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Dariusz Cezary Kotlewski
Katedra Geografii Ekonomicznej, Szkoła Główna Handlowa (SGH), https://orcid.org/0000-0003-1059-7114, dariusz.kotlewski@gmail.com

The soundness of returning to manufacturing through the lens of productivity accounting

Zasadność powrotu do przetwórstwa przemysłowego w świetle rachunku produktywności

Abstract

This article assesses whether the world economy is actually returning to manufacturing, and in particular, whether this is, or would be, economically sound in light of KLEMS productivity accounting. In this paper, the term 'economic soundness' is applied exclusively to situations in which reindustrialisation is likely to accelerate economic growth. Environmental, social and other pertinent issues are not considered. It has been established that the countries under consideration generally did not reindustrialise during the stipulated periods, despite it being economically advisable to do so. Returning to manufacturing may therefore become a major growth factor in the post-Covid economic reconstruction (which is being prolonged by the Ukraine-Russia conflict).

Keywords: GVA, MFP, productivity, KLEMS, decomposition

JEL: E22, E23, 047

Streszczenie

Celem artykułu jest oszacowanie, czy powrót do przetwórstwa przemysłowego naprawdę ma miejsce w światowej gospodarce, a szczególnie czy jest on ekonomicznie zasadny w świetle rachunku produktywności KLEMS. Ta zasadność ekonomiczna jest w artykule jednoznacznie rozumiana jako sytuacja, w której ta reindustrializacja naprawdę przyśpiesza tempo wzrostu gospodarczego. Pozostałe zagadnienia, takie jak zagadnienia środowiskowe i społeczne, zostały odłożone na bok. Ustalono, że w analizowanym okresach ta reindustrializacja raczej faktycznie nie zachodziła w krajach objętych analizą, ale była zasadna z czysto ekonomicznego punktu widzenia. Dlatego w postcovidowym okresie odbudowy gospodarczej (obecnie przedłużonym z powodu konfliktu pomiędzy Rosją a Ukrainą) powrót do przetwórstwa przemysłowego może się stać ważnym czynnikiem podtrzymującym wzrost gospodarczy.

Słowa kluczowe: WDB, MFP, produktywność, KLEMS, dekompozycja

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1. Introduction

The notion of advisability can be problematic. The more specific *advisability of reindustrialisation* is beset with dilemmas such as environmental protection and social issues. Whether reindustrialisation is advisable from an environmental standpoint is undeniably controversial. Experience justifies the assertion that industry, despite the efforts to limit its impact, is generally detrimental to the environment. Nevertheless, the mass production of manufactured goods is necessary for socioeconomic reasons. Any attempt to restrict industry, which is clearly unevenly distributed throughout the world, will therefore most likely lead to its relocation. This would not only be driven by lower labour costs, but by reduced expenditure in complying with environmental regulations. Keeping industry in countries with stringent environmental regulations can therefore be considered as ethical as demanding that other countries improve their environmental protection. The social issue is less controversial, as industry provides valuable employment. Moreover, in the case of reindustrialization, brownfield plants can be restarted, thereby revitalising abandoned and neglected post-industrial areas. Notwithstanding the importance of these and other issues (each of which may be the subject of separate studies), the present study focuses solely on *economic advisability*, or rather *economic soundness,* understood as a likeliness to accelerate economic growth.

The distinction between *reindustrialisation* and *industrialisation* is not material here. Growth accounting, whether as performed by the OECD or on the EU KLEMS platform, is predominantly carried out for countries that have *deindustrialised*. The term 'reindustrialisation' is preferred for this reason. In the event that this is not the case, it is nevertheless safe to assume that the distinction is immaterial. The accounting results indicate whether industrial expansion is beneficial for economic growth regardless of whether it occurs as a result of *reindustrialisation* or *industrialisation*. All that is at issue is whether the methodology adopted delivers comparable results.

Growth accounting (or productivity accounting) data are systematically compiled and processed using an internationally consistent methodology. They can therefore be considered sufficiently comparable, despite certain caveats that are bound to arise – primarily on account of there being a limited number of countries for which growth accounting has been comprehensively performed (specifically, by decomposing economic growth into the contributions of labour and capital, and possibly their subfactors, plus the residual contribution). This residual is termed *Solow's residual* and (according to economic theory) represents the contribution of *total factor productivity* (TFP) or *multifactor productivity* (MFP). In the regularly conducted KLEMS productivity accounts[1] this decomposition is additionally performed at the industry level, i.e. at the section and division levels of the

[1] Also known as *KLEMS growth accounts*, as in the OECD 2001 manual.

international ISIC 4[2] or NACE 2[3] classifications (the present paper, deems these classifications to be completely consistent). The available data are therefore rich in information that can be used in economic research. The present paper uses these data to assess whether the world economy is reindustrialising, and if so, whether this is economically sound. This 'world economy' is limited, however, to countries for which relevant data are available.

Data concerning gross value added (GVA),[4] i.e. the variable that is used to measure economic activity, can be compiled and compared. Comparing GVA growth rates for entire economies enables their relative general conditions to be assessed. However, these analyses can be extended so as to compare GVA growth rates at the industry level as well. The present study can ascertain whether reindustrialisation is occurring in the event that the GVA growth rates for the ISIC or NACE sections representing the industry sector (understood as any economic activities not included in the agriculture and service sectors) are higher than those for the aggregate economy. In order to avoid controversies and complications, however, the present paper limits reindustrialisation to manufacturing, i.e. NACE section C – Manufacturing (or its ISIC equivalent). This is because the other *industrial*, i.e. non-service and non-agricultural, NACE sections (B, D, E and F) undergo many disparate processes that are locally conditioned and which consequently differ from one country to the next. For instance, NACE section B (mining and quarrying) is far more dependent on local conditions (most obviously the availability of natural resources and legislation governing mining operations) than it is on general economic trends, with the possible exception of large business cycle fluctuations. In the case of NACE section D, which mainly concerns energy generation, the role of public policy is preeminent. Sections E and F also have their specificities and are often considered part of the services sector (as broadly understood). Restricting the analysis to NACE section C makes it possible to focus on a good part of the economic activity that is essential to the industry sector and which is subject to similar market rules internationally. The activities listed in NACE section C are reasonably comparable between the countries concerned, as they are seldom stringently regulated and their organisation and procedures are not completely dictated by local conditions. Section C usually subsumes most industrial activity. For this

[2] International Standard Industrial Classification of All Economic Activities. ISIC rev. 4 is the current version of this classification and will be referred to as ISIC 4 or simply ISIC.

[3] *Nomenclature statistique des Activités économiques dans la Communauté Européenne*. NACE rev. 2 is the current version of this classification and will be referred to as NACE 2 or simply NACE. From the point of view of growth accounting NACE is equivalent to ISIC (i.e. NACE 2 is the equivalent of ISIC 4 and NACE 1 is the equivalent of ISIC 3). The differences between them are applicable at lower aggregations not referred to in these accounts.

[4] According to the *OECD Glossary of Statistical Terms:* "Gross value added is the value of output minus the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry or sector; gross value added is the source from which the primary incomes of the System of National Accounts (SNA) are generated and is therefore carried forward into the primary distribution of income account." The relationship between GVA and the GDP is: GVA= GDP + subsidies on products – taxes on products.

reason, this paper limits itself to the narrower issue of returning to manufacturing. Reindustrialisation is said to exist over a given period if the compound GVA growth rate for NACE section C (or its ISIC equivalent) is greater than that for the whole economy.

This description, however, does not yield an exhaustive explanation: there are drivers (causative agents) behind every process. The rationale adopted here assumes that the main driver behind the process of reindustrialisation is *total factor productivity* (TFP) or *multifactor productivity* (MFP),[5] or more specifically, their contributions to economic growth (identified here as GVA growth). This is because the increased contribution of labour (i.e. physical labour or hours worked) to growth can be correlated with a resource-driven type[6] of economic growth, and the contribution of capital to growth can be correlated with an investment-driven (or capital-driven) type of economic growth. And both are exhaustible.[7] As the availability of cheap labour decreases, and as there are limits to capital accumulation because of the decreasing rate of return on capital, productivity is left as the sole sustainable growth resource (apart from infrastructure development, which only delivers growth over the very long run). The contribution of MFP to growth can be related with innovation-driven economic growth, which is seemingly unlimited on account of technological progress (Romer, 1990). The greater the contribution of MFP to growth, the more sustainable the economy. When two similar countries have comparable rates of economic growth, the one whose MFP contribution is greater is more sustainable over the long run. Relying on productivity (i.e. MFP) prevents stagnation[8] and promotes sustainable economic growth (Eichengreen, 2011; Agénor and Canuto, 2012; Zhuang et al., 2012; Paus, 2014; Vivarelli, 2014; Atalay, 2015; Liu et al., 2017).

