2 Structural change decomposition of labor productivity

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Abstract: This chapter examines possible sources of productivity stagnation by decomposing the productivity change to the components that describe the structural change. We apply a novel productivity decomposition by Kuosmanen and Kuosmanen (2021) which ensures consistent aggregation of firms to industry and sector levels, and also explicitly captures the effect of firms that switch from one industry to another. We empirically examine the business sector of Finland and the manufacturing, construction, information and communications, and the service industries in years 2000-2018, divided to three sub-periods. We find that the structural change has had a major contribution to the productivity development. Firm entry, exit, and industry switching had generally positive effect on productivity growth in most industries and time periods considered. The main culprit for the stagnated labor productivity is the negative Olley-Pakes reallocation effect, which offsets and nullifies the otherwise positive productivity dynamics.

2.1 Introduction

Structural change is nowadays understood as an important source of productivity growth at the aggregate level (e.g., Syverson, 2011). The first systematic productivity decompositions that allow one to break down the aggregate productivity growth of an industry into components that capture the contributions of entry and exit of firms were introduced by Baily et al. (1992) and Griliches and Regev (1995). On the other hand, Olley and Pakes (1996) drew attention to the reallocation of resources across firms. Several studies have further extended the Olley-Pakes decomposition to capture entry and exit of firms, most notably, Maliranta (2003), Böckerman and Maliranta (2007), Diewert and Fox (2009), Hyytinen and Maliranta (2013), Melitz and Polanec (2015), and Maliranta and Määttänen (2015). In all these studies firms are classified into mutually exclusive groups of surviving firms, new entrants, and exiting firms.

Recently Bruhn et al. (2021) present sharp critique of the typical practice of performing productivity decompositions based on log-transformed productivity measures. They argue that the use of logs may lead to inaccurate aggregate growth rates as well as inaccurate estimates of the microsources of aggregate growth. Using firm-level data from the French manufacturing sector during the 2009-2018 period, the authors empirically demonstrate that the magnitude of the log-induced distortions is substantial. The recent study by Fornaro et al. (2021) reveals similar log-induced distortions in Finland. Alternative decomposition formulas also yield somewhat contradictory results. This motivates us to further examine the contribution of structural change on the stagnation of labor productivity in Finland.

While the use of logs can be problematic in the present context, Kuosmanen and Kuosmanen (2021) argue that the main source of the problem is the inconsistent aggregation of firms' productivity to aggregate levels of the industry or a sector. Aggregate productivity of an industry or a sector can be computed in two alternative ways. The first approach is to sum the inputs and outputs of firms to form the industry aggregates, and subsequently compute industry productivity using the aggregate inputs and outputs. The second approach is to first compute the firm-level productivity measures, and subsequently use a share-weighted average to compute the industry productivity. Consistent aggregation requires that these two approaches yield the same results: the order in which one performs the aggregation and productivity computations should not matter. However, the use of any arbitrary share-weighted average does not guarantee consistent aggregation.

The recent article by Kuosmanen and Kuosmanen (2021) argues that the geometric mean or harmonic mean would be inconsistent with the summation of the firm-level inputs and outputs to the aggregate level of the industry. In the case of labor productivity, it is easy to prove that consistent aggregation requires the use of weighted average, and that the employment shares are the correct share weights (see Section 2.2). Importantly, the common use of the share weighted average of log-productivity of firms is subject to a significant aggregation bias because the average of log-productivities is not the same as the logarithm of the average.

Another notable practical limitation of the log-productivity is that it is undefined whenever the inputs or outputs are negative or equal to zero. However, value added of a firm can be negative: excluding such highly unproductive firms from the outset can cause sample selection bias, especially during the turbulent times such as the financial crisis.

To address these issues, in this chapter we apply the theoretically consistent productivity decomposition by Kuosmanen and Kuosmanen (2021), applying it to labor productivity of the business sector in Finland. Section 2.2 introduces the decomposition formally. Section 2.3 describes the data sources and variables. Section 2.4 presents the decomposition results for the business sector of Finland. Section 2.5 subsequently focuses more specifically on manufacturing, construction, information and communication, and service industries. Section 2.6 presents our concluding remarks.

