest m.in. przedmiotem badania w tej pracy.

1. Introduction

Services is the fastest-growing sector of the global economy. In 2022, it generated 61.8% of economic output and provided 50% of jobs globally (World Bank 2024a; 2024b). Trade in services has also been growing dynamically in recent decades. Service exports grew at an average annual rate of 7.5% between 1982 and 2023. Over the same period, the average annual growth rate for merchandise exports was 1.1 percentage points (p.p.) lower. As a result, the share of commercial services in global trade increased from 18.6% in 1982 to 23.2% in 2023 (World Bank Group 2025). Despite this upward trend, they still account for only around one-fifth of global trade, as measured by balance-of-payments statistics. This relatively low share of services in international trade explains why services trade has historically received much less attention in both academic research and trade policy debate than merchandise trade. However, it is important to note that the value of services in international trade is significantly underestimated for two main reasons.

Firstly, data on international services trade derived from the balance of payments (BoP) statistics do not cover all services transactions. Once the value of services delivered via all modes defined in the *General Agreement on Trade in Services* (GATS 1995) is taken into account, global services trade reached over \$17 trillion in 2021. This data is almost on par with the total trade in goods, and it has become bigger than world trade in manufacturing, valued at \$14 trillion. Secondly, a great variety of services are intermediate inputs in non-services industries, where their value is incorporated into merchandise trade statistics rather than services trade. When these indirect contributions are accounted for, the share of services in international trade rose to 63% (Cernat 2024a). Thus, it should not be surprising that Baldwin et al. (2024) argue that services represent the most promising path for export-led growth in developing countries, and it is the future of globalisation.

Despite the growing importance of services trade and its dominant role in global trade, when considering all types of service transactions, its vulnerability to crises has received comparatively little attention among researchers. The present study covers the period 2004–2023, during which two global crises occurred, i.e., the global financial crisis (2008–2009) and the COVID-19 pandemic (2020). To the best of the author's knowledge, only two papers, published in the aftermath of the global financial crisis, have studied this issue (Borchert, Mattoo 2010; Ariu 2016). Both studies concluded that services trade is less vulnerable than merchandise trade. However, during the COVID-19 pandemic, the opposite was true, with the fall of global service exports more than double that of global merchandise exports. This raises the question of whether services trade is more vulnerable to crises than merchandise trade.

As yet, there is no clear answer to this question. One of the characteristics of the services sector is its heterogeneous nature, which encompasses a far wider variety of activities than the manufacturing sector. Furthermore, services can be delivered to foreign customers through different modes, as discussed in more detail in section 2.2. Finally, the vulnerability of different services being traded internationally seems to depend on the type of crisis. The crises examined in this study differ significantly in their causes and the

actions taken to counteract them, which may explain why their effects on international trade in services diverged so sharply. Therefore, sectoral-level analyses are more suitable for assessing the impact of crises since they capture both the diversity of service industries and the specificity of a given crisis, showing how individual service industries respond to a given crisis. The need for conducting empirical analysis on services trade at the sector level was also highlighted by Shingal (2021).

The research presented in this article addresses precisely this need. Its objective is to study the vulnerability of exports in the field of services defined as knowledge-intensive business services (KIBS) to the two most severe crises of the 21st century. The KIBS sector was chosen for such a sectoral analysis as it plays a key role in modern economies. These services generate and disseminate knowledge to all parts of the economy, thereby positively influencing economic efficiency and innovativeness in the companies that use them (Antonelli 1998; Di Cagno, Meliciani 2005; Baker 2007; Castellacci 2010; Musolesi, Huiban 2010; Wyszowska-Kuna 2016; Shearmur, Doloreux 2019). "KIBS may also indirectly contribute to productivity growth in other industries through their embodiment in various products used as intermediate inputs or investment equipment used in production in other industries" (Wyszowska-Kuna 2023: p. 80; Wyszowska-Kuna, Przybyliński 2021).

KIBS also has enormous potential to support economic recovery during crises, as it plays a key role in preparing companies to cope with a crisis by managing disruptive or unexpected emergencies quickly and effectively. By supporting client stability, the KIBS sector supports the stability of the whole economic system during crises. "Finally, KIBS activities can help achieve other important goals, such as building greener, more digital, and more competitive companies and economies" (Wyszowska-Kuna 2023: p. 80; see also: Wyszowska-Kuna 2025).

While studying vulnerability to crises, it is important to distinguish between crisis resilience and crisis robustness. Crisis resilience refers to the capacity to recover quickly after a disruption, while crisis robustness refers to the ability to continue to produce despite external or internal disruptions (Brandon-Jones et al. 2014; Miroudot 2020).

The characteristics of services in general, and of KIBS in particular (see: section 2.1) suggest that the KIBS sector is "less subject to cyclical fluctuations than other industries" (Wyszowska-Kuna 2023: p. 81). Thus, the present study tests the **hypothesis** that KIBS trade is crisis-robust rather than crisis-resilient. The article contributes to the literature by identifying the areas of KIBS exports that are robust, resilient, or vulnerable to the two global crises, which differed fundamentally in nature. The study is based on the example of Poland, with comparisons to EU-27 averages. It also discusses how the differences between these two crises may have affected the resilience and robustness of KIBS exports.

The article is organised as follows. Section 2 presents a review of the relevant literature. Section 3 describes the methodology and data, while Section 4 presents and discusses the empirical findings. Section 5 examines the prospects for further development of KIBS trade in times of significant political and economic instability and volatility. Finally, Section 6 contains conclusions.

