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Deindustrialisation and productivity in the EU

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ABSTRACT
This article is envisioned as a first step in a comprehensive analysis of the European Union's (EU) industrial base, designed to inform the current debate, and future policy decisions regarding deindustrialisation and reindustrialisation in the EU. We focus on the study of deindustrialisation and productivity, to determine the causes of deindustrialisation and its relation to productivity in the EU, and whether it can be explained primarily as a natural process, or alternatively as a negative economic trend. Our results indicate that the main causes of deindustrialisation in the EU were shifting demand patterns caused by rising GDP per capita, followed by growing international trade which corroborates the hypothesis that the process is natural. In the second part we take a closer look at manufacturing productivity as an integral cause of deindustrialisation. We analyse the impact of market dynamics, concentration and firm size on manufacturing productivity, where we find evidence which supports the conclusion that a higher level of market dynamics increases productivity, while firm size and market concentration seem to decrease industry productivity.

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1. Introduction

Deindustrialisation is a well-researched phenomenon that began in the second half of the twentieth century in developed countries. Since then it has spread to developing countries as well (primarily in Eastern Europe and South America), making it a global, almost all encompassing phenomenon. Before the crisis of 2008, the prevailing opinion was that it was simply a by-product of successful economic development. Interfering with the process, especially by using industrial policies or strategies, was frowned upon by neoclassical orthodoxy. However, after the crisis the prevailing opinion shifted. Rodrik (2009) was one of the first to openly support industrial policies in the aftermath, seeing them as a necessity in the event of market failures. Countries gradually started shifting their focus more and more toward industrial performance, and previously dormant ideas that stressed the link between manufacturing and overall economic growth again began to see the light of day. The term 'reindustrialisation' could be heard in increasing frequency. In light of these events, the European Union (EU) states decided to begin working on a common industrial policy.

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The policy is described in detail in the 'Communication on industrial policy' (European Commission, 2014). It calls for a thorough modernisation and reindustrialisation of the EU's industrial base, focusing on highly adaptive, technologically advanced and productive industries.

In this context, we believe a systematic analysis of both deindustrialisation and productivity in an EU context is needed. Following this reasoning, this article consists of two parts, and is structured as follows. In the first part we attempt to analyse and determine the causes of deindustrialisation in the EU. By doing so we hope to further the discussion on the determinants of deindustrialisation that was primarily based on research on the OECD countries, by using EU data. This research is important because it establishes whether deindustrialisation in the EU can be seen as a naturally occurring process, or as a symptom of an underperforming industrial sector. In the second part we take a closer look at manufacturing productivity as an integral cause of deindustrialisation, as well as a key indicator of reindustrialisation. Because of its central role in both processes, we analyse the impact of market dynamics, firm concentration and firm size on manufacturing productivity. This central role of productivity consists of the fact that increased productivity usually results in a decrease of the number of workers employed, which is basically synonymous with deindustrialisation. Reindustrialisation on the other hand is characterised by growth of highly productive technologically advanced industries with above average value-added per worker.

2. Deindustrialisation

Deindustrialisation is usually defined either as an absolute or relative (to total employment) decrease of employment in industry, or as a decrease of the share of industry in GDP/value added GDP (Rowthorn & Ramaswamy, 1997; Sachs, Shatz, Deardorff, & Hall, 1994). Both of these measures can be criticised. The problem with decreasing industrial employment as a measure of deindustrialisation is that it is theoretically possible (if productivity is high enough) for it to coexist with rising industrial output and/or share in GDP, where it would then be highly debatable to categorise a country experiencing such economic developments as 'deindustrialisation'. This problem is of course solved by using the share of industry in GDP as a measure of deindustrialisation, but then we encounter difficulties of a different kind. The main one is changing prices. If for example manufacturing prices were to decrease while at the same time the market experiences a rise in prices in the service sector, this would translate into a falling share of manufacturing in GDP without any change in output or number of persons employed, which again, could hardly be characterised as deindustrialisation.