2.2 Aggregation-consistent stuctural change decomposition

Denote the labor productivity of firm *i* in period *t* as $p_{it} = y_{it} / l_{it}$ where y_{it} denotes the value added and l_{it} is the labor input. Aggregate productivity of the industry in period *t* is defined as

$$P_t = \frac{\sum_i y_{it}}{\sum_i l_{it}}.$$

Consistent aggregation of firm-level productivity measures to the industry or sector levels requires that the industry productivity is computed as a weighted average of firm-level productivity measures

$$P_t = \frac{\sum_i y_{it}}{\sum_i l_{it}} = \sum_{i=}^{N_t} \left(\frac{l_{it}}{\sum_j l_{jt}} \right) p_{it} = \sum_{i=1}^{N_t} s_{it} p_{it} , \qquad (2.1)$$

where $s_{it} = \frac{l_{it}}{\sum_j l_{jt}}$ is the employment share of firm *i* in period *t*. Clearly, if the wrong share-weights are used, the weighted average of firms' productivity does not equal the aggregate productivity of the industry. Further, it is easy to verify that the weighted average of log-productivities does not equal the log-productivity of the industry. When the objective is to gain insights on productivity impacts of structural change, in our view, the first step is to ensure that the aggregate productivity is correctly measured. Otherwise the aggregation bias can distort the decomposition and give a misleading picture of the contribution of structural change to aggregate productivity growth.

Using the results by Olley and Pakes (1996), equation (2.1) can be rewritten as

$$P_t = \overline{p}_t + \sum_{i=1}^{N_t} (s_{it} - \overline{s}_t)(p_{it} - \overline{p}_t), \tag{2.2}$$

where the right-hand side of equation (2.2) breaks down the industry-level productivity to two components: the first one is the unweighted mean productivity of all firms and the second covariance term captures the impact of resource allocation across firms. In the context of total factor productivity, Olley and Pakes (1996) present an extensive discussion of how market competition between firms leads to an improved allocation over time as more productive firms increase their market share and less productive firms decline. In the present context of labor productivity, however, it is worth to note that market competition does not necessarily favor firms that have the highest labor productivity if it is achieved at the cost of excessive capital intensity.

Kuosmanen and Kuosmanen (2021) depart from (2.2), breaking down the unweighted mean productivity $\overline{p}_t$ to account for the contributions of entering and exiting firms as well as the firms that switch from one industry to another. Considering the nested sub-samples of continuing firms *S* and the continuing firms that continue to operate in the same industry *Sn*, they introduce the following simple decomposition:

Industry productivity (P_t)

= Productivity of non-switching surviving firms ($\overline{p}_{Sn,t}$)

\+ Industry switch effect ($\overline{p}_{S,t} - \overline{p}_{Sn,t}$)

\+ Entry and exit effect ($\overline{p}_t - \overline{p}_{S,t}$)

\+ Reallocation effect ($P_t - \overline{p}_t$)

or equivalently,

$$P_t = \overline{p}_{Sn,t} + \left(\overline{p}_{S,t} - \overline{p}_{Sn,t}\right) + \left(\overline{p}_t - \overline{p}_{S,t}\right) + \left(P_t - \overline{p}_t\right). \tag{2.3}$$

The subscripts *S* and *Sn* refer to the sub-groups of continuing firms and continuing firms in the same industry, respectively.[1] By using the nested sub-groups, and by noting the equivalence of the Olley-Pakes allocation component of equation (2.2) and the last component of equation (3), the decomposition of Kuosmanen and Kuosmanen

[1] In this study, we use the Finnish TOL 2008 industry classification at the 5-digit level, which is based on the 4-digit European NACE industry classification, but provides a more detailed classification of some industries of interest.

(2021) effectively eliminate the share weights *s* from equation (2.3). Obviously the share weights are an important driver of industry productivity, but it is unnecessary to state them explicitly in the decomposition formula.

