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Renewal of Companies

INDUSTRY SWITCHING AS A FORM OF STRUCTURAL CHANGE

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Abstract

The contributions of entry and exit of firms to aggregate productivity growth are well-established in the literature. However, the impact of industry switching of firms on productivity remains overlooked. The purpose of this report is to shed new light on the role of industry switching as a form of structural change.

The results show that industry switching is very common and occurs in all industries in Finland, especially during the times of recession. Industry switching has had both positive and negative contributions to aggregate productivity in different periods. Intra-industry switching had mainly negative impact on productivity growth suggesting that switching was taken as a strategy to survive. On the other hand, inter-industry switching had mainly positive impact on productivity growth, suggesting that switching was associated with new products and technologies.

The study also looked at the structural developments of industries relevant for combating climate change. As emission reduction targets require companies to renew their product and service offerings, climate policy can help guide companies to switch industries. However, in the industries examined in the study, restructuring has so far taken place mainly through entry and exit.

Tiivistelmä

Yritysten uudistuminen: Toimialan vaihto rakennemuutoksen osatekijänä

Yritysten markkinoille tulo ja markkinoilta poistuminen on tunnistettu merkittäviksi toimialan tuottavuuteen vaikuttaviksi tekijöiksi. Sen sijaan yritysten toimialan vaihdosten tuottavuusvaikutuksista on olemassa hyvin niukasti tutkimustietoa. Tässä raportissa analysoidaan radikaalien ja vähittäisten toimialavaihdosten aikaansaamia tuottavuusvaikutuksia.

Tulokset osoittavat, että toimialan vaihdokset ovat luultua yleisempiä ja vaihdoksia tapahtuu erityisesti laskusuhdanteessa. Toimialan vaihdosten tuottavuusvaikutukset riippuvat kuitenkin ajanjaksosta. Vähittäisillä toimialavaihdoksilla on pääasiassa negatiivisia tuottavuusvaikutuksia. Tämä voi johtua siitä, että vähäisemmät toimialan muutokset ovat yrityksille kenties selviytymiskeino markkinakilpailussa. Toisaalta suurilla tai radikaaleilla toimialamuutoksilla on pääsääntöisesti positiivinen tuottavuusvaikutus. Tämä viitannee siihen, että uudet teknologiat tai tuotteet ohjaavat yrityksiä siirtymään kokonaan teollisuudenalalta toiselle tai toisella alalla on paremmat kasvu- tai kannattavuusnäkymät.

Tutkimuksessa tarkasteltiin myös ilmastomuutoksen torjunnan kannalta merkittävien teollisuudenalojen rakenteellista kehitystä. Koska päästövähennystavoitteet edellyttävät yritysten tuote- ja palvelutarjonnan uudistumista, ilmastopolitiikka voi osaltaan ohjata yrityksiä vaihtamaan toimialaa. Tutkimuksessa tarkastelluilla toimialoilla rakennemuutos on kuitenkin toistaiseksi tapahtunut pääasiassa uusien markkinoille tulevien yritysten ja markkinoilta poistuvien yritysten kautta.

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Contents

1 Introduction

Productivity growth in Finland has remained low for more than a decade, but the underlying reasons behind the stagnation remain unclear. One possible reason can be found in the structural renewal of firms. Entry and exit of firms are generally recognized as important drivers of productivity growth. In addition to these well-studied sources, renewal also occurs within firms. Some firms renew their products and services to such extent that they switch from one industry to another. The aim of this study is to systematically examine the renewal of firms through industry switching in Finland and to analyze its impact on productivity growth.

There is a well-established stream of literature focusing on the impact of structural change on productivity (see, e.g., Olley and Pakes, 1996; Melitz and Polanec, 2015; Maliranta and Määttänen, 2015, among others). Available productivity decompositions within this stream allow to examine the impacts of entry and exit of firms on productivity growth of industries. However, an entering firm is not always a new entrant, and an exiting firm is not always a bankrupt company. An existing firm can renew or change its output mix due to its internal operations or external factors that can eventually lead to a switching of the firm from one industry to another. When switching, this type of firms usually gets mixed together with new startups and bankrupt firms, which challenges the common interpretation of entrants as newly established startups and exits as firms that going out of business. In fact, a new entrant can be an established firm that just introduces a new product.

There is another stream of literature within industrial organization economics that examines multi-product firms and product switching (see Bernard et al., 2010, 2016; Maliranta and Valmari, 2017). The studies reveal that product switching is very common and frequently occurs in manufacturing and other industries. As a motivating well-known example of market entry through product switching, consider how the technology company Apple joined the mobile phone market by launching iPhone in 2007. Apple was not a startup, but a leading consumer electronics company that introduced a new product. Analogously, an exit can occur as a result of a multiproduct firm re-focusing its operations on more profitable product lines. For instance, a notorious example of Nokia exiting the mobile phone market by selling its mobile phone division to Microsoft and re-focusing on mobile networks. It does not mean that it went bankrupt but just switched products and joined another product market. As a matter of fact, Nokia has switched products several times over its history. Or the industrial machinery company Metso exited the paper machine and automotive businesses by focusing on the manufacturer of machinery for metallurgy and mining. Finally, the energy and environmental technology company Oilon Oy, which originally started as a manufacturer of oil burners and now specializes in environmental technology by focusing on improving energy efficiency and reducing emissions. These are only a few examples of industry switching.

These two streams of literature mentioned above are currently rather disconnected: an explicit link between product switching and productivity growth is missing. The novelty of the present study is to bridge this knowledge gap by systematically examining *industry switching* as a special form of entry and exit; and formally introducing it to the productivity decomposition at the industry level. Along with the well-established forms of structural change such as entry and exit, industry switching is another form of renewal that may reflect company's growth and expansion, or its strategy of survival during recessions. Even though industry switching is very common in manufacturing and other industries as the examples above illustrate, it has not been studied rigorously until now. Moreover, there is very little scientific evidence on the impact of industry switching on productivity growth. Only one recent study analyzed an effect of industry switching on productivity in agricultural sector (Kuosmanen and Kuosmanen, 2021). However, there is no studies have been undertaken to evaluate the impact of industry switching, as a new form of structural change, on productivity of the industries of the business sector.

Given the importance of climate change mitigation, companies need to adopt new technologies and innovations to comply with stricter greenhouse gas (GHG) emissions targets. Some examples of product switching can already be observed, as a response to climate change regulation. For example, renewable wind and solar power are fast replacing fossil fuels in the energy industry. We expect that the tightening GHG emission targets incentivize firms to

renew their products and service offerings, which may result as more intensive industry switching in the future.

The rest of the report is organized into three parts:

Part I: Industry switching as a new form of entry and exit

The aim of this part is to get better understanding of firms' renewal through industry switching and to identify those industries where switching is most common. Using the firm-level financial statement data of Statistics Finland, we analyze industry switching based on the industrial classification TOL08 up to the 5-digit level (see Box 1) in period 2000–2018. We distinguish two types of switching: inter-industry (across 2-digit industry level) and intra-industry (within 2-digit level). This part addresses the following research questions:

- How common is industry switching in Finland?
- In which industries product switching has occurred?
- Is it inter-industry (across 2-digit industry level) or intra-industry (within 2-digit level)?

Part II: Impact of industry switching on productivity

This part focuses on the impact of industry switching on aggregate labor productivity growth of industries. Based on the results of Part I and using the decomposition method of Kuosmanen and Kuosmanen (2021), we decompose aggregate labor productivity growth of four manufacturing industries into different components. More specifically, we analyze productivity growth and its components in three periods:[1]

- 1) 2000–2005 (the growth period),
- 2) 2006–2012 (the Great Recession),[2]
- 3) 2013–2018 (the follow-up recession and slow recovery).

This task tackles the following research questions:

- What is the impact of industry switching on productivity?
- Is industry switching a survival strategy that decreases industry productivity? Or is it associated with new products and technologies and has a positive impact on productivity?
- How does productivity impact of industry switching compare to more established forms of structural change such as entry by startup firms or exit through firm closure?