The above rationale follows from the fact that a high level of productivity (MFP) is associated with high profitability in the relevant NACE activity,[9] and that the residual value-added-based MFP contribution to GVA growth is often associated with that activity having a higher value-capture capability (OECD, 2001). These sorts of activities tend to be dominated by firms whose profitability is high or on the increase. Highly profitable firms are more expansive as they have the means to

[5] The difference between the two is not important for the present study. MFP will be the sole metric used due to data availability within the KLEMS framework.

[6] This is based on the availability of cheap resources, of which labour is generally the most important. According to Glawe and Wagner (2016, p. 7) countries are caught in the middle-income trap if they *cannot make a timely transition from resource-driven growth, with low-cost labour and capital, to productivity-driven growth.* This is caused by an inability to produce more high-value-added products (Lin and Treichel, 2012, pp. 40–41), and is associated with value-added capture. This also occurs internationally in global value chains (Gill and Kharas, 2007, p. 14), and when the range of products is especially sophisticated (Felipe et al., 2012, pp. 39–43).

[7] Paul Romer emphasizes that, in contrast to capital or labour, ideas are non-rivalrous and thus a source of increasing returns to scale, and potentially unlimited growth (Romer, 1990).

[8] The theoretical economy will approach a steady state along which capital and output will be growing at the same rate, following an increase in the supply of labour (see: Solow 1956; Romer 1990).

[9] According to Tangen (2005, pp. 38–39), the market price mechanism is the sole source of difference between productivity and profitability.

sustain this expansion, especially when the contribution of productivity to growth is high compared to that of production factors (because the profit margin then increases *ceteris paribus*). This is because high profitability attracts new financial capital to individual firms and the industries in which they operate. Anticipated profitability increases reinforce this process.

Due to these microeconomic fundamentals, high and/or increasing productivity (i.e. a high MFP contribution to GVA growth), should translate into a higher long-term growth rate for the given activity. However, there may be bottlenecks in the economy and/or domestic economic policy might not support economic growth, leading to suboptimal economic development. The information obtained by studying productivity (MFP) from this angle should assist in promoting sustainable economic growth. Following this rationale, countries should specialise in activities in which they achieve higher productivity (MFP), especially those where productivity contributes most to growth. As the contribution of productivity to growth is measurable, it is taken into consideration in the present study.

With this in mind, the contribution of MFP to GVA growth rates is analysed in addition to GVA growth rates for aggregate economies and the manufacturing sector (NACE section C). The basic premise is that, if the contribution of MFP to growth is higher for a particular NACE activity than it is at the aggregate level, then it is advisable to have this industry increase its share in the economy in order to accelerate aggregate economic growth. Therefore, in addition to determining whether a return to manufacturing is underway, the soundness of such a move can also be analysed. It should be borne in mind, however, that productivity identified as TFP or MFP is measured residually, and that this indicator consequently captures all sorts of measurement error and equation misspecification as well. Therefore, the data sample should be as comprehensive as possible.

The methodology is presented in Section 2, the manner in which the data were compiled and processed is discussed in Section 3, and the results of the calculations are presented and interpreted in Section 4. The paper closes with the Conclusion Section.

2. Basic methodology

The decomposition of economic growth into the contributions of two fundamental production factors was first proposed by Solow (1957) as a development of his economic growth theory (Solow, 1956). The application of this theory in periodic productivity accounts had its parallel in the introduction of Leontief concepts (1966) in statistics. Due to the complexity of the many calculations involved, their implementation had to wait for the advent of the computer era. The present version of KLEMS economic growth accounting was mainly formulated by Jorgenson and his associates (Jorgenson and Griliches, 1967; Jorgenson, Gollop and Fraumeni, 1987; Jorgenson, Ho and Stiroh, 2005).[10] This methodology is basically consistent with

[10] See also Jorgenson (1963 and 1989). The basic KLEMS methodology is summarised in Timmer et al. (2007) and O'Mahony and Timmer (2009).

the OECD (2001) methodology. These two methodologies are the most frequently employed in economic growth accounting. Both use the index method, which is strongly advised by Diewert (1976, 1978, 1992, 2004 and 2005).[11] The starting point, then, is Solow's decomposition:

$$\frac{\Delta Y}{Y} = \frac{\Delta A}{A} + \alpha \frac{\Delta K}{K} + \beta \frac{\Delta L}{L} \qquad (1)$$

where Y is the GDP, L is the labour factor in hours (subsequently defined as hours worked), and K is the capital factor, which is equivalent here to the capital-stock value. The weights α and β are elasticities that can be specified as shares of factor remunerations in total income. This theoretically requires that perfect competition and constant returns to scale in the economy be assumed. Moreover, the formula $\beta = 1 - \alpha$ in (1) is predicated on these assumptions. A is TFP. Its contribution $\Delta A/A$ is *Solow's residual* and is obtained by subtracting the other values in (1). There is no need to establish the value of A, which remains an abstract category and whose interpretation has always been problematic. Solow interpreted it as technological progress. It is currently usually interpreted as technological or organisational progress disembodied in labour or capital.

Following Jorgenson et al., supra, the Törnqvist index is used to aggregate the GVA growth rates of products:

$$\Delta ln V_{jt} = \sum\nolimits_i \overline{v}^V_{ijt} \Delta ln V_{ijt} \qquad (2)$$

where V_{jt} is GVA for industry j over period t (usually a year), V_{ijt} are GVA levels for individual products i of industry j over period t, and are individual product i shares in GVA calculated as the arithmetic means between two time periods t and t-1. The general idea is to weight the growth rates for individual products by their (intertemporal in the Törnqvist procedure) shares before aggregating them, and to use logarithmic expressions for relative growth rates. Similar indices are used to aggregate the growth rates of production factors at for individual products (i.e at the i level). Therefore, when the Solow-type decomposition is conducted at the industry level, formula (1) is replaced in the KLEMS framework by its trans--log approximation:

$$\Delta ln V_{jt} = \Delta ln A^V_{jt} + \overline{\alpha_{jt}} \Delta ln K_{jt} + \overline{\beta_{jt}} \Delta ln L_{jt} \qquad (3)$$

which is consistent with the Törnqvist procedure. For this procedure, it has been established that the average shares between the two time periods t and t-1 should be used as per the formula $\bar{\alpha}_t = (\alpha_t + \alpha_{t-1})/2$. Similarly, for $\bar{\beta}_t$. Subscript j for industries,

[11] There exists also the econometric method developed by, e.g.: Ackerberg, Caves and Frazer (2015); Levinsohn and Petrin (2003) and Olley and Pakes (1996), which is often considered to be more appropriate for decompositions at firm level.

present in (2) and (3), is omitted here for simplicity. By definition, these shares are shares in the GVA – V_{jt}, and it is GVA growth that is present on the LHS of (3) instead of GDP (to ensure that all the accounts are completely consistent). For each year and each industry (as represented by NACE sections and divisions), formula (3) should be used independently. The trans-log form of formula (3) renders it strictly conformable with the original Cobb-Douglas production function.[12]

Formula (3) can be developed by adding a variable representing intermediate inputs (II) to the original production function. In the theory that was developed after Solow, it was established that only the decomposition of gross output (GO) growth (with the additional factor-like contribution of II) enables the contribution to growth of technological or organisational progress, disembodied in labour or capital, to be precisely determined. This MFP contribution, based on gross output, differs from the MFP contribution based on value added. Ideally, however, they should be correlated by the ratio of GO to GVA. Alternatively, formula (3) only allows for an approximation of the contribution of technological or organisational progress. This approximation can be inconsistent (i.e. not correlated by a known ratio) due to the substitution between the production factors and II. That is why the contribution of A in (3) is considered to be the industry capacity to capture the value and participate in the income (OECD, 2001, p. 23). However, this understanding of the contribution of residual productivity to growth is even more relevant to the present study on account of the rationale presented in the previous section.