The original Olley-Pakes decomposition was stated in terms of the level of productivity. To decompose productivity changes, Kuosmanen and Kuosmanen re-state equation (2.3) as

$$\frac{P_t}{P_{t-1}} = \frac{\overline{p}_{Sn,t}}{\overline{p}_{Sn,t-1}} + \left[\quad - \quad \right] + \left[\quad - \quad \right] + \left[\quad - \quad \right]. \qquad (2.4)$$

This allows one to first calculate the changes in labor productivity separately at the firm-level and for the sub-groups of firms, and then add up the four components to arrive at the industry productivity growth, preserving the original interpretation of the components. Again, it is easy to verify that the sum of the four components on the right-hand side of (2.4) equals the aggregate productivity ratio on the left-hand side. The fact that the new decomposition applies to both the level of productivity and productivity growth is one of its appealing properties. Kuosmanen and Kuosmanen (2021) argue that their proposed decomposition provides a natural and intuitive extension of the static Olley-Pakes decomposition to the dynamic setting of productivity growth, where all components can be expressed as percentage changes.

2.3 Data

The analysis of this chapter makes use of the Financial Statement Data Panel of Statistics Finland. [2] This register data of firms contains the most essential profit and loss account and balance sheet data of all enterprises in virtually all all industries in Finland. All enterprises employing at least 20 persons are included in the direct data collection. The data of smaller enterprises and non-respondent enterprises are derived from administrative records (Business taxation register). To restrict attention on the business enterprises relevant for productivity, we exclude from the outset enterprises classified as housing company, voluntary association, foundation, pension fund, mortgage society, state or municipality, registered religious community, students' union or association, governmental institution, decedent's estate, bankrupt's estate, state-

[2] As for more information on data, see https://taika.stat.fi/en/aineistokuvaus.html#!?dataid=FIRM_19862020_jua_FSSpaneeli_001.xml.

owned or municipally-owned public utility, and other suchlike non-profit organizations and associations.

To compute labor productivity, we use value added (thousand euros) and number of employees (full-time equivalent units). We exclude observations with missing values and observations with zero employees because labor productivity cannot be computed for those observations. All nominal values are deflated to the constant prices of the year 2010 using the GDP deflator of Statistics Finland.

The time period of this study ranges from 2000 to 2018. To gain insight on structural changes, we specifically analyze productivity changes in the following time periods:

2000–2005 (the growth period),
2006–2012 (the Great Recession),
2013–2018 (the follow-up recession and slow recovery).

The choice of these periods is justified by the following reasons. First, instead of focusing on yearly changes, considering longer time periods enables us to better capture the productivity impacts of structural changes such as entry, exit, and industry switching. Second, Statistics Finland conducted major revisions to the Financial Statement Data Panel in years 2006 and 2013, which may potentially cause difficulties in comparison of the data across these three sub-periods. Thirdly, the second sub-period covers to a large extent the period of Great Recession, which refers to the global recession in 2007-2009 that started from the subprime mortgage crisis in the USA and subsequently led to the European Debt Crisis. According to the seasonally adjusted quarterly real GDP data, the Finnish economy was initially in recession from the first quarter of 2008 until the second quarter of 2009, but there was also a follow-up recession from the second quarter of 2012 until the first quarter of 2015, which overlaps with the third sub-period of our study.

2.4 Business sector of Finland

In this section we first consider the entire business sector of Finland. More specifically, the following analysis covers all industries, except the following: primary production (01-05), financial intermediation (65-672), public administration and defence (75), public education units (80), activities of organisations (91) and extra-territorial organizations and bodies (98). According to Statistics Finland: “*These industries are not* *checked by Statistics Finland and the data are of poor quality*".[3] Therefore, we henceforth exclude these industries from further analysis, noting that inclusion of those industries would change the results only marginally.

Let us first consider the levels of labor productivity in the four sub-groups of firms: firms continued to operate within the same industry (Same industry), surviving firms that switched industry during the time period considered (Industry switch), firms that exited the business sector during the time period (Exit), and firms that entered the business sector during the period (Entry). Table 1 reports the average levels of labor productivity in these four sub-groups in the first and the last year of the three sub-periods 2000–2005, 2006–2012 and 2013–2018. All productivity figures are expressed in 1000 € per worker (in 2010 prices). To gain understanding of the relative sizes of the four sub-groups of firms in the sample, the right-most columns report their relative shares in percentage.