Part III: Industry switching under climate change mitigation

Climate change will inevitably shape industries for years to come. It will likely cause renewal of products and cause industry switching on a larger scale in the future. To gain further insights, we consider two industries at the 5-digit level that are related to the climate change mitigation: *Production of electricity with hydropower and wind power* (35111) and *Plumbing, heat and air-conditioning installation* (43220). We answer the following questions:

- How large proportion of the new firms entering these industries were startups and the firms that switched from other industries?
- How the different channels of entry and exit through startups and product switching develop over time as the industries grow and mature?
- Has abatement of GHG emissions affected companies of the energy industry and caused industry switching?

2 Industry switching in Finland

2.1 Data

We use the financial statement data of Statistics Finland that contain yearly financial statement information of essentially all firms in the Finland's business sector.[3] The data cover exhaustively all enterprises in almost all industries. The statistical package Stata was used in the estimations conducted through the remote access system Fiona, Statistics Finland's research services operating system.[4] The data sample used to examine industry

switching includes approximately 610 thousand firms (over 4.5 million observations) during 2000–2018.[5] In the analysis, this period is further divided into three subperiods: 2000–2005, 2006–2012 and 2013–2018. All tables and figures presented below are based on authors' own calculations using the data stored on the Statistics Finland server.

2.2 Industry switching: an overview

The prevalence of industry switching is examined by analyzing the changes in the numerical codes of TOL08 describing firms' principal economic activities (see Box 1). We examine these changes at the 2-digit (inter-industry) and 5-digit (intra-industry) levels, which reflect the degree of firms' renewal. For instance, when industry code changes at the 5-digit level, this change indicates a gradual renewal. To illustrate, if a café is converted into a pub, the former TOL08 code *56302 Cafés and coffee bars* changes to the code *56301 Beer and drink bars*. However, operation of the firm will continue within the broader 2-digit level *56 Food and beverage service activities*. A more profound renewal of firms is reflected when TOL08 code changes at the 2-digit level. For example, if a company that previously focused on machine maintenance starts its own manufacturing and gradually displaces maintenance activity, the former industry category *33 Repair and installation of machinery and equipment* changes to *28 Manufacture of machinery and equipment n.e.c.*

Table 1 describes the total number of firms and observations for the period 2000–2018 and its three subperiods. The figures in the table provide an overview of prevalence of industry switching during these time periods. In addition to the total number of switches that occurred during different periods, the table presents the number of inter- and intra-industry switches. Firms changed industry about 83 thousand times during 2000–2018. Two thirds of these switches were between industries at the 2-digit level (inter-industry switching) and one third were between industries at the 5-digit level (intra-industry switching). Most of the switches occurred during 2006–2012, the period of the Great Recession. During this time, almost 43 thousand times firms switched from one industry to another. These switches comprised of 26 thousand inter-industry switches and about 17 thousand intra-industry switches. Interestingly, that the inter-industry switches prevailed in all considered periods. This implies that majority of switching firms were rather radically renewing their economic activities during the last two decades.

2.3 Inter-industry switching

This section focuses on inter-industry switching reflecting the changes at the 2-digit level of industry classification TOL08 (see divisions in Appendix A). When a firm switches from one industry to another, the former industry is referred to as *losing industry* and gaining industry as *receiving industry*. Many industries are both losing and receiving at the same time indicating an apparent structural change occurring within those industries.

To illustrate, Figure 1 shows the manufacturing industries based on the shares of receiving and losing firms

Table 1 The number of total-, inter- and intra-industry switches during 2000–2018 and three subperiods

	2000–2018	2000–2005	2006–2012	2013–2018
Number of firms	609,344	306,509	389,126	392,017
Number of observations	4,555,268	1,265,488	1,727,149	1,562,631
Number of switches	83,056	28,381	42,927	11,748
– Inter-industry switches (2-digit)	55,628	19,770	26,383	9,475
– Intra-industry switches (5-digit)	27,428	8,611	16,544	2,273

Note: The number of switches include all the switches that occurred between the first year and the last year of the time period indicated, including firms that switched industry multiple times during the time period. The number of firms of the subperiods do not add up to the total number of firms in 2000–2018, since some continuing firms are present in multiple subperiods.

Box 1
Classification of industries and the change of principal activity of firms

The Standard Industrial Classification 2008 from the Business Register (TOL08) is a national-based version of the EU's classification of economic activities NACE Rev. 2 (European Parliament, Regulation (EC) No 1893/2006). It is derived from the UN's International Standard Classification of All Economic Activities (ISIC). Groups on NACE levels are defined so that they are either uniform with ISIC groups or so that the ISIC group is a combination of NACE sub-divisions, which allow for the corresponding ISIC groups be combined from NACE 3-digit and 4-digit level groups. The main groups and the 2-digit levels are uniform, but further divisions have been made in NACE to many ISIC groups on the 3- and 4-digit levels.

The use of NACE or its national-based versions by the EU Member States' official statistics is mandatory within the European Statistical System. Statistics produced on the basis of NACE are comparable at European and, in general, at world level. Hierarchical classifications characterized by a finer partition of categories allow to collect and present the information at various levels of aggregation. TOL08 is widely used in statistics to describe different areas of the economy, such as production and employment, and in national accounts statistics.[a] As established in the NACE Regulation, TOL08 is formed of five hierarchical levels:

- Sections (alphabetical letters)
- Divisions (2-digit numerical code)
- Groups (3-digit numerical code)
- Classes (4-digit numerical code)
- Categories (5-digit numerical code)

TOL08 complies with NACE Rev. 2 up to the 4-digit level, whereas its 5-digit level consists of national categories defined based on Finland's own needs.

Each unit recorded in statistical business registers has one NACE code according to its principal economic activity, which is defined as the activity that contributes most to the value added of this unit. In the simple case, where a unit performs only one economic activity, the principal activity of the unit is determined by the NACE category which describes that activity. If the unit performs several economic activities, the principal activity is determined based on the value added associated to each activity. For example, if a unit performs activities falling in two different NACE categories, there will be one activity that accounts for more than 50 percent of value added, which is the principal activity that determines the NACE classification of the unit. Thus, value added is the basic concept in NACE for determining the classification of a unit according to economic activities.[b]

Changes of principal activities of units (industry switching) are reflected in TOL08. Units can change their principal activity either at once or gradually over time due to seasonal factors, management decisions to vary the output patterns, or other factors. While all these cases call for the classification of the unit to be changed, too frequent changes could result in inconsistencies between short-term and long-term statistics making interpretation difficult. To avoid frequent changes, the change of principal activity is made when the current activity has been accounting for less than 50 percent of the value added for at least two years.

[a] To see all statistics where TOL08 is used follow: https://www.stat.fi/til/tol2008_aikataulu_en.html.

