PREMATURE DEINDUSTRIALIZATION, INTER-SECTORAL EMPLOYMENT SHIFTS, AND ACCELERATED SERVICIZATION

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Abstract

Concern about the implications of 'premature deindustrialization' for economic growth of developing countries has evolved into investigation over whether parts of the service sector can play a propulsive role similar to that played by manufacturing previously. Such investigation is hampered by coarse and changing service sector classifications, but it does appear that some service sectors play such a role. In this paper we take the incremental but important step of identifying whether employment growth in certain service sectors corresponds with employment loss in manufacturing through 'premature deindustrialization,' deploying the counter-concept of 'accelerated servicization.' Investigating employment growth in key service sectors which are more finely classified than those used in the previous studies, we find that: (1) of five broadly classified service sectors, only that encompassing 'FIRE (finance, insurance and real estate) and business services' demonstrates accelerated servicization, and (2) this is attributable to the component sectors of 'information services' and 'business support,' but not FIRE. In fact FIRE exhibits a distinctive pattern, warranting the label 'quasi service.'

Keywords: economic development, premature deindustrialization, accelerated servicization, employment share, service sector

JEL Codes: L6, L8, O14, O15, J2

1. Introduction

Industrialization was long seen as *the* route to economic development, theorized by Kaldor (1967; 1968) and others. From the late 1960s, however, the world's first industrializer – Britain – began to deindustrialize (Singh, 1977), and it wasn't long before other countries started to follow. Indeed, some began to follow increasingly quickly. Britain began to deindustrialize almost 200 years after the industrial revolution, Japan after a century of industrialization, Korea and Taiwan after a mere 30 years. Nor was it only a matter of accelerated deindustrialization, as the process – measured in terms of declining employment share of manufacturing – began to set in at progressively lower levels of GDP per capita. This was characterized as 'premature deindustrialization' (UNCTAD, 2003; Rowthorn and Wells, 2004). Palma (2005) showed that deindustrialization set in at $20,645 GDP per capita in 1980, and plummeted to $8,691 in 1998 (in 1985 international US$).

The premature deindustrialization thesis has been further supported by large scale data sets. Using data from 42 developed and developing countries in the Groningen Growth and Development Centre (GGDC) database, Rodrik (2016) found that the employment share of manufacturing has more recently started to fall after a mere $6,000 GDP per capita (1990 US$), and while absorbing less than 20% share of the labour force. From an even larger database constructed from various sources, Felipe et.al. (2019) found that manufacturing employment share now peaks at 18% or less, in contrast to many earlier developers, where the share was over 30% for extended periods of time. Although the drop in manufacturing output and GDP share is less pronounced, they argue that, for economic development 'it's the jobs that matter.' For Sumner (2019), too, the growing gap between output and employment manifests the 'developer's dilemma' – an intensifying contradiction between structural transformation and productivity growth, and more inclusive, levelling-up growth.

Various explanations have been advanced for premature deindustrialization. They include reclassification of certain manufacturing jobs as service sector jobs, Dutch Disease effects in resource exporters, neoliberal economic policies (Palma, 2005), and rapid diffusion of advanced manufacturing technology through globalization (Rodrik, 2016). Although the phenomenon is widespread, it varies across countries. It is more pronounced in Latin America, for example, than in Asia. Indeed, Haraguchi et.al. (2017) argue that many developing countries have been deindustrialized because manufacturing has become concentrated in a small number of others, notably China. Yet even the recent 'workshop of the world' China is itself no exception to the 18% manufacturing employment share ceiling (Hou et.al., 2017).

Premature deindustrialization has been accompanied by qualitative changes within manufacturing as well. Whittaker et.al. (2020) propose 'thin industrialization' instead

of premature deindustrialization because in addition to absorbing fewer workers, manufacturing has tended to become concentrated in a relatively narrow range of sub-sector industries, and activities. In some cases, these industries and activities have grown spectacularly through global value chain engagement, but often without the depth, and particularly inter-industry linkages that earlier developers created over time. Thin industrialization echoes the findings of Romano and Trau (2017), who find a link between intra-sectoral concentration and export specialization, which enables later developers to grow extremely quickly, until they reach an early ceiling.

Thin or premature deindustrialization raises questions about the role of other sectors, including whether other sectors are able to serve the same 'propulsive' developmental role nowadays as manufacturing did in the past (cf. Dasgupta and Singh, 2005). Not surprisingly attention has focused on the service sector, at first tentatively and somewhat dubiously, but with increasing confidence. Szirmai (2009) cautiously noted that the advantage of manufacturing over services in terms of capital intensity, and hence capital accumulation, has declined, and that scale economies have become possible in services as well. For Kharas and Kohli (2011: 285) 'services have become a powerful engine of growth in many middle-income countries. In fact, service exports have become the fastest growing export sector globally and for many developing countries. Service productivity growth is outstripping industrial productivity growth in most developing and advanced economies.' Gryczka (2016) adds that the 'deagrarianization-deindustrialization-servicization chain' is being driven by technological progress, while Di Meglio et.al. (2018) have looked inside the service sector, and found that business services can indeed create a Kaldorian productivity growth dynamic, whereas other services appear to work against it.

The cautionary view is that a path from agriculture to services which does not lead firmly through manufacturing is a path to a 'middle income trap' (ADB, 2013). But it might be also argued that sectoral boundaries are becoming blurred, and even agriculture can feature exportability, capital intensity, and increasingly, advanced technological innovation (Whittaker et.al., 2020).

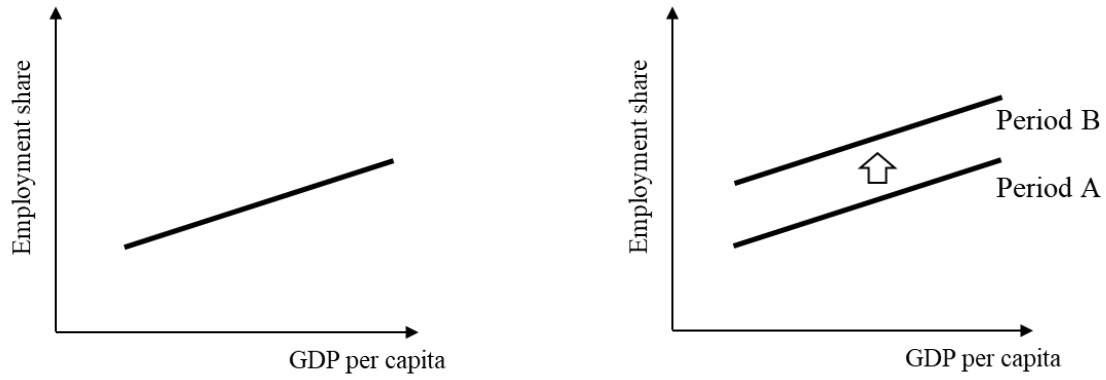
Our goal in this paper is not to venture into the normative discussion of which kind of structural transformation is preferable for economic growth, or for other outcomes such as minimization of inequality, but to investigate the more preliminary – and frequently skipped over – question of 'where has employment been created if not in manufacturing?' as a precursor to the more ambitious question of 'is there a structural or causal relationship between thin or premature deindustrialization and certain forms of servicization?'

We view employment creation from two aspects as follows:

1. The employment share of a service sector increases as the GDP per capita rises, within a given time period. We call this phenomenon a *servicization* since it reflects the conventional observation that as a country grows, it will become more dependent on the service sector. Figure 1 (a) expresses this proposition, that is, employment share of services shows an increasing trend as GDP per capita rises. In our empirical analysis, the line is estimated using macro data for a set of countries within a given time period.