Table 1. Average levels of labor productivity (1000 € per worker, in 2010 prices) in the sub-groups of firms; the shares of firms in the groups of surviving firms, switching firms and entering and exiting firms (in percentage).

Period	Levels				Group shares (%)			
	Same industry	Industry switch	Exit	Entry	Same industry	Industry switch	Exit	Entry
2000	47.6	48.4	44.3		64.8	4.5	30.7	
2005	53.9	76.9		52.2	61.2	4.3		34.5
2006	58.5	66.9	56.0		54.7	8.8	36.5	
2012	54.8	51.9		57.0	49.7	8.0		42.3
2013	50.0	42.2	45.7		62.3	2.4	35.3	
2018	65.0	72.8		129.4	70.7	2.8		26.6

Note: The number of firms in the sample varied over this period as follows: 201,943 (2000); 213,768 (2005); 223,555 (2006); 245,992 (2012); 247,205 (2013); and 217,795 (2018).

During the period 2000-2005, labor productivity developed favorably in all sub-groups. The average productivity of firms continuing in the same industry increased from 48 thousand to more than 77 thousand euros per worker. In the sub-group of firms that switched from one industry to another, labor productivity increased even more rapidly,

[3] See the data description at: https://taika.stat.fi/en/aineistokuvaus.html#!?dataid=FIRM_19862020_jua_FSSpaneeli_001.xml

however, this group is relatively small and included only approximately 4 percent of all firms. Note that the exiting firms are only observed at the beginning of the time period, whereas the entering firms are observed at the end of the period: alternative productivity decompositions mainly differ in terms of how the counterfactual productivity change of these sub-groups is estimated. It is encouraging to observe that the productivity of entering firms was considerably higher than that of the exiting firms, and that the relative shares of the entering and exiting firms were rather large, almost one third of all observations.

During the time period of 2006-2012, the global recession that started from the financial crisis in the USA and subsequently lead to the European debt crisis had major adverse effect on labor productivity in Finland. The average labor productivity of continuing firms decreased, particularly in the sub-group of switching firms. Note also that the relative share of switching firms almost doubled compared to the previous sub-period. Fortunately, the entering firms had slightly higher level of productivity than the exiting firms, however, the entering firms achieved lower productivity level than the continuing firms.

In the last sub-period of 2013-2018, the average labor productivity returned to a more positive trajectory. In the sub-groups of continuing firms, average labor productivity increased considerably, especially in the sub-group of industry switchers. During this period, the exiting firms had a lower average labor productivity, but in particular, the group of entering firms had a notably larger average productivity than any other sub-group.

Next, we consider the average yearly change of labor productivity in the three sub-periods. Using the decomposition presented in the previous sub-section, we make use of the classification of firms to four sub-groups, but also take into account changes in the labor shares of firms to capture the Olley-Pakes reallocation component. Table 2 summarizes the results.

The first column of Table 2 indicates the aggregate productivity change of the business sector in Finland. There was modest productivity growth in the first sub-period 2000-2005, but during the second sub-period 2006-2012 labor productivity declined rather remarkably. In the third sub-period 2013-2018 productivity of the business sector recovered, but did not reach the pre-recession levels. Decomposing the aggregate productivity to its components helps to shed light on the underlying structural dynamics.

Table 2. Average change in labor productivity (% per year) in the business sector of Finland and its four components

	Business sector of Finland	Continuing firms in the same industry	Industry switch effect	Entry and exit effect	Reallocation effect
2000–2005	0.46	= 2.67	+0.61	+0.04	-2.86
2006–2012	-2.12	= -1.06	-0.42	+0.66	-1.31
2013–2018	1.94	= 5.99	+0.27	+7.83	-12.15

The second column indicates the average labor productivity growth in the subgroup of continuing firms that remain in the same industry according to the 5-digit TOL 2008 industry classification. These average productivity figures can be interpreted as the baseline productivity change in the absence of structural changes. Table 2 indicates that the average productivity growth of continuing firms notably exceeded that of the business sector in all three time periods, especially in the first and the last sub-periods. In other words, there has been strong productivity growth at the firm level, despite the stagnation at the aggregate level.