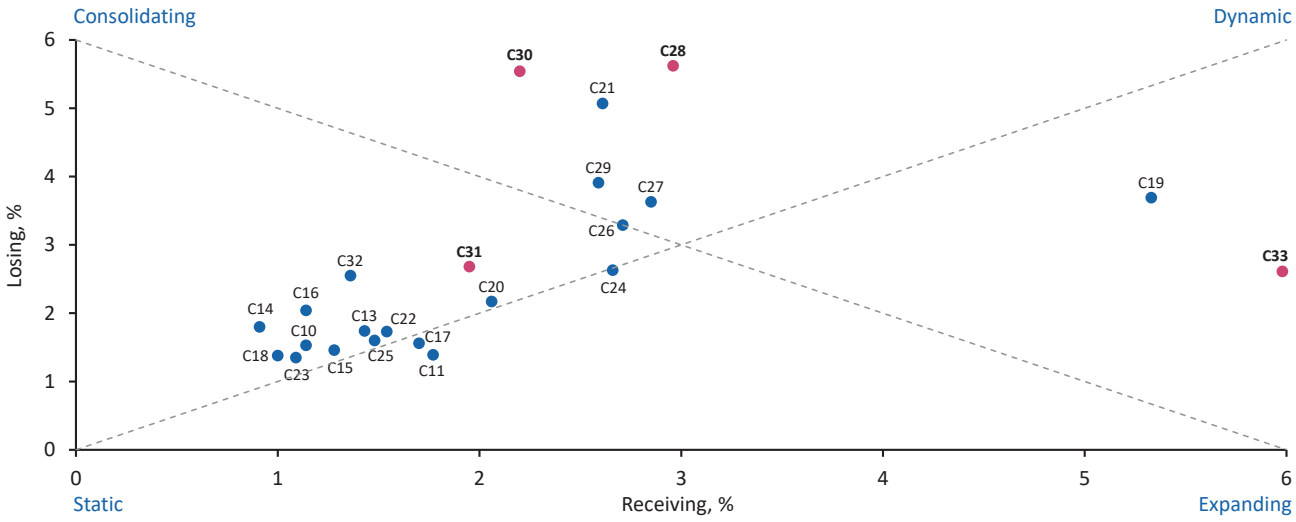
[b] For detailed information on the classification rules for activities and units see Eurostat (2008).

calculated for the period from 2000 to 2018 (similar figure for all industries is included in Appendix B). Each dot represents a single industry. Thus, each point in the scatter plot represents the result of two measurements: the Y axis is the share of firms that switched to other industry and the X axis is the share of firms that switched from other industry. The industries illustrated in the Figure 1 can be further viewed as *expanding* or *consolidating*, and *static* versus *dynamic*. For example, industries C19 and C33 can be seen as *dynamic* and *expanding* industries (attractive industries), since the share of new firms they receive from other industries prevails the share of firms these industries lose. Industries such as C21, C28 and C30 are *dynamic* and *consolidating* industries (less attractive industries), since they lost more firms than gained. Finally, the group of *static* industries (the closest points to the origin in Figure 1) indicate the lack of structural change in terms of switching. In section 3 we examine the industries highlighted in red and identify the impact of switching on aggregate productivity of these industries.

Regarding the results for all industries, Tables 2–4 report the top five receiving and losing industries in periods 2000–2005, 2006–2012 and 2013–2018 in terms of: (a) the number of switching firms, (b) the share of switching firms to/from specified industry in the total number of firms in that industry, and (c) the net effect (the number of receiving firms minus the number of losing firms).

During 2000–2005, the industries that underwent the most restructuring were *Retail trade, except of motor vehicles and motorcycles* (G47), *Wholesale trade (except of motor vehicles and motorcycles)* (G46) and *Specialised construction activities* (F43). They lost the most firms to other industries and at the same time gained new firms from other industries. For example, about half a thousand of firms switched from other industries to the wholesale sector, and at the same time about 800 companies switched from the wholesale sector to other industries. In terms of shares, the most affected industries were *Office administrative, office support and other business support activities* (N82), *Employment activities* (N78) and *Travel agency, tour operator and other related activities* (N79). About 4 to 5 percent of those industries by 2005 comprised of firms that switched from other industries at the 2-digit level. The industries that lost the most firms were *Waste collection, treatment and disposal activities* (E38), *Manufacture of computer, electronic and optical products* (C26) and *Manufacture of machinery and equipment n.e.c* (C28). Considering the net effect, *Real estate activities* (L68) was mainly receiving new firms, while *Retail* and *Wholesale trade* (G46) was mainly losing its firms.

Figure 1 Industry switching in manufacturing industries



Note: The shares of receiving and losing firms are calculated for the period 2000–2018. The dots represent manufacturing industries at the 2-digit level of TOL08.

In period 2006–2012, the largest switching in terms of the number of switching firms occurred in industries *Real estate activities* (L68), *Repair and installation of machinery and equipment* (C33), *Services to buildings and landscape activities* (N81). In terms of the shares, a significant restructuring occurred in *Repair and installation of machinery and equipment* (C33), *Civil engineering* (F42) and *Manufacture of machinery and equipment n.e.c.* (C28) industries. Up to 30 percent of firms in industry C33 from 2006 to 2012 were the switching firms. The share of firms that switched from other industries was as high as 24 percent in industry F42. The share of firms that switched from C28 to other industries was as high as 22 percent.

In period 2013–2018, the most attractive industries were *Real estate activities* (L68) and *Human health activities* (O86) (Table 4). In contrast, industries *Retail trade, except of motor vehicles and motorcycles* (G47) and *Wholesale trade, except of motor vehicles and motorcycles* (G46) were losing its firms.

Based on our results, industry switching is very common and occurs in all industries in Finland, especially during

Table 2 Inter-industry switching in 2000–2005

Top 5 receiving industries			Top 5 losing industries		
TOL08	**Description**	**Nr of firms**	**TOL08**	**Description**	**Nr of firms**
G47	Retail trade, except of motor vehicles and motorcycles	540	G46	Wholesale trade, except of motor vehicles and motorcycles	789
G46	Wholesale trade, except of motor vehicles and motorcycles	527	G47	Retail trade, except of motor vehicles and motorcycles	733
F43	Specialised construction activities	498	F43	Specialised construction activities	406
L68	Real estate activities	355	I56	Food and beverage service activities	302
F41	Construction of buildings	337	M71	Archit. and engineering activities; technical testing and analysis	252
TOL08	**Description**	**Share, %**	**TOL08**	**Description**	**Share, %**
N82	Office admin., office support and other business support act.	5.28	E38	Waste collection, treatment and disposal activities	4.17
N78	Employment activities	4.39	C26	Manufacture of computer, electronic and optical products	3.33
N79	Travel agency, tour operator and other related activities	4.29	C28	Manufacture of machinery and equipment n.e.c	3.20
C28	Manufacture of machinery and equipment n.e.c	4.01	N77	Rental and leasing activities	3.20
C30	Manufacture of other transport equipment	3.75	N82	Office admin., office support and other business support act.	2.76
TOL08	**Description**	**NET**	**TOL08**	**Description**	**NET**
L68	Real estate activities	182	G46	Wholesale trade, except of motor vehicles and motorcycles	262
F41	Construction of buildings	107	G47	Retail trade, except of motor vehicles and motorcycles	193
F43	Specialised construction activities	92	M71	Archit. and engineering activities; technical testing and analysis	106
C25	Manuf. of fabricated metal products except machin. and equip.	81	S96	Other personal service activities	53
Q86	Human health activities	63	J62	Computer programming, consultancy and related activities	42

Note: Sample size is 423,437 observations.

the times of recession and economic downturn. Thousands of firms changed from one industry to another at the 2-digit level during period 2006–2012. The most renewing industries during all considered periods were *Wholesale trade, except of motor vehicles and motorcycles* (G46), *Retail trade, except of motor vehicles and motorcycles* (G47), *Specialised construction activities* (F43), *Construction of buildings* (F41), *Real estate activities* (L68), *Activities of head offices; management consultancy activities* (M70) and *Services to buildings and landscape activities* (N81).

