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DEPARTMENT OF FOOD AND RESOURCE ECONOMICS
UNIVERSITY OF COPENHAGEN

IFRO Report

Start-up and SME dynamics in the Danish food sector

An analysis of innovation and growth dynamics in food industries by enterprise size group

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IFRO Report 241

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An analysis of innovation and growth dynamics in food industries by enterprise size group

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Preface

The enclosed report consists of an investigation of entrepreneurship and SME dynamics as well as innovative activities in the Danish food sector. Details on start-ups, terminated firms, size of enterprises when born, survival rates, high growth enterprises, size-class dynamics in relation to number of enterprises, growth (employment), performance (measured both by turnover and value added) and innovation activities (divided into technological innovations, trademarks and aesthetic innovations) are presented based on industry-level data from Statistics Denmark, EUROSTAT, and intellectual property (IP) register data from the Danish Patent and Trademark Office and World Intellectual Property Organization.

The report presents findings for four sub-sectors: The primary industry, manufacturing of food and beverages, food-related wholesale and retail, and accommodation (hotels etc.) and food and beverage services (restaurants etc.).

The findings are limited to descriptive analysis using industry-level data. The report therefore provides a baseline for further research on drivers and barriers of entrepreneurship and innovation in the food sector. The data presented in this report points to the trends in developments divided by sub-sectors and subindustries. For some subindustries the data shows a very severe situation as there has been a decline in employment and number of SMEs. The differences in between sub-industries are in this report analyzed at an industry level, as this data was available; however, the results points in the direction of further analysis, using firm level data, to explore the determinants for the failing firms in the different sub-sectors and sub-industries.

Several employees from The Department of Food and Resource Economics (IFRO) were engaged in writing this report. Katharina Poetz and Karin Beukel are behind the full report. Henning Otte Hansen contributed to the turnover and value added chapter. Henning Otte Hansen and Carsten Nico Portefeé Hjortsø contributed to the study design and commented on early drafts. Nina Louise Fynbo Riis also commented on a draft version and Sharissa Devina Funk was in charge of the editing.

1 Introduction and objectives

New and small- and medium-sized enterprises (SMEs) are often seen as the drivers of socio-economic development through their contribution to innovation (new products, services, or organizations successfully introduced on the market) and the creation of new employment opportunities (self- and wage-employment). It is therefore no surprise that start-ups and SMEs have become a target area for policy makers and an increasing amount of support is provided to foster their development (for example, eased access to finance, advisory services, business incubation programs).

However, do start-ups and SMEs really live up to the promise of innovation and of wealth and employment creation? Several studies suggest that most new and small enterprises fail, or become the "living dead", i.e., they do not grow in terms of employees and/or are not innovative. In light of significant public investments into entrepreneurship and SME support, there is thus a need to study new enterprises' and SMEs' contributions to socio-economic development in more detail.

In Denmark, the food sector has become an area for which such an investigation is particularly relevant. The food industry has long played a significant role for the national economy and there are several large and internationally successful firms. However, a strong national focus on innovation as a driver of competitiveness and new trends in healthy and Nordic Food provide many opportunities for new enterprises and SMEs in the sector. This can be expected to have led to a number of new start-ups that are now trying to grow and compete with incumbent firms.

The purpose of this report is to create a baseline for investigating the role of start-ups and SMEs in the food sector. Do they contribute to economic growth, and if so, how? We do this by identifying the entrepreneurship and innovation dynamics in the food sector over a 5-10 year period, with particular emphasis on the role of food start-ups and SMEs. By food start-ups and SMEs we mean new enterprises and enterprises with less than 250 employees operating in the food sector. To take the whole value chain of food production and consumption, we divide the food sector into four food and food-related sub-sectors that we focus our investigation on: 1) Primary production (agriculture and fisheries), 2) Manufacturing of food and beverages, 3) Food-related

wholesale and retail, and 4) accommodation (hotels and similar accommodation) and food and beverage service activities (i.e., restaurants, cafés, and bars).

We divide the analysis into three separate chapters each giving details on the status, historic trend and comparative similarities and differences experienced when analyzing sub-industries within agriculture, manufacturing, wholesale & retail as well as hotels & restaurants. The three areas of analysis are: 1) *Start-up activity* in terms of new and terminated enterprises and enterprise size upon birth and death*;* 2) *Growth and survival* in terms of survival rates, high growth enterprises, and size-class dynamics with regard to number of enterprises, employees, turnover and added value; and 3) *Innovativeness* in terms of technological innovations (patents), aesthetic innovations, and new brands (trademarks). The three chapters are standalone chapters, each focuses in-depth on the details of the particular topic. We begin each chapter with a general introduction to the topic, based on recent findings in academic literature, and main mechanisms previously found to be influential within the topic, thereafter we focus on presenting the detailed data on the food sector.