The third and fourth columns indicate the incremental contribution due to industry switching of continuing firms (third column) and the entry and exit of firms (fourth column). Recall that the industry switching is a novel component that has not been considered in any previous structural change decompositions. We find that industry switching had a small but noteworthy positive contribution to aggregate productivity growth in the first and the third sub-period, however, industry switching had a negative effect on productivity growth during the crisis years of the second sub-period. In contrast, the entry and exit effect was positive in all time periods, and particularly strong during the third sub-period, thanks to high average productivity of entering firms during that period (compare with Table 1).

The right-most column of Table 2 reports the Olley-Pakes reallocation effect, which can be interpreted as the change in the covariance of the employment shares and the firm-level productivity measures. The reallocation effect is negative in all time periods, and in practice cancels out the productivity growth of continuing firms and the positive contributions of industry switching and the entry and exit. Our decomposition results point to the deteriorating resource allocation as the main culprit of the stagnated labor productivity of Finland's business sector. To gain further insight, we next examine the structural change components at a more detailed level of 1-digit industries.

2.5 Industry-level decompositions

This section zooms from the aggregate level of the business sector to more specific industries at the 1-digit and 2-digit NACE/TOL levels. We consider the following four industries:

Manufacturing (C)

Construction industry (F)

Information and communication industry (J)

Service industries (69-96)

It is worth noting that when we focus on a more narrowly specified industries, the classification of firms to the sub-groups of entering, exiting, and switching firms changes to some extent compared to the previous analysis of the business sector. When decomposing aggregate productivity change, we can only account for firms that operate in the given industry or sector of interest, even if the entering firms come from another industry or exiting firms continue to operate in another industry. For example, if an ICT manufacturing firm switches to the ICT services, this firm will be classified as industry switcher within the business sector, however, it will be treated as an exiting firm in the analysis of the manufacturing industry. The industry switch effect will only include firms that switch withing the manufacturing industries. This is worth keeping in mind when interpreting the decomposition results. For the sake of brevity, we here focus on the decomposition of productivity change in these four industries: the average levels of productivity of the sub-groups and their relative shares are reported in Appendix 1.

Table 3 reports the productivity decomposition for the manufacturing industries (C). This industry had productivity decline already in the first sub-period, which further deteriorated during the crises of the second sub-period. The main culprit is the negative Olley-Pakes reallocation component, analogous to Table 2, but fortunately it is relatively small in the last sub-period. Industry switching and the entry and exit had small positive contributions in most sub-periods considered, the positive entry component was particularly notable during the last sub-period.

Table 4 examines the construction industry (F). This industry exhibited productivity growth in all three sub-periods, including the second sub-period of 2006-2012. In this sub-period the productivity of continuing firms declined, but the positive Olley-Pakes reallocation component offset the negative effect. The reallocation component became negative in the last sub-period, but then the strong growth of the continuing firms and the entry of high-productivity firms maintained the growth of this industry.

Table 3. Manufacturing industry (C): Average change in labor productivity (% per year) and its four components

	Manufacturing industry	Continuing firms in the same industry	Industry switch effect	Entry and exit effect	Reallocation effect
2000–2005	-1.20	= 2.67	+0.05	+0.15	-4.08
2006–2012	-4.80	= -1.19	-0.19	+0.13	-3.55
2013–2018	2.86	= 1.37	+0.08	+1.85	-0.44

Table 4. Construction industry (F): Average change in labor productivity (% per year) and its four components

	Construction industry	Continuing firms in the same industry	Industry switch effect	Entry and exit effect	Reallocation effect
2000–2005	2.02	= 1.83	+0.05	+0.19	-0.05
2006–2012	0.34	= -0.62	-0.53	+0.38	+1.12
2013–2018	1.24	= 3.19	-0.08	+6.68	-8.55

The ICT-industry (J) also managed to maintain productivity growth in all three sub-periods, as indicated by Table 5. Interestingly, the industry switching had a major positive contribution in all three sub-periods, especially during 2000-2005. In contrast, the entry and exit effect was negative during the first two sub-periods. There was an extremely large positive contribution of entry and exit in the last sub-period, but unfortunately it was offset by the negative reallocation effect. Note that many firms in this industry were closely linked to the supply chain of Nokia Corporation, the world's largest mobile phone manufacturer from 1998 till 2011, which started to rapidly losing its market share towards the end of the second sub-period of this study. The downfall of Nokia resulted as major restructuring of this industry. Hence, it is not surprising to see double-digit structural change components in the last sub-period reported in Table 5.

