Advisability of Reindustrialization In the Light of Klems Growth Accounting

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ADVISABILITY OF REINDUSTRIALIZATION IN THE LIGHT OF KLEMS GROWTH ACCOUNTING

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Abstract

The aim of the article is to assess whether the processes of reindustrialization (understood as a return to manufacturing) does really happen in the world economy, and particularly whether it is economically advisable in the light of KLEMS growth accounting. This economic advisability is clearly understood in the paper as a situation when reindustrialisation is truly enhancing the pace of economic growth. Other issues, such as the environmental and social ones, are being put aside. It was established that in the covered periods reindustrialization generally did not actually happen in the countries concerned but was advisable from pure economic point of view. Therefore, in the post-Covid economic reconstruction (prolonged actually, because of the Ukraine-Russia conflict) the return to manufacturing may become an important growth enhancing lever.

Key words: GVA, MFP, productivity, growth accounting, decomposition.

JEL: O47, E22, E23, E24

1. INTRODUCTION

The notion of advisability may be subject to some issues. In the case of the more specific *advisability of reindustrialisation* this includes dilemmas such as the environmental protection issue and the social issue. Whether reindustrialisation is good (i.e. advisable) as far as the environment is considered is certainly tricky. Based on broad experience, it can be asserted that industry development, despite the efforts to limit its impact, is generally detrimental for the environment. However, the production of many manufactured goods is necessary for socioeconomic reasons. Therefore, restricting industry, that is obviously spatially unevenly distributed in the world, may rather lead to a relocation of some economic activities instead of their shrinking. This relocation is being driven not only by cost reduction of the labour force but is also due to reduced outlays on abiding to environmental protection regulations. Keeping industry in countries with tough environmental regulations can be considered, therefore, as ethical as demanding that other countries enhance their environmental protection regulation activity. The social issue is less controversial, as industry provides valuable jobs, and in the case of reindustrialization some *brownfield* industrial plants can be established revitalizing many depleted post-industrial areas. Having in mind all the above-mentioned issues (and possibly other, that may be subject to ample separate studies), in this paper it is the *economic advisability* that will be considered, and this advisability will be understood as a situation of positive impact on the pace of economic growth.

The important issue is *reindustrialization* versus *industrialization*. However, it is an issue only seemingly. Growth accounting, whether the one performed by OECD or on the EU KLEMS platform is an exercise performed predominantly for countries that have undergone *deindustrialization*, and this is why the first notion has been adopted here. In some situations when this is not the case, we can assert that from the point of view of the growth accounting methodology (including KLEMS) applied in the present study this distinction remains unimportant. The adopted growth accounting exercise results indicate whether industry expansion is beneficial for economic growth regardless of whether it is reindustrialization or industrialization. The only problem here is to adopt a methodology that can deliver comparable results.

In the scope of the above-mentioned growth accounting, data are being systematically compiled and appropriately processed, thanks to a methodology that is quite consistent

internationally[1]. Therefore, these data can be considered comparable with each other to an extent sufficient for many analyses. This seems the case despite some limitations arising mostly from the fact that there is a limited number of countries for which growth accountings are performed in a comprehensive manner. Moreover, for some countries quite systematically growth accountings are being conducted which include a decomposition of economic growth into production factor contributions (i.e., contributions of labour and capital factors and possibly their subfactors) and the contribution of a residual. This residual is termed as the *Solow's residual* and (according to economic theory) represents the contribution of productivity, called *total factor productivity* (TFP) or *multifactor productivity* (MFP). In the regularly carried out KLEMS productivity accounts or OECD productivity accounts[2] this decomposition is performed additionally at industry level, i.e. at section and division level of international ISIC 4[3] or NACE 2[4] classifications (from the point of view of the present analysis requirements these classifications can be considered as fully consistent with each other). The available body of data is therefore rich in information that can be used in economic research. In the present work these data will be used to assess whether the process of reindustrialization does really happen in the world economy and whether it is advisable. This 'world economy' will be limited, however, to a number of countries for which the data are available.