In a final discussion and conclusion chapter, we draw on our findings in each of the three previous chapters and show how they connect, i.e., we summarize the trends regarding start-ups, survival and growth in connection to innovation in the different food sub-sectors investigated. We also present study limitations and need for further research: The report is largely limited to a descriptive analysis of publicly available, industry-level data; only the innovation data was available at firm-level. Nevertheless, the descriptive results indicate a need for change (e.g. a policy intervention) in certain industries in order for them to regain strength, increase start-up activity, and foster innovation – which the food sector as a whole can benefit from in the future. However, on the basis of the data utilized for the making of this report, we cannot provide any statements regarding the drivers and barriers behind these developments and the influence of policy changes in the different sub-sectors and industries. This would require access to firm-level data on firms in the sector and econometric analyses, which we find to be a natural next step for further work.

In the appendix, we provide links to the datasets on which the descriptive analysis in the individual chapters is conducted (see Appendix A). The main data sources used for the chapters on start-ups and survival and growth are publicly available business demography and structural business statistics data from Statistics Denmark (DST) and from Eurostat. In the innovation chapter

we rely on enterprise level DST data linked to intellectual property (IP) rights register data, using both national data from the Danish Patent and Trademark office and international register data from the World Intellectual Property Organization (WIPO) and the Office for Harmonization in Internal Market (OHIM). In Appendix B, we provide an overview on the different industry classifications used.

2 Start-up dynamics

Start-ups are associated with innovation and the creation of employment as two important factors that drive socio-economic development (Acs, Desai, & Hessels, 2008; Schumpeter, 1934; Wennekers & Thurik, 1999). By discovering and exploiting new business opportunities, entrepreneurs and the ventures they create can contribute to "permanent improvement in the quality of life for society as a whole" (Venkataraman, 2004). It is therefore no surprise that policy makers increasingly promote entrepreneurship and support start-up activity (Audretsch, Keilbach, & Lehmann, 2006). Consequently, we will start our investigation of the dynamics in the food sector by looking at the number and characteristics of new enterprises (births) vs. terminated enterprises (deaths) in Denmark and the Danish food sector. Prior to this, we introduce a number of factors that research has found to influence start-up activity, since we would expect that they should also be reflected in our findings.

Determinants of entrepreneurship in the food sector

Entrepreneurship scholars suggest that the creation of new ventures results from the interaction between new business opportunities and enterprising individuals that respond to them (Shane, 2003). New business opportunities are opportunities for creating and capturing value through introducing new products or services, new production processes, or new ways of doing business that allow people to do things better, cheaper, or in a different way. Such opportunities can arise from at least three different sources. First, variations in the type, amount, and availability of information can allow entrepreneurs to exploit market inefficiencies brought about by information asymmetries (Kirzner, 1997). Second, opportunities arise from external changes in our environment. This includes a) technological change that allows people to do things in new and more productive ways (new inventions, for example new packaging material for food), b) political and regulatory change (for example, regulation of CO_2 emissions), and c) social and demographic change that can alter demand and generate new consumer groups (for example, trends, economic development, and migration) (Shane, 2003). Third, business opportunities are also created by individuals on the basis of their interests, experience, and personal connections (Sarasvathy, 2001).

If we look at the food sector, the past two decades have opened up significant business opportunities for new ventures. Traditionally, the sector is considered to be less dynamic than other sectors (for example high tech). Both consumers and enterprises in the food sector are expected to

be subject to a certain inertia causing only slow and gradual adjustment of food production and consumption patterns (Galizzi & Venturini, 1996). Consequently, the entrepreneurship and innovation management literature has so far not paid much attention to the sector (Galizzi & Venturini, 1996; Grunert et al., 2008). However, over the past decade technological change and particularly product innovation have become crucial determinants of enterprise performance and consumer welfare, leading to increasing research interest in innovation and entrepreneurship in the food sector (see e.g., Matthyssens, Vandenbempt, & Berghman, 2008). Food markets are increasingly competitive environments in which novelty, quality improvements, and new technologies contribute to new consumption trends, food habits, market opportunities, and change in enterprises' strategies. In food manufacturing, enterprises have accelerated the development of new products by using new ingredients as well as new processing and packaging techniques. On the consumer side there is a positive trend towards consumer's willingness to pay for new and improved food products as well as services related to cooking food at home and in gastronomy (Galizzi & Venturini, 1996; Grunert, 2002; Svejenova, Mazza, & Planellas, 2007). Factors such as higher incomes, demographic changes, urbanization, time-pressured households demanding convenience products, increasing information levels, as well as new cultural values related to food quality, safety, and health and environmental attributes drive these developments (Galizzi & Venturini, 1996; Weber, Heinze, & DeSoucey, 2008).

