Measuring reshoring – approaches and limits

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Abstract

This paper provides novel insights into existing approaches to measure reshoring activities and their main advantages and limitations. Surveys and secondary data collection have possibilities to provide insights in the underlying motivations and strategies. However, they mainly provide responses whether companies have reshored during a specific time period or not (yes or no), without judging the magnitude of the reshored activities. Trade data and World Input-Output data allow for an investigation of the magnitude of the phenomenon and the development over time. However, they do not allow for firm-level analysis of motivations and characteristics of the respective companies.

Keywords: reshoring, backshoring, input-output data

Background

This paper analyses and compares different surveys and secondary data collections that measure reshoring activities in the EU and the US. It also looks at trade data and Input-Output-Tables as alternative approaches to measure offshoring and reshoring tendencies. Finally, it draws conclusions on the potentials and limitations of the existing approaches to measure the reshoring phenomenon.

Reshoring or backshoring is the decision to relocate manufacturing activities back to the home country of the parent company (Kinkel & Maloca, 2009; Arlbjørn & Mikkelsen, 2014; Fratocchi et al., 2014; Foerstl et al., 2016). Reshoring or backshoring can origin from and be relocated to wholly owned production sites of the company (captive mode) as well as from foreign suppliers or to home-base suppliers (outsourced mode), thus covering different ownership modes of manufacturing in the offshore and home country.

There is no explicit theory of reshoring or backshoring. The literature explains reshoring in the framework of existing theories of the multinational firm, as a reverse or subsequent decision of a previous offshoring decision (Bals, et al., 2013; Ellram et al., 2013; Gray et al., 2013; Tate, 2014; Foerstl et al., 2016). Reshoring is a result of changes in the ownership, internalization and/or location advantages from international production, or a consequence of a wrong assessment of these advantages (Ellram et al., 2013, Fratocchi et al., 2016). International expansion of multinational firms was fueled by labor arbitrage, a substantial lowering of import barriers for intermediate goods, lower cost of cargo transport, and the rapid development of ICTs which supported transborder communication and coordination (Dicken, 2014). Case studies have shown that some managers have offshored manufacturing activities based on simple comparisons of easily measurable costs, in particular labor costs (Kinkel & Maloca, 2009). Factors that contributed to a wrong assessment of offshoring advantages include rising labor costs in foreign locations,

long lead-times, low flexibility and quality in foreign production, unforeseen coordination cost, or a loss of intellectual property to foreign competitors or suppliers (Kinkel & Maloca, 2009; Holweg at al., 2011; Nassimbeni, 2006).

High and growing transaction and coordination costs can also be strong arguments for re-concentrating manufacturing activities via reshoring. *Transaction cost theory* (TCT) points to various reasons for a wrong assessment of the 'hidden' costs of offshoring. *Bounded rationality* and possible contingencies in transactions across companies and countries may lead to higher than expected costs, poorer than expected quality, and higher than expected efforts for the management of transborder activities (Fredriksson & Jonsson, 2009; Pisano & Shih, 2009; Tate et al., 2009). The *level of uncertainty* also influences companies' offshoring and reshoring decisions, encompassing unforeseen cost increases, quality and flexibility issues, raw material shortages, or currency fluctuations (Ellram et al., 2013; Foerstl et al. ,2016; Gray et al., 2013; Tate, 2014). *Supply chain complexity* includes vertical complexity, horizontal complexity, geographic dispersion and length of the supply chain (Choi & Hong, 2002; Foerstl et al. ,2016). It can lead to excessive coordination and monitoring efforts, rising transportation cost or high amounts of working capital in safety stock (Tate et al., 2011; Ritter & Sternfels, 2004).

To put it simply, reshoring takes place when the trade-offs between cost advantages, market and knowledge seeking, transaction costs and maintaining control are not advantageous for the firm anymore. However, reshoring is not yet captured in official statistics, and empirical evidence and statistical data on reshoring is relatively scarce and calls for more knowledge about its drivers, effects, and about its likely evolution (Fratocchi et al., 2016, 2014; Kinkel, 2014).Against this background, the paper tries to collect and analyse evidence on the following *research questions*:

RQ-1: What approaches have been applied by different researchers to measure the reshoring phenomenon in the EU and the US?

RQ-2: What are the main opportunities and limits of these measurement approaches?