2. Literature review

2.1. The characteristics of services and KIBS trade in terms of vulnerability to a crisis

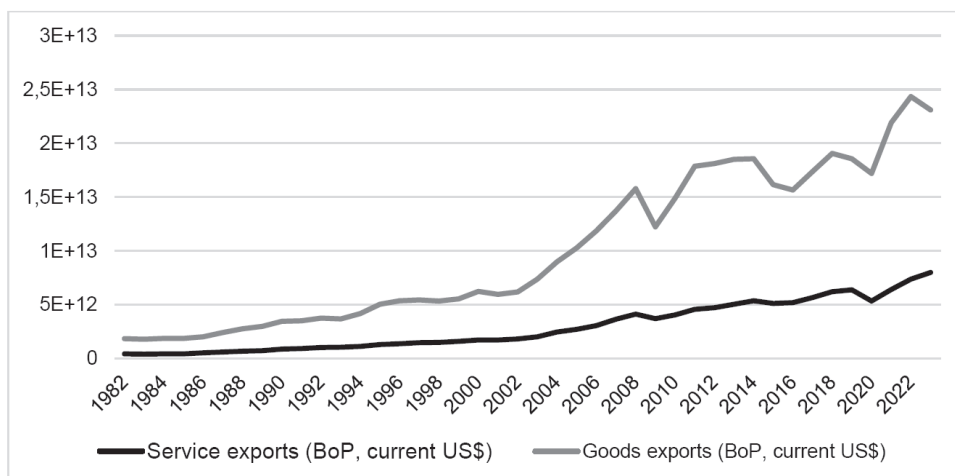
The characteristics of service activities suggest that they are generally less exposed to economic shocks than manufacturing for several reasons (Wyszkowska-Kuna 2023). Firstly, services often involve long-term contracts or continuity of provision, which helps limit the impact of fluctuations in demand (Swinney, Netessine 2009). Secondly, services are not storable, so they cannot be overproduced. As a result, they are less subject to sharp declines in demand during a crisis than manufacturing goods (Baldwin, Venables 2013; Davies, Markusen 2021). Finally, most service activities are characterised by relatively low market entry and exit costs compared to industrial activities, which has two implications. First, service activities are more flexible in reacting to the changing economic situation than manufacturing. Second, they usually need less finance than manufacturing in normal times; thus, they are less affected by external capital constraints during crises. The same logic applies to exporters, implying that services exports should fall less sharply than merchandise trade during crisis periods (Borchert, Mattoo 2010; Ariu 2016).

These features indicate that service activities should be defined as crisis-robust rather than crisis-resilient (Wyszkowska-Kuna 2023). She notes, however, that in the literature on the counter-cyclical role of services, no distinction is made between these two terms. While many studies claim to examine crisis resilience, their findings in fact demonstrate that the service sector (particularly public services) “was less subject to cyclical fluctuations than other industries, meaning it was crisis-robust rather than crisis-resilient” (Wyszkowska-Kuna 2023: p. 98). This terminological ambiguity likely reflects the more frequent use of the term *crisis resilience* in academic research and policy discourse than *crisis robustness*.

For the same reasons, service trade should likewise be less subject to economic shocks than merchandise trade, which indicates its robustness rather than resilience or vulnerability to a crisis. Nevertheless, both the service sector and services trade encompass a wide variety of economic activities or products. Therefore, the degree of robustness, resilience, or vulnerability to a crisis may vary across different service industries and may also depend on the specific causes and dynamics of a given crisis.

As demonstrated in *Figure 1*, the value of global services exports has exhibited fewer cyclical fluctuations than global merchandise exports. Over the 41 years covered by the study, service exports declined four times: between 1981 and 1983 (-2.8%), in 2009 (-10.4%), in 2015 (-4.7%), and in 2020 (-16.6%), while merchandise exports fell eight times. Declines in service exports were not only less frequent than those in merchandise exports but also less pronounced. In 2009, merchandise exports fell sharply by 22.5%, more than twice as much as services exports. Consequently, after the 2008 crisis, a belief emerged that services trade was more crisis-resilient than merchandise trade. However, during the COVID-19 pandemic, the opposite proved true, as global services exports fell by 16.5%, while world merchandise exports fell by only 7.3%.

Figure 1: The values of world services exports compared to the values of world goods exports in the years 1982-2022 (current prices, in USD).



Source: World Bank Group (2025).

Regarding the vulnerability of KIBS trade to a crisis, economic crises can positively and negatively impact the demand for KIBS. On the one hand, an economic crisis reduces economic activity across various industries, reducing demand for various components of intermediate inputs, including KIBS. This was evident during both crises. "Moreover, during a crisis, enterprises try to cut their expenses, and they may perceive purchasing certain KIBS as unnecessary expenses (e.g., advertising, R&D expenditures). Some companies may also stop purchasing certain KIBS (e.g., market research, marketing) from external suppliers and try to perform these tasks in-house" (Wyszowska-Kuna 2023: p. 84). The reduced availability of external capital, which was more visible during the first crisis,³ can adversely affect expenditures on KIBS. Finally, some companies may take advantage of free KIBS (e.g., advisory or legal services) delivered by publicly funded entities, whose activities may be expanded during a crisis.⁴

On the other hand, the demand for certain KIBS (e.g., computer and information, bookkeeping, and accountancy) seemed to contract less than the demand for material goods (e.g., computers) because: (1) businesses constantly need these services and, like all services, they cannot be overproduced, (2) demand for them does not depend on the scale of production (Borchert, Mattoo 2010). KIBS companies also help their clients solve problems and adapt to changing situations, so during a crisis, KIBS input

³ This was due to the problems in the banking sector. However, during the second crisis, national governments provided large-scale financial support to domestic companies affected by restrictions introduced then.

⁴ For example, The Recovery Advice for Business scheme, initiated by the UK government, gave small firms access to free advisory services to help them through the COVID-19 pandemic and prepare for long-term recovery.

may be more important than other types of intermediate inputs. This role was more important during the second crisis when the operating conditions for businesses changed more radically than during the first crisis. "Thanks to this role, KIBS can strengthen both the robustness and resilience of clients' companies and the entire economic system. Some companies may also increase their demand for certain KIBS, such as bankruptcy, financial advisory, and crisis management services" (Wyszkowska-Kuna 2023: p. 84). "To sum up, some factors will reduce the demand for KIBS during a crisis, while others will increase it. The overall change in demand largely depends on awareness among business owners about the KIBS sector's contribution to the effectiveness and stability of economic systems and the recovery process" (Wyszkowska-Kuna 2023: p. 85). Based on the example of European Union (EU) countries, it can be demonstrated that KIBS activities are less exposed to cyclical fluctuations than other industries, demonstrating their crisis robustness. This study tries to determine whether the same can be said for KIBS trade.