For Denmark, these developments are likely of particular importance since the production and manufacturing of food have long played a major role for the national economy – significant enough for the Economist to call 'tiny Denmark' an agricultural superpower in which the food industry is still thriving and, contrary to expectations, a dynamic and innovative sector (Economist, 2014). Denmark has a strong agricultural sector and there are several internationally successful incumbent enterprises in food and beverage manufacturing (e.g. Danish Crown, Arla, Carlsberg). In terms of consumer trends, convenience products and services have gained momentum. Over the past decade, there has been an increase in product offers (such as ready meals, semi-finished goods, etc.) and food services (take-away, restaurants, home delivery, etc.). At the same time, culinary success stories spearheaded by NOMA and trends in Nordic Food have started to drive a new food culture focused on local production and high-quality foodstuffs and services (Byrkjeflot, Pedersen, & Svejenova, 2013). Notably, organic is moving into the mainstream, and preparing and consuming food is increasingly part of the 'experience economy'. That is, cooking at

home as well as dining out has become an enjoyable, social activity that is as much about the way the food is prepared and served as about the food itself. Next to convenience, a growing demand for healthy food that is produced and served in a sustainable and interesting way thus continues to be a major trend. These developments have opened up opportunities for start-ups in the sector. Increasing demand for health- and socio-environmental product attributes has opened up opportunities for new enterprises operating in niche markets, such as manufacturing of high-quality food products using local ingredients (for example, companies such as Hanegal A/S producing organic meat, and Thise Mejeri producing organic dairy products). Similarly, opportunities have also opened up in trade with food stuffs and food and beverage service activities.

The extent to which individuals respond to these opportunities depends on individual level-factors and environmental dynamics. On an individual level, a person's human and social capital (education and work experience, family and social relations as well as networks), risk attitude, and creativity are expected to influence their likelihood of becoming an entrepreneur (Block, Thurik, van der Zwan, & Walter, 2013; Davidsson & Honig, 2003). The motivations to engage in entrepreneurship naturally include expected economic returns. However, there is also a wide range of non-financial motives (Hamilton, 2000; Zahra, Gedajlovic, Neubaum, & Shulman, 2009). In this sense, we would expect that start-ups in the food industry are at least to a certain extent also driven by a preference for independence as well as perhaps a certain passion for producing and serving food of high quality (especially concerning organic and local produce).

In terms of environmental factors, research suggests that different environments can be more or less favorable to the success of new ventures, leading to start-up rates that vary significantly across countries and time (Acs & Virgill, 2010; Wennekers, Thurik, Van Stel, & Noorderhaven, 2007). More specifically, scope and type of opportunity discovery and exploitation are likely determined by a number of macro-environmental factors that can be distinguished into economic and institutional drivers (Simon-Moya, Revuelto-Taboada, & Fernandez Guerrero, 2014).

Economic drivers include factors such as level of economic development, income distribution, employment, social security systems, and economic growth rates. In countries with high levels of economic development and lower income inequality (like Denmark), start-up rates are expected to be lower than in countries with lower level of socio-economic development and

greater income inequality (Simon-Moya et al., 2014). This is because economic necessity is a strong driver of entrepreneurship in developing countries, whereas better job opportunities and a high degree of social security increase the opportunity cost of entrepreneurship for individuals in developed countries (Bosma & Schutjens, 2011). In Denmark, we would thus expect a lower rate of entrepreneurial activity than in less developed economies but those companies that are started are more likely opportunity-based, rather than necessity-based. Nevertheless, the influence of economic growth makes this relationship more complex: Low economic growth rates should be associated with lower rates of start-ups (Simon-Moya et al., 2014). However, low economic growth rates also tend to correlate with higher unemployment, which can have a positive effective on start-up activity. In this regard, we expect to see the effects of the economic crisis in 2008 in the data. It would be no surprise if the crisis reduced overall start-up activity. At the same time, it might have also contributed to the emergence of new business opportunities and pushed individuals into self-employment.