Methodology

Different sources of possible evidence on reshoring trends, motivations and characteristics in the EU and the US have been analysed and compared regarding the achievable results, possibilities and limits of measuring the reshoring phenomenon:

- The *2012 Eurostat international sourcing survey*, which covers *backshoring* and *home-shoring* activities of companies from 15 European countries.
- Data from the *European manufacturing survey (EMS)* 2012 edition, covering data from more than 3000 companies from 11 European countries.
- Data collected by the *Uni-CLUB MoRe* through a keyword search in major business-related newspapers, magazines, white papers and the library of the US *Reshoring Initiative*, covering 377 reshoring cases from EU (51%) and US (47%) companies (Fratocchi et al., 2016).
- Data from the *European Monitor of Reshoring (EMR)*, based on a broad media screening of more than 7,500 press releases, covering 93 backshoring cases from January 2016 until May 2017 (Ancarani et al., 2017).
- Recent *country-specific evidence* based on specific surveys in the Nordic countries (Heikkilä, 2017), covering answers of 847 manufacturing companies from Sweden, Finland, and Denmark; in France, covering answers of 215 buyers and purchasing managers (Fel and Griette, 2016); in the UK, covering answers of 262 UK-based manufacturers (Li et al., 2017),

- *Recent studies and surveys on US reshoring* (Boston Consulting Group 2011, 2012; A.T. Kearney, 2014; Moser, 2013),
- Analysis of *trade data,* using the "share of imports at domestic demand" (OECD, 2015).
- Analysis of data from the *World Input-Output Database (WIOD)*, using a novel indicator of international production fragmentation that encompasses all imports and intermediate goods needed in any stage of the production of a final good (Timmer et al., 2016).

Findings

Table 1 provides a condensed overview of the most important data sources on reshoring activities in the EU and the US and their main strengths and limitations.

Table 1: Data sources on reshoring and their main strengths and limitations

Data source	**Strengths**	**Limitations**
Eurostat 2012 international sourcing survey	Covers data from 15 European countries (Belgium, Bulgaria, Denmark, Estonia, Ireland, France, Latvia, Lithuania, the Netherlands, Portugal, Romania, Slovakia, Finland, Sweden, Norway) for 2009-2011 Covers *backshoring* of activities that have been previously moved out of the home country by the company itself and *home-shoring* of activities that have not previously been moved out of the home country by the company.	Lack of large countries, which limits the results basically to small European economies. Reshoring data only for the period 2009-2011, does not allow for analysing developments over time. Does only provide responses whether companies have reshored (yes or no), without judging the magnitude of the reshored activities.
European manufacturing survey (EMS)	The 2012 edition covers data from more than 3000 companies from 11 countries (Austria, Switzerland, Germany, Denmark, Spain, France, Hungary, Portugal, Netherlands, Sweden, Slovenia). Covers *captive off- and backshoring* as well as *outsourced off- and backshoring* activities, use of new manufacturing technologies and organisational principles, performance indicators. Allows for analysing developments over time, incl. data from surveys 2015, 2012, 2009, 2006, 2003.	Data covers "only" 11 of the 28/27 EU countries. Does only provide responses whether companies have reshored (yes or no), without judging the magnitude of the reshored activities.
Uni-CLUB MoRe data base	Data collected through keyword search in the major business-related newspapers and magazines, and white papers of major consulting companies and initiatives. Data on US companies collected by the *Reshoring Initiative* is also integrated. Covers 377 reshoring cases from EU (51%) and US (47%) companies (Fratocchi et al., 2016). Continuous, ongoing effort.	Data (so far) limited on the period from 2011 to early 2014 (Fratocchi et al., 2016). Covers only companies active in reshoring and thus cannot provide shares at all companies. Restricted to motives reported in media articles, other motives might have been surveyed. Does only provide responses whether companies have reshored (yes or no), without judging the magnitude of the reshored activities.