2.4 Intra-industry switching

This section focuses on intra-industry switching. Table 5 lists the top five industries at the 2-digit level with the most intra-industry switches in periods 2000–2005, 2006–2012 and 2013–2018. From the results of inter-industry switching, we know that industries *Wholesale trade* (G46) and *Retail trade* (G47) received and lost firms from/to other industries at the 2-digit level. Table 5 further reveals that structural changes occurred also within

Table 3 Inter-industry switching in 2006–2012

Top 5 receiving industries			Top 5 losing industries		
TOL08	**Description**	**Nr of firms**	**TOL08**	**Description**	**Nr of firms**
L68	Real estate activities	1,323	N81	Services to buildings and landscape activities	1,449
C33	Repair and installation of machinery and equipment	1,022	G47	Retail trade, except of motor vehicles and motorcycles	911
F43	Specialised construction activities	859	G46	Wholesale trade, except of motor vehicles and motorcycles	860
G47	Retail trade, except of motor vehicles and motorcycles	835	C28	Manufacture of machinery and equipment n.e.c	856
G46	Wholesale trade, except of motor vehicles and motorcycles	637	F43	Specialised construction activities	666
TOL08	**Description**	**Share, %**	**TOL08**	**Description**	**Share, %**
C33	Repair and installation of machinery and equipment	29.79	C28	Manufacture of machinery and equipment n.e.c	22.37
F42	Civil engineering	24.17	N81	Services to buildings and landscape activities	9.39
C28	Manufacture of machinery and equipment n.e.c	7.47	C32	Other manufacturing	9.03
C26	Manufacture of computer, electronic and optical products	7.20	C26	Manufacture of computer, electronic and optical products	8.78
C31	Manufacture of furniture	6.22	C31	Manufacture of furniture	8.28
TOL08	**Description**	**NET**	**TOL08**	**Description**	**NET**
L68	Real estate activities	1,104	N81	Services to buildings and landscape activities	1,189
C33	Repair and installation of machinery and equipment	784	C28	Manufacture of machinery and equipment n.e.c	570
F42	Civil engineering	269	J62	Computer programming, consultancy and related activities	223
F43	Specialised construction activities	229	G46	Wholesale trade, except of motor vehicles and motorcycles	223
F41	Construction of buildings	183	M70	Activities of head offices; management consultancy activities	213

Note: Sample size is 483,895 observations.

these industries. Intra-industry switching was the most common in 2006–2012 when 859 firms in *Retail trade* (G47) and 846 firms in *Sports activities and amusement and recreation activities* (R93) changed industry at the 5-digit level.

Table 6 reports the top five industries at the 2-digit level with the highest share of intra-industry switching[6] in the same three periods. In 2000–2005, almost 8 percent of *Electricity, gas, steam and air conditioning supply* (D35) and *Travel agency, tour operator and other reservation service and related activities* (N79) consisted of intra-industry switching firms. During 2006–2012, almost 15 percent of *Sports activities and amusement and recreation activities* (R93) were intra-industry switching firms. Furthermore, intra-industry switching was largely observed within industries: *Residential care activities* (Q87) with almost 10 percent of switching firms, *Creative, arts and entertainment activities* (R90) with 8 percent and *Accommodation* industry (I55) with 7 percent. More detailed results of intra-industry switching are reported in Tables C1-C3 in Appendix C.

Table 4 Inter-industry switches in 2013–2018

Top 5 receiving industries			Top 5 losing industries		
TOL08	**Description**	**Nr of firms**	**TOL08**	**Description**	**Nr of firms**
L68	Real estate activities	584	G47	Retail trade, except of motor vehicles and motorcycles	580
F43	Specialised construction activities	386	G46	Wholesale trade, except of motor vehicles and motorcycles	460
F41	Construction of buildings	333	F43	Specialised construction activities	340
G47	Retail trade, except of motor vehicles and motorcycles	316	S96	Other personal service activities	307
Q86	Human health activities	297	F41	Construction of buildings	270
TOL08	**Description**	**Share, %**	**TOL08**	**Description**	**Share, %**
N82	Office admin., office support and other business support act.	3.30	N78	Employment activities	2.70
B08	Other mining and quarrying	2.69	N77	Rental and leasing activities	2.68
I55	Accommodation	2.63	N82	Office admin., office support and other business support act.	2.19
F42	Civil engineering	2.34	C26	Manufacture of computer, electronic and optical products	1.96
N78	Employment activities	2.27	M73	Advertising and market research	1.72
TOL08	**Description**	**NET**	**TOL08**	**Description**	**NET**
L68	Real estate activities	322	G47	Retail trade, except of motor vehicles and motorcycles	264
Q86	Human health activities	188	G46	Wholesale trade, except of motor vehicles and motorcycles	180
F41	Construction of buildings	63	S96	Other personal service activities	169
I55	Accommodation	63	M74	Other professional, scientific and technical activities	83
R90	Creative, arts and entertainment activities	59	I56	Food and beverage service activities	55

Note: Sample size is 526,814 observations.

Table 5 The top five industries with the highest number of intra-industry switches

TOL08	Description	Nr. of switches at 5-digit level
2000–2005		
G46	Wholesale trade, except of motor vehicles and motorcycles	527
G47	Retail trade, except of motor vehicles and motorcycles	510
I56	Food and beverage service activities	459
H49	Land transport and transport via pipelines	153
C25	Manufacture of fabricated metal products, except machinery and equipment	134
2006–2012		
G47	Retail trade, except of motor vehicles and motorcycles	859
R93	Sports activities and amusement and recreation activities	846
G46	Wholesale trade, except of motor vehicles and motorcycles	707
M74	Other professional, scientific and technical activities	641
J62	Computer programming, consultancy and related activities	547
2013–2018		
G47	Retail trade, except of motor vehicles and motorcycles	214
G46	Wholesale trade, except of motor vehicles and motorcycles	120
I56	Food and beverage service activities	120
L68	Real estate activities	107
G45	Wholesale and retail trade and repair of motor vehicles	74

Table 6 The top five industries with the highest share of intra-industry switches

TOL08	Description	Share, %
2000–2005		
D35	Electricity, gas, steam and air conditioning supply	7.60
N79	Travel agency, tour operator and other reservation service and related activities	7.58
C32	Other manufacturing	4.05
I56	Food and beverage service activities	2.69
J58	Publishing activities	2.29
2006–2012		
R93	Sports activities and amusement and recreation activities	14.67
Q87	Residential care activities	9.60
R90	Creative, arts and entertainment activities	7.64
I55	Accommodation	7.18
Q88	Social work activities without accommodation	6.14
2013–2018		
D35	Electricity, gas, steam and air conditioning supply	1.32
Q87	Residential care activities	1.04
I56	Food and beverage service activities	0.61
G47	Retail trade, except of motor vehicles and motorcycles	0.55
C22	Manufacture of rubber and plastic products	0.46

3 Impact of industry switching on productivity

3.1 Structural change productivity decomposition

Consider an industry consisting of N_t firms in period t. In any given period t, the aggregate output is the sum of firm-level outputs of all firms operating in period t. Denote the productivity index of firm i in period t by p_{it}. Aggregate productivity of the industry in period t can be measured by first aggregating inputs and outputs to the industry level, and subsequently applying the productivity measure to the aggregated inputs and outputs. Aggregate productivity of the industry is henceforth denoted by P_t.

Regarding levels of labor productivity, it is straightforward to compute the average productivity levels for multiple different sub-groups of firms. Further, one can apply standard statistical tests for testing whether the average productivity levels differ significantly between the sub-groups. We would advocate the statistical testing of the group means of the productivity levels as the first step before proceeding to productivity decompositions.

To link the group averages to the aggregate productivity of the industry, we extend the Kuosmanen and Kuosmanen (2021) four-component productivity decomposition to draw a distinction between the intra-industry and inter-industry switches, and break down the aggregate productivity to the following five components:

Industry productivity (P_t)
= *Productivity of continuing firms* ($\overline{p}_{Sc,t}$)
+ *Intra-industry switch effect* ($\overline{p}_{Scw,t} - \overline{p}_{Sc,t}$)
+ *Inter-industry switch effect* ($\overline{p}_{S,t} - \overline{p}_{Scw,t}$)
+ *Entry and exit effect* ($\overline{p}_t - \overline{p}_{S,t}$)
+ *Allocation effect* ($P_t - \overline{p}_t$)

or equivalently,

$$P_t = \overline{p}_{Sc,t} + \left(\overline{p}_{Scw,t} - \overline{p}_{Sc,t}\right) + \left(\overline{p}_{S,t} - \overline{p}_{Scw,t}\right) + \left(\overline{p}_t - \overline{p}_{S,t}\right) + \left(P_t - \overline{p}_t\right). \quad (1)$$

The left-hand side of (1) is the aggregate productivity of the industry in period t. The first component on the right-hand side of (1) is the average productivity of continuing firms that do not switch industry. The second component captures the effect of intra-industry switching by comparing the mean productivity of all continuing firms in the sector and the non-switching continuing firms. This component is similar to the product switching effect introduced by Kuosmanen and Kuosmanen (2021). The third component is new: it captures the productivity impact of the intra-industry switching through the difference in the mean productivity of all continuing firms and that of the sub-group of firms that continue within the same industry of interest.