The second problem seems to us to be larger than the first. While it is debatable whether a country with decreasing employment in industrial activities but increasing industrial output is *actually* deindustrialising, in our opinion it is not debatable whether a country that isn't experiencing a drop in industrial output or employment is deindustrialising – it is not. Therefore, like the majority of research done on this subject (Kollmeyer, 2009; Krugman, 1996; Rowthorn & Ramaswamy, 1999), we opt for industrial employment as the variable of choice when discussing deindustrialisation.

However it is measured, there is no escaping the fact that in the last few decades deindustrialisation has been experienced by virtually all developed countries, and also by a growing number of developing countries. Since it implies major long-term structural changes, it has been a subject of great interest to economists. Consequently, a large (and growing) body of literature has been devoted to the subject, trying to pinpoint and explain the size, scope, and causes of this phenomenon.

2.1. Causes and determinants

As a first step, the causes of deindustrialisation can be roughly divided into two categories: *internal* to the country in question, and *external* to it.

The first authors who wrote on the subject of deindustrialisation concentrated on internal causes. Clark (1957) theorised that as an economy gets more advanced, after a certain point it will experience a systematic shift in demand from manufactured goods to services. This explanation assumes changing income elasticity's for manufactured goods as per capita GDP increases. At lower levels of GDP per capita, income elasticity for manufactured goods is assumed to be high, but starts to decrease as GDP per capita rises, and the share of income devoted to manufactured goods loses ground to services. This of course does not necessarily mean that household expenses on manufactured goods decrease in absolute terms, although this was proposed by sociologist Daniel Bell (1976), who from a psychological perspective argued that when a population becomes (from their point of view) sufficiently equipped with industrial goods, they turn their attention to services.

A different approach was taken by Baumol (1967) who argued that the root cause of deindustrialisation is a higher productivity growth rate in the industrial sector as opposed to the service sector. By this logic, even assuming a constant level of output in both sectors, higher productivity in manufacturing implies fewer workers are needed for maintaining the same level of output, which then leads to the excess workforce becoming unemployed, and presumably eventually gravitating toward the service sector. However, interestingly Rowthorn and Ramaswamy (1999) point out that the exact consequences of higher relative productivity of manufacturing are theoretically somewhat ambiguous, since in addition to decreasing work needed for maintaining the same level of output, rising productivity should lower the relative price of manufactured goods, thereby increasing demand for them, which in turn should lead to more workers being employed in manufacturing. Consequently, in order for deindustrialisation to occur, the former effect has to be stronger than the latter, perhaps due to demand for manufactured goods not increasing because of reasons stated in the previous passage.

As for external causes, the large-scale decrease of employment in manufacturing in the past few decades has coincided with tremendous growth in trade between developed and developing countries, making North–South trade the primary suspect in the search for causes of deindustrialisation.

There are two avenues by which changes in trade patterns can cause deindustrialisation, and both have to do with specialisation. The first is tied to long-term economic policy, where countries focus on developing certain sectors of their economy which they think will maximise growth. If, for example, a country has a deficit in raw materials, food, energy, etc. it will be more inclined to specialise in manufacturing and the production of sophisticated products, and use the revenues gained from exporting such products to finance the import of whatever it is they lack. Another example would be developing countries that target certain sectors of the economy which they think will have the highest impact on GDP growth. In socialist countries this was mostly heavy industry, and in more recent times, we have the Asian tigers with their strong focus on electronics. Thus, increasing specialisation connected with increasing globalisation, will necessitate a shift in certain countries away from manufacturing, which will lead to deindustrialisation.

The second avenue has to do with specialisation *within* manufacturing. The trend in recent times has been that developed countries will increasingly specialise in sophisticated manufactured products which require a small number of high skilled workers, while developing countries will specialise in less skill-intensive industries which yield products of a lesser degree of sophistication. Thus, labour intensive industries in developed countries will lose ground to labour-intensive industries in developing countries, and the corresponding loss of employment in labour-intensive industries will not be absorbed by the skill-intensive industries, due to their low labour requirements. In the end, this will result in a net loss of labour in manufacturing, which is precisely how industrialisation is defined.