Studies of industrial economics also suggest taking economic drivers on the industry level into account. Industries that heavily rely on human capital and do not depend on economies of scale, such as many service activities and creative industries, tend to provide more favorable conditions for new entrants. In manufacturing, entrepreneurs will find it difficult to compete with large and efficient enterprises, especially in less dynamic markets. Research suggests that in these industries, only technological change can give new entrants a chance to compete on product innovation as existing enterprises will be less flexible and will find it difficult to change their routines (Geroski, Mata, & Portugal, 2010; Winter, 1994). However, once a dominant design, such as a product standard, emerges, new entrants will have to compete on efficiency and process innovations. Those unable to do so will most likely exit the market, leading to a shake-out and the survival of few incumbent enterprises that dominate the matured market (Abernathy & Utterback, 1978b; Klepper, 1996). In addition, industrial economics highlight that in very traditional industries, such as food processing, new entrants experience survival and growth disadvantages that are not only due to scale economies and high capital intensity but also to consumer inertia and lower rates of technological change. However, research suggests that these disadvantages first of all do not seem to deter entrepreneurs from entering into such industries, and secondly may be compensated by adopting innovative strategies (Acs & Audretsch, 1990).

Next to economic drivers, institutional drivers are increasingly seen as having a strong influence on start-up activity. They operate on the three different levels. First, there is the level of formal institutions, i.e., the regulatory environment including aspects such as property rights regimes, business law, and policy measures (North, 1990). Second, with regard to entrepreneurship, research suggests that start-up activity is influenced by how easy (or difficult) it is to set up a business, and how much support is provided. Notably, positive drivers of entrepreneurship are reduced costs and bureaucratic formalities entrepreneurs have to undertake when setting up new ventures (Van Stel, Storey, & Thurik, 2007). In terms of the ease of doing business, the World Bank places Denmark on rank 25 out of 189 countries (World Bank, 2014). In comparison to the OECD average, it takes less time and is less expensive to formally set-up a business. However, the minimum capital that needs to be paid is higher. Finally, entrepreneurial activity can be fostered through support and reward systems, including advisory services, business incubators, and financial support (Lalkaka & Abetti, 1999). In this sense, Denmark has seen the introduction of a number of support programs and new organizations promoting entrepreneurship over the past decade. For example, most universities have started business incubation programs to support entrepreneurship among their students (including students of food science). We would expect that these developments have a positive influence on start-up activity.

Institutional drivers operate on two more levels that are increasingly gaining research attention. These are a) norms and values (normative institutions) and b) individual beliefs and habits (cultural-cognitive institutions) that drive the typical expectations and behavior of people in a particular country, industry, or profession. Building on the influence of these institutions, a fairly large body of literature investigates how national culture can both drive and inhibit entrepreneurship (e.g., Thomas & Mueller, 2000). The factors most widely investigated are two of Hofstede's dimensions of national culture: Individualism vs. collectivism, and uncertainty avoidance (Hofstede, 1990). Notably, Denmark is characterized as an individualistic society, i.e., people are expected to take care of themselves and their immediate family only. There is a preference for a loosely-knit social framework that makes it relatively easy to start doing business without having to first create personal relationships (Hofstede, Hofstede, & Michael Minkov, 2010). There are some indications that this is positively associated with entrepreneurial activity (Simon-Moya et al., 2014). Danes also score low on the uncertainty avoidance dimension. This is associated with a higher

tolerance for ambiguity and risk-taking propensity, which should also have a positive influence on entrepreneurship (Simon-Moya et al., 2014).

Another stream of literature is concerned with the effects of both societal norms and individual beliefs and behaviors that are transmitted through the education system and through socialization within families and communities. Several studies suggest that education helps entrepreneurs identify opportunities in the market, especially entrepreneurship education (e.g., De Clercq & Arenius, 2006). Finally, socialization through families and peer groups (i.e., whether family members or friends have started a business or have entrepreneurial tendencies) can influence the likelihood of people becoming entrepreneurs (Chang, Memili, Chrisman, Kellermanns, & Chua, 2009). Given the increasing emphasis on entrepreneurship and entrepreneurship education in Denmark over the past decade, we would therefore expect to see more start up activity.

Against this backdrop, we now first look into what available data can tell us about the births and deaths of enterprises in Denmark in general and in the food sector in particular. Using business demography data from DST and EUROSTAT, the goal is to gain insight into whether and in which sub-industries the factors outlined above seem to be reflected in start-up activity.

New and terminated enterprises

Business demography data from Statistics Denmark provides insight into the number of new and terminated enterprises from 2001 to 2012. Before we present the data for Denmark in total and in the food industries investigated, we define what is meant by new enterprises (births) and terminated enterprises (deaths). These definitions need to be taken into account when interpreting the data.