Moreover, there are several issues involved in using GO growth decomposition. Data insufficiency necessitates that most countries performing KLEMS can only carry out GVA decomposition according to (3). Fortunately, GVA decomposition remains the backbone of KLEMS, and provides the most essential information about the economy. Therefore, despite its limitations, it remains the basis for most analyses conducted within the framework of this accounting. Performing GVA growth decomposition as in (3) instead of GO growth decomposition also facilitates international comparisons, as the huge differences in the vertical integration of firms between the countries that impact II are no longer an issue. As the present study takes in as many countries as possible, this is an even stronger justification for choosing GVA growth decomposition in the KLEMS framework.

The main thing is that different definitions of production factor contributions are used in KLEMS accounting. Instead of the contributions of factor stocks (resources), as in Solow's decomposition, the contributions of factor services are used in (3). This is because the Törnqvist index is used to aggregate factor values. For this reason, the productivity term is MFP, which can be considered more 'modern' than TFP. The present study is therefore based on MFP productivity.

Some values had to be calculated specifically for the present study. Preference has been given to calculations made on a compound basis that give more weight to later periods of economic growth – they are not therefore precisely equivalent to arithmetic means. Chaining was employed as per the formulae:

[12] However, in the event that growth rates are high (>>10%), the logarithmic values diverge from the relative growth rates from formula (1).

$$\Delta lnV_{(1,n)} = \prod_{t=1}^{n}\left(1+\Delta lnV_t\right)-1 \qquad (4)$$
$$\Delta lnA^{V}_{(1,n)} = \prod_{t=1}^{n}\left(1+\Delta lnA^{V}_t\right)-1$$

where V is GVA in discrete time periods t or the entire time span $(1,n)$ and A^V is value-added-based MFP in discrete time periods t or the entire time span $(1,n)$.

3. Data compilation and processing

The data used in the study consist of relative GVA growth rates at the aggregate level of the economy, and for manufacturing represented by NACE section C or its ISIC equivalent. MFP contributions to these two growth rates are also required. Therefore, four variables are established for each year in the time series under consideration for each country.

Most of these data are available on the EU KLEMS website, and its 2017[13] and 2021,[14] releases are used in the present study. They include the United Kingdom (UK), presently not an EU member state, the United States (US), and Japan, whose data are also published in a consistent manner. These releases cover every EU member state. However, the most important methodological component of KLEMS, viz. the decomposition of GVA growth into the contributions of production factors and MFP, is not available for every member state. The representativeness of the 2017 EU KLEMS release, although methodologically appropriate, is therefore limited. The 2021 release (the most recent during the elaboration of the present paper) of the EU KLEMS series was used to increase the validity of the analysis. This allowed the data to cover more countries and to include more recent years (up to 2019), However, this series is slightly less appropriate, because it is primarily focused on extracting the contribution of intangible capital (superfluous to the present analysis). Due to the limitations of the 2021 release, the use of the 2017 release can only enhance the validity of the study.

Growth decomposition for Austria, Belgium, Finland, France, Germany, Italy, the Netherlands, Spain, Sweden, and the UK is traditionally published on the EU KLEMS website. The required data are available for these countries prior to 2005, but that year was chosen as the starting point in order to include as many countries as possible. Moreover, as it is present, not past, trends that need to be identified, 2005 is sufficiently far back. In the 2017 release, the required data are available for these countries until 2015, except for Italy and Sweden, for which they are available until 2014. In the 2021 release, the required data are available for these countries until 2019, except for Italy, Spain and the UK, for which they are available until 2018, and Sweden, for which they are available until 2017. In the 2017 release, growth was additionally decomposed for Czechia, Denmark, Latvia, Luxembourg, Slovakia, and Slovenia. In this release, the required data for Denmark and Slovakia are available for the entire span of the

[13] http://www.euklems.net. See Jäger K., 2017.

[14] https://euklems-intanprod-llee.luiss.it/download/. See Bontadini F. et al., 2021.

study – 2005–2015, for Czechia – 2005–2014, for Luxembourg – 2009–2015, for Latvia – 2009–2014, and for Slovenia – 2009–2013. In the 2021 release, the decomposition was additionally performed for Latvia and Lithuania, and covered the period 2010–2018. The possibility of including the US is that the required data are also available on the relevant websites. An attempt was made to include Russia, as the World KLEMS site has the requisite data up until 2014 but in the older ISIC Rev. 3 classification (equivalent to NACE Rev. 1, not NACE Rev. 2).[15] These data are comparable methodologically with the 2017 EU KLEMS release, but not the 2021 release (so they are classified in the same left-hand-side part of Table 1). Data for Poland are taken from the Statistics Poland website,[16] as they contain the GVA growth decomposition for this country over the period under consideration and these are not available on the EU KLEMS website. The methodology applied in their computation (Kotlewski and Błażej, 2018 and 2020) is very similar to that employed in the 2017 EU KLEMS release (for this reason, they are presented in the same left-hand-side of Table 1). They are available until 2016. The 2021 release also contains the relevant data for Japan for 2005–2018.

The EU KLEMS websites also contain the relevant data for country aggregates. These are of value because the countries in question are weighted in these aggregates. The first of these aggregates (EU12) consists of the group of ten countries together with Czechia and Denmark. The time series for this group covers the period 2005–2015 in the 2017 release and 2010–2018 in the 2021 release. The second aggregate (EU16) consists of the EU12 group of countries plus Latvia, Luxembourg, Slovakia, and Slovenia. Its time series covers 2009–2015[17] in the 2017 release, but data for this aggregation are not available in the 2021 release.[18] The World KLEMS site has some data for Argentina, India, South Korea, China and Canada, although they cannot be easily used in the present study as they are either methodologically inconsistent or incomplete and their time series are frequently too short.[19] The availability of any further reference data is listed in Table 1.

As can be seen in Table 1, the countries under consideration can be divided into two groups: those for which data are available for the entire period of the study (except: occasionally for 2015 and once for 2014 in the 2017 release; and for 2019 and once for 2018 in the 2021 release); and those for which data are only available from 2009 onward in the 2017 release and from 2010 onward in the 2021 release. For this reason, the study was conducted as a two-tier analysis covering: 2005–2015 and 2009–2015 (2017 release) (both periods were shorter for some countries, but extended to 2016 for Poland); and 2005–2019 and 2010–2018 periods (2021 release). Due to the specific data availability structure, any other division would have been less valid.

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[15] http://www.worldklems.net/data.htm

[16] https://stat.gov.pl/en/experimental-statistics/klems-economic-productivity-accounts/

[17] Slovakia is not included in the EU12 aggregate on the EU KLEMS website for some unknown reason. Nor is it clear why the data are unavailable for Denmark in the 2021 release, despite it being included in EU12 aggregate.

[18] There is also an EU19 aggregate in the 2021 release, albeit with data issues (i.e. obvious errors). This aggregate was therefore excluded.

[19] The two main platforms are LA KLEMS (*Latin America KLEMS*) and Asia KLEMS. The data for the vast majority of these countries are very basic; there is no growth accounting or decomposition.