These three phenomenona (the shift in demand, the rise of productivity and the shift in trade patterns) are considered to be the dominant causes of deindustrialisation. A few others are mentioned in the existing literature that usually do not carry as much explanatory weight. Among these are: fixed investments and simple statistical redefining.

The amount of fixed investments made by the private sector is theoretically a substantial factor in determining the size of the manufacturing sector. Since a large portion of private investments is usually reserved for manufacturing it follows that if the marginal propensity to save declines in a given population (due to for example: recession), manufacturing employment will tend to fall as well, leading to deindustrialisation.

What is meant by 'simple statistical redefining' is a reclassification in official statistical databases of certain industries from 'manufacturing' to 'services'. This occurs because of, again, increasing specialisation, where manufacturing firms outsource a number of links in their production chain to outside contractors who specialise in such services, whereby these links are then reclassified as services, leading to a statistical drop in workers employed in manufacturing, where, in fact, there is none.

2.2. Empirical analysis

All of the empirical research involving the causes of deindustrialisation agrees that, in essence, there are three causes worth considering when discussing deindustrialisation. These are: a shift in consumer demand, rising productivity, and increasing globalisation (NorthS–outh trade).

The point of contention is whether the most important factors are internal (as maintained by Kollmeyer, 2009; Krugman & Lawrence, 1993; Krugman, 1996; Rowthorn & Ramaswamy, 1999; Rowthorn & Coutts, 2004), or connected to North–South trade (as maintained by Kucera & Milberg, 2003; Sachs et al., 1994; Saeger, 1997; Wood, 1995).

And of the internal causes, which is more important: the shift in consumer demand , or rising productivity? In our study we are primarily interested in deindustrialisation in the EU. Since most of the above studies are by now 10-years-old (or more), we hope to further this discussion with more recent data. In addition, all of the aforementioned studies have been conducted using data on 18–23 OECD countries from the OECD database, while we are primarily interested in deindustrialisation within the EU, therefore we deviate from this norm by using data on EU-27 countries.

2.2.1. Data, variables and methods

Our data was obtained from World Development Indicators (WDI), and Eurostat (for data on labour productivity). Regarding the method of analysis, since we are looking for causes of deindustrialisation of EU-27 countries, the natural way to represent our data is in panel format. Our cross-section element is therefore comprised of 27 EU member states. Our time series is 18 years, from 1995 to 2012, which, after accounting for missing data brings us to a total of 357 observations. Our equation is as follows:

$$\begin{aligned} \ln\left(industryemp_{i,t}\right) = \beta_0 &+ \beta_1 \ln\left(GDPpc_{i,t}\right) + \beta_2 (\ln\left(GDPpc_{i,t}\right))^2 + \beta_3 \ln\left(trade_{i,t}\right) \\ &+ \beta_4 \ln\left(labprodeurostat_{i,t}\right) + \beta_5 \ln\left(Unemrate_{i,t}\right) \\ &+ \beta_6 \ln\left(Growthr_{i,t}\right) + \varepsilon \end{aligned} \tag{1}$$

Where *industryemp* is industrial employment, calculated as a percentage share of total employment, *GDPpc* is GDP per capita, *labprodeurostat* is labour productivity calculated as an index, *trade* represents the share of import plus export in GDP, *Unemrate* is the unemployment rate of the overall economy, and *Growthr* is the growth rate of the overall economy. Summary statistics of the variables used in equation (1) are given in Table 4

GDPpc and squared GDPpc are supposed to account for Clark's (1957) effect of shifting demand for industrial products, where the expected result is that higher levels of GDP per capita should in the beginning lead to larger shares of industrial employment in the economy (which is accounted for with the variable GDPpc), but in later stages of development rising GDP per capita is expected to have the opposite effect on industrial employment (accounted for with squared GDPpc). The variable *labprodeurostat* (labour productivity) is here to account for Baumol's (1967) effect of rising productivity, which assumes that productivity growth is higher in manufacturing than in other sectors of the economy, and therefore should lead to a decrease in industrial employment.[1] The variable *trade* is envisioned as a direct measure of the effects of shifting trade patterns, where increasing trade connections should in theory lead to a decrease in industrial employment, either by way of between country specialisation, or within country specialisation.