European Monitor of Reshoring (EMR)	Based on secondary sources from a broad media screening of more than 7,500 press releases, newspapers, trade journals, news agencies, etc. Covers 93 very recent backshoring cases from January 2016 until May 2017 (Ancarani et al., 2017). Continuous, ongoing effort.	Data (so far) limited on the period from 2016 to May 2017 (Ancarani et al., 2017). Covers only companies active in reshoring and thus cannot provide shares at all companies. Restricted to motives reported in media articles, other motives might have been surveyed. Does only provide responses whether companies have reshored (yes or no), without judging the magnitude of the reshored activities.
Survey on the *Relocation of Nordic manufacturing* (Heikkilä, 2017)	Covers answers of 847 manufacturing companies from 3 Nordic countries (373 from Sweden, 229 from Finland, 245 from Denmark). Includes questions on off- and backshoring, captive and outsourced modes, use of new manufacturing technologies, performance indicators.	Data limited on the period from 2010 to 2015. Data covers only 3 EU countries. Does only provide responses whether companies have reshored (yes or no), without judging the magnitude of the reshored activities.
French online survey (Fel and Griette, 2016)	Online survey of 215 buyers and purchasing managers from companies located in France (87%) and Western Europe (13%). Covers nearshoring and backshoring activities	Restricted to companies sourcing in China, does not provide shares at all companies. Data limited on the period from 2011 to 2015. Data covers only one specific country. Does only provide responses whether companies have reshored (yes or no), without judging the magnitude of the reshored activities.
UK survey (Li et al., 2017)	Covers 262 UK-based manufacturers. Covers *direct reshoring* of previously offshored manufacturing activities, and *indirect reshoring* "to keep manufacturing activities in the UK instead of moving them abroad".	Data limited on the period from 2008 to 2015. Data covers only one specific country. Softens definition of re-/backshoring, as *indirect reshoring* is no real reshoring activity. Does only provide responses whether companies have reshored (yes or no), without judging the magnitude of the reshored activities.
Boston Consulting Group: Made in America, Again (2012)	Survey of around 200 executives of US companies. Covers active reshoring engagements, but also planning or considering of reshoring activities. Allows for comparisons of data from 2011, 2012, and 2013.	Data covers only one specific country. Softens definition of re-/backshoring, as *considering* of reshoring is also included. Does only indirectly judge the magnitude of the reshored activities.
A.T. Kearney: The Truth About Reshoring (2014)	Covers 700+ reshoring cases that have been announced in the years 2010-14. Covers offshoring and reshoring, and impact on aggregate indicators like production and jobs.	Data limited on the period from 2010 to 2014. Data covers only one specific country. Does only indirectly judge the magnitude of the reshored activities.
Data of the Reshoring Initiative	Database of around 200 reshoring cases (Moser, 2013). Covers active reshoring engagements, but also keeping manufacturing activities in the US instead of moving them abroad.	Data covers only one specific country. Softens definition of re-/backshoring, as keeping manufacturing in the US is also included. Does only provide responses whether companies have reshored (yes or no), without judging the magnitude of the reshored activities.

The *Eurostat 2012 international sourcing survey* is the only "official" data base on reshoring activities in the EU. It differentiates in so called "international backsourcing", that is the movement of functions by the enterprise back into its home country, which the enterprise has previously moved out of the country, and "international relocation", that is the movement of functions by the enterprise into its home country, which have been carried out for the enterprise abroad but have not previously been moved out of the home country by the enterprise. These activities can also be characterized as "backshoring" and "home-shoring", as described in Pegoraro et al. (2017).

Overall, reshoring activities have been in particular performed by enterprises from small, open economies with high labour costs – as also international sourcing activities (Rikama et al., 2013). The highest shares of home-shoring are found in Ireland (9%), followed by Slovakia, Belgium and Sweden, with shares of 6% to 7% of all manufacturing enterprises. Backshoring is particularly frequent in Sweden, Ireland, Finland and Denmark, with shares of 3.5% to 5% of manufacturing enterprises. Low shares are displayed for Romania, Bulgaria and Lithuania, which are clearly below average in both home-shoring and backshoring activities. It is remarkable that home-shoring levels are higher than backshoring levels over all covered countries, meaning that in most cases the foreign functions have not been moved out of the home country (offshored or outsourced) by the respective enterprise itself. Here, two different ways are possible:

1. The enterprise has built up additional capacities or acquired (parts of) a company in some foreign country, without moving existing activities from the home country there, and home-shored (some of) these capacities at a later time.
2. The enterprise is part (subsidiary) of a foreign parent company and reshored some activities from other countries (maybe also the home country of the parent company) to the country where the enterprise (subsidiary) has its seat.

The first option is assumed to be the more frequent one and seems to be a common path of reshoring. Thus, it needs to be taken into account that reshoring activities do not necessarily follow an own previous offshoring or outsourcing activity of the respective enterprise, but also expansion capacities can be reshored at a later time. The **main limitation** of the Eurostat 2012 survey on international sourcing is the lack of large countries, which limits the results basically to small European economies. Results on reshoring are also limited to one period (2009-2011), not allowing for analysing developments over time. Also, the data only provides responses whether companies have reshored (yes or no), without being able to judge the magnitude of the reshored activities.