Table 1.
EU KLEMS data availability for countries included in the study based on the 2017 and 2021 releases

EU KLEMS 2017 release + Poland + Russia								EU KLEMS 2021 release							
		"Time series of the study"								"Time series of the study"					
No	COUNTRIES	from 2005	from 2009	until 2013	until 2014	until 2015	until 2016	no	COUNTRIES	from 2005	from 2010	until 2017	until 2018	until 2019
1	Austria					X		1	Austria	X				X
2	Belgium					X		2	Belgium	X				X
3	Czechia				X			3	Czechia	X				X
4	Denmark	X				X			Denmark					
5	Finland	X				X		4	Finland	X				X
6	France	X				X		5	France	X				X
7	Germany	X				X		6	Germany	X				X
8	Italy	X			X			7	Italy	X			X	
9	Latvia		X		X			8	Latvia		X		X	
	Lithuania							9	Lithuania		X		X	
10	Luxembourg		X			X			Luxembourg					
11	Netherlands	X				X		10	Netherlands	X				X
12	Poland	X					X		Poland					
13	Slovakia	X				X			Slovakia					
14	Slovenia		X	X					Slovenia					
15	Spain	X				X		11	Spain	X			X	
16	Sweden	X			X			12	Sweden	X		X		
17	UK	X				X		13	UK	X			X	
18	EU12	X				X		14	EU12		X		X	
19	EU16		X			X			EU16					
20	Russia	X			X				Russia					
21	USA	X				X		15	USA	X				X
	Japan							16	Japan	X			X	

Note: Data in NACE Rev. 2 classification or its equivalent ISIC 4 classification, except for Russia for which data are in ISIC 3 classification. EU12 is the aggregate of 12 European countries on the EU KLEMS website for which the relevant data are available from 2005 (or earlier) onward. These countries are Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, the Netherlands, Spain, Sweden, and the UK. EU16 is the aggregate of 16 European countries on the EU KLEMS website for which the relevant data are available from 2009 onward. These countries are the EU12 countries and Latvia, Luxembourg, Slovakia, and Slovenia.

Source: own elaboration based on the EU KLEMS, World KLEMS and Statistics Poland websites.

The data used are listed in the Appendix (Tables A1, A2, A3, and A4). These data are applicable both to the economy as a whole and to the manufacturing sector

(NACE section C)[20] for the 21 countries and country aggregates (2017 release) and the 16 countries and country aggregates (2021 release) displayed in Table 1. The compound values that have been calculated make it possible to clearly establish whether there has in fact been a return to manufacturing during the time spans under consideration. Moreover, it can be established, to the extent that the methodology employed is viable in this respect, whether this process is beneficial to economic development, i.e. whether it is sustainable in the long run.

4. Empirical findings

To conduct a joint analysis of the issue in question and formulate a general opinion on whether the world economy was really reindustrialising[21], and if so, whether this was economically sound, all the compound rates from the Tables in the Appendix are compiled in Table 2. The results based on the 2017 release differ slightly from those based on the 2021 release. The main reason is the difference in time series. The additional years 2016–2019 in the 2021 release were prosperous for the world economy, including the countries included in the study. For this reason, the compound rates based on the 2021 release are usually higher. In addition, the shorter time series starting from 2010 in the 2021 release do not cover the recession year 2009, which is included in the shorter time series in the 2017 release. The differences in the outcome results based on the 2021 release, in comparison with those based on the 2017 release, are indicated in Table 2 as grey cells. These differences have a surprisingly minor impact on the outcome of the study. This is especially the case for the longer time series starting at 2005. Nor do they contradict the general conclusions, which are meant to be general, not specific.

[20] For Russia section D of ISIC rev. 3.

[21] This 'world economy' is of necessity limited here to the group of countries of Table 1. But they are representative to a considerable degree of the group of countries that have deindustrialised.

Table 2.
Results of the study

		EU KLEMS 2017 release + Poland + Russia						EU KLEMS 2021 release					
		compound values from 2005			compound values from 2009			compound values from 2005			compound values from 2010		
		"Total economy"	NACE section C	Reindustrialisation	"Total economy"	NACE section C	Reindustrialisation	"Total economy"	NACE section C	Reindustrialisation	"Total economy"	NACE section C	Reindustrialisation
Austria	GVA growth	16.93	23.87	R	3.91	2.05	nR	25.24	42.87	R	16.92	39.22	R
	MFP contribution	5.02	15.57	+	-0.06	-0.15	-	8.39	22.66	+	5.13	20.64	+
Belgium	GVA growth	15.41	10.90	nR	5.27	4.25	nR	25.72	5.77	nR	17.11	13.26	nR
	MFP contribution	0.70	24.63	+	0.01	17.27	+	1.80	15.65	+	2.59	15.58	+
Czechia	GVA growth	23.71	64.66	R	0.41	5.31	R	49.20	105.04	R	27.08	53.09	R
	MFP contribution	-3.70	35.36	+	-11.14	0.29	+	11.14	49.71	+	6.51	20.57	+
Denmark	GVA growth	8.71	11.47	R	2.82	7.22	R						
	MFP contribution	-3.20	21.52	+	-1.09	14.83	+						
Finland	GVA growth	4.54	-17.27	nR	-7.79	-32.57	nR	14.78	-3.13	nR	11.05	7.29	nR
	MFP contribution	-1.19	-1.47	-	-6.54	-16.38	-	1.74	20.10	+	3.53	25.30	+
France	GVA growth	11.06	5.84	nR	4.00	2.65	nR	19.29	8.34	nR	14.40	12.06	nR
	MFP contribution	-1.86	9.27	+	-2.16	7.31	+	2.57	12.11	+	1.98	10.84	+
Germany	GVA growth	14.82	16.54	R	4.91	3.93	nR	23.48	21.41	nR	20.73	37.75	R
	MFP contribution	5.24	13.21	+	-0.01	1.93	+	8.90	14.92	+	8.45	20.19	+
Italy	GVA growth	-4.30	-11.39	nR	-7.45	-15.22	nR	0.98	-2.91	nR	3.28	16.56	R
	MFP contribution	-5.21	-0.89	+	-2.40	-0.90	+	-5.33	2.04	+	0.55	16.04	+
Latvia	GVA growth				-7.29	-8.47	nR				19.98	43.18	R
	MFP contribution				0.53	11.73	+				19.78	40.09	+
Lithuania	GVA growth										35.27	58.36	R
	MFP contribution										16.38	42.08	+
Luxembourg	GVA growth				15.04	-2.68	nR						
	MFP contribution				-2.94	-0.65	+						
Netherlands	GVA growth	14.41	5.03	nR	2.53	-3.38	nR	25.28	23.29	nR	15.65	24.65	R
	MFP contribution	5.30	8.14	+	0.84	0.26	-	0.36	17.34	+	0.10	16.36	+

		EU KLEMS 2017 release + Poland + Russia						EU KLEMS 2021 release					
		compound values from 2005			compound values from 2009			compound values from 2005			compound values from 2010		
		"Total economy"	NACE section C	Reindustrialisation	"Total economy"	NACE section C	Reindustrialisation	"Total economy"	NACE section C	Reindustrialisation	"Total economy"	NACE section C	Reindustrialisation
Poland	GVA growth	54.28	116.66	R	26.73	46.57	R						
	MFP contribution	10.57	88.45	+	2.86	32.58	+						
Slovakia	GVA growth	49.47	103.35	R	10.73	38.87	R						
	MFP contribution	16.50	71.02	+	0.02	36.24	+						
Slovenia	GVA growth				-9.07	-12.46	nR						
	MFP contribution				-8.40	-2.35	+						
Spain	GVA growth	8.79	-5.44	nR	-4.38	-9.27	nR	18.13	-5.87	nR	7.73	5.01	nR
	MFP contribution	-3.42	14.07	+	-2.54	9.00	+	-1.94	9.36	+	-0.18	7.91	+
Sweden	GVA growth	17.52	1.96	nR	6.31	-9.78	nR	29.76	-1.06	nR	23.44	22.48	nR
	MFP contribution	-5.27	8.94	+	-1.77	-1.85	-	-1.40	13.72	+	7.23	25.03	+
UK	GVA growth	15.00	-3.82	nR	6.74	-3.70	nR	24.85	0.99	nR	20.22	10.87	nR
	MFP contribution	0.68	12.83	+	-1.96	2.99	+	3.16	17.28	+	3.41	7.73	+
EU12	GVA growth	10.99	6.04	nR	2.27	-2.04	nR				14.48	24.74	R
	MFP contribution	0.18	11.10	+	-1.42	3.21	+				5.74	20.95	+
EU16	GVA growth				2.35	-1.73	nR						
	MFP contribution				-1.42	3.50	+						
Russia	GVA growth	36.58	22.76	nR	5.75	4.73	nR						
	MFP contribution	1.17	-8.51	-	-7.90	-10.36	-						
USA	GVA growth	14.08	9.20	nR	8.07	1.74	nR	30.02	19.11	nR	24.03	20.92	nR
	MFP contribution	2.79	4.78	+	2.63	-0.46	-	5.17	7.38	+	4.69	4.72	+
Japan	GVA growth							8.08	14.13	R	11.26	25.05	R
	MFP contribution							2.79	16.50	+	6.87	21.45	+

Note: same as for Table 1.
Legend:
Reindustrialisation: is occurring – R, is not occurring – nR,
The symbols '+' means that reindustrialisation is sound (as indicated by the MFP), and the symbol '-' means that it is not.
Source: own elaboration based on the EU KLEMS, World KLEMS and Statistics Poland websites.