The fourth component measures the contribution of genuine entry and exit by comparing the average productivity of all firms and the continuing firms. Note that without the third component of intra-industry switching, the continuing firms that switch from or to the industry of interest would be confused with the startups and closeups. The fifth component captures reallocation of resources between all firms in the sample observed in period t, directly analogous to the resource allocation component of Olley and Pakes (1996) decomposition.

To decompose productivity changes, we can state equation (1) as

$$\frac{P_t}{P_{t-1}} = \frac{\overline{p}_{Sc,t}}{\overline{p}_{Sc,t-1}} + \left[\frac{\overline{p}_{Scw,t}}{\overline{p}_{Scw,t-1}} - \frac{\overline{p}_{Sc,t}}{\overline{p}_{Sc,t-1}}\right] + \left[\frac{\overline{p}_{S,t}}{\overline{p}_{S,t-1}} - \frac{\overline{p}_{Scw,t}}{\overline{p}_{Scw,t-1}}\right] + \left[\frac{\overline{p}_t}{\overline{p}_{t-1}} - \frac{\overline{p}_{S,t}}{\overline{p}_{S,t-1}}\right] + \left[\frac{P_t}{P_{t-1}} - \frac{\overline{p}_t}{\overline{p}_{t-1}}\right]. \quad (2)$$

3.2 Structural changes in four manufacturing industries

To examine the impacts of intra- and inter-industry switching on aggregate labor productivity growth, we analyze four manufacturing industries at the 2-digit level: *Manufacture of machinery and equipment n.e.c.* (C28), *Manufacture of other transport equipment* (C30), *Manufacture of furniture* (C31) and *Repair and installation of machinery and equipment* (C33). These industries are chosen based on the results of industry switching and represent different types of structural change dynamics (see Figure 1). Industry C33 represent a *dynamic* and *expanding* industry, C28 and C30 – *dynamic* and *consolidating* industries, and C31 – a *static* industry.

Using the financial statement data panel of Statistics Finland and the decomposition method of Kuosmanen and Kuosmanen (2021) presented above, we decompose aggregate labor productivity growth of four manufacturing industries into different components. More specifically, we analyze productivity growth in the period from 2000 to 2018 and its subperiods: 2000–2005, 2006–2012, and 2013–2018. To calculate labor productivity, we use value added and number of employees (in the full-time equivalent units). Nominal values are deflated using the GDP price deflator. Labor productivity is measured in levels and changes.

Table 7 presents the relative shares of continuing firms in the same industry, switching firms, and entering and exiting firms. As the table reveals, there have been structural changes taking place in these industries both in terms of entry and exit and in terms of industry switching. The inter-industry switching was prevailing intra-industry switching in all considered industries and in all periods. Firms were especially active in changing industries during period 2006–2012. There has been also a lot of exits and entries in all periods. Considering longer time period from 2000 to 2018, the largest share of new firms was in industry C33 with the share of 66 percent. The largest share of exiting firms was found in industry C31 (67 percent) in period 2000–2018.

Table 8 reports the average levels of labor productivity for different groups of firms in the selected industries. Specifically, firms that continued to operate within the same industry, firms that switched industry at the 2- and 5-digit levels and exiting and entering firms. The table helps to identify how different firms from different groups compare in terms of their productivity levels. The average labor productivity of continuing firms has been improving over time especially in industries C30 and C31, except for period 2006–2012, when the average labor productivity fell in all industries. Firms that changed industry at the 2-digit level (inter-industry switching) typically improved their productivity over time.

Table 9 reports the average changes in labor productivity of the selected industries in three subperiods and a longer period (in percent per year). The second column reports the average productivity growth of the industries and other columns are the contributing components. The aggregate productivity of industry is the sum of five components: the average productivity of non-switching continuing firms (column three), the effect of industry switching (intra- and inter-industry switching) (columns four and five), the productivity impact of entry and exit (column six), and the effect of allocation of resources between the firms (column seven).

Industry switching has both, positive and negative, contributions to aggregate labor productivity of the industries in different periods. The impact of intra-industry switching has mainly negative impact, except for industry C33, where the impact is consistently positive but rather small. This finding suggests that intra-industry switching could be a survival strategy for firms: instead of exiting the market completely some firms are adjusting their goods and services that leads to industry switching at the 5-digit level. For instance, during the period 2006–2012, in addition to the negative contribution of continuing firms in industry C31 (2 percent), intra-industry switching also contributed negatively (1.6 percent) to the aggregate productivity growth of the industry. Interestingly, the inter-industry switching had mainly a positive contribution to the aggregate productivity growth of analyzed industries, suggesting that inter-industry switching is associated with new products and technologies. For example, during 2006–2012, the firms that switched industries at the 2-digit level to industries C30, 31 and 33 were the main drivers of productivity growth of these industries.

Table 7 Relative shares of continuing firms in the same industry, switching intra- and inter-industry firms, entering and exiting firms in manufacturing industries (%)

	Same industry	Intra-industry switch	Inter-industry switch	Exit	Entry
Manufacture of machinery and equipment n.e.c. (C28)					
2000–	63.9	4.2	6.4	25.4	
2005	65.2	4.3	8.7		21.8
2006–	30.7	3.2	36.2	29.9	
2012	51.3	5.3	19.7		23.7
2013–	72.1	0.7	3.3	24.0	
2018	80.0	0.7	3.6		15.6
2000–	13.7	2.8	23.4	60.0	
2018	26.9	5.6	20.5		41.7
Manufacture of other transport equipment (C30)					
2000–	63.7	0.6	5.0	30.8	
2005	59.8	0.5	7.3		32.4
2006–	31.4	1.6	34.2	32.7	
2012	54.4	2.8	7.4		35.4
2013–	63.6	-	4.5	31.9	
2018	72.3	-	2.7		25.0
2000–	14.8	0.6	20.8	63.8	
2018	27.4	1.0	5.8		65.8
Manufacture of furniture (C31)					
2000–	64.9	1.4	3.8	29.9	
2005	69.9	1.5	4.8		23.9
2006–	51.2	1.0	15.3	32.4	
2012	64.5	1.3	14.1		20.1
2013–	66.5	0.3	2.8	30.4	
2018	85.8	0.4	1.6		12.2
2000–	21.4	1.3	9.9	67.4	
2018	39.9	2.4	16.3		41.4
Repair and installation of machinery and equipment (C33)					
2000–	71.2	-	4.7	24.1	
2005	74.1	-	5.1		20.8
2006–	42.7	1.5	27.7	28.2	
2012	16.7	0.6	41.8		40.9
2013–	68.6	0.2	2.8	28.4	
2018	69.9	0.2	4.3		25.7
2000–	23.7	1.2	19.8	55.3	
2018	9.5	0.5	23.9		66.1

Note: The number of firms in Manufacture of machinery and equipment n.e.c. (C28) included 1,241–2,437 firms, Manufacture of other transport equipment (C30) 292–577 firms, Manufacture of furniture (C31) 737–1,374, and Repair and installation of machinery and equipment (C33) 941–2,488 firms.