Data concerning the gross value added (GVA), i.e. the variable that can be considered as well representing the level of economic activity, can be compiled and compared. By comparing the GVA growth rates for entire economies their relative general conditions can be assessed. But these analyses may extend beyond, as GVA growth rates can be compared also for individual industries. In the scope of the present study, it can be ascertained that if the rates of GVA growth for ISIC or NACE sections representing the industry sector, understood here as the group of economic activities not included in the agriculture and the service sectors, are higher than for the aggregate economy, then the process of reindustrialisation is on track. But, in order to avoid all controversies and other issues, this process is being limited here to manufacturing extension, i.e. NACE section C (or its exact ISIC equivalent[5]) relative

[1] OECD data and particularly EU KLEMS and World KLEMS sites.
[2] Otherwise called KLEMS growth accountings or OECD growth accountings.
[3] International Standard Industrial Classification of All Economic Activities. ISIC rev. 4 is the last and presently abiding version of this classification and will be referred to later on as ISIC 4 or simply ISIC.
[4] *Nomenclature statistique des Activités économiques dans la Communauté Européenne*. NACE rev. 2 is the last and presently abiding version of this classification and will be referred to later on as NACE 2 or simply NACE. From the point of view of the mentioned growth accounting NACE is the exact equivalent of ISIC (i.e., NACE 2 is the equivalent of ISIC 4 and NACE 1 is the equivalent of ISIC 3). The differences are at lower aggregations not referred to in these accounts.
[5] As above mentioned, it is about NACE rev. 2 or ISIC rev. 4.

expansion. It is because the other *industrial*, i.e. non-service and non-agricultural, NACE sections (B, D, E and F) undergo many disparate processes, different in different countries and locally conditioned. For instance, NACE section B (mining and quarrying) is dependent on local conditions, related with the availability of natural resources and local mining policy, to a far greater degree than on pure economic trends, except the business cycle. In the case of NACE section D, related mainly with different energy generation activities, the role of public policy is preeminent. The sections E and F also have their specificities and often are considered to belong to the wide service sector. Limiting the present analysis to NACE section C allows to concentrate on a large bulk of the economy that is essential for the industry sector and which is subject to similar market rules quite internationally. Therefore, the activities contained in NACE section C are quite comparable between the countries concerned, since they are usually not tightly controlled by regulators and not strictly determined locally. This section C is also usually the bulk of industrial activity. So it is the narrower issue of the return to manufacturing that will be considered in the present paper.

This issue being outlined in this way cannot be considered as explained exhaustively, however. One of the reasons is that behind all processes, that need to be examined, drivers (causative powers) stand. In the scope of the adopted rationale here, it can be ascertained that the main driver in question is total factor productivity (TFP) or multifactor productivity (MFP)[6] and particularly their contributions to economic growth, that will be identified here as GVA growth. It is because the increased contribution of labour (i.e. physical labour, particularly understood as hours worked) to growth can be related with a resource-driven type[7] of economic growth and the contribution of capital to growth with an investment-driven (or capital-driven) type of economic growth, and they are both exhaustible[8]. Since capital-accumulation growth resource can be exhausted together with cheap-labor growth resource, because of falling rates of capital returns, at last only the productivity growth remains as the sustainable growth resource in general, apart from infrastructure capital growth delivering growth in the very long

[6] The difference between the two is of no prime importance for the present study. Later on, only MFP will be used in the study because of data availability within the KLEMS framework.

[7] Based on the availability of cheap resources, of which the labor resource 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 labor and capital, to productivity-driven growth.* This phenomenon can be linked with the inability to produce more high-value-added products (Lin and Treichel, 2012, pp. 40-41), therefore linking it with the process of value-added capture, also internationally in the scope of global value chains (Gill and Kharas, 2007, p. 14) – this process can be also linked to a more sophisticated product offer (Felipe *et al.*, 2012, pp. 39-43).