The results in Table 2 show that, for the 2017 release, a return to manufacturing is observed for 6 of the countries under consideration as of 2005 (symbol 'R' in

Table 2), but not for the other 10 countries and the EU12 aggregate (symbol 'nR' in Table 2). This type of reindustrialisation is understood here as a higher compound GVA growth rate in the manufacturing sector (as defined above) than for the aggregate economy. From the standpoint of the contribution of MFP, reindustrialisation, construed as the expansion of manufacturing, is economically sound for 14 countries and for the EU12 aggregate (indicated by '+' in Table 2) as far as the high rate of economic growth is being pursued. This is because the contribution of MFP to GVA growth is greater in the manufacturing sector than for the economy as a whole in these countries. The converse is observed for two countries (indicated by '-' in the Table), compelling the conclusion that this reindustrialisation is not advisable for them. The results for 2005 onward, based on the 2021 release, differ only slightly (two grey cells in the Table), but the coverage is somehow different. Reindustrialisation is observed for 3 countries, but not for 10. It is economically sound for all the countries enumerated in the table from this release.

The groups of countries under consideration can be expanded by commencing the time span at 2009 for the 2017 release and at 2010 for the 2021 release. The results based on the 2017 release show that this reindustrialisation is observed for 4 of the countries under consideration. For 15 countries, and the EU12 and EU16 aggregates, it is not observed. From the standpoint of the contribution of MFP to GVA growth, this reindustrialisation is economically sound for 15 countries, and the EU12 and EU16 aggregates, but not for 4 countries. The results based on the 2021 release show that this reindustrialisation is observed for 8 countries and the EU12 aggregate, but not for 7 countries. From the standpoint of the contribution of MFP to GVA, reindustrialisation here is economically sound for all 15 countries and the EU12 aggregate. The 10 grey cells in Table 2 indicate some differences in outcome from the 2017 release. However, the results based on the 2021 release do not contradict the general outcome based on 2017 release, but actually strengthen it as complementary outcome data.

This outcome based on the 2017 release indicates that there was no overall return to manufacturing in the (mostly developed) countries under consideration. Such reindustrialisation as did occur was confined to a few countries, although it was economically sound in most cases, as confirmed for the two periods starting at 2005 and 2009. The outcome based on the 2021 release is slightly different, especially for the shorter period beginning at 2010, when a conspicuous increase in the number of countries with reindustrialising economies can be observed. The analysis based on this release shows that this reindustrialisation is sound for all the countries under consideration. As these countries vary in size, however, this result needs to be made more plausible. This can be achieved by observing the data for the EU12 and EU16 aggregates. The outcome of the analysis based on the 2017 release is the same for both aggregates: these entities are not reindustrialising, but they would be well advised to do so in order to accelerate economic growth. The analysis based on

the 2021 release, however, shows that this reindustrialisation has been occurring as of 2010 for the EU12 aggregate, and that it is economically sound.[22]

5. Conclusion

Given the state of the available statistical data and growth accounting methodology, no analysis of whether reindustrialisation (understood as a return to manufacturing) is occurring can be complete. Nevertheless, the present study is fairly representative for the OECD. Moreover, whether this is beneficial for the economy in general, and therefore economically advisable or sound, can be reasonably assessed. This is the advantage of using KLEMS growth accounting for this kind of exercise. The results for the period of economic reconstruction following the Covid-19 pandemic and the Ukraine-Russia conflict can be inspiring.

The present study sheds light on the controversy as to whether this kind of reindustrialisation has occurred and whether it is, or would be, advisable. According to the 2017 EU KLEMS 2017 release, it has only occurred in rare cases for the countries and periods (2005–2015 and 2009–2015) under consideration, although, according to the 2021 EU KLEMS release, it gained momentum in 2016–2019. However, reindustrialisation seems advisable, and is at least economically sound, and should therefore be embraced. The 2021 release makes this conclusion even more compelling.

A worldwide deceleration in productivity growth[23] justifies the use of every means available (including reindustrialisation) to reverse or at least contain it. What stands out in the present study is that many countries would benefit economically be returning to manufacturing. This, however, should be understood as an increase in the share of the manufacturing sector (NACE section C). More advanced manufacturing subsectors probably require more capital investment. Future research (when there are fewer limitations on the availability of relevant data) will hopefully corroborate these conclusions.

[22] Estimations about certain countries *industrialising*, not *reindustrialising*, could be made, although they would only be intuitive. These countries are generally termed *emerging markets*. Most are developing countries, although some are middle-income countries. The author contends that such industrialisation is in fact occurring, that it is advisable, and that KLEMS would bear this out.

[23] This can cause secular stagnation. At issue is the feasibility of continuous exponential growth on a finite planet (Jackson, 2019). Increased inequality and the rise of political populism, together with historical congruence between declining productivity growth and resource bottlenecks are often cited as causes. Demographic reasons (Cerrellati, Sunde and Zimmermann, 2017), and unfavourable technological developments (Cova, Notarpietro, Pagano and Pisani, 2021) additionally have to be taken into account. Many other explanations are being advanced and it is impossible to cite them all here. Unbalanced growth between technologically dynamic and stagnant sectors (Storm, 2018) are a further consideration, although not exactly as the author puts it.

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Appendix

Table A1.

Aggregate GVA growth rates and MFP contributions to aggregate growth for countries included in the study, based on EU KLEMS 2017 release