Dachs and Zanker (2014) present recent results on European companies' backshoring activities based on data from the *European manufacturing survey (EMS)*[1]. The data covers answers of more than 3000 companies from 11 countries (Austria, Switzerland, Germany, Denmark, Spain, France, Hungary, Portugal, Netherlands, Sweden and Slovenia) for the period between 2010 and mid-2012. It shows that around 4% of all companies in the survey sample have moved production activities to their home country. In the same time period, there are more than three offshoring companies for every backshoring company. The database covers captive off- and backshoring as well as outsourced off- and

[1] The European Manufacturing Survey investigates technological and non-technological innovation in European industry. In contrast to the Community Innovation Survey, it is more focused on technology diffusion and organisational innovation (including offshoring, outsourcing, and reshoring). The survey is organised by a consortium of research institutes and universities, coordinated by the Fraunhofer Institute for Systems and Innovation Research ISI, and takes place every three years. More than 3,500 firms in 13 EU countries participated in the last available survey in 2012.

backshoring activities, use of new manufacturing technologies and organisational principles, and performance indicators and allows for analysing developments over time, comprising data from surveys 2015, 2012, 2009, 2006, 2003. The **main limitation** is that the survey does not cover more of the 28 EU countries and that it only provides responses whether companies have reshored (yes or no), without being able to judge the magnitude of the reshored activities.

The *Uni-CLUB MoRe* collects continuously data through a keyword search in the major business-related newspapers, magazines, trade journals, press releases, news agencies, and white papers of major consulting companies and initiatives. For the US perspective, data by the *Reshoring Initiative* is also integrated. Up to the publication by Fratocchi et al. (2016), the database covered 377 reshoring cases from EU (51%) and US (47%) companies for the period from 2011 to early 2014. The tested approach is carried on in the *European Monitor of Reshoring (EMR)*, which covers 93 very recent backshoring cases from January 2016 until May 2017 (Ancarani et al., 2017). The **main limitations** are that the approach covers only companies active in reshoring and thus cannot provide shares of backshoring companies at all companies, that it is restricted to motives reported in media articles, possibly missing other motives that might have been reported in a survey, and that it only provides responses whether companies have reshored (yes or no), without being able to judge the magnitude of the reshored activities.

Heikkilä (2017) provides a comprehensive study on *Relocation of Nordic Manufacturing* in the so called Nordic countries Denmark, Finland and Sweden. The data covers answers of 847 manufacturing companies (373 from Sweden, 229 from Finland, 245 from Denmark) and includes questions on off- and backshoring, captive and outsourced modes, use of new manufacturing technologies, and performance indicators. The **main limitations** are that the data only covers the period from 2010 to 2015, not allowing for analysing developments over time, and that it only provides responses whether companies have reshored (yes or no), without being able to judge the magnitude of the reshored activities.

Different one-country, one-time surveys on backshoring activities have been performed in different countries, e.g. the UK (Li et al., 2017) and France (Fel and Griette, 2016). The **main limitations** of these surveys are that the data covers only one specific country and is usually limited to a specific period in time, and that they only provide responses whether companies have reshored (yes or no), without being able to judge the magnitude of the reshored activities.

There are several databases covering reshoring activities of US companies, e.g. different rounds of the study “Made in America, Again” of the Boston Consulting Group (2011, 2012), a study by A.T. Kearney (2014) and data of the Reshoring Initiative (e.g. Moser, 2013). They cover US companies reshoring activities and partly also their impact on aggregate indicators like production and jobs, Their main limitations are that they soften the definition of re-/backshoring, as considering of reshoring or keeping manufacturing in the US is also included, and that they only indirectly judge the magnitude of the reshored activities.

Over all analysed surveys, the average *share of companies active in reshoring* at all manufacturing companies in Europe is around 4%, varying significantly from around 1% in Eastern European countries like Romania or Bulgaria over 3% in large industrial countries like Germany, 13% in Ireland or in some Nordic countries like Denmark or Finland, up to around 15% in France and the UK or even 27% in Sweden. Reshoring from Eastern and Western European countries is relevant only for EU based companies, but not for US companies. *China* has emerged as the most important single source country of backshoring, and also India has become more important over time. The most important *reasons for backshoring* are quality issues, loss of flexibility and delivery time, logistics costs, the

"Made in" reputation effect, the reduction of labor cost gaps, and total costs of sourcing. Innovation-related factors like the loss of know-how or the vicinity of production to R&D are less important.