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

run. The contribution of MFP to growth can be highly related with the category of innovation-driven economic growth of which the horizons seem unlimited (thanks to technological progress as in Romer, 1990). The greater is the share of MFP in the growth, the more the economy sustainable. In a situation of similar economic growth rates for two similar[9] countries, that with higher MFP contribution to growth is more sustainable over the long run. Relying on productivity (here represented by the MFP indicator) prevents from stagnation[10] and promotes sustainable economic growth (e.g. Eichengreen, 2011; Agénor and Canuto, 2012; Zhuang *et al.*, 2012; Paus, 2014; Vivarelli, 2014; Atalay, 2015; Liu *et al.*, 2017).

The above rationale springs from the fact that the high level of productivity (MFP) can be related to high weighted average profitability in the given NACE activity, and in relation with it the residual value-added-based MFP contribution to GVA growth is often associated with the value-capture capability increase (OECD, 2001) in the given NACE activity. In such activity, there are more high-profit firms and profit-level-rising firms. More profitable firms are relatively more expansive and this expansion is sustainable (because of the wide profit margin), particularly when the contribution of productivity to growth is high compared to the contribution of production factors (because the profit margin then increases). It is because high profitability attracts new financial capital both to firms and to the given industry as a whole, and this is reinforced by expected profitability increases in the future.

Because of the above-mentioned microeconomic fundamentals a higher and growing productivity, i.e. high MFP contribution to GVA growth, should translate into higher economic growth rate of the given activity in the long run, but there can be bottlenecks in the economy, and the country economic policy may not always support economic growth. Therefore, the economy may develop in a suboptimal way. Therefore, the information provided by studying productivity (MFP) from this angle should be helpful in promoting sustainable economic growth. Following the above-mentioned rationale, countries should specialise in activities in which they achieve higher productivity (MFP) levels and particularly in which the contribution of productivity to growth is highest. Since the contribution of productivity to growth is measurable it is the one that will be considered in the present study, oriented at reindustrialization (understood narrowly as a return to manufacturing, as mentioned).

[9] With similar sizes and levels of development.

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

Considering the above-mentioned rationale, not only the growth rates of GVA for aggregate economies and the manufacturing sector (NACE section C) will be analysed but also the contribution of MFP to GVA growth rates – the MFP contribution entity will be used in the present study, because it is the Solow's residual version available in KLEMS growth accounting datasets. The basic assertion is that if in the given NACE activity MFP contribution to growth is higher than at the aggregate level then the development of this industry towards increasing its share in the economy is advisable in promoting the speed of economic growth at the aggregate level. Therefore, not only can be analysed the issue whether a return to manufacturing in the economy is under way but also whether it is advisable or not.

We keep in mind, however, that the productivity indicated as TFP or MFP is measured residually, and therefore these indicators also capture all sorts of measurement error and equation misspecification – the covered sample of data cannot be for a single instance but as comprehensive as possible.

2. BASIC METHODOLOGY

The decomposition of economic growth into the contributions of two basic production factors has been initiated originally by Solow (1957), following a specific development of his economic growth theory (Solow, 1956). The application of this theory in regularly conducted productivity accounts was related with the introduction of Leontief concepts (1966) in statistics. Because of the relative complexity of numerous calculations to be performed its practical implementation was only possible with the advent of the computer era. The present version of economic growth accounting in the form of KLEMS growth accounting was formulated mainly by Jorgenson and associates (Jorgenson & Griliches, 1967; Jorgenson, Gollop, Fraumeni, 1987; Jorgenson, Ho, Stiroh, 2005)[11]. It is a methodology that is basically consistent with the OECD (2001) methodology, and together with it remains one of the two most often performed ways of conducting economic growth accounting using the index method, very strongly advised by Diewert (1976, 1978, 1992, 2004 and 2005)[12], a well-known expert of the trade. The starting point, then, will be the Solow's decomposition:

[11] It is worth to see also: Jorgenson (1963 and 1989). The basic KLEMS methodology was well summarized in: Timmer et al. (2007) and O'Mahony & Timmer (2009).