First, according to Statistics Denmark, a birth occurs when an enterprise starts from scratch and actually starts activity. The new enterprise needs to amount to the creation of a combination of production factors, in particular employment. The restriction is that no other enterprises are involved in this event, that is, births do not include entries due to mergers, break-ups, or splitting or restructuring of a set of existing enterprises. It also excludes entries that result from a change of prior activity. If a dormant unit is reactivated within two years, this is also not considered a birth. These restrictions are important to provide insight into actual entrepreneurial activity. However, it is important to note that the numbers provided may still under- as well as overestimate

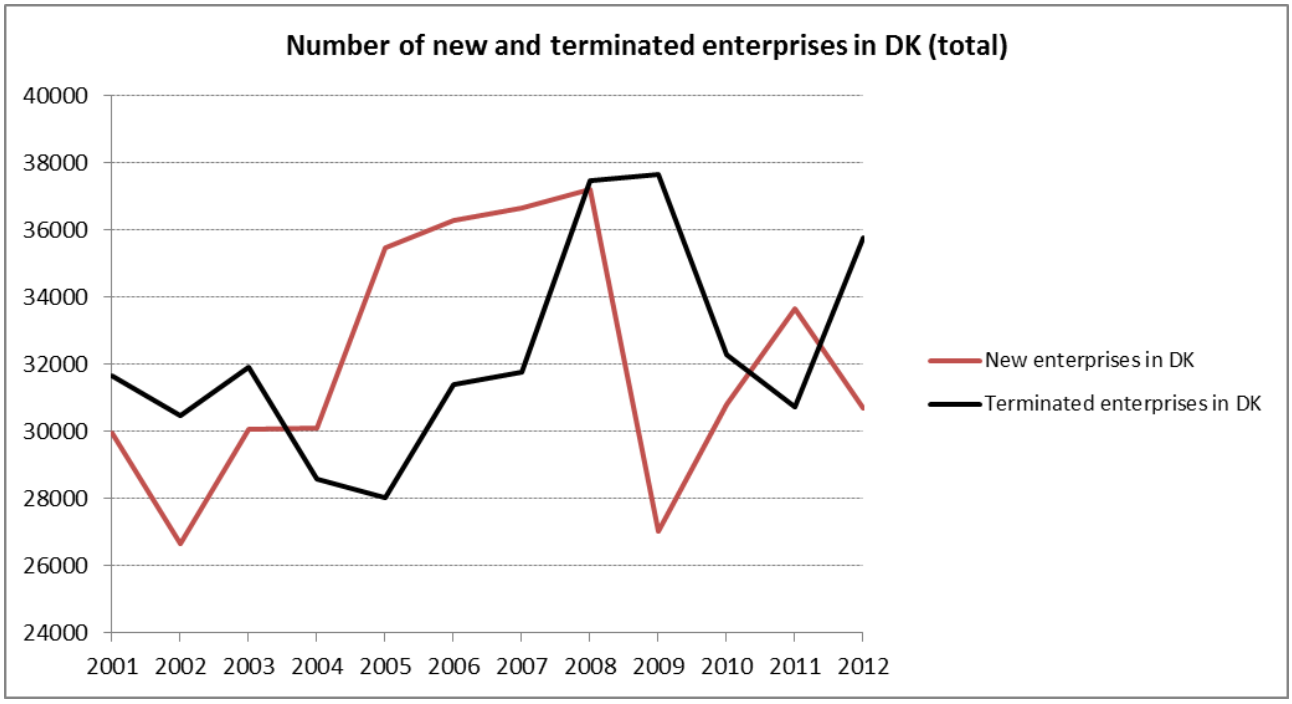
the level of entrepreneurial activity in Denmark: First, because changes in activity are not included (i.e., when existing enterprises identify a new opportunity[1]), and second, activity does not necessarily mean full-time employment, i.e., companies may not be very active[2].

Second, a death amounts to the dissolution of a combination of production factors. Again, the restriction is that no other enterprises are involved in the event and a change of activity is excluded. Moreover, a dormant enterprise is only included in the death statistics if it is not reactivated within two years. In this regard, note that the number of actually terminated enterprises is adjusted annually for the year prior to the current reference period. Hence, the number for 2012 will be adjusted downwards when the next yearly data are published.