One **major limitation of all surveys** analysed is that they do not allow for directly judging the magnitude and impacts of the reshored activities on aggregate indicators like value added and jobs, as most of them only provide responses whether companies have reshored (yes or no). But as reshoring is not yet captured in official statistics, also economic data can only be used indirectly to analyse the extent of reshoring on a wider economy or sectoral level (OECD, 2015). Possible data and indicators are.

- Analysis of *trade data* using the indicator "share of imports at domestic demand", as increasing backshoring should be reflected in a larger share of domestic production and a lower share of imports at domestic demand (e.g. OECD, 2015).
- Analysis of data from the *World Input-Output Database (WIOD)*, using the "global import intensity" (GII) of production, a novel indicator of international production fragmentation that encompasses all imports, intermediate goods and services needed in any stage of the production of a final good or service (Timmer et al., 2016).

Analysis of trade data shows that in most countries the growth in the *share of imports at domestic demand* has slowed down in recent years, but not necessarily reversed. In some countries like e.g. Japan, Germany or the United Kingdom, it has indeed decreased in the most recent years covered (2013-2014), indicating some reshoring activity (OECD, 2015, p. 14-15). In the US, the growth of offshoring and importing of goods seems to have slowed down from 2004 to 2013, but still offshoring seems to be slightly stronger than reshoring tendencies.

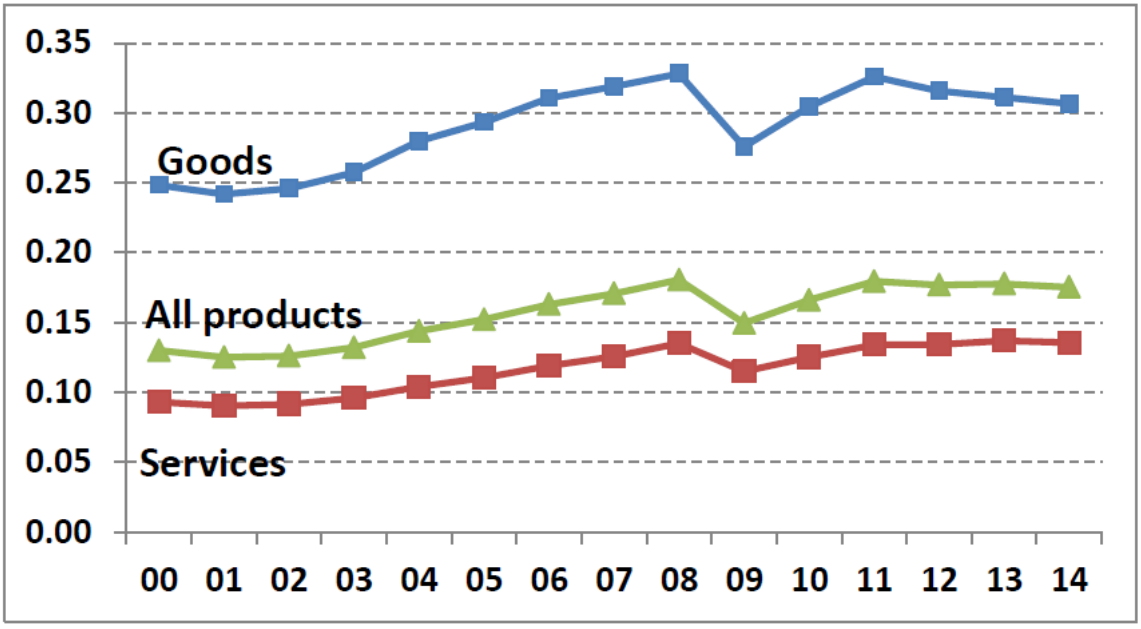

Figure 1: International fragmentation of production (Timmer et al., 2016, p. 5)

Analysis of *WIOD Data* reveals a rapid *international fragmentation* of worldwide goods production from 2000 to 2008, followed by a dramatic collapse in 2009 and a gradual recovery until 2011 (Figure 1). Since then, international fragmentation seems to have slightly reverted, indicating some reshoring tendencies in global value chains. Changes in the import intensity of world GDP can stem from more or less internationally fragmented production processes, or from final demand shifts to goods and services that are

more or less import intensive. More detailed analysis discloses that around half of the decrease of the GII was due to **international de-fragmentation of production**, providing a clear indication for some forms of **reshoring** (Timmer et al., 2016).