"Total economy"		Growth													
		annual												compound	
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	from 2005	from 2009
Austria	GVA growth	2.00	4.00	4.00	2.00	-4.00	2.00	3.00	1.00	0.00	1.00	1.00		16.93	3.91
	MFP contribution	1.00	2.00	2.00	0.00	-3.00	1.00	1.00	0.00	0.00	0.00	1.00		5.02	-0.06
Belgium	GVA growth	2.17	2.42	3.39	1.33	-2.41	2.50	2.01	0.02	-0.22	1.64	1.69		15.41	5.27
	MFP contribution	0.21	0.39	1.00	-0.89	-2.17	1.68	0.08	-0.75	-0.46	0.92	0.76		0.70	0.01
Czechia	GVA growth	6.14	6.97	4.93	3.42	-5.85	2.72	1.93	-0.87	-0.55	3.33			23.71	0.41
	MFP contribution	3.18	4.74	0.47	-0.19	-5.87	-0.75	-1.03	-4.06	-2.34	2.57			-3.70	-11.14
Denmark	GVA growth	1.54	3.71	0.44	-0.04	-4.49	1.80	1.42	0.21	0.92	1.66	1.43		8.71	2.82
	MFP contribution	0.62	1.00	-1.65	-2.08	-3.02	-0.16	0.08	0.58	0.44	1.05	-0.02		-3.20	-1.09
Finland	GVA growth	2.56	3.72	5.68	0.85	-9.17	2.93	1.93	-1.99	-0.91	-0.64	0.29		4.54	-7.79
	MFP contribution	1.20	2.19	3.38	-1.11	-6.92	2.67	0.90	-2.25	-0.28	-0.52	-0.04		-1.19	-6.54
France	GVA growth	1.41	2.35	2.45	0.42	-2.78	1.73	2.07	0.41	0.63	1.09	0.88		11.06	4.00
	MFP contribution	-0.21	1.73	-0.45	-0.74	-2.36	0.33	0.40	-0.77	0.08	0.42	-0.24		-1.86	-2.16
Germany	GVA growth	0.65	3.60	3.75	1.18	-6.47	4.12	3.46	0.55	0.48	1.49	1.54		14.82	4.91
	MFP contribution	1.03	3.04	1.89	-0.78	-5.28	2.64	1.58	0.06	0.23	0.41	0.55		5.24	-0.01
Italy	GVA growth	0.80	1.90	1.55	-0.86	-5.82	1.72	0.57	-2.53	-1.53	0.09			-4.30	-7.45
	MFP contribution	-0.71	-0.27	-0.65	-1.28	-4.27	1.85	0.25	-0.79	0.17	0.48			-5.21	-2.40
Latvia	GVA growth					-14.36	-4.58	5.90	3.20	2.07	1.70				-7.29
	MFP contribution					-6.29	0.02	3.10	2.19	1.22	0.57				0.53
Luxembourg	GVA growth					-4.65	4.92	1.86	-0.85	3.92	5.10	4.25			15.04
	MFP contribution					-6.47	-0.24	-1.08	-2.46	1.85	2.32	3.44			-2.94
Netherlands	GVA growth	2.08	3.40	3.71	1.94	-3.49	1.67	1.96	-0.80	0.14	1.52	1.61		14.41	2.53
	MFP contribution	1.39	1.69	1.37	-0.09	-3.22	2.11	0.87	-0.90	0.14	0.70	1.23		5.30	0.84
Poland	GVA growth	3.30	5.97	6.84	4.08	3.05	3.41	4.88	1.66	1.46	3.22	3.61	2.81	54.28	26.73
	MFP contribution	1.22	3.31	1.59	1.19	0.72	1.45	1.38	-0.54	-1.25	-0.96	1.33	0.73	10.57	2.86
Slovakia	GVA growth	5.30	9.47	10.40	6.08	-5.65	5.02	2.45	2.39	1.16	1.91	3.32		49.47	10.73
	MFP contribution	-0.15	6.37	9.42	0.23	-6.15	3.71	0.98	1.77	-1.08	0.14	0.93		16.50	0.02
Slovenia	GVA growth					-7.60	1.26	0.33	-2.39	-0.76					-9.07
	MFP contribution					-8.02	1.87	0.82	-1.57	-1.51					-8.40
Spain	GVA growth	3.43	4.23	4.15	1.34	-3.49	0.01	-0.54	-2.81	-1.50	1.22	2.80		8.79	-4.38
	MFP contribution	-0.74	0.17	0.67	-0.99	-1.83	0.16	-0.22	-0.95	-0.48	-0.02	0.80		-3.42	-2.54
Sweden	GVA growth	2.61	4.60	3.33	-0.32	-6.02	5.96	2.87	-0.17	1.31	2.61			17.52	6.31
	MFP contribution	0.25	1.57	-1.77	-3.58	-6.18	3.81	1.02	-1.26	0.12	1.01			-5.27	-1.77
UK	GVA growth	3.13	2.41	2.48	-0.46	-4.59	2.03	1.30	0.99	1.33	3.34	2.34		15.00	6.74
	MFP contribution	1.24	1.47	0.41	-0.43	-2.82	1.14	-0.83	-0.99	-0.78	0.98	1.41		0.68	-1.96
EU12	GVA growth	1.84	2.99	2.96	0.49	-4.76	2.33	1.83	-0.32	0.16	1.51	1.67		10.99	2.27
	MFP contribution	0.45	1.53	0.50	-0.85	-3.62	1.45	0.43	-0.68	-0.12	0.50	0.68		0.18	-1.42
EU16	GVA growth					-4.79	2.34	1.84	-0.30	0.18	1.54	1.69			2.35
	MFP contribution					-3.66	1.46	0.44	-0.67	-0.12	0.51	0.70			-1.42

"Total economy"		Growth													
		annual												compound	
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	from 2005	from 2009
Russia	GVA growth	5.80	7.55	8.04	5.04	-7.20	4.05	3.76	3.36	1.38	0.72			36.58	5.75
	MFP contribution	2.61	3.33	3.13	0.47	-7.70	0.72	1.32	0.03	-1.07	-1.20			1.17	-7.90
USA	GVA growth	2.86	2.28	1.38	-1.03	-1.81	1.93	1.07	1.56	1.30	1.77	2.05		14.08	8.07
	MFP contribution	1.05	0.41	0.08	-1.37	0.83	1.10	0.10	0.03	-0.16	0.37	0.33		2.79	2.63

Note: The data in the NACE Rev. 2 (or its ISIC 4 equivalent) system, with the exception of Russia (whose data are in ISIC 3). EU12 is the aggregate of the 12 European countries from EU KLEMS websites for which the relevant data are available from 2005. These countries are Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, the Netherlands, Spain, Sweden and the UK. EU16 is the aggregate of the 16 European countries from EU KLEMS websites for which the relevant data are available from 2009. These countries are the EU12 countries plus Latvia, Luxembourg, Slovakia, and Slovenia. Blank cells mean that the relevant data are unavailable or superfluous to requirements.

Source: own elaboration based on EU KLEMS 2017 release, World KLEMS and Statistics Poland websites.

Table A2.

Manufacturing GVA growth rates and MFP contributions to manufacturing (NACE section C) growth for countries included in the study, based on EU KLEMS 2017 release