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

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

where *Y is* the GDP, *L* – the labour factor, considered as physical counted hours (later on strictly defined as hours worked), *K* – the capital factor, considered as capital-stock value. The weights α and β are elasticities, that can be specified as shares of factor remunerations in total income, which requires, according to the theory, the adoption of the assumptions about the existence of perfect competition and constant returns to scale in the economy – moreover, these assumptions allow to use the formula $\beta = 1 - \alpha$ in (1). *A* is the *total factor productivity* (TFP). The contribution of TFP, i.e. *ΔA/A* is calculated residually by subtracting the other values in (1) – it is called as the *Solow's residual*. In this way, there is no direct need to establish the value of *A*, which remains an abstract category and its interpretation was (and to some degree still is) an issue. Solow interpreted it as technological progress. Presently, it is usually interpreted as technological or organisational progress disembodied in labour or capital[13].

Because the Törnqvist procedure (quantity index) is used for aggregation when the Solow-type decomposition is conducted at industry level this formula (1) was replaced in the KLEMS growth accounting by its trans-log approximation:

$$\Delta lnV_{jt} = \Delta lnA^{V}_{jt} + \overline{\alpha_{jt}} \Delta lnK_{jt} + \overline{\beta_{jt}} \Delta lnL_{jt} \quad (2)$$

which is consistent with this procedure. It has been established that in this procedure average shares between two time periods *t* and *t-1* should be used, according to formula $\bar{\alpha}_t = (\alpha_t + \alpha_{t-1})/2$ and similarly for $\overline{\beta_t}$ – subscript *j* for industries, present in (2) has been omitted here for simplicity. By definition, these shares are shares in the gross value added (GVA) here, and it is the growth of GVA (V_{jt}) that is present on the left-hand side of formula (2). For each year and each industry (for instance represented by NACE sections and divisions) the formula (2) should be used independently. Thanks to its trans-log shape the formula (2) is strictly conformable with the original Cobb-Douglas production function[14].

The formula (2) can be developed by introducing an additional variable, related with the intermediate inputs, to the original production function. In the theory developed after Solow, it was established that only the decomposition of gross output growth (with an additional factor-alike contribution in the form of intermediate inputs' contribution to gross output growth) allows

[13] This will be stipulated later on again.
[14] However, in the instance when growths are high (much over 10%) the logarithm values become discrepant with the classic relative growths from formula (1).

to establish technological or organisational progress disembodied in labour or capital. This gross-output-based MFP contribution is different than the value-added-based MFP contribution, but in an ideal situation they should be related with each other by the ratio between the gross output and the GVA. Otherwise, the formula (2) allows to establish the contribution to growth of technological or organisational progress disembodied in labour or capital only approximately – it can be inconsistent (i.e. not related by a known ratio as above mentioned) because of the phenomenon of substitution between the production factors (labour and capital) and the intermediate inputs. That is why the contribution of the *A* variable in (2) is presently rather considered as the industry capacity to capture the value, to participate in the income (OECD, 2001, 23). But this understanding of the residual productivity contribution to growth is even more appropriate for the present study, because of the rationale presented in the previous section.

Moreover, the use of gross output decomposition is associated with data issues. Data insufficiency causes that for most countries, for which KLEMS growth accounting is performed, only the GVA decomposition according to formula (2) is being done. Fortunately, the GVA decomposition remains the central backbone of KLEMS growth accounting, providing the most essential information about the economy. Therefore, despite its limitations, it remains the basis for most analyses based on the method of decomposition in the framework of this accounting. Performing GVA growth decomposition as in (2) instead of gross output decomposition facilitates also international comparisons, since the issue of huge differences in the vertical integration of firms between the countries related with intermediate inputs is lifted. Therefore, for the present study oriented to as many countries as possible the choice of GVA decomposition in the framework of KLEMS growth accounting seems to be even more justified.

What is important to notice is that in the KLEMS growth accounting different definitions of production factor contributions are applied – instead of contributions of factor stocks (resources), as in the Solow's decomposition, the notions of contributions of factor services are applied in formula (2). It is because the Törnqvist quantity index is used in the aggregation of factor values. Because of that, the residual productivity contribution term is the MFP contribution, which can be considered as a more 'modern' kind of the residual productivity than the older TFP contribution. Therefore, the present study will be further based on MFP-type productivity.