In principal, the WIOD data does also allow for country and sector specific analysis. Timmer et al. (2016) provide an example of an analysis of the production of motor vehicles in selected countries like Mexico, Germany, South Korea, USA, Japan, Brazil, and China. Here pattern vary, as some countries (e.g. South Korea, Mexico, and Germany) seem to show international de-fragmentation – and thus reshoring –, whereas other countries (e.g. Japan, Brazil, and USA) show rather international fragmentation – and thus further offshoring and outsourcing.

One major *limitation* of the measure "*share of imports at domestic demand*" is the assumption that all of an import's value was added in the exporting country, however in today's fragmented global value chains (GVC) this assumption might be rather naïve (e.g. Sturgeon, 2013; Timmer et al., 2016). *World Input-Output Data* allows for measuring international production fragmentation more precisely (Timmer et al., 2016). However, it also has severe limitations, in particular the lack of timeliness (usually it takes up to 4 years for a new edition) and accuracy (usually only NACE 2-3 digit level) that arises from estimation procedures and cross-border harmonization (Sturgeon et al., 2013).

Conclusions

This paper provides novel insights into existing approaches to measure reshoring activities and their main advantages and limitations. The main advantages of surveys and secondary data collection on reshoring are their possibilities to provide insights in the underlying motivations and strategies, but they are limited to the selected survey sample and, at least so far, only provide responses whether companies have reshored during a specific time period or not (yes or no), without judging the magnitude of the reshored activities. Trade data and World Input-Output Data allow for an investigation of the overall magnitude of the phenomenon, also in relation to the ongoing offshoring activities taking part at the same time, and the development of such trends over time. However, they do not allow for firm-level analysis and cannot provide background information on motivations and characteristics of the respective companies.

Overall, it is very difficult to compare the shares of companies active in reshoring between countries, as they cover different time-frames over which the reshoring activities have extended, ranging from 2 years in the German case over 3 years in the case of the 2012 Eurostat survey, up to 6 years in the case of the Nordic countries and 8 years in the UK case. One approach to make these results more comparable could be to adjust the figures to a commonly defined time-frame of e.g. two years. The resulting **"adjusted" shares of companies active in reshoring** are displayed in Table 2. Accordingly, reshoring levels seem to be highest in Sweden and Ireland (around 9%), followed by Belgium, Slovakia and France (around 6%). Many countries are not significantly differentiating from a 4% level that seems to be "common" for some Western European countries (e.g. Denmark, Finland, Portugal, Netherlands, UK, Germany). Only some small Eastern European countries show significantly lower reshoring levels.

Table 2: "Adjusted" shares of reshoring companies for selected European countries

Country	Share of companies active in reshoring	Time-frame (years covered)	"Adjusted" share of companies active in reshoring over a 2 years period
Sweden	27.0%	6	9.0%
Ireland	13.0%	3	8.7%
Belgium	9.5%	3	6.3%
Slovakia	9.0%	3	6.0%
France	14.0%	5	5.6%
Denmark	13.0%	6	4.3%
Finland	13.0%	6	4.3%
DACH	4.0%	2	4.0%
Portugal	6.0%	3	4.0%
Netherlands	6.0%	3	4.0%
Selected European countries (EMS survey)	**4.0%**	**2**	**4.0%**
UK	13.0%	8	3.3%
Germany	3.0%	2	3.0%
Estonia	3.5%	3	2.3%
Lithuania	2.0%	3	1.3%
Bulgaria	2.0%	3	1.3%
Romania	1.0%	3	0.7%

However, also this approach has some shortcomings, as companies may have reshored more than once over a longer period of time and company managers may be more reminiscent of recent events than those of some years ago. The surveys may have also been conducted at different points in time, making comparisons difficult because the external environment may have significantly changed. Therefore, quantitative *European panel data* on companies' reshoring activities could be an appropriate approach to support reliable (cross-country) analysis (Sturgeon, 2013).

A major limitation of measurement approaches for reshoring based on trade data is the assumption that all of an import's value was added in the exporting country, which is in times of fragmented global value chains (GVC) not really realistic. In the case of *Input-Output Data*, the main limitations are in particular the lack of up-to-dateness of the data and the restricted accuracy of sectoral allocation and detailing, that both arise mainly from estimation procedures and cross-border harmonization.

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