Various control variables were experimented with, including: Foreign direct investment (FDI), Gross capital formation (GCF), unemployment rate, GDP growth rate, and a dummy EU variable to account for the fact that some countries are not EU members throughout the entire sample. Of these, only the unemployment and GDP growth rates were included in the final regression, since all the other mentioned variables proved to be statistically insignificant in every model used.

The majority of the empirical work mentioned earlier (especially the work done in the 1990s) used pooled ordinary least squares (OLS) as the primary regression method. This article aims to improve upon the statistics by using the standard three models of static panel analysis in the estimation of the above equation: pooled OLS, random-effects model and fixed-effects model. Additionally, a version of a robust fixed-effect model that clusters the error terms around the time variable was used as the fourth model (Fixed CE). It is designed to give better results in the presence of heteroscedasticity and cross-sectional dependence as described in Hoechle (2007). These methods should in theory prove superior to pure OLS, since the EU countries and industries constitute a very heterogeneous group, a fact that OLS ignores.

2.3.2. Results

Our overall results are presented in Table 1, as well as the results of tests for random effects, autocorrelation, Hausmann test, heteroscedasticity and cross-sectional dependence. The results of the various tests suggest the presence of cross-sectional dependence and heteroscedasticity but not of autocorrelation, so a fifth model (Fixed CE) was used, which is (as described above) essentially a robust version of the fixed-effects model designed to address the specific set of specification problems that were encountered. The results of the tests also suggest that the random-effects model is superior both to pooled OLS and fixed-effects models, so we consider it to be the most correct specification of the five.

The results of the random-effects model indicate that the strongest negative effect on industrial employment was Clark's (1957) effect of rising GDP per capita, which leads to an average drop of industrial employment of 0, 18% when increased by 1%. This is followed closely by international trade, which when increased by 1% leads to an average drop of 0.17% in industrial employment. Productivity as a cause of deindustrialisation comes in last, as it decreases industrial employment only by 0.12% when increased by 1%. As far as the debate between internal and external causes goes, the results indicate that internal causes (GDPpc, and productivity) have a larger effect on deindustrialisation than external (trade), as argued by Krugman and Lawrence (1993), Krugman (1996), Rowthorn and Ramaswamy (1999), Rowthorn and Coutts (2004) and Kollmeyer (2009). Furthermore, the results indicate that Clark's effect seems to be stronger than Baumol's, that is, GDP growth seems to have a stronger effect on deindustrialisation than rising productivity, which is in agreement with the findings of Kollmeyer (2009).

Table 1. Regression results of equation (1).

	(1)	(2)	(3)	(4)
VARIABLES	OLS	Random	Fixed	FixedCE
lnGDPpc	2.691***	3.272***	3.383***	3.383***
	(0.262)	(0.247)	(0.253)	(0.315)
sqlnGDPpc	−0.147***	−0.178***	−0.182***	−0.182***
	(0.0136)	(0.0128)	(0.0135)	(0.0176)
Lntrade	−0.0146	−0.168***	−0.207***	−0.207***
	(0.0199)	(0.0273)	(0.0324)	(0.0333)
lnlabprodeurostat	−0.158**	−0.117***	−0.119**	−0.119*
	(0.0661)	(0.0398)	(0.0586)	(0.0668)
lnUnemrate	−0.0256	−0.120***	−0.117***	−0.117***
	(0.0222)	(0.0123)	(0.0145)	(0.0239)
lnGrowthr	0.00299	0.0208***	0.0212***	0.0212***
	(0.00880)	(0.00335)	(0.00332)	(0.00559)
Constant	−7.956***	−10.02***	−10.52***	−10.52***
	(1.268)	(1.161)	(1.190)	(1.370)
Observations	357	357	357	357
R-squared	0.507		0.639	0.639
Number of ID		27	27	27
Breusch-Pagan(χ^2)		1300.48***		
Hausmann(χ^2)		7.97		
ALM(Var(u)=0) (χ^2)		1066***		
ALM(lambda=0) (χ^2)		3.43*		
Wald (χ^2)			456.35***	
Pesaran			8.7***	