On this basis, Figure 1 shows the number of new and terminated enterprises in Denmark between 2001 and 2012 (all industries). The data suggests an annual increase in births prior to the economic crisis, followed by a decline in 2008, recovery between 2009 and 2011, and another decrease in 2012 relative to the amount of start-up activity prior to the crisis. In total, there is only a small increase in the number of new enterprises in 2012 in comparison to 2001.This suggests that the crisis indeed had a negative and immediate effect on the creation of new enterprises. In its aftermath, start-up activity has returned to about the level it was at in 2001. We would of course also expect that the crisis partly contributed to an increase in the number of deaths. Interestingly, however, the number of deaths levelled off and decreased, seemingly correlating (with a time shift) with the number of births (note that the numbers for 2012 will be adjusted when the data for the next reference period is released). Although we lack information about the age of enterprises when they die, this seems to support existing research showing that start-ups and young enterprises tend to account for the largest share of enterprise deaths (Aldrich & Martinez, 2001; Shane, 2009; Stinchcombe, 1965). In other words, the number of deaths needs to be interpreted carefully since higher start-up activity may automatically entail more enterprise deaths, and vice versa.

[1] Consider that especially enterprises that are newly founded still tend to be in the process of developing their business model and may change it entirely.
[2] Statistics Denmark also provides the number of new enterprises with full-time employees. These numbers are significantly lower.

Figure 1: Number of new and terminated enterprises (DK total)



Data source: DST Business Demography by status, unit, industry (DB07 127-grouping) and time

After looking at the overall trend, we now focus on new and terminated enterprises in the food industries we aim to investigate, i.e., primary production, food and beverage manufacturing, food wholesale and retail, and accommodation and food and beverage service activities. For this purpose, we aggregated industry-level business demography data from Statistics Denmark (DB07 127-grouping) from the following sub-industries: Primary production (2 sub-industries, including agriculture and fisheries), food and beverage manufacturing (6 sub-industries, including production of meat and meat products, processing and preserving of fish, manufacture of dairy products, manufacture of grain mill and bakery products, other manufacture of food products, manufacture of beverages), food-related wholesale and retail (4 sub-industries, including wholesale of cereals and feeding stuffs, wholesale of food, beverage and tobacco, supermarkets and department stores, and retail sale of food in specialized stores), and accommodation and food and beverage service activities (2 sub-industries, including hotels and other accommodation, and restaurants and other food and beverage service activities).

On the following pages, Figure 2 shows the number of new enterprises that were created each year in the four different industries we focus on (2001-2012). The first thing to notice is the comparably large difference between the numbers of births in the different sub-sectors. In agriculture and fisheries, births range from a maximum of 3,386 births in 2001 to a minimum of

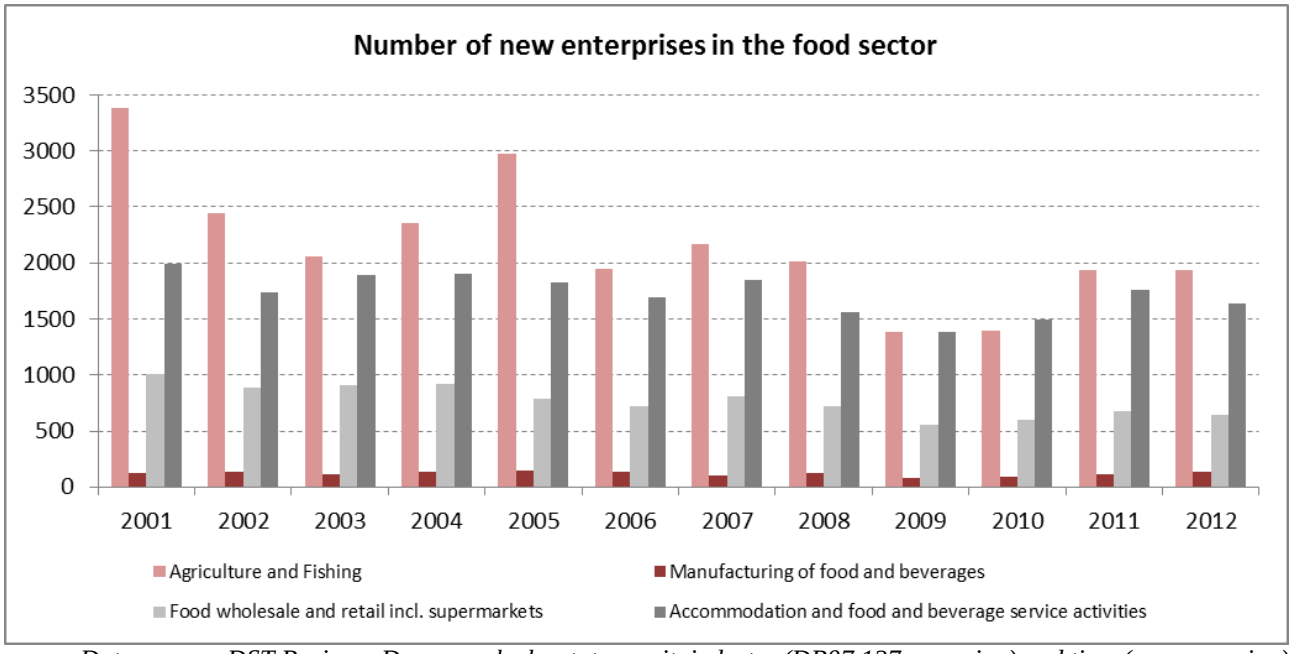
1,379 births in 2009. We can also see a comparatively large number of births in accommodation and food and beverage service activities (1,639 in 2012, which includes 69 hotels and other accommodation and 1,570 restaurants, cafés, bars, etc.). In contrast, the number of births in food and beverage manufacturing is relatively small in comparison to wholesale and retail, and accommodation and food and beverage services. This supports the arguments that food processing is a particularly difficult industry for new entrants. We can also see a potential effect of the economic crisis after 2008, followed by a recovery. Except for food manufacturing (122 births in 2001 vs. 140 in 2012), however, start-up activity did not return to the 2001 level. In fact, the data suggests an overall downward trend in annual births in the primary sector, in food-related wholesale and retail, and in accommodation and food and beverage service activities over the reference period. To better illustrate these developments, Figure 3 shows the trend of annual births on the basis of the births in 2001.We can see the decline in annual births, a pronounced dip in 2009, followed by a recovery period – and interestingly, a rebound in the number of births in food manufacturing.