2.2. The modes of service supply in terms of vulnerability to a crisis

According to the *General Agreement on Trade in Services* (GATS 1995), adopted by the WTO, trade in services is defined as comprising four modes of services delivery to foreign markets:

- 1) *Cross-border supply* – services flow from the territory of one member into the territory of another (e.g. financial or advisory services delivered remotely).
- 2) *Consumption abroad* – a service consumer (e.g. a tourist or student) moves into another member's territory to obtain a service.
- 3) *Commercial presence* – a service supplier from one member establishes a territorial presence in another member's territory, for example, through ownership or leasing of premises, to provide a service (e.g. domestic subsidiaries of foreign banks or restaurant chains).
- 4) *Presence of natural persons* – individuals from one member enter another member's territory to supply a service (e.g. business managers, doctors or construction workers).

To this list, Cernat and Kutlina-Dimitrova (2014) propose an additional category, *mode 5*, which refers to the indirect supply of services incorporated in merchandise. It includes the value of service intermediate inputs embedded in goods traded internationally.

Data on international services trade derived from the BoP statistics cover only services delivered via modes 1, 2, and 4 (almost entirely). Services delivered via *mode 3* are excluded. To fill this gap, Eurostat collects separate data on foreign affiliates' trade statistics (FATS), which measure commercial presence through affiliates in foreign markets. Furthermore, the WTO, Eurostat, and other international agencies launched the *Trade in Services by Modes of Supply* (TISMOS) experimental database, which provides *mode 3* estimates. Estimating the value of trade in indirect services requires data derived from the OECD's database *Trade in Value Added* (TiVA).

In 2021, services delivered via *mode 3* accounted for 56% of services trade (across four modes) and 25% of global trade, while *mode 5* was estimated at 29% of world services trade (across five modes) and 18% of global trade (Cernat 2024a,b).

KIBS delivered via *modes 3 and 5* are excluded from the BoP and thus fall out of the scope of the present study. However, given their growing shares in international trade, further research based on FATS, TISMOS, and TiVA databases is needed. Unfortunately, these databases are currently incomplete and have been available for a relatively short time.

How a given service is delivered to foreign markets can influence its vulnerability to various crises. For service categories classified as KIBS trade, *modes 1 and 3* dominate (WTO 2025). Charges for the use of intellectual property are delivered exclusively via *mode 1*. More than half of other business services are delivered via *mode 3* (52%), although the share of *mode 1* is not much smaller (45%), with *mode 4* accounting for the remainder. However, if we omit *mode 3* (as it is not included in the BoP), KIBS appear to be delivered almost exclusively via *mode 1* (on average 95%, with the rest via *mode 4*). However, in the case of information services, 100% is delivered via *mode 1*. In turn, *mode 5* covers intermediate services used in production processes, which also includes KIBS.

How a given service is provided did not impact its vulnerability to the financial crisis. The COVID-19 pandemic, however, was markedly different, as it involved various restrictions on personal contact and cross-border mobility. Therefore, trade in services delivered via modes 2, 3, and 4 was most severely affected then (*Table 1*). These services included travel (SD), transport (SC), construction services (SE), manufacturing services on physical inputs (SA), maintenance and repair services (SB), and personal, cultural and recreational services (SK). By contrast, computer services (SI) experienced new development opportunities, particularly in activities that could be delivered remotely, with KIBS being a prominent example.

To conclude, KIBS trade should be more crisis-robust than trade in other services and merchandise trade, which should be more evident during the second crisis.

3. Methodology and data

The study examines changes in KIBS exports, compared to trade in other services and merchandise exports, during two crisis periods – the financial crisis (2008–2009) and the COVID-19 pandemic (2019–2020) – as well as three non-crisis periods: 2004–2007, 2010–2019, and 2021–2023. The research refers to Poland in relation to the EU-27 average. Due to this comparison, the first non-crisis period started in 2004, when data for the EU-27 became available (earlier data exist only for the EU-15).

Additionally, two immediate post-crisis periods (2009–2010 and 2020–2021) were considered to identify which KIBS categories were able to quickly return to pre-crisis growth rates. The year 2008 is omitted as it represents neither a whole non-crisis year nor a full crisis year, as the financial crisis started in September. For the non-crisis periods, average annual growth rates are calculated, while annual growth rates are calculated for the crisis and recovery years. The KIBS sub-sectors are classified as follows:

- Crisis-robust: those that maintained positive export growth rates during the crisis years.
- Crisis-resilient: those that experienced a decline but quickly returned to previous growth trends.
- Vulnerable: those that experienced a significant decline and did not quickly return to previous growth levels.

The study is based on Eurostat data. In 2010, there was a change in the classification of services in the BoP (BPM6). Therefore, it was necessary to use two data sources from the Eurostat database:

- 1) *International trade in services – historical data (2004–2013)*, where the EU is defined as comprising 27 countries that were members between 2007 and 2013, i.e. the current member states without Croatia but with the United Kingdom
- 2) *International trade in services (since 2010)* (BPM6), where the EU is again defined as comprising 27 countries, but those that are members since 2020 (i.e., including Croatia but excluding the United Kingdom).

From 2010 onwards, selecting a database in which the EU is defined as comprising 28 countries (including Croatia and the United Kingdom) was also possible. However, this database would only include data until 2020. Thus, due to the changes in both the classification of services in the BoP and the composition of the EU, data for 2004–2009 are not fully comparable with those for 2010–2022.