Standard errors in parentheses.
***$p < 0.01$.
**$p < 0.05$.
*$p < 0.1$.
Source: Authors.

The results are overall in agreement with the literature, and point to the conclusion that a large portion of EU deindustrialisation can be explained as a by-product of successful economic growth (evidenced by rising GDP per capita and productivity). In other words: a natural process.

3. Productivity

There are two key words that constantly 'pop-up' while reading the 'Communication on industrial policy' (2014), and these are: competitiveness and reindustrialisation. Since both are tightly linked with productivity (which was also a significant variable in our analysis of deindustrialisation), in this section we will take a closer look at productivity. Specifically, we are interested in how industry dynamics, firm and industry size will affect industrial productivity. As far as the link between firm size and productivity is concerned, the majority of recent papers conclude that larger firms will on average be more productive (Van Ark & Monikoff, 1996; Van Bieseboreck, 2005; Leung, Meh, & Terajima, 2008; Snodgrass & Biggs, 1996). This falls in line with the Schumpeterian view that large monopolistic firms are the true engine of growth as opposed to the classical view that industries with small firms and strong competition should exhibit the fastest productivity growth.

The link between industry size and dynamics with productivity however, is found to be in line with classical assumptions, where most of the papers on the subject find a positive effect of industry dynamics and overall increased level of competition on productivity (Bartelsman & Doms, 2000; Dune, Klimek, & Schmitz, 2008; De Loecker, 2009; Syverson, 2004; Schmitz, 2005). Since industry size (or industry concentration) is essentially a proxy for the level of competition, we expect that the reduction of the number of firms in an industry should on average lead to decreasing productivity in the industry. However, there is some evidence that the causal relationship between industry concentration and productivity is not so simple, but that although increasing concentration leads to higher productivity, there exists a threshold after which the effect becomes negative (Gopinath, Pick, & Li, 2002).

3.1. Data, variables and methods

Since we are interested in how industry dynamics, firm size, and industry size affect productivity at the industrial level, our cross-section element are manufacturing industries of EU-27 countries in the period 2008–2013, which translates to 1807 distinct observations. Our data source is Eurostat. The term 'industry' refers to the standard NACE Rev.2. classification of industrial activities at the two-digit level of aggregation, where 'C' is the manufacturing sector, comprised of 24 separate industries (C10-C33). Additionally, since Eurostat's data on business demography is available only in a certain format (which aggregates a part of the original 24 industries to 15 industries) we follow the same classification. The 15 industries in question are given in Table 2.

Since we cannot take both countries and individual industries as our cross-section element, we decided on the approach to simply treat each industry in each country as completely separate entities (for example, the textile industry in Germany is considered as a separate unit of analysis from the textile industry of any other country in the sample, and from every other industry in the same country). In short, our cross-section element is

Table 2. NACE rev. two-digit classification.