Table 8 Average levels of labor productivity of continuing firms in the same industry, switching intra- and inter-industry firms, entering and exiting firms in manufacturing industries (1,000 € per worker, in 2010 prices)

	Same industry	Intra-industry switch	Inter-industry switch	Exit	Entry
Manufacture of machinery and equipment n.e.c. (C28)					
2000–	53.9	53.8	50.0	51.7	
2005	64.7	58.6	68.3		53.6
2006–	65.7	64.0	64.5	62.3	
2012	65.3	56.9	66.6		69.5
2013–	59.2	40.9	61.7	56.3	
2018	52.8	40.4	45.4		74.0
2000–	54.2	49.1	50.9	53.8	
2018	53.5	62.6	44.2		61.3
Manufacture of other transport equipment (C30)					
2000–	42.1	53.1	39.3	47.7	
2005	51.9	61.7	54.3		33.2
2006–	48.5	47.2	46.3	39.6	
2012	37.7	34.6	55.7		35.1
2013–	39.9	-	41.0	33.3	
2018	49.9	-	63.4		-66.2
2000–	35.7	44.8	42.4	46.0	
2018	43.1	45.0	57.0		8.6
Manufacture of furniture (C31)					
2000–	35.7	40.9	37.7	28.3	
2005	39.6	43.4	42.6		32.5
2006–	42.1	304.2*	38.5	38.1	
2012	37.1	40.6	40.4		34.2
2013–	36.8	40.8	27.0	22.2	
2018	40.5	52.7	36.1		129.1
2000–	35.7	45.3	34.4	32.7	
2018	37.7	38.9	41.1		69.2
Repair and installation of machinery and equipment (C33)					
2000–	61.1	-	64.3	64.4	
2005	81.9	-	57.7		68.0
2006–	84.3	63.5	69.5	80.1	
2012	51.2	50.2	53.2		53.6
2013–	50.9	33.4	46.4	50.4	
2018	55.3	47.2	52.5		106.9
2000–	64.2	46.8	60.3	62.1	
2018	51.6	49.7	53.9		76.2

* The large value of average labor productivity of this group is due to an intra-industry switching firm that had large value added in 2006 and much lower value added in 2012. This firm changed from industry *Manufacture of other furniture* (31090) to *Manufacture of office and shop furniture* (31010).

Table 9 **Average change in labor productivity (% per year): aggregate industry productivity and contributions by different groups of firms**

	Aggregate productivity of industry	Same industry	Intra-industry switch	Inter-industry switch	Entry and exit effect	Allocation effect
Manufacture of machinery and equipment n.e.c. (C28)						
2000–2005	0.69	4.01	-0.14	0.32	-0.71	-2.79
2006–2012	0.39	-0.09	-0.16	0.27	0.48	-0.12
2013–2018	3.39	-2.17	0.01	-0.14	1.36	4.32
2000–2018	0.82	-0.07	0.25	-0.29	0.40	0.53
Manufacture of other transport equipment (C30)						
2000–2005	12.80	4.69	-0.02	0.24	-3.83	11.72
2006–2012	-2.44	-3.70	-0.04	1.02	0.19	0.07
2013–2018	1.02	5.03	0.00	0.20	-13.99	9.79
2000–2018	2.61	1.14	-0.05	-0.28	-3.66	5.47
Manufacture of furniture (C31)						
2000–2005	0.65	2.18	-0.02	0.04	0.46	-2.00
2006–2012	-1.18	-2.04	-1.59	0.80	0.50	1.16
2013–2018	5.86	2.05	0.02	0.20	9.74	-6.14
2000–2018	0.82	0.31	-0.08	0.24	2.45	-2.10
Repair and installation of machinery and equipment (C33)						
2000–2005	-1.19	6.82	0.00	-0.60	-1.15	-6.27
2006–2012	-4.92	-6.54	0.08	1.01	0.01	0.52
2013–2018	3.55	1.72	0.01	0.01	5.29	-3.48
2000–2018	-1.28	-1.09	0.05	0.25	1.36	-1.85

4 Industry switching under climate change mitigation

In this section we focus on two specific industries at the 5-digit level of TOL08 that are closely related to the climate change mitigation. Our aim is to analyze the developments of these industries and to identify whether the growth of these industries is due to new firms or due to switching firms.

The first industry we consider is *Production of electricity with hydropower and wind power* (35111). The production of the enterprises classified under this economic activity is regarded as environmental activity and the enterprises are called main principal producers of environmental goods and services[7]. The second considered industry is *Plumbing, heat and air-conditioning installation* (43220). Air conditioning is a big contributor to climate change and GHG emissions. While traditionally, the heating and cooling industry has been slow to adopt more energy-efficient technologies, entities under this economic activity are working on making heating and cooling more energy efficient and getting off of fossil fuels. They are working on incentivizing and financing the adoption of green tech like electric heat pumps and other energy-efficient retrofits.

Figures 2 and 3 illustrate the developments of these two industries in terms of the number of firms on the left Y-axes (blue lines) and the value added[8] on the right Y-axes (red lines). The number of firms under economic activity 35111 increased from 42 in 2000 to 210 in

2018 with the largest increase taking place in 2013 (Figure 2). With some downturn in 2016, value added in the industry also increased during this period. The number of firms under economic activity 43220 increased from about 3 thousand firms in 2000 to about 4 thousand firms in 2018. The number of firms of the industry reached its peak by 2013 and then stagnated. This industry also grew in terms of value added.

Figure 2 Production of electricity with hydropower and wind power (35111): number of firms and value added (million €, in 2015 prices) in 2000–2018

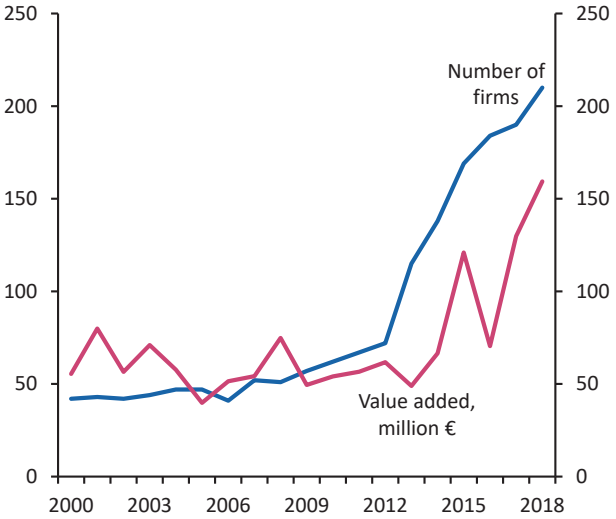


Figure 3 Plumbing, heat and air-conditioning installation (43220): number of firms and value added (million €, in 2015 prices) in 2000–2018

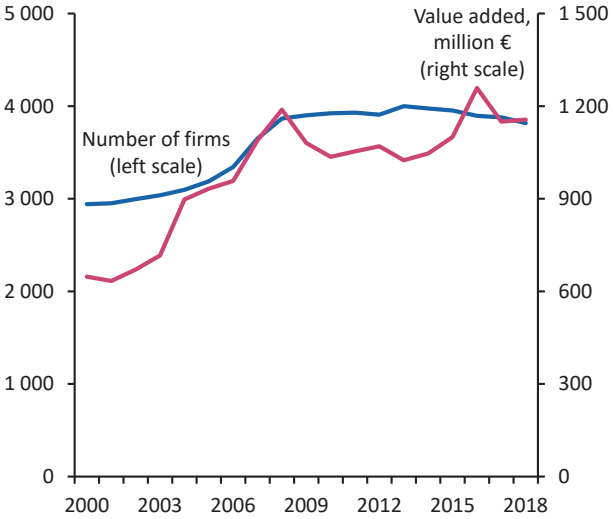


Table 10 Shares of continuing firms in the same industry, losing firms to other industries, receiving firms from other industries, entering and exiting firms (%) in industries Production of electricity with hydropower and wind power (35111) and Plumbing, heat and air-conditioning installation (43220)