2. The employment share of a service sector increases over time at *a given GDP per capita*. We call this phenomenon *accelerated servicization* in the sense that we expect it to be observed as a consequence of premature deindustrialization.[1] Figure 1 (b) shows a typical line-shift for the accelerated servicization, that is, the employment share line shifts upward from the former time period, A, to the later time period, B. In our empirical analysis, the lines are estimated using macro data for a set of countries within two different time periods.

This paper uses the two concepts – servicization and accelerated servicization – to empirically examine employment creation in various service sectors, which are more finely classified than those used in the previous studies.



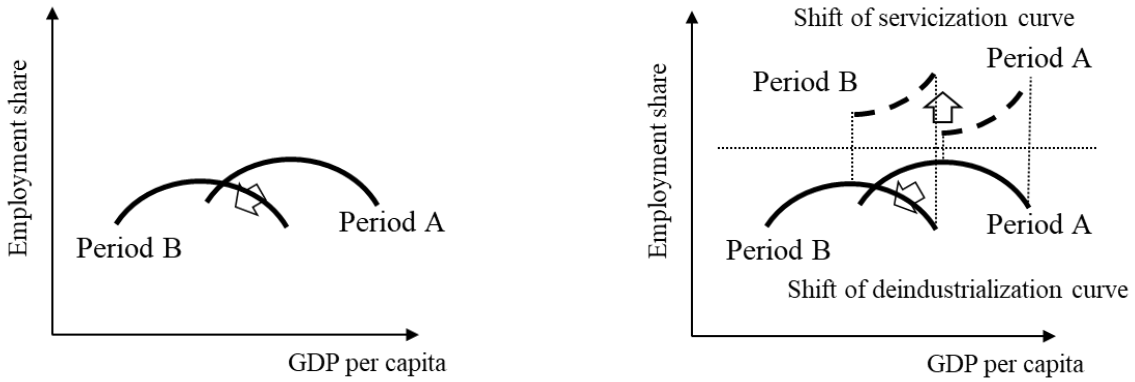
(a) Servicization (b) Accelerated servicization

Figure 1 Two aspects of the employment creation in service sectors: servicization and accelerated servicization

Note: The line in (a) is drawn for a given time period. In contrast, the lines in (b) are drawn for time periods A and B, respectively, where period A is prior to period B.

2. Accelerated servicization and premature deindustrialization

This section explains the idea of the accelerated servicization in relation to premature deindustrialization. Premature deindustrialization refers to the recent trend for developing countries to become more dependent on services without a 'full' experience of industrialization (Felipe et.al., 2019; Palma, 2015; Rodrik, 2016). In fact, it encompasses two phenomena, shown in Figure 2 (a), namely a shift over time between Period A and Period B, with the peak of manufacturing employment share reached at lower levels of GDP per capita; and the manufacturing employment share peak itself becoming lower.



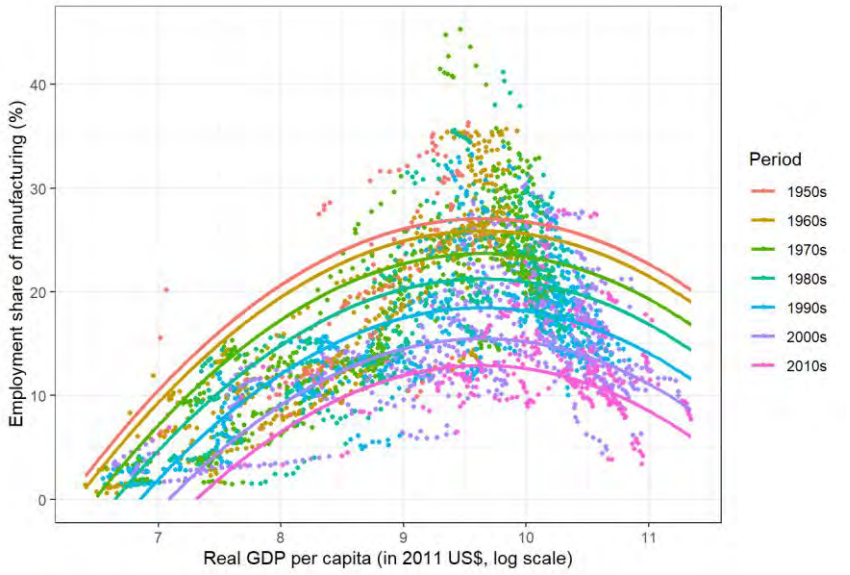
(a) Premature deindustrialization

(b) Relationship between premature deindustrialization and accelerated servicization

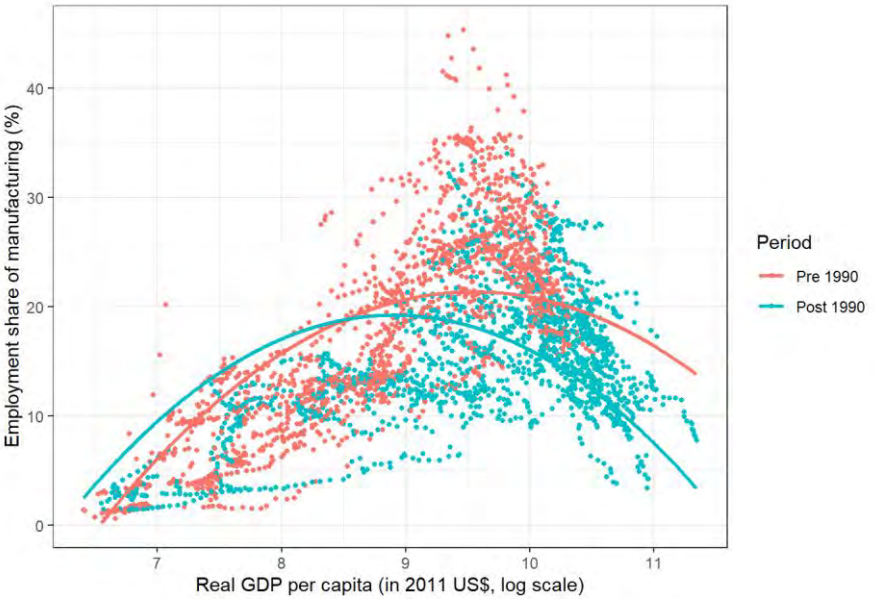
Figure 2 Accelerated servicization and premature deindustrialization

Note: The curves in (a) and (b) are drawn for time periods A and B, respectively, where period A is prior to period B. The dashed curves in (b) show accelerated servicization since the curves shift upward from the former period, A, to the later period, B.

Figure 3 represents an attempt to reproduce Rodrik's (2016) results, based on a slightly different data set.[2] Manufacturing employment share is plotted against GDP per capita (log scale). A single country-year combination is represented as a single dot, whose colour indicates the time period the country-year combination belongs to. The arrangements of the dots in (a) and (b) are identical, but their colour schemes vary: (a) divides them into 1950s, 1960s, 1970s, 1980s, 1990s, 2000s, and 2010s, while (b) divides them into pre-1990 and 1990 onwards. Figures 3 (a) and (b) further draw the estimated curves of the manufacturing employment shares corresponding to the time periods. The curves clearly show the inverted U turning point moving left on the x-axis, and lower on the y-axis, confirming Rodrik's results.[3] The estimation results are summarized in Appendix A.