NACE section C		Growth													
		annual												compound	
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	from 2005	from 2009
Austria	GVA growth	4.00	7.00	8.00	1.00	-16.00	8.00	6.00	2.00	0.00	2.00	2.00		23.87	2.05
	MFP contribution	4.00	6.00	5.00	0.00	-12.00	7.00	5.00	1.00	0.00	-1.00	1.00		15.57	-0.15
Belgium	GVA growth	1.41	0.61	5.78	-1.44	-11.37	6.29	1.70	-0.08	1.02	3.54	4.11		10.90	4.25
	MFP contribution	1.61	0.30	5.50	-1.17	-4.80	7.44	0.98	1.06	2.52	5.48	3.90		24.63	17.27
Czechia	GVA growth	14.44	18.65	6.57	8.06	-12.85	10.58	9.62	-3.27	-2.77	6.00			64.66	5.31
	MFP contribution	10.03	14.63	2.20	4.70	-11.13	8.87	7.42	-4.05	-2.96	3.64			35.36	0.29
Denmark	GVA growth	-1.75	5.22	1.20	-0.62	-12.67	3.71	6.06	4.00	2.75	1.66	2.74		11.47	7.22
	MFP contribution	-0.52	5.08	0.26	0.98	-7.25	8.03	3.74	4.46	3.92	1.55	0.20		21.52	14.83
Finland	GVA growth	3.74	10.82	9.61	-2.65	-26.44	7.40	-0.11	-12.16	0.84	-0.91	-2.64		-17.27	-32.57
	MFP contribution	3.33	9.62	7.88	-3.58	-19.43	9.58	-0.21	-10.79	5.32	2.18	-1.12		-1.47	-16.38
France	GVA growth	1.68	2.65	2.09	-3.23	-5.98	2.42	3.86	-0.40	0.15	1.78	1.10		5.84	2.65
	MFP contribution	2.02	3.27	0.88	-4.19	-1.58	4.46	3.38	-1.38	0.45	2.13	-0.20		9.27	7.31
Germany	GVA growth	1.59	8.07	4.28	-2.06	-21.33	16.90	8.18	-2.26	0.13	5.38	1.29		16.54	3.93
	MFP contribution	3.93	8.50	2.66	-4.05	-16.00	15.08	5.17	-3.02	-0.60	3.83	0.15		13.21	1.93
Italy	GVA growth	0.46	4.49	2.97	-3.30	-19.42	8.46	2.00	-3.52	-1.59	0.17			-11.39	-15.22
	MFP contribution	0.20	2.07	0.57	-2.77	-11.84	9.62	1.57	-0.09	0.29	0.76			-0.89	-0.90
Latvia	GVA growth					-24.97	13.25	4.99	4.24	-1.97	0.40				-8.47
	MFP contribution					-5.64	13.03	3.47	0.28	-1.14	2.12				11.73
Luxembourg	GVA growth					-23.72	9.51	-12.92	4.07	15.16	11.52	0.12			-2.68
	MFP contribution					-21.90	7.97	-14.74	3.71	20.12	9.39	1.40			-0.65
Netherlands	GVA growth	3.22	1.94	5.34	-1.93	-11.46	5.14	3.55	-1.45	-1.23	1.75	1.21		5.03	-3.38
	MFP contribution	4.20	1.90	4.52	-2.81	-9.36	5.51	3.95	-0.41	-0.48	0.89	0.85		8.14	0.26
Poland	GVA growth	4.60	15.45	13.27	8.07	1.31	8.42	7.58	3.19	0.41	7.64	6.74	4.19	116.66	46.57
	MFP contribution	3.99	15.17	10.82	7.09	-1.15	5.46	5.24	3.22	0.05	5.99	6.06	4.10	88.45	32.58
Slovakia	GVA growth	10.26	12.38	11.35	6.14	-16.77	23.72	3.92	0.58	-0.10	15.10	12.22		103.35	38.87
	MFP contribution	5.14	8.27	10.30	-0.03	-9.72	23.86	0.22	-0.10	-1.26	12.29	9.77		71.02	36.24
Slovenia	GVA growth					-17.40	7.04	2.76	-3.23	-0.45					-12.46
	MFP contribution					-11.49	9.28	3.60	-2.03	-0.53					-2.35
Spain	GVA growth	1.82	3.12	1.41	-2.12	-11.55	0.00	-1.31	-5.34	-0.21	3.09	6.74		-5.44	-9.27
	MFP contribution	1.59	3.53	2.22	-2.66	-4.40	1.50	0.84	-0.71	2.03	3.46	6.27		14.07	9.00
Sweden	GVA growth	3.78	7.83	4.07	-2.96	-21.85	20.54	4.81	-7.53	-0.70	-0.49			1.96	-9.78
	MFP contribution	3.87	7.83	3.28	-4.05	-16.76	19.74	4.20	-6.17	0.51	0.20			8.94	-1.85
UK	GVA growth	0.01	2.14	0.63	-2.83	-9.82	4.43	2.16	-1.44	-0.98	2.86	-0.28		-3.82	-3.70
	MFP contribution	1.49	4.85	1.31	1.62	-1.53	4.18	1.93	-2.27	-1.15	2.38	-0.43		12.83	2.99
EU12	GVA growth	1.66	5.30	3.40	-2.20	-15.71	9.30	4.55	-2.41	-0.31	2.79	1.69		6.04	-2.04
	MFP contribution	2.52	5.39	2.24	-2.55	-9.88	9.34	3.41	-1.95	0.09	2.33	0.85		11.10	3.21
EU16	GVA growth					-15.75	9.40	4.52	-2.37	-0.29	2.93	1.80			-1.73
	MFP contribution					-9.90	9.46	3.37	-1.93	0.10	2.44	0.95			3.50
Russia	GVA growth	4.69	6.38	7.39	-2.00	-16.44	8.23	5.93	2.81	3.78	2.46			22.76	4.73
	MFP contribution	1.61	2.50	2.88	-4.75	-15.23	2.94	2.50	-0.96	0.44	0.73			-8.51	-10.36
USA	GVA growth	2.21	4.86	3.16	-2.92	-7.97	5.24	0.21	0.31	1.95	0.97	1.52		9.20	1.74
	MFP contribution	2.13	3.40	2.28	-2.55	-1.31	4.59	-1.50	-1.55	-0.22	-0.23	-0.10		4.78	-0.46

Note: as per Table A1.

Source: own elaboration based on EU KLEMS 2017 release, World KLEMS and Statistics Poland websites.

Table A3.

Aggregate GVA growth rates and MFP contributions to aggregate growth for countries included in the study, based on EU KLEMS 2021 release

"Total economy"		Growth																	
		annual																compound	
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	from 2005	from 2010
Austria	GVA growth	2.31	3.70	3.79	1.62	-4.28	1.90	3.21	0.53	0.14	0.68	0.84	1.93	2.46	2.75	1.36	25.24	16.92
	MFP contribution	1.57	2.82	1.98	-0.22	-2.97	1.25	1.42	0.03	-0.23	0.34	0.41	0.16	1.15	0.83	-0.34	8.39	5.13
Belgium	GVA growth	2.42	2.42	3.66	0.78	-2.04	2.84	1.97	0.79	0.41	1.67	2.20	0.94	1.54	1.80	1.79	25.72	17.11
	MFP contribution	0.64	0.21	1.44	-1.18	-1.85	1.50	-0.14	0.07	0.09	0.93	1.18	-0.65	-0.50	-0.04	0.15	1.80	2.59
Czechia	GVA growth	6.56	7.03	5.15	3.51	-5.42	2.96	1.74	-0.84	-0.02	2.82	4.71	2.47	5.07	3.33	2.17	49.20	27.08
	MFP contribution	4.12	4.21	1.82	-0.03	-5.53	1.38	0.10	-1.47	-1.97	1.04	3.08	-0.44	3.01	0.84	0.88	11.14	6.51
Finland	GVA growth	2.55	3.73	5.83	0.91	-9.02	3.18	1.89	-1.92	-1.06	-0.31	0.40	2.58	3.56	1.02	1.35	14.78	11.05
	MFP contribution	1.13	2.04	3.63	-1.15	-7.03	2.67	0.60	-2.29	-0.57	-0.37	0.20	1.98	2.46	-1.12	0.02	1.74	3.53
France	GVA growth	1.47	2.45	2.52	0.51	-2.66	1.73	2.21	0.56	0.62	1.11	0.90	0.96	2.15	1.82	1.50	19.29	14.40
	MFP contribution	0.64	2.44	0.36	-0.52	-2.29	0.56	0.83	-0.47	0.05	0.27	-0.32	-0.33	1.46	-0.05	-0.02	2.57	1.98
Germany	GVA growth	0.68	3.81	3.49	1.05	-6.42	4.27	3.79	0.53	0.46	2.23	1.20	2.22	2.67	1.29	0.44	23.48	20.73
	MFP contribution	1.29	3.15	1.89	-0.59	-5.12	2.28	2.38	0.01	0.22	1.58	0.02	1.08	1.43	-0.20	-0.59	8.90	8.45
Italy	GVA growth	0.81	1.89	1.55	-0.70	-5.60	1.81	0.73	-2.71	-1.57	0.05	0.87	1.35	1.59	0.95	0.26	0.98	3.28
	MFP contribution	-0.54	-0.14	-0.45	-0.93	-3.87	1.50	0.31	-1.48	-0.34	-0.10	0.24	0.19	0.53	-0.08	-0.22	-5.33	0.55
Latvia	GVA growth						-5.24	6.30	3.44	1.69	0.68	3.60	1.78	3.21	3.35			19.98
	MFP contribution						-0.81	4.64	2.22	0.31	1.58	3.77	1.57	3.45	1.63			19.78
Lithuania	GVA growth						1.64	5.86	3.77	3.49	3.47	2.01	2.49	4.19	3.86			35.27
	MFP contribution						2.62	4.89	2.14	1.87	1.22	-1.22	-0.94	4.19	0.69			16.38
Netherlands	GVA growth	2.05	3.29	3.78	2.46	-3.36	1.50	1.85	-0.80	0.26	1.43	1.69	1.95	2.89	2.29	1.63	25.28	15.65
	MFP contribution	1.10	1.41	0.75	0.28	-3.22	1.21	0.86	-0.87	-0.62	0.59	-0.30	-0.25	0.45	-0.02	-0.92	0.36	0.10
Spain	GVA growth	3.40	4.15	3.98	1.27	-3.30	-0.11	-0.44	-2.93	-1.30	0.94	3.22	2.78	3.04	2.46		18.13	7.73
	MFP contribution	-0.58	0.26	0.58	-0.98	-1.04	-0.06	-0.29	-1.18	-0.54	-0.49	0.78	0.55	1.04	0.02		-1.94	-0.18
Sweden	GVA growth	2.63	4.68	3.34	-0.50	-4.85	5.89	3.58	-0.51	1.16	2.70	4.26	1.65	2.74			29.76	23.44
	MFP contribution	0.40	1.52	-1.54	-3.54	-5.02	3.78	1.45	-1.58	0.10	1.09	2.50	-0.96	0.75			-1.40	7.23
UK	GVA growth	3.41	2.57	2.28	-0.15	-4.13	2.32	1.52	1.42	2.22	2.86	2.18	1.63	1.73	1.34	1.38	24.85	20.22
	MFP contribution	2.00	0.79	0.53	-0.22	-3.27	1.90	-0.05	-0.45	0.58	0.44	1.08	-0.52	0.55	0.13	-0.27	3.16	3.41
EU12	GVA growth						3.42	2.05	1.00	-0.48	2.29	3.60	-0.56	1.11	1.29			14.48
	MFP contribution						2.21	0.97	0.42	-0.57	1.23	1.87	-1.67	0.08	1.12			5.74
USA	GVA growth	3.34	2.76	1.56	-0.24	-2.56	2.18	1.37	2.08	1.45	2.43	3.03	1.71	2.29	2.90	2.34	30.02	24.03
	MFP contribution	1.47	0.13	-0.25	-0.90	0.02	1.48	-0.49	0.19	-0.32	0.50	1.10	-0.17	0.89	0.83	0.60	5.17	4.69
Japan	GVA growth	1.84	1.29	1.53	-1.32	-6.00	3.93	-0.18	1.62	1.62	0.38	1.44	-0.43	1.87	0.55		8.08	11.26
	MFP contribution	1.02	-0.82	1.49	-0.70	-3.69	3.06	0.04	0.74	2.36	-0.05	0.64	-1.18	0.17	0.94		2.79	6.87