Industry	NACE rev.2 classification	Label
1	C10-C12	Manufacture of food products; beverages and tobacco products
2	C13-C14	Manufacture of textiles and wearing apparel
3	C15	Manufacture of leather and related products
4	C16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
5	C17-C18	Manufacture of paper and paper products; printing and reproduction of recorded media
6	C19	Manufacture of coke and refined petroleum products
7	C20-C21	Manufacture of chemicals and chemical products; basic pharmaceutical products and pharmaceutical preparations
8	C22	Manufacture of rubber and plastic products
9	C23	Manufacture of other non-metallic mineral products
10	C24-C25	Manufacture of basic metals and fabricated metal products, except machinery and equipment
11	C26-C27	Manufacture of computer, electronic and optical products; manufacture of electrical equipment
12	C28	Manufacture of machinery and equipment n.e.c.
13	C29-C30	Manufacture of motor vehicles, trailers, semi-trailers and of other transport equipment
14	C31-C32	Manufacture of furniture; other manufacturing
15	C33	Repair and installation of machinery and equipment

Source: Authors (adapted from Eurostat's business demography statistics).

comprised of every EU-27 industry, while the fact that some industries belong to the same country is ignored.

Our equation is:

$$ln(labprod_{i,t}) = \beta_0 + \beta_1 nbr_{i,t} + \beta_2 \ln\left(invpp_{i,t}\right) + \beta_3\left(pemp_{i,t}\right) + \beta_4 \ln(noe_{i,t}) + \beta_5 \ln(pc_{i,t}) + \varepsilon \tag{2}$$

Where β_0 is the constant term, *labprod* is labour productivity for a given industry, *nbr* encompasses the net birth rate of firms[2] in a given industry, *invpp* stands for investment per person, *pemp* is number of persons employed, *noe* stands for number of enterprises, and *pc* for personnel costs. We are interested in how industry dynamics (accounted for by *dynamics*), firm size (accounted for by *pemp*) and industry size (accounted for by *noe*) affect industry productivity, while *invpp* and *pc* are included as control variables. Summary statistics of all the variables used in equation (2) are given in Table 5.

3.2. Results

Our overall results are presented in Table 3, with the results of tests for random effects, autocorrelation, heteroscedasticity and of the Hausmann test. The results of the various tests suggest the presence of autocorrelation, heteroscedasticity and possibly cross-sectional dependence,[3] so a fifth (FixedCE) and sixth (PW) model were used. The 'Fixed CE' (clustered error) model is used in the case of the presence of autocorrelation and heteroscedasticity, while the 'PW' (Prais-Winsten regression) model is used to account for the presence of cross-sectional dependence (if any), as recommended by Hoechle (2007). Since virtually all of the tested models show the same sign in all the variables (if not intensity), we can conclude that industry dynamics, investments per person, and personnel costs all have a positive effect on labour productivity, while the number of firms and employees in an industry have a

Table 3. Regression results of equation (2).

	(1)	(2)	(3)	(4)	(5)
VARIABLES	OLS	Random	Fixed	FixedCE	PW
nbr	0.169	0.782***	0.908***	0.908**	0.499**
	(0.194)	(0.135)	(0.137)	(0.411)	(0.241)
lninvpp	0.264***	0.182***	0.0769***	0.0769**	0.213***
	(0.00783)	(0.0116)	(0.0165)	(0.0329)	(0.0142)
lnpemp	−0.685***	−0.646***	−0.402***	−0.402***	−0.663***
	(0.0148)	(0.0266)	(0.0592)	(0.148)	(0.0222)
lnnoe	−0.0124*	−0.0342***	−0.234***	−0.234**	−0.0206**
	(0.00693)	(0.0130)	(0.0558)	(0.105)	(0.0104)
lnpc	0.741***	0.740***	0.640***	0.640***	0.745***
	(0.0118)	(0.0213)	(0.0471)	(0.104)	(0.0188)
Constant	5.721***	5.682***	5.535***	5.535***	5.638***
	(0.0789)	(0.138)	(0.566)	(1.291)	(0.133)
Observations	1,807	1,807	1,807	1,807	1,807
R-squared	0.827		0.177	0.177	0.908
Number of id		367	367	367	367
Breusch-Pagan(χ^2)		1603.91***			
Hausmann(χ^2)		104.66***			
ALM(Var(u)=0) (χ^2)		609.17***			
ALM(lambda=0)(χ^2)		129.43***			
Wald (χ^2)			7.5e+31***		

Standard errors in parentheses.
***$p < 0.01$.
**$p < 0.05$.
*$p < 0.1$.
Source: Authors.