(a) Downward-trend in manufacturing sector



(b) Leftward-trend in manufacturing sector

Figure 3 Premature deindustrialization phenomena
Source: Authors' analysis.
Note: The data for employment is obtained from the merged database of the GGDC 10-sector database and the OECD ALFS database. The GGDC 10-sector database was used in preference to the OECD ALFS database when both databases had the data for the same item. The newer revision of the OECD ALFS database was used when two or more revisions had the data for the same item. The data for the GDP per capita and the population number was obtained from the GGDC Maddison project database 2020.
A single country-year combination is represented as a single dot, whose colour indicates the time period the country-year combination belongs. The inverse U curves in (a) are estimated based on model (1), which detects the vertical shift of the curves, while the inverse U curves in (b) are estimated based on model (2), which detects the horizontal shift of the curves. All curves are

drawn for a representative country, which features the median population of the sample and the averaged country fixed effect.

Conceptually, we might expect a mirror image of these twin manufacturing trends in the service sector, namely a corresponding shift to the left, and an *upward* shift in services, as shown in Figure 2 (b). This we would call accelerated servicization, wherein the curves are linearly symmetrical to the decline part of the corresponding deindustrialization curves. This feature would hold if employment were confined to just two sectors, but in reality the curves are expected to be different due to the effect of the employment in other sectors, particularly primary industry. Nevertheless, we expect the leftward and upward shift of the servicization curves to be apparent to some degree.

Thus, we regard the accelerated servicization as a paired phenomenon with premature deindustrialization, without specifying a causal direction, in the same way that servicization is discussed as a counterpart to deindustrialization. We use 'accelerated' instead of 'premature' for servicization because the latter often carries a negative connotation. 'Premature' deindustrialization implicitly suggests an apprehension about the future economic growth of developing countries; 'accelerated' servicization is somewhat more neutral. Ultimately, we are interested in finding the specific service sectors that may play a propulsive role in economic growth, compensating for premature deindustrialization.

3. Method

3.1 Data

We begin the investigation with the GGDC 10-sector database (Timmer, de Vries, and de Vries, 2015), also used by many of the writers we have cited. It assembles gross value added and employment data from 42 countries[4] from 1950-2013 for the following ten sectors:

1. Agriculture, hunting, forestry and fishing (A, B)
2. Mining and quarrying (C)
3. Manufacturing (D)
4. Electricity, gas and water supply (E)
5. Construction (F)
6. Wholesale and retail trade, hotels and restaurants (G, H)
7. Transport, storage, and communication (I)
8. Finance, insurance, real estate and business services (J, K)
9. Government services (L, M, N)
10. Community, social and personal services (O, P)

These ten sectors are defined based on ISIC Rev.3.1, whose section codes are in parentheses. Although the data have been carefully assembled, a number of caveats about the database have been noted. Accuracy of data collected can vary across countries; there are differences in incorporation of the informal sector or economy, especially in value added statistics; employment figures refer to workers, not hours, while seasonality, for example, varies across sectors; and average labour productivity figures for sectors can be swayed by labour share (Diao et.al., 2017; Sumner, 2019). Nonetheless, for our relatively simple purposes of comparing employment shares, it is a good place to start.

While the GGDC 10-sector database is often used in studying deindustrialization, it is much less suitable for examining the service sectors, in the sense that its classification of the service sectors is very coarse. Specifically, it combines sectors J (financial intermediation) and K (real estate, renting, business activities), although each of these may play a very different role in terms of contribution to economic growth. One database in which sectors J and K are not combined is the OECD Annual Labour Force Statistics (ALFS), which gathers data from the 37 OECD member countries, plus Costa Rica, Brazil, and the Russian Federation. Of these countries, sixteen countries[5] are also covered by the GGDC 10-sector database. Since the employment data in ALFS consists of three subsets, each of which corresponds to ISIC Revs. 2, 3, and 4, we refer to these subsets as ALFS Rev.2, Rev.3, and Rev.4, corresponding to the ISIC revisions (see Appendix B for the brief explanation of the ISIC revisions).

Table 1 shows how the combined J and K service sector in the GGDC 10-sector database is divided in the ALFS Rev.3, and especially Rev.4 databases; ALFS Rev.3 database explicitly distinguishes sector J from K, while ALFS Rev.4 database divides sector K (of Rev.3) into four sectors: J, L, M, and N. These finer classifications enable us to investigate and compare the dynamics of the employment creation in these specific service sectors, although the temporal coverages of the databases are limited (see Appendix C). Correspondence among the sectors across the revisions is not simple, particularly between Rev.3.1 and Rev.4. This means that the correspondence in Table 1 has some minor exceptions at the class-level of the classification structure (see Appendix D).

Table 1 Correspondence of service sectors

GGDC 10-sector database (ISIC Rev.3.1)		ALFS Rev.3 database		ALFS Rev.4 database	
J, K	Financial intermediation, Real estate, renting and business activities	J	Finance and intermediation	K	Financial and insurance activities
		K	Real estate, renting and business activities	J	Information and communication
				L	Real estate activities
				M	Professional, scientific and technical activities
				N	Administrative and support service activities

We also use the GGDC Maddison project database 2020 (Bolt and van Zanden, 2020) to obtain the GDP per capita and population numbers. It includes the data from the distant past, to 2018. Finally, the data that we identify as the outliers is summarized in Appendix E.

3.2 Model

Three models used in this paper are formalized as follows:

$$y_{it} = \beta_0 + \beta_1 \ln pop_{it} + \beta_2 (\ln pop_{it})^2 + \beta_3 \ln x_{it} + \beta_4 (\ln x_{it})^2 + \sum_i \gamma_i D_i + \sum_T \varphi_T PER_T + \epsilon_{it} \,. \quad (1)$$

$$y_{it} = \beta_0 + \beta_1 \ln pop_{it} + \beta_2 (\ln pop_{it})^2 + \beta_3 \ln x_{it} + \beta_4 (\ln x_{it})^2 + \sum_i \gamma_i D_i + \sum_T (\varphi'_T \ln x_{it} + \varphi''_T (\ln x_{it})^2) PER_T + \epsilon_{it} \,. \quad (2)$$

$$\ln y_{it} = \beta_0 + \beta_1 \ln pop_{it} + \beta_2 \ln x_{it} + \sum_i \gamma_i D_i + \sum_T \varphi_T PER_T + \epsilon_{it} \,. \quad (3)$$

y_{it}: employment share (%)
x_{it}: GDP per capita
pop_{it}: population
D_i: country dummy
PER_T: period dummy
β_0-β_4, γ_i, φ_T, φ'_T, φ''_T: intercept and coefficients
ϵ_{it}: error term
i, t, T: subscript specifying a country (i), a year (t), and a period (T)
ln: natural logarithm ($\log_e$)

Models (1) and (2), both of which were introduced by Rodrik (2016), assume that the estimated curves have a quadratic form. Model (1) detects the vertical shift of the curves since the estimates of coefficient φ_T represent the relative differences of the employment share among the periods. In contrast, model (2) detects the horizontal shift of the curve's peak since the coefficients of the interaction terms, φ'_T and φ''_T, represent the relative differences of the GDP capita among the periods. Indeed, when model (2) is differentiated by x_{it}, coefficients φ'_T and φ''_T are left to give the value of the GDP per capita at the peak.

Model (3) is used when we assume that the estimated curves do not have a quadratic form but have an exponential form. Model (3) drops the quadratic terms from model (1) and takes the natural logarithm of the employment share as the dependent variable. Model (3) detects the vertical shift of the curves in the same way as model (1).