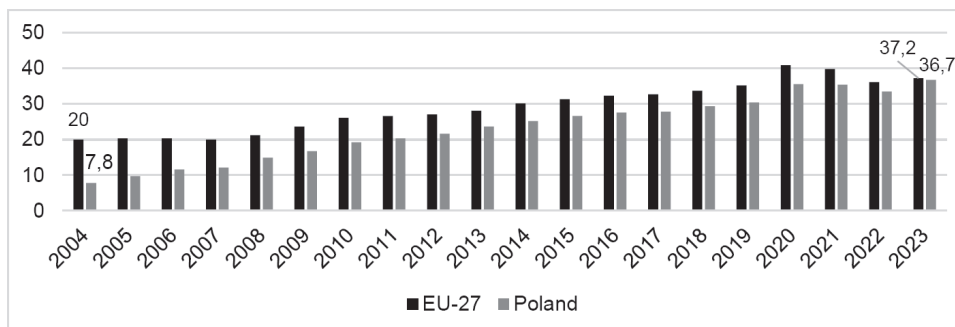
In the study based on the BoP, KIBS trade should be defined as comprising the following services: charges for the use of intellectual property rights (SH), computer services (SI2) and information services (SI3). There are also three subcategories of Other Business Services: Research and development services (SJ1), Professional and management consulting services (SJ2) and Architectural, engineering, scientific and other technical services (SJ31). SJ2 comprises: Legal, accounting, management consulting and public relations services (SJ21, which includes: Legal services – SJ211, Accounting, auditing, bookkeeping, and tax consulting services – SJ212, and Business and management consulting and public relations services – SJ213) and Advertising, market research and public opinion polling services (SJ22). SJ31 includes: Architectural services (SJ311), Engineering services (SJ312) and Scientific and other technical services (SJ313).

4. Research results

The empirical analysis begins with a presentation of the shares of KIBS in service exports in Poland compared to the EU-27 average between 2004 and 2023 (*Figure 2*). In 2004, the share of KIBS in Polish exports was 2.5 times lower than in the EU-27, on average. However, over the study period, the share increased in both Poland and the EU-27, but the upward trend was stronger in Poland. As a result, by the end of the period, the gap had almost closed, amounting to only 0.5 p.p. in 2023. The years 2021–2022 were an exception, as slight declines occurred in both Poland and the EU-27 average. However, these are unsurprising as they followed substantial increases in 2020 (by 5 p.p.), when

the growing importance of KIBS trade rose during the pandemic, while trade in most other services declined sharply. After the pandemic, as other service industries returned to growth, the share of KIBS in exports naturally decreased, although it remained higher than before the pandemic and resumed growth thereafter.

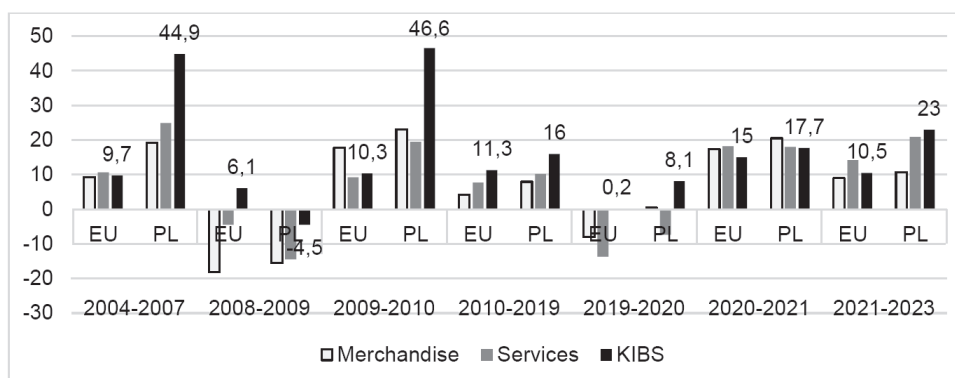
Figure 2: Shares of KIBS in services exports.



Source: Own calculations based on Eurostat (2014, 2025).

Figure 3 presents the growth rates of KIBS exports compared to services and merchandise exports in the examined periods. Table 1 presents (see: page 64) the growth rates for each service category (SA–SK), including KIBS (in bold in Table 1). The values for Poland are compared with the EU-27 average.

Figure 3: Growth rates of KIBS exports compared to services and merchandise exports in Poland and the EU-27 average in the examined periods (%).



Source: Own calculation based on data derived from Eurostat (2014, 2025).

On average, KIBS exports in the EU-27 proved to be crisis robust, though this was more apparent during the first crisis. In 2009, the growth rate was positive (+6.1%), slightly lower than before the crisis (by 3.6 p.p.). During the second crisis, which hit

services trade much more severely than the first, and more substantially than merchandise trade, the growth rate was still positive (+0.2%), but significantly lower than before the crisis (by 11.1 p.p.).

The situation in Poland was the opposite. During the first crisis, the growth rate of Polish KIBS exports declined sharply (from +44.9% between 2004 and 2007 to -4.5% in 2009), although this decreased rate was three and a half times lower than that recorded for merchandise and services exports. Moreover, it recovered very quickly in 2010, reaching +46.6%, higher than during the pre-crisis period. In the post-crisis years, KIBS exports' growth rate was lower than the pre-crisis level, but remained extremely high (twice as high as those of merchandise and services exports then).

During the second crisis, the growth rate of exports in Poland decreased by half, but remained high (+8.1%). In 2021, their growth rates were higher than in the pre-crisis years in both Poland and the EU-27 average (17.7% and 15%, respectively). Between 2021 and 2023, the growth rate of KIBS exports in Poland was still higher than before the COVID-19 pandemic (by 7 p.p.). Thus, Polish KIBS exports can be considered resilient to the first crisis and robust to the second.