Some values had to be calculated especially for the present study. Preference has been given for the calculations made on a compound basis, that give more weight to later vintages

of economic growth – they are not therefore exactly equivalent to simple averages. Chaining was used according to the following formulae:

$$\Delta lnV_{(1,n)} = \prod_{t=1}^{n}(1 + \Delta lnV_t) - 1 \qquad (4)$$

$$\Delta lnA^{V}_{(1,n)} = \prod_{t=1}^{n}(1 + \Delta lnA^{V}_t) - 1$$

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

3. Data Compiling and Processing

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

Most of these data are available on the EU KLEMS internet site, and its last 2017[15] and 2021[16] data releases are those referred to in the present study. They include the United Kingdom (UK), presently not belonging to the European Union (EU), the United States (USA), and Japan for which the data are published there as well in a consistent manner. On these sites all EU countries are present. However, the most important methodological component of KLEMS growth accounting which is the GVA growth decomposition into the contributions of production factors and MFP is not performed there for all EU countries. That is why the EU KLEMS 2017 release, which is methodologically appropriate for the study, has a strained representativeness. To increase the validity of the present analysis another EU KLEMS series, of which the 2021 release is the most recent one, has been used. This turn allowed to somehow extent the data coverage on some additional countries and particularly to include few more recent years (up to 2019) in the analysis, despite the fact that this series (and its 2021 release) is slightly methodologically less appropriate, because it is focused mainly on extracting the contribution of intangible capital (which is superfluous in the present analysis, despite the fact that it is very much interesting for some other studies). However, because the coverage of the

[15] http://www.euklems.net. See: Jäger K., 2017.
[16] https://euklems-intanprod-llee.luiss.it/download/. See: Bontadini F. *et al.*, 2021.

mentioned 2021 release remains strained as well keeping the 2017 release in the analysis seems appropriate to enhance the validity of the study.

Quite traditionally, the above-mentioned growth decomposition is published on the EU KLEMS site for ten EU countries. These are: Austria, Belgium, Finland, France, Germany, Italy, the Netherlands, Spain, Sweden, and the UK (presently not a EU country). For these countries, the required data are available in the past beyond 2005, but to include as many countries as possible in the present study it has been limited to that year as the earliest one. The other point here is to identify the present trends that are still operating, not the past trends – so there is no need to go further in the past. In the 2017 release, the required data are available for these countries until 2015, except for Italy and Sweden for which the required data are available until 2014. In the 2021 release, the required data are available for these countries until 2019, except for Italy, Spain, the UK for which the required data are available until 2018, and Sweden for which the required data are available until 2017. In the 2017 release the above-mentioned decomposition was performed in addition for six EU countries: Czechia, Denmark, Latvia, Luxembourg, Slovakia, and Slovenia. In this release, for Denmark and Slovakia the required data are available for the entire period of the present study i.e. 2005-2015, for Czechia – 2005-2014, for Luxembourg – 2009-2015, for Latvia – 2009-2014, and for Slovenia – 2009-2013. In the 2021 release the above-mentioned decomposition was performed in addition for two EU countries: Latvia and Lithuania, covering the period 2010-2018. The US can be included in the study, since the required data for this country presented on these sites are just as available as for the above-mentioned ten European countries. An effort has been made to include Russia, for which the data available on the World KLEMS internet site are available until 2014 but in the older ISIC Rev. 3 classification system (equivalent to NACE Rev. 1, not NACE Rev. 2)[17] – these data are quite comparable methodologically with EU KLEMS 2017 release, not the 2021 release (so they are classified in the same left-hand-side table of Table 1). Data for Poland are taken from the Statistics Poland internet site[18] because they contain the above-mentioned GVA growth decomposition, missing for this country on the EU KLEMS site in the time span considered[19] – the methodology applied in their computation is very similar to that of the EU KLEMS 2017 release (therefore, they are presented in the same left-hand-side table of Table

[17] http://www.worldklems.net/data.htm
[18] https://stat.gov.pl/en/experimental-statistics/klems-economic-productivity-accounts/
[19] The methodology for Polish KLEMS accounting is closely aligned with the EU KLEMS methodology (Kotlewski, Błażej, 2018 and 2020).