4. Where has employment been created?

4.1 Analysis of ten sectors, based on the GGDC 10-sector database

We analyze the shapes and the shifts of the employment share curves of the ten sectors based on the GGDC 10-sector database. We used model (1), which was used to examine the deindustrialization in Section 2, to compare the trends of all the sectors including the service sectors[6]. Table 2 shows the result of the estimates. The cells with a blue background show a significant downward shift, while the cells with a red background show a significant upward shift. The red font is used for significant estimates for the ln GDP per capita squared term. The significance level used was 0.01.

Table 2 Result of estimates for ten sectors, based on GGDC 10-sector database

Sector	A,B	C	D	E	F	G,H	I	J,K	L,M,N	O,P
ln population	-26.449**	-0.507	4.999	1.251**	-2.426	12.782**	1.382	5.335*	20.572***	-11.123**
	(13.188)	(1.247)	(7.945)	(0.579)	(2.926)	(5.293)	(1.913)	(2.879)	(5.993)	(5.195)
ln population squared	0.540	0.022	0.029	-0.035**	0.157*	-0.196	0.006	-0.175*	-0.769***	0.323**
	(0.404)	(0.041)	(0.258)	(0.017)	(0.091)	(0.161)	(0.059)	(0.091)	(0.178)	(0.157)
ln GDP per capita	-29.936**	3.991***	38.454***	1.556***	9.049***	0.945	2.076	-24.228***	-1.058	5.439
	(12.997)	(1.066)	(8.252)	(0.358)	(1.977)	(4.845)	(1.641)	(2.220)	(4.037)	(4.374)
ln GDP per capita squared	1.011	-0.219***	-2.008***	-0.084***	-0.378***	0.028	-0.094	1.521***	0.131	-0.284
	(0.771)	(0.059)	(0.463)	(0.021)	(0.111)	(0.286)	(0.094)	(0.124)	(0.238)	(0.251)
1960s	-6.366*	-0.517*	-0.958	0.064	-0.057	0.539	-0.149	-0.096	2.410***	1.307*
	(3.698)	(0.292)	(0.924)	(0.055)	(0.325)	(0.645)	(0.294)	(0.280)	(0.897)	(0.671)
1970s	-8.384**	-0.839**	-2.623**	0.096	-0.706*	0.587	-0.365	0.262	5.758***	2.550***
	(4.028)	(0.347)	(1.164)	(0.071)	(0.364)	(0.861)	(0.349)	(0.295)	(0.981)	(0.805)
1980s	-10.103**	-0.932**	-4.562***	0.106	-1.653***	1.147	-0.527	0.845**	8.634***	3.445***
	(4.364)	(0.419)	(1.384)	(0.084)	(0.445)	(1.025)	(0.393)	(0.346)	(1.179)	(1.005)
1990s	-10.714**	-1.178**	-6.682***	0.052	-2.113***	2.071	-0.471	1.666***	10.163***	3.472***
	(4.840)	(0.501)	(1.664)	(0.110)	(0.553)	(1.298)	(0.457)	(0.423)	(1.400)	(1.158)
2000s	-10.853**	-1.400**	-9.649***	-0.048	-2.682***	3.100**	-0.305	2.641***	11.496***	3.941***
	(5.265)	(0.583)	(1.986)	(0.131)	(0.647)	(1.570)	(0.544)	(0.536)	(1.674)	(1.359)
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2139	2130	2130	2129	2130	2130	2130	2130	1707	2029

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; Cluster robust standard errors are in parentheses. (A country-period combination constitutes a cluster.)

Construction (F) shows a similar trend to Manufacturing (D) in absorbing fewer workers over time, although the curve becomes flatter in the sense that the coefficient estimate for the ln GDP per capita squared was closer to zero (-0.378). The sizes of the downward shift are much smaller than the manufacturing sector, however.

Next, we turn to the employment share of the service sectors. Wholesale and retail trade, hotels and restaurants (G, H) and Transport, storage, and communication (I) show neither a significant upward shift nor a significant increase with rising the GDP per capita. Government services (L, M, N) and Community, social and personal services (O, P) show significant upward shifts, but do not show a significant increase with rising the GDP per capita; rather they show a significant increase with rising population.

Of considerable interest is the profile of Finance, insurance, real estate and business services (J, K), which is referred to subsequently as the FIRE and business services. Figure 4 shows the scatter plots and the estimated curves for FIRE and business services in comparison with those for the manufacturing sector. As shown in the left figure, we can see both servicization and the accelerated servicization trends for FIRE and business services. Instead of an inverse U, as for manufacturing, it is U-curved and upward sloping. It seems most likely to be moving in tandem with deindustrialization. It is worth noting that, of the three service sectors that revealed a significant upward shift, only the FIRE and business services sector had a positive and statistically significant estimate for the ln GDP per capita squared term (1.521), meaning that the shape of the curve is the reverse shape of the inverse U in the manufacturing sector. This suggests that, in terms of the variation in the employment share, changes in the FIRE and business services sector correlate with the manufacturing sector in an essential way, unlike the other service sectors.

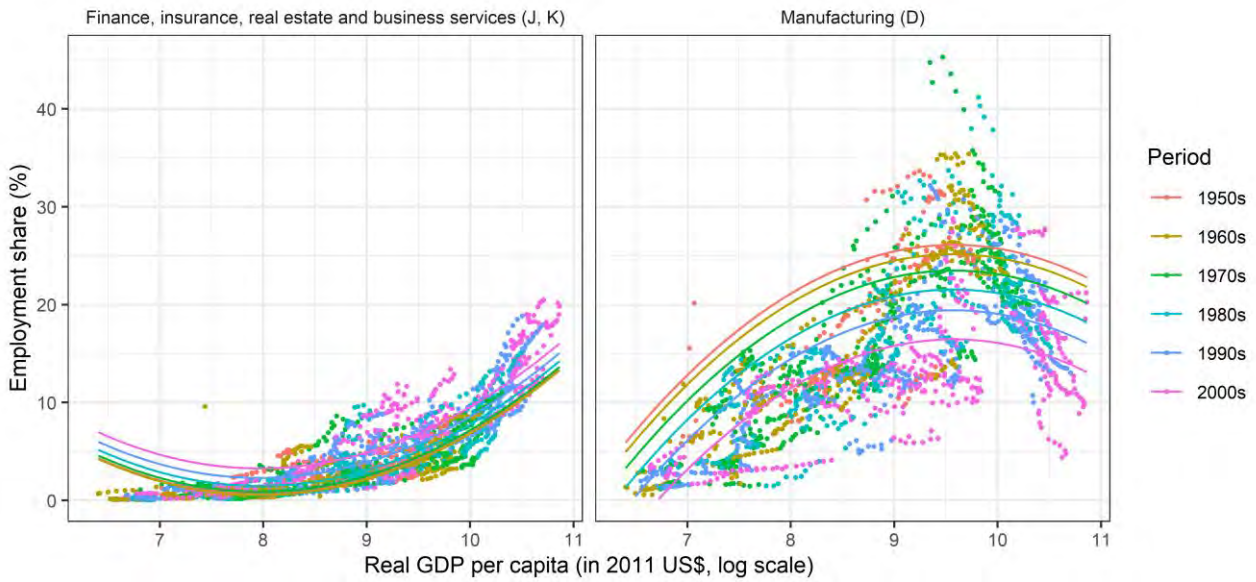


Figure 4 Scatter plots and estimated curves.
Source: Authors' analysis.
Note: The data for the employment number was obtained from the GGDC 10-sector database. The data for the GDP per capita and the population number was obtained from the GGDC Maddison project database 2020. The left figure is for the Finance, insurance, real estate and business services (J, K) sectors, while the right figure is for the Manufacturing (D) sector.
A single country-year combination is represented as a single dot, whose colour indicates the time period to which the country-year combination belongs. All curves are estimated based on model (1), which detects the vertical shift of the curves. All curves are drawn for a representative country, which features the median population of the sample and the averaged country fixed effect.