By comparison, merchandise and services exports can be described as resilient to both crises, both in Poland and on average in the EU-27. In Poland, the decline in merchandise exports in 2009 was lower than the pre-crisis growth rate, whereas the EU-27 average was twice as high as the pre-crisis growth rate. At the same time, the decline in services exports in both Poland and the EU-27 was lower than the pre-crisis growth rates. In 2010, merchandise and services exports made up for the losses from 2009, in most cases with a surplus. It should be noted, however, that between 2010 and 2019, the growth rates of merchandise and services exports did not return to the pre-crisis levels. In general, services exports were less heavily hit by the first crisis than merchandise exports, with this disparity much more apparent in the EU-27 average than in Poland.

During the second crisis, the situation was the opposite. The decline in Polish services exports was half of the EU-27 average and half that experienced during the first crisis. Conversely, in the EU-27, the average was three times higher than during the first crisis. In the recovery year, services exports more than compensated for the losses from the crisis, particularly in Poland. After the crisis, the growth rates of services exports were twice as high as those in the pre-crisis period. Polish merchandise exports managed to maintain a positive growth rate in 2020 (+0.4%), while the EU-27 average decreased, although half as low as in the first crisis and as services exports. Between 2021 and 2023, the growth rates of merchandise exports were higher than before the crisis, but lower than those of services and KIBS exports.

In general, the growth rates of KIBS exports in Poland were typically twice as high as those of merchandise and services exports. On average in the EU-27, KIBS export growth rates before the financial crisis and after the COVID-19 pandemic were roughly similar to those of merchandise and services exports. From 2010 to 2019, KIBS exports recorded the highest growth.

Table 1: Growth rates of exports in each service category in Poland and on average in the EU in the examined periods (%)

Period Category	2004–2007		2008–2009		2009–2010		2010–2019		2019–2020		2020–2021		2021–2023	
	EU	PL	EU	PL	EU	PL	EU	PL	EU	PL	EU	PL	EU	PL
SA	-	-	-	-	-	-	8.4	13.1	-8.4	-6.5	20.0	17.0	8.5	8.1
SB	-	-	-	-	-	-	13.6	14.2	-11.8	5.2	9.3	10.2	21.1	35.2
SC	9.9	26.1	-14.9	-16.6	15.4	6.7	4.8	11.7	-13.6	-3.6	30.1	23.4	9.3	17
SC4	6.5	28.2	9.5	73.3	8.6	-26.5	15.5	16.3	31.1	40.3	24.8	27.1	6.6	23.4
SD	5.3	18.3	-8.4	-19.7	4.0	12.5	5.3	6.4	-57.7	-42.5	25.6	7.0	46.4	34.3
SE	16.1	30.5	4.3	-17.9	-8.9	-6.6	5	6.8	-18	-11.7	0.6	34.0	15.7	8
SF	4.8	-34.7	43.2	-82.3	1.5	678.5	6	10.1	3.9	0.7	12.9	26.5	14.5	-
SG	22.5	30.5	-13.2	-19.7	6.0	38.8	6.5	6.3	3.3	7.2	18.5	5.9	6.9	34.1
SH	9.7	44.5	21.3	-52.6	9.2	136.3	15.1	14	-18.1	67.1	17.4	28.3	2.6	1.2
SI1	13.3	14.1	-4.6	0.1	15.6	-5.1	-0.4	5.8	-6.4	6.8	6.2	-14.3	5.6	3
SI2	12.9	47.1	1.8	1.7	13.5	75.5	11.9	22.7	12.6	7.6	21.1	21.9	12	27.6
SI3	7.7	21.5	3.9	-29.4	7.7	235.1	20.3	16.9	3.6	3.5	21.5	15.3	14.3	19.3
SI31	-	-24	11.3	-73.6	-17.6	708.3	6.9	-7	-6.3	34.1	-17.3	-20.7	20.3	24.9
SI32	-	39.7	1.2	-14.8	17.9	186.6	21.3	19.8	3.9	2.6	22.8	16.7	14.1	19.2
SJ1	8.8	33.8	1.9	-5.2	6.3	83.0	10.4	15.3	5.9	8.6	-7.7	16.1	12	20.5
SJ2	-	-	-	-	-	-	10.1	13.6	-1.7	5.2	14.5	12.6	12.7	22.7
SJ21	13.7	42.2	5.2	16.4	9.8	49.8	10.5	18.3	2.4	10.7	10.5	13.2	12.9	24.2
SJ211	-	34.2	-	-9.9	-	38.0	9	5.2	0.4	0.9	9.2	18.2	7.5	6.1
SJ212	-	35.3	-	10.7	-	24.5	8.7	20.6	6.5	21	9.0	9.1	11.9	19.3
SJ213	-	65.2	-	42.0	-	83.6	10.9	19.1	2	2.8	10.9	16.8	13.5	30.4
SJ22	9.1	54.3	6.9	-9.1	15.3	29.6	9.3	6.7	-11.9	-8.2	26.1	11.0	12.1	18.2
SJ3	-	-	-	-	-	-	8	2.8	-7.6	3	10.6	21.5	12.9	17.1
SJ31	7.5	33.8	-3.1	-11.6	8.3	8.5	2.8	11.1	3	4.6	11.1	21.8	17.1	19.5
SJ311	-	-	-	-	-	-	-11	6.2 ^a	-18.8	-9.7	41.5	7.6	10.9	22.2
SJ312	-	-	-	-	-	-	5.9	10.2 ^a	-11.7	10.9	15.8	24.9	7	19.4
SJ313	-	-	-	-	-	-	6.3	21.6 ^a	-8.5	-14	0.7	10.9	13.3	19.5
SJ32	22.3	63.8	-17.4	23.5	-7.6	99.5	3.4	-11	4.8	-21.1	6.0	7.1	14.6	19.4
SJ33	23.0	54.5	5.3	44.8	7.5	77.3	11.3	13.1	-6.8	-15.1	-4.4	55.8	9.3	25.8
SJ34	21.4	45.9	-4.5	-34.6	12.8	1.2	11.3	9.7	2.3	-1.9	7.9	19.4	15.1	13.3
SJ35 ^b	5.5	42.4	-5.6	-1.3	15.4	-11.8	8.2	-1.2	-11.9	8.5	18.0	19.6	14.7	15.3
SK1	-6.4	17.3	4.7	-44.1	29.4	62.5	7.7	1.5	-6.2	-9.9	22.1	35.4	8.2	36.2
SK2	15.5	27.9	9.0	-18.8	31.3	155.7	12.5	15.7	-7.8	-8.6	33.6	10.1	11.5	14.2

^a2013–2019. ^bUntil 2010: Other miscellaneous business, professional and technical services; after 2010: Other business services.