1), and they are available until 2016. In the 2021 release appropriate data are also available for Japan for the period of 2005-2018.

In addition, on these EU KLEMS sites the required data are also available for country aggregates, which is of value because the countries in question are weighted in these aggregates. The first of these aggregates (EU12) included in the study consists of the above-mentioned group of ten countries together with Chechia and Denmark – the time series for this group covers the period of 2005-2015 in the 2017 release and 2010-2018 in the 2021 release. The second aggregate (EU16) consists of EU12 group of countries and Latvia, Luxembourg, Slovakia, and Slovenia – its time series covers the period of 2009-2015[20] in the 2017 release, but data for this aggregation are unavailable in the 2021 release[21]. On the World KLEMS site some data can be found for Argentina, India, South Korea, China and Canada – however, they cannot be easily used in the present study based mainly on EU KLEMS 2017 and 2021 releases, because they are either methodologically inconsistent or incomplete and often with too short time series[22]. To ease any further reference the data availability information has been compiled in Table 1.

As can be seen in Table 1 the considered countries can be generally divided into two group of countries – those for which the data are available for the entire period of the study (except sometimes: for the year 2015 and once for the year 2014 in the 2017 release, for the year 2019 and once for the year 2018 in the 2021 release), and those for which the data are only available from 2009 onward in the 2017 release and from 2010 onward in the 2021 release. Therefore, the study has been conducted latter on as a two-tier analysis, for two periods – the 2005-2015 period (for some countries shorter, for Poland up to 2016) and the 2009-2015 period (for some countries shorter, for Poland up to 2016) in the 2017 release. Similarly, these are 2005-2019 and 2010-2018 periods in the 2021 release. Because of the specific data availability structure the other divisions would be less readable.

[20] There is a small issue of Slovakia not being included in the EU12 aggregate on the EU KLEMS site for unknown reason. The other issue is why the data are unavailable for Denmark in the 2021 release despite it being included in the EU12 aggregate.

[21] There is also the EU19 aggregate in the 2021 release but with data issues (obvious errors), therefore this aggregate could not be used in the present analysis.

[22] The two main platforms are LA KLEMS (i.e., Latin America KLEMS) and Asia KLEMS. The data for the great majority of these countries are very basic, not performing growth accounting with a decomposition.

Table 1.

EU KLEMS data availability for countries included in the study based on 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				X		1	Austria	X				X
2	Belgium	X				X		2	Belgium	X				X
3	Czechia	X			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 the data are in ISIC 3 classification. EU12 is the aggregate of 12 European countries from EU KLEMS internet site, for which the data required in the study are available at least from 2005 onward. It contains: Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, the Netherlands, Spain, Sweden and the UK. EU16 is the aggregate of 16 European countries from EU KLEMS internet site, for which the data required in the study are available only from 2009 onward. It contains: EU12 countries and Latvia, Luxembourg, Slovakia and Slovenia.

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

The data used in the study are in the Appendix Tables A1, A2, A3, and A4. These data concern the total economy and the manufacturing sector (NACE section C)[23] for the 21

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

countries and country aggregates in the 2017 release and for the 16 countries and country aggregates in the 2021 release, compiled in Table 1. Thanks to compound values, that have been calculated, there is the possibility to clearly establish whether the process of reindustrialization (understood as above mentioned) have truly operated in the considered time spans. Moreover, it can be established, in as much as the presented methodology is viable in this respect, whether these processes were beneficial for economic development – i.e. whether they can be considered as sustainable in the long run. Their sustainability is important, otherwise these processes should be considered as ephemerids that although also interesting for the researcher are however of lesser importance in the light of the rationale presented in the first section.