4.2 Analysis of FIRE and business service sectors, based on the OECD ALFS database

We use the ALFS Rev.3 and Rev.4 databases to examine the FIRE and business services sector in more detail. We performed the analysis based on the ALFS Rev.4 database, and following that we used the ALFS Rev.3 database to confirm the findings. We used model (3) to estimate the employment share curves not in a quadradic form but in an exponential form, which fits the trend of the FIRE and business services sector as shown in Figure 4 (left figure).

The ALFS Rev.4 database divides the FIRE and business services sector into five finer-grained service sectors: J – N (see Table 1). Its employment data for most countries is only available from 2008 to 2019 (see Appendix C), so unfortunately it does not give us a long time period, or a substantial overlap with the GGDC 10-sector database, but it might offer some suggestive lines of inquiry. We set the period dummy as a binary: pre-2013 and 2013 onwards[7]. Table 3 shows the estimate results. The cells with a red background show a significant upward shift. The red font is used for significant

estimates for the ln GDP per capita term. The significance level used was 0.01.

As shown in Table 3, the three specific service sectors – Information and communications (J), Professional, scientific and technical activities (M), and Administrative and support service activities (N) – show positive and significant estimates for the ln GDP per capita and period dummy terms, suggesting both servicization and accelerated servicization. In contrast, the remaining two specific service sectors – Financial and insurance activities (K) and Real estate activities (L) – do not show such significant trends. These results suggest that the employment creation of the FIRE and business services sector mainly comes from (Rev.4) J, M and N sectors, thus excluding (Rev.4) K and L sectors.

Table 3 Result of estimates for sectors K, J, L, M, and N, based on OECD ALFS Rev.4 database

Sector	K	J	L	M	N
ln population	-0.477**	-0.196	0.532	-0.084	0.240
	(0.225)	(0.277)	(0.351)	(0.214)	(0.336)
ln GDP per capita	0.118	0.466***	0.258	0.517***	0.381***
	(0.093)	(0.115)	(0.198)	(0.093)	(0.107)
Period	-0.016	0.060***	0.045*	0.101***	0.085***
	(0.014)	(0.019)	(0.024)	(0.013)	(0.018)
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Number of observations	453	453	433	453	453

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Cluster robust standard errors are in parentheses. (A country-period combination constitutes a cluster.)

Among the sectors showing significant servicization, sector M had the largest slope, followed by sectors J and N, in that order. The significant slopes 0.517, 0.466, and 0.381 of sectors M, J, and N imply that if the GDP per capita doubles, then the employment share will increase by 1.43, 1.38, and 1.30 times, respectively. These significances distinguish them from sectors K and L, whose employment share is almost unchanged with rising GDP per capita. Among the sectors showing a significant accelerated servicization, sector M again had the largest upward shift, followed by sectors N and J, in that order. The significant upward shift (0.101) of sector M from pre-2013 to 2013 onwards means a 0.48% increase of the employment share.[8] This increase rate is smaller than the 2.59% decrease of manufacturing[9] from 2000s to 2010s, suggesting that the employment creation associated with deindustrialization has been distributed across several other sectors, as we expected.

Next, the ALFS Rev.3 database divides the FIRE and business services sector into the two service sectors: J and K (see Table 1).[10] Its employment data is available from the 1990s to 2000s, depending on the country (see Appendix C). Although the ALFS Rev.3 database adopts a coarser classification compared to the ALFS Rev.4 database, investigation based on the ALFS Rev.3 database is useful since it is very different in terms of the temporal coverage. We set the period dummy as a binary: pre-2003 and

2003 onwards[11]. Table 4 shows the estimate results. The red font is used for significant estimates for the ln GDP per capita term. Again, the significance level used was 0.01.

Table 4 Result of estimates for sectors J and K, based on OECD ALFS Rev.3 database

Sector	J	K
ln population	-0.709**	0.428
	(0.353)	(0.258)
ln GDP per capita	0.265**	0.856***
	(0.109)	(0.085)
Post2003	-0.001	0.068**
	(0.037)	(0.029)
Country fixed effect	Yes	Yes
Number of observations	590	589

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Cluster robust standard errors are in parentheses. (A country-period combination constitutes a cluster.)

As shown in Table 4, Real estate, renting and business activities (K) shows positive and significant estimates for the ln GDP per capita and period dummy terms, suggesting both servicization and the accelerated servicization, although the significance level for the period dummy term becomes comparatively weak ($p < 0.05$). In contrast, Finance and intermediation (J) does not show such significant trends. These results are consistent with the findings based on the ALFS Rev.4 database in the sense that the significant trends are shown only in Rev.3 sector K, which contains the three significant Rev.4 sectors (J, M, and N), and not in Rev.3 sector J, which corresponds to the insignificant Rev.4 sector (K).

5. Discussion

In Section 4.1, the servicization and the early servicization trends of the FIRE and business service sector (Rev.3.1 J and K sectors) were confirmed based on the GGDC 10 sector database. For the FIRE and business service sectors, a number of possibilities present themselves. First, this could be related to the 'servicization' of manufacturing, especially with the growth of business service employment. Second, since this sector includes professional, scientific and technical activities, it could be linked to the upgrading of both manufacturing and economies in general, as manual manufacturing jobs are automated. Third, it could be linked to the emergence of the digital economy, as the sector encompasses information and communications. And fourth, it could be linked to the expansion of employment in FIRE, especially finance, which may in turn be linked to 'financialization.' To examine these possibilities, we performed an analysis based on the ALFS Rev.4 database, which adopts a much finer sector classification.

In Section 4.2, the analysis based on the ALFS Rev.4 database showed the servicization and the accelerated servicization trends of the three specific service sectors: Information

and communication (J), Professional, scientific and technical activities (M), and Administrative and support service activities (N). These results suggest that the employment creation of these three sectors is enhanced as rising GDP per capita and years proceed in tandem with the employment reduction of the manufacturing sector. The emergence of the digital economy, upgrading and implementing the automation, and promoting the business services can enhance the employment creation in these sectors. On the other hand, neither the servicization nor the accelerated servicization was confirmed: Financial and insurance activities (K) and Real estate activities (L). Thus, it is reasonable to think that the employment creation in ISIC Rev.3.1 J and K sectors is attributed mainly to ISIC Rev.4 J, M, and N sectors. In other words, financial and the real estate activities do not so contribute to the servicization and the accelerated servicization of the FIRE and business service sector. These analytical results are consistent with those based on the ALFS Rev.3 database, which covers an earlier time period. Thus, we think the findings based on the ALFS Rev.4 database not as a recent very short-term trend but as a trend that has been established over a longer time period, although we can't say for sure about the relationships among Rev.4 sectors J, L, M, and N in the longer run.

Di Melgio et.al. (2018, p. 1512) argued that the 'business services sector' contributes to economic growth as follows: '*More importantly, the evidence suggests that within the heterogeneous service sector, business services represent an additional engine of growth, as they contribute to aggregate productivity by means of the same Kaldorian mechanisms traditionally at work in manufacturing industries*.' This analysis, however, was based on the combined FIRE and business service sector of the GGDC 10-sector database. Our analysis confirms that this sector contains two (or more) specific service sectors that have totally different properties. To know the respective contributions more certainly, we need value added data provided by finer classification, such as the ISIC Rev.4 sectors. From our analytical results based on the employment data, the sectors related to the information services and the business support activities are plausible candidates to serve as an additional Kaldorian engine in the sense that the sectors take the place of the deindustrialization effect.