Numbers in bold refer to KIBS. Source: Own calculation based on data derived from Eurostat (2014, 2025).

Appendix to the Table 1: Classification of services in the BoP statistics since 2010.

SA – Manufacturing services on physical inputs owned by others; SB – Maintenance and repair services; SC – Transport, including SC4 – Postal and courier services; SD – Travel; SE – Construction; SF – Insurance and pension services; SG – Financial services; SH – Charges for the use of intellectual property;
SI1 – Telecommunication services; SI2 – Computer services; SI3 – Information services, including: SI31 – News agency services; SI32 – Information services other than news agency services;
SJ – Other business services, including: SJ1 – Research and development services; SJ2 – Professional and management consulting services: SJ21 – Legal, accounting, management consulting and public relations service (including SJ211 – Legal services; SJ212 – Accounting, auditing, bookkeeping, and tax consulting services and SJ213 – Business and management consulting and public relations services); SJ22 – Advertising, market research and public opinion polling services); SJ3 – Technical, trade-related and other business services: SJ31 – Architectural, engineering, scientific and other technical services (including: SJ311 – Architectural services; SJ312 – Engineering services and SJ313 – Scientific and other technical services); SJ32 – Waste treatment and de-pollution, agricultural and mining services; SJ33 – Operating leasing services; SJ34 – Trade-related services; SJ35 – Other business services n.i.e.);
SK1 – Audiovisual and related services; SK2 – Personal, cultural, and recreational services other than audiovisual and related services.

Source: BPM6 (IMF 2010).

As regards specific KIBS categories (*Table 1*), in Poland, the highest growth rates during the non-crisis periods were observed for the exports of computer services (SI2: 47.1%, 22.7% and 27.6%, respectively) and business and management consulting and public relations services (SJ213: 65.2%, 19.1% and 30.4%, respectively). Exports of charges for the use of intellectual property (SH), research and development services (SJ1), legal, accounting, management consulting and public relations services (SJ21), and architectural, engineering, scientific and other technical services (SJ31) also recorded consistently high growth. The highest average EU-27 growth rates, which typically ranged from 8% to 14%, were for the exports of information services (SI3), legal, accounting, management consulting and public relations service (SJ21), computer services (SI2), advertising, market research and

public opinion polling services (SJ22) and architectural, engineering, scientific and other technical services (SJ31).

In Poland, legal, accounting, management consulting, and public relations services (SJ21), notably, held up well in both crises (+16.4% and +10.7%, respectively). However, regarding the subcategories within SJ21, only the exports of legal services (SJ211) appeared to be resilient to the first crisis – they declined in 2009 (-9.9%) but made up for this loss with a large surplus a year later. During the second crisis, they managed to maintain a slight increase. Exports of other SJ21 categories demonstrated an upward trend during both crises. In 2009, the highest growth dynamics were observed in business and management consulting and public relations services (SJ213: +42%), while in 2020, they were observed in accounting, auditing, bookkeeping, and tax consulting services (SJ212: +21.0%, three times as high as the EU-27 average). On average in the EU-27, exports of legal, accounting, management consulting, and public relations services (SJ21) also demonstrated an upward trend during both crises, but the growth rates were significantly lower than during the non-crisis periods (particularly during the first crisis)⁵.

Computer services (SI2) can also be considered crisis-robust in Poland and, on average, in the EU-27. Poland recorded positive growth rates during both crises (+1.7% and +7.6%, respectively), although they were much lower than during the non-crisis periods. In the EU-27, by contrast, this was the case only during the first crisis. In 2020, the exports of computer services increased even more strongly than in the pre- and post-crisis years.

Polish exports of R&D services (SJ21) and architectural, engineering, scientific, and other services (SJ31) declined only during the first crisis, while they continued to increase during the second crisis. The situation was the opposite for the EU-27, however. During the second crisis, they did not decline in 2020 but fell a year later. In cases where growth rates remained positive during the crisis years, they were usually significantly lower than in the non-crisis periods. After the pandemic, export growth rates exceeded pre-pandemic levels.

As data on trade in the subcategories within SJ31 are available only from 2013, it is impossible to study the impact of the financial crisis on export performance in this field. In Poland, exports of engineering services were robust during the pandemic. By contrast, architectural services (SJ311) and scientific and other technical services (SJ313) were only resilient to this crisis – exports declined sharply (by 9.7% and 14%, respectively), but they nearly rebounded a year later, which was also visible in the EU-27 average. The difference was that the export growth rates for architectural and engineering services in 2021 exceeded the magnitude of their declines in 2020, particularly in the case of architectural services. Scientific and other technical services can be described as vulnerable to this crisis, as their rebound was only evident in the post-crisis years. During the non-crisis periods, exports in this field generally increased, with the exception of architectural services between 2010 and 2019.

Advertising, market research, and public opinion polling services (SJ22) exports experienced significant drops in Poland during both crises (-9.1% and -8.2%, respectively,

⁵ There is no data for individual subcategories within SJ21 for the EU-27 until 2010.

similar to decreases in total services exports). However, they rebounded with a surplus the following year. Therefore, they are considered crisis-resilient. On average in the EU-27, they were resilient only during the second crisis (-11.9%), while in the first crisis, they were robust (+6.9%).