Note: The data in the NACE Rev. 2 (or its ISIC 4 equivalent) system. EU12 is the aggregate of the 12 European countries from the EU KLEMS websites whose relevant data are available from 2005. These countries are Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, the Netherlands, Spain, Sweden, and the UK. Blank cells mean that the relevant data are unavailable or superfluous to requirements.

Source: own elaboration based on EU KLEMS 2021 release.

Table A4.

Manufacturing GVA growth rates and MFP contributions to manufacturing (NACE section C) growth for countries included in the study, based on EU KLEMS 2021 release

NACE section C		Growth																
		annual															compound	
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	from 2005	from 2010
Austria	GVA growth	4.37	7.63	7.50	1.08	-15.93	7.81	6.98	2.02	0.26	2.21	0.85	4.26	3.63	5.20	0.73	42.87	39.22
	MFP contribution	3.37	6.63	5.33	0.10	-12.51	7.10	5.39	0.21	-0.45	0.84	-0.22	2.90	1.91	2.58	-1.02	22.66	20.64
Belgium	GVA growth	2.61	-2.35	6.15	-3.40	-9.12	5.92	0.13	-1.59	1.03	3.07	2.69	-1.66	1.52	-0.27	1.92	5.77	13.26
	MFP contribution	2.67	-2.55	5.99	-3.02	-2.70	6.36	-0.74	-0.42	2.44	4.97	2.79	-1.69	0.38	-0.80	1.60	15.65	15.58
Czechia	GVA growth	13.49	18.73	6.31	7.85	-13.31	11.02	10.49	-4.11	-1.26	3.51	7.31	4.47	8.31	1.87	2.96	105.04	53.09
	MFP contribution	9.28	16.46	1.63	4.69	-8.29	10.42	7.42	-5.62	-5.61	1.42	4.05	1.05	6.65	-0.91	1.27	49.71	20.57
Finland	GVA growth	3.75	10.82	9.61	-2.65	-26.42	7.32	0.05	-12.31	0.82	-0.89	0.37	4.79	7.17	-3.59	4.95	-3.13	7.29
	MFP contribution	3.52	9.63	7.99	-3.46	-18.99	9.22	0.07	-10.88	5.50	2.26	2.49	6.52	7.44	-3.58	5.42	20.10	25.30
France	GVA growth	1.66	2.61	1.99	-3.30	-6.02	2.33	3.96	-0.25	-0.12	1.60	0.67	0.85	2.21	0.02	0.24	8.34	12.06
	MFP contribution	2.41	3.51	0.97	-4.12	-1.44	4.39	3.39	-0.98	0.70	1.30	0.53	0.35	2.96	-1.49	-0.64	12.11	10.84
Germany	GVA growth	1.68	8.26	4.14	-2.11	-21.46	17.48	8.00	-1.81	-0.06	4.88	1.08	3.84	3.42	0.74	-3.51	21.41	37.75
	MFP contribution	4.24	8.97	2.77	-3.68	-14.96	15.25	5.34	-2.44	-0.78	3.19	-0.09	3.26	2.25	-1.17	-4.93	14.92	20.19
Italy	GVA growth	0.67	4.35	3.06	-3.31	-20.43	9.00	1.60	-4.08	-1.35	0.22	2.51	2.93	3.42	1.70		-2.91	16.56
	MFP contribution	0.43	2.02	0.82	-2.66	-12.54	9.63	1.01	-1.06	0.16	0.55	2.08	1.12	1.86	0.02		2.04	16.04
Latvia	GVA growth						13.04	5.20	3.95	-1.68	-2.89	4.33	1.72	6.48	7.35			43.18
	MFP contribution						12.08	2.51	-0.04	-1.44	-0.42	6.93	1.97	6.76	6.77			40.09
Lithuania	GVA growth						8.77	9.71	4.86	4.49	4.25	2.95	3.10	5.45	3.79			58.36
	MFP contribution						11.65	9.63	3.93	5.42	3.46	0.32	-0.20	4.47	-2.10			42.08
Netherlands	GVA growth	3.17	2.38	5.42	-0.61	-10.62	4.23	4.43	-0.94	-0.94	2.35	0.71	2.13	5.91	3.90	0.75	23.29	24.65
	MFP contribution	4.22	2.39	4.79	-1.36	-8.57	3.69	4.23	-0.45	-0.37	1.80	0.82	1.49	4.89	1.72	-2.33	17.34	16.36
Spain	GVA growth	1.34	2.34	1.00	-2.60	-12.15	-0.35	-1.62	-6.03	-1.03	2.05	4.50	2.30	5.51	0.04		-5.87	5.01
	MFP contribution	1.74	3.40	2.52	-2.41	-3.71	1.81	0.85	-1.04	1.74	2.79	3.34	-0.77	2.04	-2.95		9.36	7.91
Sweden	GVA growth	2.84	7.15	4.02	-4.25	-26.40	19.55	5.66	-7.42	-3.52	-1.14	5.42	0.46	3.69			-1.06	22.48
	MFP contribution	2.64	6.62	2.99	-3.05	-16.75	22.35	7.88	-6.45	-2.96	-1.37	4.91	-0.64	1.49			13.72	25.03
UK	GVA growth	0.12	2.37	0.50	-2.81	-9.01	4.55	2.22	-1.18	-1.08	2.80	-0.49	0.27	2.30	1.14		0.99	10.87
	MFP contribution	3.72	4.49	1.45	2.10	-3.02	5.55	2.43	-1.80	-1.01	2.94	-1.20	-0.18	1.20	-0.23		17.28	7.73
EU12	GVA growth						10.28	4.63	-1.48	-1.11	3.08	2.83	0.93	2.87	0.83			24.74
	MFP contribution						10.1	3.8	-1.1	-0.5	2.8	1.7	0.2	1.9	0.8			20.95
USA	GVA growth	2.99	5.67	3.22	-2.23	-10.31	5.34	0.17	-0.51	2.91	1.88	1.62	-0.76	2.29	4.32	2.09	19.11	20.92
	MFP contribution	2.51	4.25	2.83	-2.64	-4.16	4.91	-1.25	-2.98	1.17	0.70	0.50	-2.24	0.93	2.23	0.88	7.38	4.72
Japan	GVA growth	4.28	3.30	4.65	-0.84	-18.37	15.39	-2.79	3.39	-1.39	2.37	4.08	-1.57	2.91	1.32		14.13	25.05
	MFP contribution	3.34	0.01	2.91	0.09	-9.88	13.92	-2.02	2.84	1.23	2.25	3.55	-2.48	1.49	-0.25		16.50	21.45

Note: as per Table A3.

Source: own elaboration based on EU KLEMS 2021 release.