In concluding this section, we offer some comments on financial activities, whose trends were found to be farthest from servicization and the accelerated servicization. Figure 5 (a) shows the scatter plots for Finance and intermediation (J) in comparison with those for Real estate, renting and business activities (K) sectors, based on the ALFS Rev.3 database. At first glance, both sectors show an increasing trend with rising GDP per capita. However, a closer look reveals a fundamental difference. Namely, for sector J, even where the GDP per capita increases, the employment share remains almost constant for individual countries, whereas for sector K, as the GDP per capita increases, the employment share increases as well. For the former, across countries there is indeed a strong link to economic growth, but for a given country there is not much of a link to

economic growth. In other words, servicization appears at the global-level, but not at the domestic-level. Indeed, when we use model (3) including the country fixed effect term, we obtain Figure 5 (b) showing that the slope of sector J is gently inclined to a horizontal, although the slope of sector K is significant. In contrast, when we use model (3) dropping the country fixed effect term, we obtain Figure 5 (c) showing that the slope of sector J becomes significant, although the slope of sector K is nearly unchanged. While it may seem reasonable to expect that if the finance and intermediation sector expands in a country, it will bring significant economic growth, this does not appear to be the case, at least in terms of employment. We are tempted, therefore, to call finance and intermediation a ‘quasi service’ activity, given this fundamental difference.

(a) Scatter plots

(b) Scatter plots and estimated lines, based on model (3)

(c) Scatter plots and estimated lines, based on model (3) dropping country fixed effect term

Figure 5 Global-level and domestic-level servicizations

Source: Authors' analysis.
Note: Employment data was obtained from the OECD ALFS Rev. 3 database. The data for the GDP per capita and the population number was obtained from the GGDC Maddison project database 2020. The left figure is for Financial and intermediation (J) sector while the right figure is for Real estate, renting and business activities (K) sector.
A single country-year combination is represented as a single dot, whose colour indicates the country. The straight lines in (b) are estimated based on model (3) including the country fixed effect term while those in (c) are estimated based on model (3) dropping the country fixed effect term. All lines in (b) and (c) are drawn based on the median population of the sample and the averaged coefficient of the period dummy.

6. Limitations and future work

Major limitations of our findings are due to the properties and the qualities of the databases. Particularly, we have to be careful about the interpretation of findings based on the OECD ALFS database given that it has two unfavorable features. One concerns its shorter temporal coverage. Specifically, the ALFS Rev.4 database only provides the employment data from 2008 to 2019 for most of the countries covered. Thus, it does not show long-term trends but suggests recent short-term trends. The other concerns country coverage; it mainly includes the OECD members, meaning that the country coverage is biased toward high- and middle-income countries. Thus, the analytical results based on the database are not necessarily indicative of trends in developing countries themselves. To understand long-term trends in developing countries, we need additional analyses such as dividing the countries into different income levels and appending an additional database containing different time periods.

We proposed accelerated servicization as a phenomenon corresponding to the premature deindustrialization phenomenon (Section 2). To understand the relationship between these two phenomena, including their causal direction, a theoretical study based on a more formal definition is required, rather than the intuitive approach in our paper. We discussed the particularities of the finance and intermediation sector, concluding that its idiosyncratic employment trend warrants the label 'quasi service' (Section 5). Further examination is necessary in order to explain the phenomenon.

Notes

1 It is accelerated in the sense of being higher for a given level of GDP per capita, rather than unfolding faster in terms of pace.

2 Our analysis covers 66 countries, with employment data obtained from a merged database of the GGDC 10 sector database and the OECD ALFS database (see Section 3), whereas Rodrik's analysis covers 42 countries from the GGDC 10-sector database only.

3 We note, however, that when we use the combined database, and use cluster robust standard errors instead of robust standard errors, the significance of the leftward shift disappears.

4 The 42 countries are: Botswana, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Nigeria, Senegal, South Africa, Tanzania, Zambia, Egypt, Morocco, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru, Venezuela, U.S., Germany, Denmark, Spain, France, U.K., Italy, the Netherlands, and Sweden.

5 The countries are: Brazil, Chile, Colombia, Costa Rica, Germany, Denmark, Spain, France, U.K., Italy, Japan, Korea, Mexico, the Netherlands, Sweden and the U.S.

6 Note that there is no economic theory that suggests that a quadradic regression model like model (1) is appropriate for all the ten sectors. Nevertheless, the quadradic term of a certain sector is expected to be significant if the employment share of the sector goes up or down 'in tandem with' the employment share of the manufacturing sector, whose curve is often regarded as a quadradic function in the context of the deindustrialization. Section 2 presents an intuitive discussion in the context of the accelerated servicization. Model (2) was not used since it detects a horizontal shift only when a curve has a peak, which is not always a reasonable assumption for non- manufacturing sectors.

7 We determined the boundary year so that the data size would be divided as evenly as possible. Note that the data for 2019 was dropped due to the lack of the GDP per capita and population figures in the GGDC Maddison project database 2020.

8 More specifically, the employment share increases from 4.49 % to 4.97 % at the median of the GDP per capita.

9 This calculation uses the merged database of the GGDC 10-sector and ALFS databases with the same median of the GDP per capita for calculating the increase rate of sector M.

10 Note that Rev. 3 sectors J and K are totally different from Rev. 4 sectors J and K.

11 We determined the boundary year so that the data size would be divided as evenly as possible.

12 International Labour Organization, International Standard Industrial Classification of All Economic Activities (ISIC), https://ilostat.ilo.org/resources/concepts-and-definitions/classification-economic-activities/ (access 1, Dec. 2020)

13 United Nations, ISIC - UN Correspondence Tables, https://unstats.un.org/unsd/classifications/Econ/ISIC/ (access 1 Dec. 2020)

14.https://unstats.un.org/unsd/classifications/Econ/Download/In%20Text/ISIC_Rev_2_english_structure.txt (access 1 Dec. 2020)

15.https://unstats.un.org/unsd/classifications/Econ/Download/In%20Text/ISIC_Rev_3_english_structure.txt (access 1 Dec. 2020)

16.https://unstats.un.org/unsd/classifications/Econ/Download/In%20Text/ISIC_Rev_3_1_english_structure.txt (access 1 Dec. 2020)

17.https://unstats.un.org/unsd/classifications/Econ/Download/In%20Text/ISIC_Rev_4_english_structure.Txt (access 1 Dec. 2020)

18 https://stats.oecd.org/Index.aspx?DataSetCode=ALFS_EMP (access 9 Nov 2020)

19 https://stats.oecd.org/Index.aspx?DataSetCode=ALFS_SUMTAB (access 9 Nov 2020)

20 We used only the records for the total employment numbers (SEX=TT) and did not use the records for the male and female employment numbers (SEX=MA and FE).

21 United Nations, ISIC - UN Correspondence Tables, https://unstats.un.org/unsd/classifications/Econ/ISIC/ (access 1 Dec. 2020)

22 United Nations (2002) International Standard Industrial Classification of All Economic Activities (ISIC), Revision 3.1, Statistical Papers Series M, No. 4, Rev.3.1.

23 United Nations (2008) International Standard Industrial Classification of All Economic Activities, Revision 4, Statistical Papers Series M, No. 4, Rev.4.