Table 5. Information and communication industry (J): Average change in labor productivity (% per year) and its four components

	ICT-industry	Continuing firms in the same industry	Industry switch effect	Entry and exit effect	Reallocation effect
2000–2005	1.79	= 1.59	+1.29	-1.06	-0.03
2006–2012	0.08	= -0.22	+0.18	-0.07	+0.20
2013–2018	2.34	= 0.73	+0.42	+17.06	-15.87

Table 6. Service industries (69-96): Average change in labor productivity (% per year) and its four components

	Service industries	Continuing firms in the same industry	Industry switch effect	Entry and exit effect	Reallocation effect
2000–2005	1.79	= 2.74	+0.02	-0.53	-0.44
2006–2012	-0.39	= -0.14	-0.15	-0.01	-0.09
2013–2018	0.82	= 0.54	+0.18	+11.69	-11.58

Finally, we consider service industries 69-96, which include such industries as legal and accounting activities, management consulting, architectural and engineering activities, research and development, advertising and market research, education, health care, public administration and defence, among others. Recall that most of these service industries were excluded from the analysis of the business sector in Section 2.4. For the sake of completeness, we here extend the productivity analysis to cover the service sector as well.

Table 6 presents the labor productivity decomposition of the service industries. The overall picture does not differ much from the pattern observed in other industries. The continuing firms serve as the main engine of growth, and the components of structural change are relatively small in the service sector, except for the last sub-period 2013-2018. In that period we observe a pattern of large positive entry and exit effect offset by large negative reallocation effect, very similar to the ICT-industry. We suspect that this pattern may be related to the major restructuring of Finland’s ICT sector observed in Table 5: although industries 69-96 do not span the core ICT services, these service industries are heavy users of the ICT services and as such part of the broader digital economy of Finland.

2.6 Conclusions

While structural change has been recognized as an important driver of productivity growth at the aggregate levels of industries and sectors, most commonly used decompositions are prone to aggregation errors and log-induced bias, which can blur both the overall picture about productivity change and its structural change components. To address this issue, Kuosmanen and Kuosmanen (2021) proposed an aggregation-consistent decomposition that applies to both levels and the change of productivity, and also explicitly considers the productivity effect of firms that switch from one industry to another. In this chapter we have applied this approach to examine labor productivity in Finland's business sector and in four one-digit industries during the period 2000-2018.

We find that structural change has had a major contribution to labor productivity in Finland. The entry and exit of firms as well as industry switching contributed to productivity growth in most periods and industries considered. Indeed, relatively large shares of entering, exiting and switching firms point towards dynamic renewal of Finland's business sector, especially during the years of the Great Recession. However, the negative contribution of the Olley-Pakes reallocation component tends to offset and nullify the positive contributions in most sectors and periods considered. Indeed, we find the deteriorated resource allocation as the main culprit for the stagnated labor productivity.

The negative reallocation component does not necessarily mean that workers have moved from high-productivity firms to low-productivity firms. A more likely explanation for the negative reallocation effect is that workers remained in their jobs despite the entry of new high-productivity firms, which failed to attract workers to increase their market share. According to the popular media, many firms in Finland have faced difficulties in finding skilled workers. Indeed, the mismatch of skills and experience can be one impediment of growth. On the other hand, the labor market in Finland remains rather rigid and heavily regulated, which can affect the competition between firms for the high-skill workforce. Finally, it is not self-evident that the high-productivity startups need workforce to grow if their superior productivity performance is based on highly automated, capital intensive technology. As we noted in Section 2.2, market competition does not necessarily reward firms that achieve high level of labor productivity; firms' competitiveness is more closely related to the total factor productivity that also takes into account the capital inputs.