Period	Same	Losing	Receiving	Exit	Entry
35111 Production of electricity with hydropower and wind power					
2000–2005	66.7	4.8	14.9	28.6	25.5
2006–2012	78.0	2.4	2.8	19.5	52.8
2013–2018	74.8	2.6	2.4	22.6	56.7
43220 Plumbing, heat and air-conditioning installation					
2000–2005	73.5	2.3	2.8	24.3	29.4
2006–2012	64.2	2.3	4.1	33.5	41.0
2013–2018	65.5	2.1	2.0	32.4	29.3

In order to identify how large proportion of the new firms entering these industries were startups and the firms that switched from other industries, Table 10 describes the shares of continuing firms within industries 35111 and 43220, the shares of losing and receiving firms, and the shares of entering and exiting firms in the total number of firms in three periods: 2000–2005, 2006–2012 and 2012–2018. Our results indicate that climate change mitigation has influenced the industrial structure of these industries mainly through entry and exit. For instance, the shares of new firms in industry 35111 increased over time and constituted about 57 percent in 2018. During considered periods, the share of new entrants in industry 43220 was the largest in year 2012 (41 percent). The share of switching firms from other industries to industry 35111 was the largest in 2005 (15 percent) and to industry 43220 in 2012 (approximately 4 percent). Based on these findings, we conclude that climate change mitigation has influenced the industrial structure of these two industries mainly through entry and exit. However, combatting climate change and its impacts will likely cause renewal of products and services in many industries and cause industry switching on a larger scale in the future.

5 Conclusions

This report sheds new light on the role of industry switching of firms as a form of structural change. While contributions of entry and exit of firms to aggregate productivity growth are well-established in the literature, the impact of industry switching has been overlooked. In contrast to previous productivity studies which mix continuing firms that switch from one industry to another with startups and bankrupt firms, we take industry switching of firms explicitly into account.

Our three main findings are as follows. First, by examining different industries in Finland during the period from 2000 to 2018, we observe that firms frequently switch from one industry to another. The switching occurs both across 2-digit industry level (inter-industry switching) and within 2-digit level (intra-industry switching). We conclude that industry switching is very common in all industries and especially during the times of recession and economic downturn.

Second, we employ structural change decomposition of productivity that takes industry switching explicitly into account. We focus on the impact of industry switching on aggregate labor productivity growth of four manufacturing industries at the 2-digit NACE level. The results show that industry switching has had both positive and negative contributions to aggregate productivity in different periods. Intra-industry switching within 2-digit industries had mainly negative impact on productivity growth suggesting that switching was taken as a strategy to survive. On the other hand, inter-industry switching between 2-digit industries had mainly positive impact on productivity growth, suggesting that this type of switching was associated with new products and technologies.

Third, we analyze the developments of two 5-digit industries that are relevant to the climate change mitigation and identify whether the growth of these industries is due to new firms or due to switching firms. Our results for these industries indicate that climate change mitigation has influenced the industrial structure mainly through entry and exit. Combatting climate change will likely cause renewal of products and services and cause industry switching on a larger scale in the future.

The insights of this study and especially our findings on the positive impact of inter-industry switching on productivity growth are very relevant to the Finnish innovation policy that aims to provide incentives for continuous renewal of firms. There is a large literature on the barriers of entry focusing on startups, however, industry switching should also be recognized as a form of market entry. In the future research, it would be interesting to examine what are the main barriers of industry switching and how those could be lowered. In dynamic competitive markets, firms have a possibility to switch from one industry to another: the history of Nokia Corporation provides an illustrative example. Another fascinating question for future research concerns the environmental technologies and GHG mitigation, which offer both opportunities and pressures for firms to renew their products and services, and can lead to further industry switching in the future. Some examples of industry switching are already observed in the energy industry where renewable wind and solar power are quickly replacing fossil fuels as sources of energy.

Endnotes

1 The choice of these periods is justified by the following reasons: 1) In order to capture industry switching, time periods should be long enough, since in the industrial classification TOL08 the change of firms' classification is performed when current economic activity of the firm stays less than 50 percent of value added for at least two years (see Box 1). 2) These periods allow us to examine industry switching in relation to the Great Recession. 3) These take into account revisions made to the data that potentially can cause difficulties in comparison of the data over time (there were two major revisions in 2006 and 2013).

2 The term Great Recession refers to the global recession in 2007–2009, which started from the subprime mortgage crisis in the USA and subsequently led to the European Debt Crisis. The Finnish economy was initially in recession from Q1-2008 until Q2-2009, but there was a follow-up recession from Q2-2012 until Q1-2015, which overlaps with our third study period.

3 Statistics Finland, https://taika.stat.fi/en/aineistokuvaus.html#!?dataid=YA211_19862016_jua_tppaneeli_001.xml.

4 For more details on Fiona, see: https://stat.fi/tup/mikroaineistot/etakaytto_en.html.

5 The new types of central and local government enterprises and firms that belong to industries, which do not belong to the description area of the statistics on financial statements, were removed before the analysis. For additional information, see https://taika.stat.fi/en/aineistokuvaus.html#!?dataid=YA211_19862016_jua_tppaneeli_001.xml.

6 When calculating the shares, industries with less than 1,000 observations were excluded.

7 Environmental goods and services sector, Statistics Finland: https://www.stat.fi/meta/til/ylt_en.html.

8 Value added was deflated using the GDP price deflator.

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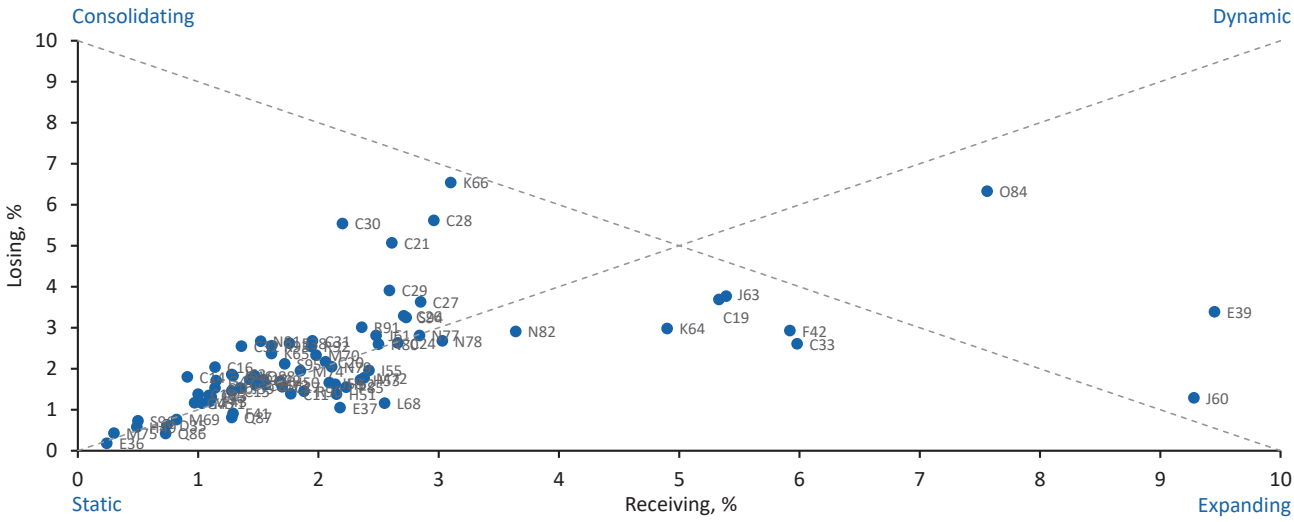
Appendices

Appendix A Classification of industries at the 2-digit level of TOL 2008

Section	Title	Divisions
A	Agriculture, forestry and fishing	01–03
B	Mining and quarrying	05–09
C	Manufacturing	10–33
D	Electricity, gas, steam and air conditioning supply	35
E	Water supply; sewerage, waste management and remediation activities	36–9
F	Construction	41–43
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	45–47
H	Transportation and storage	49–53
I	Accommodation and food service activities	55–56
J	Information and communication	58–63
K	Financial and insurance activities	64–66
L	Real estate activities	68
M	Professional, scientific and technical activities	69–75
N	Administrative and support service activities	77–82
O	Public administration and defence; compulsory social security	84
P	Education	85
Q	Human health and social work activities	86–88
R	Arts, entertainment and recreation	90–93
S	Other service activities	94–96
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	97–98
U	Activities of extraterritorial organisations and bodies	99

Appendix B Industry switching in all industries



Note: The shares of receiving and losing firms are calculated for the period 2000–2018. The dots represent industries at the 2-digit level of TOL08.