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APPENDIX

Appendix A. Analytical results of deindustrialization phenomena

Table A shows the results of the estimates based on models (1) and (2). The deindustrialization curves based on the estimates are presented in Figures 2 (a) and (b), which correspond to models (1) and (2), respectively. Note that the analysis uses the cluster robust standard errors, which are often used for panel data analysis when the different points of an observation unit, or a country, are expected to be correlated (cf. Wooldridge, 2010, Ch. 20). In our analysis, a country-period combination constitutes a cluster, meaning that the different points of a country within a period are correlated.

Table A. Result of estimates for manufacturing sector

Model	(1)	(2)
ln population	-7.422	-2.367
	(7.925)	(9.746)
ln population squared	0.420	0.000
	(0.250)	(0.296)
ln GDP per capita	45.706***	44.843***
	(6.561)	(8.073)
ln GDP per capita squared	-2.370***	-2.348***
	(0.353)	(0.441)
1960s	-1.172	
	(0.914)	
1970s	-3.366***	
	(0.980)	
1980s	-5.805***	
	(1.094)	
1990s	-8.593***	
	(1.259)	
2000s	-11.565***	
	(1.468)	
2010s	-14.153***	
	(1.623)	
ln GDP per capita × Post 1990		2.761***
		(0.477)
ln GDP per capita squared × Post 1990		-0.325***
		(0.051)
Country fixed effect	Yes	Yes
Number of observations	3349	3354

$*\ p < 0.1, **\ p < 0.05, ***\ p < 0.01$;
Cluster robust standard errors are in parentheses.
(A country-period combination constitutes a cluster.)

Appendix B. International Standard Industrial Classification of All Economic Activities (ISIC)

The International Standard Industrial Classification of All Economic Activities (ISIC)[12] provides an international standard classification of economic activities. It has four levels of classification: section, division, group, and class. It has had several major revisions, namely 1948 (1948), Rev. 1 (1958), Rev. 2 (1968), Rev. 3 (1989), Rev. 3.1 (2002), and Rev. 4 (2006). The following tables show the sections in Revs. 2, 3, 3.1, and 4, with two additional columns: the number of the classes belonging to the section and the description of the section. The number of the classes represents the degree of the fineness of classification scheme used for the section; a larger number means that a finer classification scheme is used. Comparison of the classification schemes across the revisions is organized in correspondence tables,[13] which enable us to know their class-level correspondences.

Table B. Classification schemes for ISIC Revs. 2, 3, 3.1, and 4
(a) ISIC Rev. 2

Section	Number of Classes	Description
1	7	Agriculture, Hunting, Forestry and Fishing
2	8	Mining and Quarrying
3	81	Manufacturing
4	4	Electricity, Gas and Water
5	1	Construction
6	4	Wholesale and Retail Trade and Restaurants and Hotels
7	14	Transport, Storage and Communication
8	12	Financing, Insurance, Real Estate and Business Services
9	28	Community, Social and Personal Services
0	1	Activities not Adequately Defined

The number of classes is counted using the CSV file[14] provided by UN.

(b) ISIC Rev. 3

Section	Number of Classes	Description
A	9	Agriculture, hunting and forestry
B	1	Fishing
C	12	Mining and quarrying
D	127	Manufacturing
E	4	Electricity, gas and water supply
F	5	Construction
G	29	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
H	2	Hotels and restaurants
I	17	Transport, storage and communications
J	12	Financial intermediation
K	31	Real estate, renting and business activities
L	8	Public administration and defence; compulsory social security
M	5	Education
N	6	Health and social work
O	22	Other community, social and personal service activities
P	1	Private households with employed persons
Q	1	Extraterritorial organizations and bodies

The number of classes is counted using the CSV file[15] provided by UN.

(c) ISIC Rev. 3.1

Section	Number of Classes	Description
A	9	Agriculture, hunting and forestry
B	2	Fishing
C	12	Mining and quarrying
D	127	Manufacturing
E	4	Electricity, gas and water supply
F	5	Construction
G	31	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
H	2	Hotels and restaurants
I	17	Transport, storage and communications
J	12	Financial intermediation
K	32	Real estate, renting and business activities
L	8	Public administration and defence; compulsory social security
M	5	Education
N	6	Health and social work
O	22	Other community, social and personal service activities
P	3	Activities of private households as employers and undifferentiated production activities of private households
Q	1	Extraterritorial organizations and bodies

The number of classes is counted using the CSV file[16] provided by UN.

(d) ISIC Rev. 4

Section	Number of Classes	Description
A	38	Agriculture, forestry and fishing
B	14	Mining and quarrying
C	137	Manufacturing
D	3	Electricity, gas, steam and air conditioning supply
E	8	Water supply; sewerage, waste management and remediation activities
F	11	Construction
G	43	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	20	Transportation and storage
I	7	Accommodation and food service activities
J	23	Information and communication
K	18	Financial and insurance activities
L	2	Real estate activities
M	14	Professional, scientific and technical activities
N	26	Administrative and support service activities
O	7	Public administration and defence; compulsory social security
P	8	Education
Q	9	Human health and social work activities
R	10	Arts, entertainment and recreation
S	17	Other service activities
T	3	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
U	1	Activities of extraterritorial organizations and bodies

The number of classes is counted using the CSV file[17] provided by UN.

Appendix C. OECD Annual Labour Force Statistics (ALFS) database

The ALFS database consists of two parts: employment by activities and status dataset,[18] and summary tables dataset[19]. Our employment dataset[20] comes from the former. Table C shows the temporal coverage of the ALFS databases. The temporal coverages are determined under the condition that the employment data are available for all sectors. As shown in the table, the range of the temporal coverage starts from 1955 and ends in 2019. Two or three ALFS revisions are available for each country for many years, while no ALFS revision is available for some countries for some years.

Table C. Temporal coverage of ALFS databases

Country Code	Country Name	ALFS Rev.2	ALFS Rev.3	ALFS Rev.4	Note
AUS	Australia	1960 – 2005	1985 – 2012	1991 – 2018	
AUT	Austria	1968 – 2001	1998 – 2011	2008 – 2019	
BEL	Belgium	1956 – 1999	1993 – 2009	2008 – 2019	
BRA	Brazil*	NA	2002 – 2015	2016 – 2018	Rev.3: 2010 is NA.
CAN	Canada	1956 – 1998	1987 – 2019	NA	
CHE	Switzerland	NA	NA	2010 – 2019	
CHL	Chile	1996 – 2009	2010 – 2014	2013 – 2019	
COL	Colombia	NA	2001 – 2019	2015 – 2019	
CRI	Costa Rica*	NA	NA	2010 – 2019	
CZE	Czech Republic	1975 – 1998	1993 – 2009	2000 – 2019	
DEU	Germany	1956 – 1998	1991 – 2009	2008 – 2019	
DNK	Denmark	1960 – 2008	1992 – 2008	2005 – 2019	Rev.2: 1961-1964, 1966, 1968, and 1980 are NA.
ESP	Spain	1960 – 1999	1988 – 2008	2008 – 2019	
EST	Estonia	NA	1989 – 2010	2000 – 2019	
FIN	Finland	1959 – 1998	1990 – 2008	2000 – 2019	
FRA	France	1956 – 1989	NA	2008 – 2019	
GBR	United Kingdom	1955 – 2013	1985 – 2015	2008 – 2019	
GRC	Greece	1960 – 1997	1993 – 2007	2008 – 2019	Rev.2: 1962-1970 and 1972-1976 are NA.
HUN	Hungary	1992 – 1998	1998 – 2008	2008 – 2019	
IRL	Ireland	1956 – 2014	1994 – 2014	2000 – 2019	
ISL	Iceland	1964 – 2014	1991 – 2014	2008 – 2019	