To compare the number of births with the number of deaths, Figure 4 shows the number of deaths per year in the same observation period. We can see that the number of deaths reflects the number of births in the sense that the more new enterprises are born in an industry, the higher also the number of deaths. Figure 5 again shows us the development over the observation period (index 2001). We can see a downward trend that is followed by peaks in the number of deaths in each industry just before the crisis (around 2007). These peaks may be related to an earlier increase in the numbers of new enterprises around 2005 (see, in particular, food and beverage manufacturing). In the beginning of the crisis, death numbers seem to go down (2008), and then (with the exception of agriculture and fisheries) rebound in the aftermath of the crisis. We would expect that this rebound reflects a direct effect of the crisis on enterprise deaths that is nevertheless moderated by the fact that fewer enterprises were born around 2010 and consequently, fewer young enterprises could die. In terms of the increase in 2012, note again that the number for 2012 might be adjusted when the next dataset is published.

Finally, the detailed numbers for each sub-industry can be found in Table 1. Note that, interestingly, only five of the sub-industries show a positive number of total births minus total deaths over the observation period. These are production of meat and meat products (11 more births than deaths), manufacture of dairy products (14 more births than deaths), other manufacture of food products (98 more births than deaths), manufacture of beverages (85 more births than deaths), and

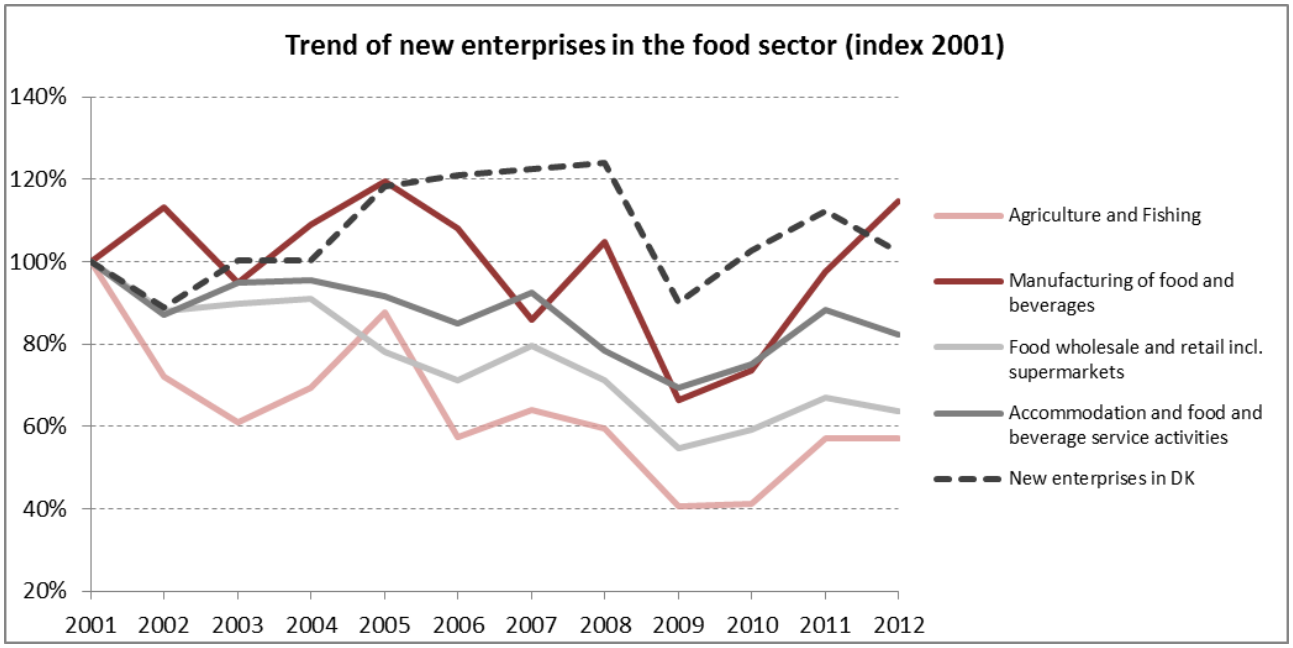
restaurants (1,313 more births than deaths). Vice versa, the greatest differences are in agriculture and fisheries (over 17,500 more deaths than births), followed by wholesale (over 600 more deaths than births) retail (over 1,100 more deaths than births), manufacture of grain mill and bakery products (337 more deaths than births), accommodation and food and beverage service activities (160 more deaths than births), and processing and preserving of fish (9 more deaths than births).