Exports of other KIBS categories, namely charges for the use of intellectual property (SH) and information services (SI3), suffered significant declines in Poland, but only during the global financial crisis (-52.6% and -29.4%, respectively). In 2010, conversely, exports surged; thus, we can classify them as resilient to this crisis. By contrast, on average in the EU-27, exports were robust. SH, in particular, saw its export growth rate in 2009 double that of 2004–2007. Polish exports of charges for the use of intellectual property appeared robust to the pandemic (they increased by +67.1% in 2020, the highest growth rate in Polish services exports at that time), while the EU-27 average exports in this field were resilient to this crisis. Information services exports in the EU-27 were crisis-robust, except for news agency services (SI31), which were vulnerable to this crisis. In 2020, Polish exports of news agency services recorded high growth, which was largely offset by a decline a year later.

Notably, the KIBS categories identified as crisis-robust belong to the group of services referred to as "leading exported services". This group comprises services with a comparative advantage, a positive trade balance, and relatively high export shares (Wyszkowska-Kuna, Witkowska 2024). In 2022, the following KIBS were included in this group:

- Polish exports to EU countries: accounting, auditing, bookkeeping, and tax consulting services (SJ212, 3.9%⁶), engineering services (SJ312, 2.2%), and R&D services (SJ1, 0.7%);
- Polish exports to non-EU countries: accounting, auditing, bookkeeping, and tax consulting services (5.3%), engineering services (2.5%), computer services (SI2, 18%), business and management consulting and public relations services (SJ213, 6.5%), advertising, market research and public opinion polling services (SJ22, 3.2%), and information services other than news agency services (SI32, 1%).

The shares of these KIBS in Polish services exports were higher than the EU-27 average. Only advertising, market research, and public opinion polling services (SJ22) were resilient rather than robust to both crises.

This article studies the vulnerability of Polish KIBS exports, without distinguishing between exports to EU and non-EU countries. Investigating these two dimensions separately could be the subject of further research.

Compared with the export performance of other service categories during the examined periods, service exports appeared to be crisis-resilient in most cases, with a few exceptions. Postal and courier services (SC4) experienced more substantial increases in the crisis years than during the non-crisis periods. A similar trend was observed for the EU-27 average exports of insurance and pension services (SF) during the first crisis.

⁶ Share in Polish services exports.

These exports were robust to the second crisis, both in Poland and on average in the EU-27. This was also true for the following services: maintenance and repair services (SB, in Poland during the second crisis), financial services (SG, during the second crisis), waste treatment and de-pollution, agricultural and mining services (SJ32, in Poland during the first crisis and on average in the EU-27 during the second crisis), operating leasing services (SJ33, during the first crisis), trade-related services (SJ34, on average in the EU-27 during the second crisis), other business services n.i.e. (SJ35, in Poland during the second crisis), and personal, cultural, and recreational services (SK1 and SK2, on average in the EU-27 during the first crisis).

In contrast, several service exports were vulnerable during crisis periods. They include transportation services (SC, in Poland during the first crisis), travel (SD, during the second crisis), construction services (except for Poland, where they were resilient to the second crisis), financial services (SG, on average in the EU-27 during the first crisis), operating leasing services (SJ33, on average in the EU-27 during the second crisis), and trade-related services and other business services n.i.e. (SJ34 and SJ35, in Poland during the first crisis).

5. Prospects for the development of KIBS trade in face of various crises and other threats

Unfortunately, contemporary times have been characterised by significant economic and political instability, an increased risk of armed conflicts, climate change, and other unpredictable threats. Paradoxically, conflicts and other threats may support the development of comparative advantages in some KIBS areas, as demonstrated by the examples of Israel and Ukraine, which have become the world's leading exporters of computer services. In 2022, Israel ranked third on the normalised comparative advantage index and second on the trade balance index, while Ukraine was ranked fourth and first, respectively (Wyszowska-Kuna 2024).

Israel is geopolitically, economically, and culturally unique, although valuable lessons can still be learned from its experience. Its defence doctrine is heavily focused on technological advancement, with government and technology-intensive military service exerting a profound impact on enterprises that operate in related areas. The country's cybersecurity industry, which accounts for 65% of all financial transactions conducted by software-related start-ups between 2017 and 2022, is a byproduct of military crossover. By comparison, in the U.S., cybersecurity start-ups account for only 13% of total spending by software-related start-ups. Another determinant of Israel's innovation capacity is its sustained commitment to public investments in R&D. The country consistently allocates the highest proportion of R&D expenditure to GDP globally, which is accompanied by targeted initiatives designed to strengthen basic research. In contrast, the United States has experienced a marked reallocation of R&D expenditure from the public to the private sector, which resulted in a gradual decline in basic research (from 19% in 2010 to 15% in 2019). Such state-supported research plays a crucial strategic and pre-competitive role

in developing new technologies like quantum computing (Tomoshige, Glanz 2022).

Ukraine provides another case wherein the military conflict has acted as a catalyst for technological progress. The war has reinforced Ukraine's comparative advantage in computer services exports, such as cloud computing, artificial intelligence, and big data (*Hatanpää* 2023), all of which are subsectors of KIBS trade. Additionally, the ongoing war has created opportunities for new comparative advantages in value-added IT services. For instance, the imperative to maintain uninterrupted communication has accelerated innovation in alternative communication technologies. The country's IT sector has also introduced innovations that directly serve military objectives, including the JeWoroh chatbot, which is part of the Diia platform that enables citizens to provide intelligence information to Ukraine's military forces (Wittenberg 2023) and cyber operations through the IT Army of Ukraine (<https://itarmy.com.ua/>). Furthermore, the BRAVE1 initiative – a dedicated technology cluster – has accelerated innovations in the defence and security sectors (Fedorov 2023). These measures not only stimulate technological advancement in crisis contexts but also generate significant international demand for Ukrainian expertise. Consequently, Ukraine possesses the potential to emerge as a leading actor in digital transformation and IT services (Wyszkowska-Kuna 2024).

Beyond geopolitical and military threats, climate change presents a critical challenge as it exacerbates the energy crisis, increases the frequency of natural disasters, and elevates the risk of another pandemic. Building a green economy through energy transformation and developing a circular economy, as the EU is undertaking, also requires support from various KIBS (Jones et al. 2016). As noted, services remain an important contributor to job creation and growth, and these jobs are frequently green. Combining public and private service activities can expedite the transition towards a green economy.