ISR	Israel	NA	1995 — 2012	2013 — 2019	
ITA	Italy	1956 — 2010	1993 — 2010	2008 — 2019	
JPN	Japan	1956 — 2003	2003 — 2009	2003 — 2019	
KOR	Korea	1970 — 2008	1992 — 2008	2004 — 2019	Rev.2: 1971 is NA.
LTU	Lithuania	NA	NA	2008 — 2019	
LUX	Luxembourg	1960 — 1994	1995 — 2011	2008 — 2019	
LVA	Latvia	NA	1998 — 2008	2008 — 2019	
MEX	Mexico	1970 — 2014	1991 — 2014	2005 — 2019	Rev.2: 1971-1979 and 1981-1989 are NA.; Rev.3: 1992 and 1994 are NA.
NLD	Netherlands	1956 — 2002	1992 — 2008	2008 — 2019	Rev.2: 1962-1974 are NA.
NOR	Norway	1956 — 2000	1996 — 2008	2008 — 2019	
NZL	New Zealand	1956 — 1999	1991 — 2010	2010 — 2019	
POL	Poland	1993 — 2012	1999 — 2007	2008 — 2019	
PRT	Portugal	1956 — 2008	1992 — 2008	2008 — 2019	
RUS	Russia*	NA	1999 — 2016	2005 — 2019	
SVK	Slovak Republic	1994 — 2008	1994 — 2008	2008 — 2019	
SVN	Slovenia	NA	1996 — 2008	2008 — 2019	
SWE	Sweden	1963 — 2008	1998 — 2008	2008 — 2019	
TUR	Turkey	1955 — 2000	2000 — 2009	2009 — 2019	Rev.2: 1956-1959 are NA.
USA	United States	1956 — 2002	NA	NA	
40 countries	*non-OECD member	30 countries	35 countries	38 countries	

Source: Authors' analysis

Appendix D. Correspondence among Revs. 3, 3.1 and 4[212223]

The Rev.3 classes of sections J and K are inherited by the Rev.3.1 classes of the same sections except for a very minor revision, which is summarized as follows:

- Rev.3.1 class 6592 (other credit granting), section J, is newly introduced as a part of Rev.3 class 5240 (retail sale of second-hand goods in stores), section G.
- Rev.3 class 7494 (photographic activities), section K, is divided into two classes: Rev.3.1 7494 (photographic activities), section K, and 9309 (other service activities n.e.c.), section O.

The Rev.3.1 classes of section J are inherited by the Rev.4 classes of section K except for a very minor revision, which is summarized as follows:

- Rev.3.1 class 6599 (other financial intermediation n.e.c.), section J, is divided into six classes: Rev.4 6420 (activities of holding companies), 6430 (trusts, funds and similar financial entities), 6499 (other financial service activities, except insurance and pension funding activities, n.e.c.), 6619 (other activities auxiliary to financial service activities), section K, 7740 (leasing of intellectual property and similar products, except copyrighted works), section N, and 9499 (activities of other membership organizations n.e.c.), section S.

The Rev.3.1 classes of section K are split into three sections in Rev.4: L (real estate activities), M (professional, scientific and technical activities), and N (administrative and support service activities). In addition, the Rev.3.1 classes of section K are inherited by the major part of the Rev.4 classes of section J (Information and communication), which is newly created as a Rev.4 section. Indeed, 14 classes of all 23 J classes inherit the K classes of Rev.3.1.

Note that Rev.4 sections L, M, and N cover some Rev.3.1 classes of sections other than K. Note also that Rev.4 sections other than L, M, and N also cover some Rev. 3.1 classes of section K. These minor revisions are summarized as follows:

- Rev.4 section L covers the following class in Rev.3.1 section other than K: 7514 (supporting service activities for the government as a whole), section L.
- Rev.4 section M covers the following four classes in Rev.3.1 sections other than K: 6309 (activities of other transport agencies), section I, 7523 (public order and safety activities), section L, 8520 (veterinary activities), section N, 9220 (news agency activities), section O.
- Rev.4 section N covers the following eleven classes in Rev.3.1 sections other than K: 0140 (agricultural and animal husbandry service activities, except veterinary activities), section A, 5260 (repair of personal and household goods), section G, 6304 (activities of travel agencies and tour operators; tourist assistance activities n.e.c.), 6411 (national post activities), section I, 6599 (other financial intermediation n.e.c.), section J, 7513 (regulation of and contribution to more efficient operation of business), section

L, 9000 (sewage and refuse disposal, sanitation and similar activities), 9214 (dramatic arts, music and other arts activities), 9219 (other entertainment activities n.e.c.), 9241 (sporting activities), 9249 (other recreational activities), section O.

- The following five Rev.3.1 classes of section K are inherited by the Rev.4 sections other than J, L, M, and N: 7010 (real estate activities with own or leased property), 7250 (maintenance and repair of office, accounting and computing machinery), 7414 (business and management consultancy activities), 7421 (architectural and engineering activities and related technical consultancy), 7499 (other business activities n.e.c.).

Appendix E. Outliers

We identified some data for the employment numbers as outliers, which are inconsistent with the rest of a time series. The following tables show the outliers; the data with a yellow background are outliers and were removed from our analysis. Note that the tables do not cover all outliers in the databases but only the parts of the databases we used for our analysis.

Table E. Outliers
(a) GGDC 10-sector database (employment numbers, thousand)

Country Code	Country Name	Year	Government services (L, M, N)
HKG	Hong Kong	1979	239
HKG	Hong Kong	1980	287
HKG	Hong Kong	1981	0
HKG	Hong Kong	1982	0
HKG	Hong Kong	1983	0
HKG	Hong Kong	1984	0
HKG	Hong Kong	1985	212
HKG	Hong Kong	1986	220

(b) ALFS Rev.2 database (employment numbers, thousand)

Country Code	Country Name	Year	Manufacturing (3)
GBR	United Kingdom	1955	0
GBR	United Kingdom	1956	0
GBR	United Kingdom	1957	0
GBR	United Kingdom	1958	0
GBR	United Kingdom	1959	0
GBR	United Kingdom	1960	0
GBR	United Kingdom	1961	0
GBR	United Kingdom	1962	0
GBR	United Kingdom	1963	8423
GBR	United Kingdom	1964	8553

(c) ALFS Rev.3 database (employment numbers, thousand)

Country Code	Country Name	Year	Finance and intermediation (J)	Real estate, renting and business activities (K)
GBR	United Kingdom	1985	0	0
GBR	United Kingdom	1986	0	0
GBR	United Kingdom	1987	0	0
GBR	United Kingdom	1988	0	0
GBR	United Kingdom	1989	0	0
GBR	United Kingdom	1990	0	0
GBR	United Kingdom	1991	1198	2076
GBR	United Kingdom	1992	1147	2001

Country Code	Country Name	Year	Real estate, renting and business activities (K)
DNK	Denmark	1990	NA
DNK	Denmark	1991	NA
DNK	Denmark	1992	6.9
DNK	Denmark	1993	177.8
DNK	Denmark	1994	197.1

Country Code	Country Name	Year	Real estate, renting and business activities (K)
NLD	Netherlands	1990	NA
NLD	Netherlands	1991	NA
NLD	Netherlands	1992	38.5
NLD	Netherlands	1993	616.3
NLD	Netherlands	1994	652.2