4. EMPIRICAL FINDINGS

In order to carry out a joint analysis of the issue in question and formulate a general opinion on whether the reindustrialization process was really happening in the world economy[24], and whether it is economically advisable in general, all the compound results from Tables in the Appendix have been compiled in Table 2 below. The results based on the 2017 release are different to some degree from the results based on the 2021 release. The main reason is the difference in the time series. The additional years 2016-2019 of the 2021 release were quite prosperous for the world economy, including the countries considered in the present analysis. Therefore, the compound values based on the 2021 release are usually much higher. In addition, the shorter time series starting from 2010 in the 2021 release do not cover the year 2009, included in the shorter time series of the 2017 release, which was a deep recession year. The differences of the outcome results based on the 2021 release in comparison with the outcome results based on the 2017 release, have been indicated in Table 2 as grey cells. These differences remain surprisingly minor, as far as the general outcome of the study is considered, particularly for the longer time series starting from 2005 onward, and they do not contradict the general conclusions, which are meant to be general, not specific.

[24] This 'world economy' is forcibly limited here to the group of countries presented initially in Table 1. But it is thought that they are representative to a considerable degree for the group of countries that have undergone deindustrialization in the past.

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	+
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:

Reindustrialization: is happening – R, is not happening – nR,

Symbols '+' mean that reindustrialization is advisable because of the appropriate level of MFP, whereas the symbols '-' mean that it is not.

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

The results show that for the considered group of countries in the EU KLEMS 2017 release from 2005 onward reindustrialization is observed for 6 countries (symbol 'R' in Table

2) and for 10 countries and the EU12 aggregate it is not observed (symbol 'nR' in Table 2) – this reindustrialization is being understood here as a situation of a faster compound growth rate in the manufacturing sector (defined as above mentioned) than for the aggregate economy. From the point of view of productivity contribution (understood as MFP contribution as in the KLEMS growth accounting framework) reindustrialisation, meant as manufacturing relative extension, is advisable for 14 countries and for the EU12 aggregate (which is indicated by '+' in the Table) as far as the speed of economic growth is considered. It is because the contribution of MFP to GVA growth is higher in manufacturing than for the entire economy in these countries. For 2 countries reindustrialization is not advisable (indicated by '-' in the Table) because the converse is observed. The results based on the EU KLEMS 2021 release from 2005 onward differ only slightly (two grey cells in the Table), but the coverage is somehow different. Here, reindustrialization is observed for 3 countries, and for 10 countries it is not observed. It is advisable for all the countries considered from this release.

The group of countries considered in the present study can be extended if the time span is shortened to the period from 2009 onward for the 2017 release and from 2010 onward for the 2021 release. The results based on the 2017 release show that for the considered group of countries from 2009 onward reindustrialization is observed for 4 countries. For 15 countries, the EU12 and the EU16 aggregates it is not observed. From the point of view of productivity contribution reindustrialization is advisable for 15 countries, the EU12 and the EU16 aggregates, and for 4 countries it is not advisable. The results based on the 2021 release show that for the considered group of countries from 2010 onward reindustrialization is observed for 8 countries and the EU12 aggregate, and for 7 countries it is not observed. From the point of view of this release reindustrialization is advisable for all the 15 countries considered and for the EU12 aggregation. There are 10 grey cells in Table 2 indicating some outcome differences in comparison with the 2017 release. However, the results based on the 2021 release do not contradict the general outcome based on the 2017 release but strengthen it.

This outcome based on the 2017 release indicates that the process of reindustrialization as an international trend did not operate in the considered countries, mostly developed ones. It was only a local phenomenon, active for only few countries. But at the same time, it seems that reindustrialization was in most cases advisable, as confirmed for two periods starting from 2005 and 2009. The outcome based on the 2021 release is slightly different, particularly for the shorter period from 2010 onward when we can observe that the number of countries with reindustrializing economies has increased conspicuously. Based on this release, we can observe

that reindustrialization is advisable for all the considered countries. The countries in question are however of varied sizes, so this result should be made more plausible. In order to achieve this, we can observe the data for the EU12 aggregate economy and the EU16 aggregate economy. Based on the 2017 release considered in the study, the outcome results are the same for both aggregations – reindustrialization is not operating for these entities but it is advisable as far as the pace of economic growth is considered following the rationale explained at the beginning of this paper. Based on the 2021 release, reindustrialization is operating in the period from 2010 onward for the EU12 aggregate, however, and it is advisable.[25]

5. CONCLUSION

In the present condition of available statistical data, in the light of the growth accounting methodology, the analysis of whether the process of reindustrialisation of the economy is happening can be conducted, only as a partial exercise – the performed study is however quite representative for the OECD countries. At the same time it is possible to assess, quiet sensibly, whether this process is beneficial for the economy in general, and therefore economically advisable – this is the merit of the use of KLEMS growth accounting for this kind of exercise. The resulting outcomes of the present study can be inspiring as far as the economic reconstruction period is considered, when the onslaught of the Covid-19 pandemic and the crisis generated by the Ukraine-Russia conflict will be over.