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Appendix 1: Productivity levels and group shares in manufacturing, construction, information and communication, and service industries

This appendix presents the average levels of labor productivity in the four industries considered in Chapter 2 to support the interpretation of the components of productivity change presented and discussed in Section 2.5. The following tables have been organized analougs to Table 1 in Section 2.4.

Table A1.1 Manufacturing: Average levels of labor productivity (1000 € per worker, in 2010 prices) and the shares of firms in groups of surviving firms, switching firms and entering and exit-ing firms (in percentage).

Period	Levels				Group Shares			
	Same industry	Industry switch	Exit	Entry	Same industry	Industry switch	Exit	Entry
2000	47.6	48.0	41.7		65.5	6.4	28.2	
2005	53.9	55.9		47.8	68.8	6.9		24.4
2006	55.4	59.0	49.1		52.7	14.5	32.8	
2012	51.5	51.8		45.7	56.6	14.2		29.2
2013	58.3	43.3	41.8		67.9	2.7	29.4	
2018	62.3	51.8		61.3	77.5	3.0		19.5

The number of firms in the considered years: 23,615 (2000); 22,480 (2005); 22,355 (2006); 20,813 (2012); 20,4430 (2013); and 17,904 (2018).

Table A1.2 Construction industry: Average levels of labor productivity (1000 € per worker, in 2010 prices) and the shares of firms in groups of surviving firms, switching firms and entering and exit-ing firms (in percentage).

Period	Levels				Shares			
	Same industry	Industry switch	Exit	Entry	Same industry	Industry switch	Exit	Entry
2000	50.0	48.9	51.2		68.5	2.7	28.8	
2005	54.6	56.1		56.9	58.2	3.0		38.1
2006	57.1	115.5	59.7		59.2	4.3	36.5	
2012	54.9	74.3		58.8	49.9	5.2		44.8
2013	55.3	48.0	59.1		63.9	1.6	34.5	
2018	64.1	49.7		127.7	72.4	2.2		25.4

The number of firms in the considered years: 27,667 (2000); 32,185 (2005); 34,374 (2006); 40,753 (2012); 40,850 (2013); and 36,054 (2018).

Table A1.3 Information and communication: Average levels of labor productivity (1000 € per worker, in 2010 prices) and the shares of firms in groups of surviving firms, switch-ing firms and entering and exit-ing firms (in percentage).

Period	Levels				Shares			
	Same industry	Industry switch	Exit	Entry	Same industry	Industry switch	Exit	Entry
2000	50.6	29.8	46.3		54.7	7.1	38.1	
2005	54.7	59.8		48.1	46.8	5.3		47.8
2006	54.7	60.4	51.5		42.0	18.2	39.9	
2012	53.9	61.8		52.0	34.5	14.3		51.2
2013	54.4	54.9	46.3		60.1	2.9	37.0	
2018	56.4	78.8		164.9	58.9	3.2		37.9

The number of firms in the considered years: 5,825 (2000); 6,810 (2005); 7,243 (2006); 8,816 (2012); 8,958 (2013); and 9,146 (2018).

Table A1.4 Service industries: Average levels of labor productivity (1000 € per worker, in 2010 prices) and the shares of firms in groups of surviving firms, switching firms and entering and exit-ing firms (in percentage).

Period	Levels				Shares			
	Same industry	Industry switch	Exit	Entry	Same industry	Industry switch	Exit	Entry
2000	40.6	41.6	39.0		66.4	3.4	30.1	
2005	46.2	47.9		42.1	57.6	3.1		39.3
2006	49.0	46.4	45.9		53.0	10.7	36.3	
2012	48.6	42.7		45.7	44.9	7.7		47.5
2013	45.8	35.3	38.4		62.4	2.3	35.3	
2018	47.1	47.6		129.2	70.0	2.6		27.4

The number of firms in the considered years: 61,527 (2000); 70,003 (2005); 75,161 (2006); 88,779 (2012); 89,547 (2013); and 79,902 (2018).