Table 4. Summary statistics of variables used in equation (1).

Variable	Obs	Mean	Std. Dev.	Min	Max
lnindustry~p	471	3.314802	.2165199	2.517696	3.763523
lnGDPpc	506	9.846658	.8074398	7.763865	11.38187
sqlnGDPpc	506	97.60734	15.5491	60.27761	129.5469
lntrade	504	4.532847	.4454097	3.611653	5.917387
lnlabprode~t	481	4.56764	.1466147	4.065602	5.065124
lnUnemrate	474	2.071356	.4416576	.6418539	3.314186
lnGrowthr	425	1.031839	.9264945	−4.590463	2.504156

Source: Authors.

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lnGrowthr	425	1.031839	.9264945	−4.590463	2.504156

Source: Authors.

negative effect on that industry's productivity. Taken together, the positive effect of industry dynamics and negative effects of firm and industry size are somewhat perplexing. Under the standard classical assumptions more competition should lead to higher productivity, so the expected result would be that industry size and dynamics should have a positive effect, while firm size should have a negative effect on industry productivity. The Schumpeterian view on the other hand is that the engine of productivity growth is located primarily in large monopolistic firms, which means we should expect a positive effect of firm size, and a negative effect of industry size on productivity. As we have shown, our results corroborate neither possibility completely, which suggests that in the EU the causal links between these variables are more subtle and complex, and in our opinion warrant further investigation (perhaps in line with the attempt of Gopinath, Pick, and Li [2002]).

4. Conclusion

In our investigation of deindustrialisation within the EU, in the context of the European Commission's call for smart reindustrialisation through focusing on competitiveness and productivity, we opted for a two layered approach.

First, we attempted to ascertain the main driving forces of deindustrialisation and their respective strength. We concluded that rising GDP per capita had the strongest effect on deindustrialisation within EU-27 countries in the period 1995–2012, followed by increasing trade volume, and lastly by productivity, which suggests that deindustrialisation in the EU is primarily caused by the natural process of gravitating toward the service sector, which is experienced by all advanced economies.

As our next step, we took a closer look at productivity. Specifically we tried to ascertain the effects of firm size, industry size and industry dynamics on productivity in the EU-27 in the period 2008–2013. Our results indicate that firm and industry size have a negative effect, while industry dynamics have a positive effect on productivity, suggesting a more complicated causal relationship between these variables than is expected from the viewpoint of a straightforward Schumpeterian-classical dichotomy.

This article is viewed as a first step in a comprehensive analysis of the EU's industrial base, designed to inform the current EU debate on deindustrialisation and reindustrialisation. We feel it would be useful for further analysis to focus on disentangling the theoretically somewhat perplexing results obtained in our research regarding the relationship between firm size, industry size, industry dynamics and their relationship with productivity. This could perhaps be achieved by conducting the analysis on a smaller, more homogenous sample (with individual countries, or groups of countries with similar characteristics).

Notes

1. Note that the ideal measure here would be manufacturing or industrial productivity, but that data is unavailable for the period in question. Instead we concluded that overall labour productivity will serve as a satisfactory proxy variable, since we assume that the vast majority of overall productivity growth within a country comes from manufacturing (industrial) productivity growth, rather than productivity growth in services.
2. Calculated as: (No. of birth of enterprises - No. of deaths of enterprises) / No. of enteprises.
3. Since our sample contains a fair amount of missing observations, and thus creates a highly unbalanced panel, we were unable to perform standard tests for cross-sectional dependence (Pesaran's, Friedman's and Free's).

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