The study that was carried out indicates that the controversy on whether to reindustrialize the economy or not is substantial. On the one hand, it seems that based on the EU KLEMS 2017 release reindustrialization was happening in the considered periods (2005-2015 and 2009-2015) for the considered countries only in some rare cases, despite that based on the EU KLEMS 2021 release it can be ascertained that it got some momentum in the later years 2016-2019. On the other hand, it seems that it was quite advisable and should be embraced, and this outcome is even more indubitable based on the 2021 release.

It seems that in a situation of the observed secular phenomenon of a worldwide productivity increase slowdown, all means that can help to reverse or at least contain this negative trend should be engaged, and reindustrialization happen to be one of them. It is conspicuous that for numerous countries the return to manufacturing should be accepted as

[25] Some estimation about countries undergoing *industrialization* not *reindustrialization* can be advanced, though it is only intuition. These countries are mostly developing countries, sometimes already medium income countries, termed sometimes as *emerging markets.* We believe that this industrialization would happen to be found through KLEMS lenses as happening and advisable at the same time.

beneficial for their economies. It should, however, be understood as the manufacturing sector (NACE section C) share increase and probably requires capital investment in the more advanced part of it. To strengthen this assertion, more future research on the topic is paramount when data availability limitations will be lifted, however.

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Appendix

Table A1

GVA growths and MFP contributions to growths at the aggregate level,

for countries included in the study, based on EU KLEMS 2017 release

Total economy		Growths													
		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
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: Data in NACE Rev. 2 classification or its equivalent ISIC 4 classification, except for Russia for which the data are in ISIC 3 classification. EU12 is the aggregate of 12 European countries from EU KLEMS sites, for which the data required in the study are available at least from 2005 onward. It contains: Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, the Netherlands, Spain, Sweden and the UK. EU16 is the aggregate of 16 European countries from EU KLEMS internet site, for which the data required in the study are available only from 2009 onward. It contains: EU12 countries and Latvia, Luxembourg, Slovakia and Slovenia. Blank cells mean data unavailable or superfluous (since incomplete for the study).

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

Table A2

GVA growths and MFP contribution to growths for manufacturing (NACE section C),

for countries included in the study, based on EU KLEMS 2017 release

NACE section C		Growths													
		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: same as for Table A1.

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

Table A3

GVA growths and MFP contributions to growths at the aggregate level,

for countries included in the study, based on EU KLEMS 2021 release

Total economy		Growths																	
		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	-0.5412	-0.1439	-0.45182	-0.93134	-3.87231	1.503248	0.313992	-1.48452	-0.34215	-0.10414	0.243203	0.197174	0.539822	-0.0797	-0.21654	-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	3.401872	4.15141	3.975828	1.270786	-3.29835	-0.10656	-0.4353	-2.93115	-1.29806	0.939223	3.220188	2.776819	3.039165	2.461711		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: Data in NACE Rev. 2 classification or its equivalent ISIC 4 classification. EU12 is the aggregate of 12 European countries from EU KLEMS sites, for which the data required in the study are available at least from 2005 onward. It contains: Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, the Netherlands, Spain, Sweden and the UK. Blank cells mean data unavailable or superfluous (since incomplete for the study).

Source: own elaboration based on EU KLEMS 2021 release.

Table A4

GVA growths and MFP contribution to growths for manufacturing (NACE section C),

for countries included in the study, based on EU KLEMS 2021 release

NACE section C		Growths																	
		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: same as for Table A3.

Source: own elaboration based on EU KLEMS 2021 release.