For instance, an initiative in West Sweden's textile, furniture, and engineering industries aims to enhance the service value content and facilitate regional economic resilience. Moreover, knowledge-intensive services have enabled the development of new business models characterised by increased servitisation and the dematerialisation of consumption.⁷ Both enhance economic efficiency by promoting reuse and creating new untapped value from existing products and new services for other related purposes. They contribute significantly to sustainable development and support the transition to a green economy (European Commission 2020).

Another example is the development of new digital platforms that have proliferated across different sectors of the economy. For instance, cloud-based platforms enable software companies to rival traditional manufacturing firms by utilising the immense amounts of data generated across countless processes. Within consumer-oriented platform services, there has also been a rise in the sharing economy.⁸ By facilitating access to

⁷ Dematerialisation of consumption – the market does not need physical distribution to the same degree. Instead, value is transferred through digital channels, which can reduce the environmental footprint.

⁸ A sharing economy is an economic system in which assets or services are shared between private individuals, either free or for a fee, typically via the internet.

goods rather than outright ownership, sharing platforms can reduce resource consumption and potentially limit environmental footprint (Felländer et al. 2015). Finally, the smart cities initiative, which combines technical and engineering services with information technology to reduce environmental footprint, exemplifies integrative sustainability efforts (Haarstad 2016).

6. Conclusions

Given the wide diversity of service activities and the five modes of service delivery to foreign markets, sectoral research is necessary to understand the vulnerability of services trade to a crisis. To the best of the author's knowledge, there is no such sectoral research. This article addresses this gap by examining the vulnerability of KIBS exports to the two most severe crises of the 21st century.

The study demonstrates that KIBS exports are less subject to cyclical fluctuations than exports of other services and can thus be considered crisis robust. This results from the characteristics of services, and KIBS in particular. KIBS exports steadily increased in services exports both in Poland and on average in the EU-27, generally maintaining positive growth rates during the examined crises. Thus, the average KIBS exports in the EU-27 can be considered crisis robust, although this was more clearly visible during the first crisis. In Poland, the situation was the opposite, with KIBS exports demonstrating robustness only during the COVID-19 pandemic and resilience during the financial crisis.

The pandemic generally hit the services trade much more heavily than the financial crisis, especially services requiring international mobility (GATS modes 2, 3, and 4). In this regard, KIBS trade is an outlier, as it includes computer services and other services that can be delivered online. These services have gained new opportunities for growth since the COVID-19 pandemic, which is evidenced by the higher growth rate of computer services exports in the EU-27 in 2020 compared to pre- and post-crisis levels. Although direct contact between service providers and recipients is one of the characteristics of KIBS, the pandemic resulted in a pronounced shift from face-to-face contacts to online delivery, thereby enhancing the robustness of KIBS trade. Additionally, business operating conditions changed more radically during the pandemic than during the financial crisis, likely boosting demand for KIBS, though this effect was mainly observed in Poland.

On average, KIBS exports in the EU-27 can be classified as robust in both crises, although the robustness deteriorated between 2009 and 2020. By comparison, the exports of other services usually appeared resilient, particularly during the financial crisis. Global services exports have generally been subject to fewer cyclical fluctuations than global merchandise exports.

The robustness of Polish KIBS exports was enhanced mainly thanks to their growing competitiveness and rising shares in Polish exports. While shares of KIBS exports steadily increased in both Poland and the EU-27, it was much stronger in Poland. As a result, the significant disparity between Poland and the EU-27 had nearly disappeared by the end of the examined period. Robustness was particularly evident among KIBS exports

identified as "leading exported services" in Poland. Specifically, exports of accounting, auditing, bookkeeping, and tax consulting services (SJ212), business and management consulting and public relations services (SJ213), and computer services (SI2) were robust to both crises. Legal services (SJ211), R&D services (SJ1), engineering services (SJ312), charges for the use of intellectual property, and information services other than news agency (SI32) were robust only to the second crisis. Of these, only charges for the use of intellectual property (SH) do not belong to the leading exported services group.

The robustness of KIBS exports contributes to the robustness of the whole economic system, as does the robustness of the KIBS sector, especially amid significant current challenges, including economic and political instability, the rising risk of conflict, climate change, and other threats. This robustness also helps maintain overall export performance during a crisis. Moreover, the growing share of KIBS in international trade enhances the robustness and resilience by providing enterprises and economies with access to more diversified and competitive KIBS at lower prices, thereby facilitating recovery.

Finally, the experiences of Israel and Ukraine illustrate how war, or the threat thereof, can foster the development of comparative advantages in some KIBS areas. Poland is also facing an increased threat of war and could follow a similar path, but above all, it would have to invest more in R&D.

Several measures are recommended to strengthen the crisis robustness of the KIBS sector and KIBS exports:

- 1) At the enterprise's level: build long-term relationships and become embedded in clients' strategic operations; offer virtual services if possible; and offer flexible payment and service terms during crises.
- 2) At the government's level: raise awareness among business owners about the role of KIBS in building robustness (or at least resilience); offer free public services that support business; invest in the development of communication infrastructure and digitalisation; facilitate remote working; support shared digital platforms for service delivery or joint exports; and adopt and disseminate best practices from other countries.
- 3) At the global level (WTO): increase the importance of *mode 1* (digital trade) in international services trade by reducing regulatory barriers; harmonise regulatory approaches and encourage mutual recognition agreements.

Joanna Wyszowska-Kuna – dr hab., prof. Uniwersytetu Łódzkiego, zainteresowania naukowe: gospodarka usługowa i gospodarka usług; międzynarodowy handel usługami, usługi oparte na wiedzy (w szczególności usługi biznesowe oparte na wiedzy), innowacyjność usług, konkurencyjność gospodarki, konkurencyjność w handlu usługami, jednolity rynek usług Unii Europejskiej.

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