Appendix C: Intra-industry switching

Tables C1–C3 report the industries at the 5-digit level of TOL08 that were most affected by intra-industry switching during periods 2000–2005, 2006–2012 and 2013–2018. Tables report the top five receiving and losing industries in terms of: (a) the number of switching firms, (b) the share of switching firms to/from specified industry in the total number of firms in that industry, and (c) the net effect, which is the number of receiving firms less the number of losing firms by industry.

During 2000–2005, industries such as *Food and beverage service activities* (I56) and *Wholesale trade, except of motor vehicles and motorcycles* (G46) underwent significant structural changes: *Beer and drink bars* (56301), *Restaurants* (56101) were attracting firms from other industries, while *Cafés and coffee bars* (56302) were losing firms to other industries between 2000 and 2005. *Wholesale of other machinery for use in industry* (46692) was largely losing its firms to other industries and *Wholesale of machinery and equipment n.e.c.* (46699) was gaining.

Table C1 Intra-industry switching in 2000–2005

Top 5 receiving industries			Top 5 losing industries		
TOL08	**Description**	**Nr of firms**	**TOL08**	**Description**	**Nr of firms**
56301	Beer and drink bars	238	46692	Wholesale of other machinery for use in industry	278
46699	Wholesale of machinery and equipment n.e.c.	182	56302	Cafés and coffee bars	268
47596	Locksmiths and key cutters	132	47529	Other retail sale of hardware, plumbing and building materials	214
79110	Travel agency activities	129	79900	Other reservation service and related activities	129
32501	Manufacture of medical and dental instruments and supplies	117	32502	Manufacture of dentures, dental implants, etc.	118
TOL08	**Description**	**Share, %**	**TOL08**	**Description**	**Share, %**
74102	Interior design activities	3.37	47529	Other retail sale of hardware, plumbing and building materials	15.38
25620	Machining	2.50	56302	Cafés and coffee bars	13.03
46140	Agents inv. in the sale of machin, ind. equip., ships, aircraft	2.40	46692	Wholesale of other machinery for use in industry	11.29
56101	Restaurants	2.38	79900	Other reservation service and related activities	8.80
45112	Retail sale of cars and light motor vehicles	1.64	74901	Show production and management activities	1.88
TOL08	**Description**	**NET**	**TOL08**	**Description**	**NET**
56301	Beer and drink bars	238	46692	Wholesale of other machinery for use in industry	270
46699	Wholesale of machinery and equipment n.e.c.	182	56302	Cafés and coffee bars	255
47596	Locksmiths and key cutters	132	47529	Other retail sale of hardware, plumbing and building materials	209
79110	Travel agency activities	129	79900	Other reservation service and related activities	129
32501	Manufacture of medical and dental instruments and supplies	117	32502	Manufacture of dentures, dental implants, etc.	118

Note: Sample size is 423,437 observations.

During 2006–2012 (Table C2), *Activities of sport clubs* (93120) was one of the industries that largely lost firms to other industries (more than 600 firms switched at the 5-digit level). In terms of the share, more than 40 percent of the firms of this industry switched to other industries. In contrast, *Other sports activities* (93190) gained new firms from other industries (578 firms). By 2012, 36 percent of the firms of this industry were the intra-industry switching firms. Note, that both industries are operating within the 2-digit industry *Sports activities and amusement and recreation activities* (R93). Other industries that attracted switching firms were *Performing arts* (90010), *Other professional, scientific and technical activities* (74909), and *Computer consultancy activities* (62020). More than 25 percent of these industries in 2012 were represented by the firms that operated in some other industries at the 5-digit level in 2006.

Table C2 Intra-industry switching in 2006–2012

Top 5 receiving industries			Top 5 losing industries		
TOL08	**Description**	**Nr of firms**	**TOL08**	**Description**	**Nr of firms**
93190	Other sports activities	578	93120	Activities of sport clubs	638
62020	Computer consultancy activities	508	62010	Computer programming activities	523
90010	Performing arts	320	81210	General cleaning of buildings	367
81220	Other building and industrial cleaning activities	275	90030	Artistic creation	362
74909	Other professional, scientific and technical activities	264	74102	Interior design activities	355
TOL08	**Description**	**Share, %**	**TOL08**	**Description**	**Share, %**
93190	Other sports activities	36.17	93120	Activities of sport clubs	41.19
90010	Performing arts	25.93	74102	Interior design activities	17.45
74909	Other professional, scientific and technical activities	25.58	46150	Agents inv. in sale of furniture, household goods, hardware	11.77
62020	Computer consultancy activities	25.41	90030	Artistic creation	11.55
95220	Repair of household appliances, home and garden equipment	6.18	93110	Operation of sports facilities	10.40
TOL08	**Description**	**NET**	**TOL08**	**Description**	**NET**
47785	Retail sale of gift articles and hobby materials	7	74102	Interior design activities	91
55101	Hotels	7	90030	Artistic creation	87
69201	Book-keeping and closing-of-accounts activities	7	74901	Show production and management activities	77
46692	Wholesale of other machinery for use in industry	6	93120	Activities of sport clubs	60
68201	Letting of dwellings	6	81210	General cleaning of buildings	47

Note: Sample size is 483,895 observations.

Compared to the previous two periods, intra-industry switching was much less common in 2013–2018 (Table C3). Most of the restructuring took place within industries (in the 2-digit level): *Food and beverage service activities* (I56); *Real estate activities* (L68), *Wholesale and retail trade and repair of motor vehicles and motorcycles* (G45), *Retail trade, except of motor vehicles and motorcycles* (G47), and *Legal and accounting activities* (M69).

Table C3 Intra-industry switching in 2013–2018

Top 5 receiving industries			Top 5 losing industries		
TOL08	**Description**	**Nr of firms**	**TOL08**	**Description**	**Nr of firms**
L68209	Letting of other real estate	49	I56101	Restaurants	40
I56102	Cafés	45	I56102	Cafés	40
G45201	Maintenance and repair of motor vehicles (excl. tyres)	36	G47113	Retail sale in self-service stores (100 m² – 400 m²)	36
I56101	Restaurants	35	G45112	Retail sale of cars and light motor vehicles	29
G47113	Retail sale in self-service stores (100 m² – 400 m²)	30	L68209	Letting of other real estate	25
TOL08	**Description**	**Share, %**	**TOL08**	**Description**	**Share, %**
G47113	Retail sale in self-service stores (100 m² – 400 m²)	1.49	G47113	Retail sale in self-service stores (100 m² – 400 m²)	1.78
M69101	Legal representation activities	1.05	M69102	Legal advisory activities	1.24
M69102	Legal advisory activities	0.88	G47301	Service station activities	1.23
I56103	Food kiosks	0.83	G45112	Retail sale of cars and light motor vehicles	0.92
F42999	Other civil engineering n.e.c.	0.82	L68201	Letting of dwellings	0.78
TOL08	**Description**	**NET**	**TOL08**	**Description**	**NET**
L68209	Letting of other real estate	24	G45112	Retail sale of cars and light motor vehicles	16
G45201	Maintenance and repair of motor vehicles (excl. tyres)	17	L68310	Real estate agencies	15
G47111	Retail sale in large supermarkets (over 1,000 m²)	17	S96021	Hairdressing activities	12
H49392	Non-scheduled bus and motor-coach transport	11	G47301	Service station activities	11
N79120	Tour operator activities	11	J62010	Computer programming activities	11

Note: Sample size is 526,814 observations.

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