Figure 2: Number of new enterprises in food-related industries in DK 2001-2012



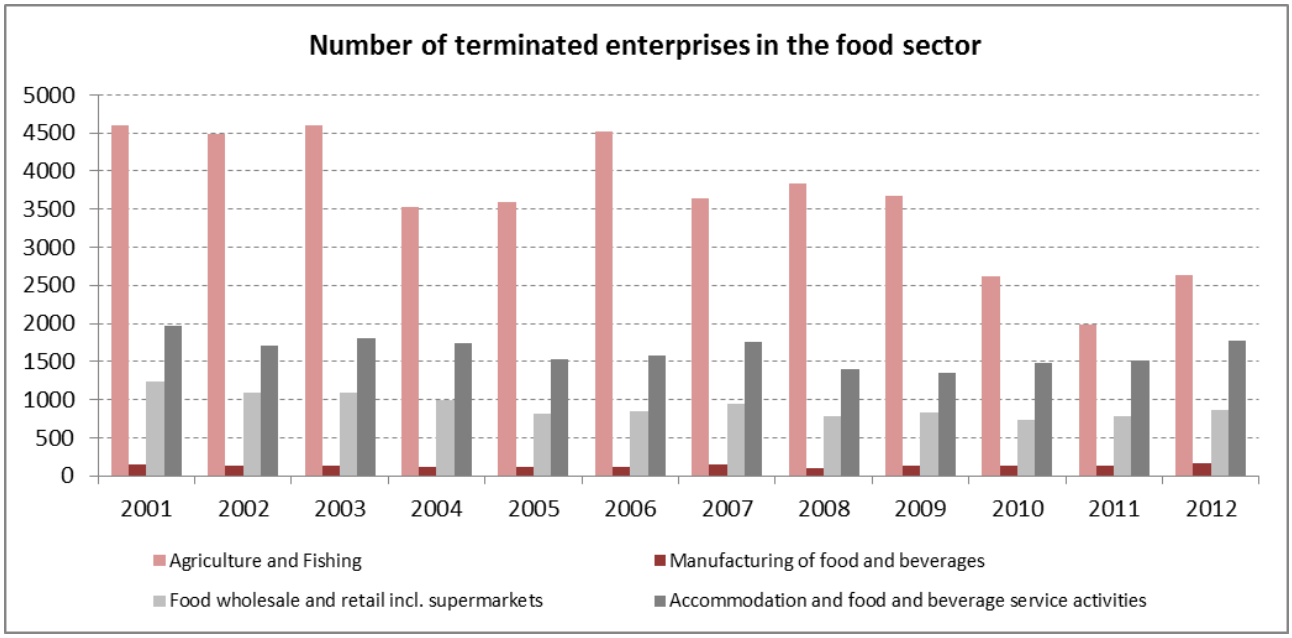
Data source: DST Business Demography by status, unit, industry (DB07 127-grouping) and time (own grouping)

Figure 3: Trend of new enterprises in food-related industries in DK (index 2001)



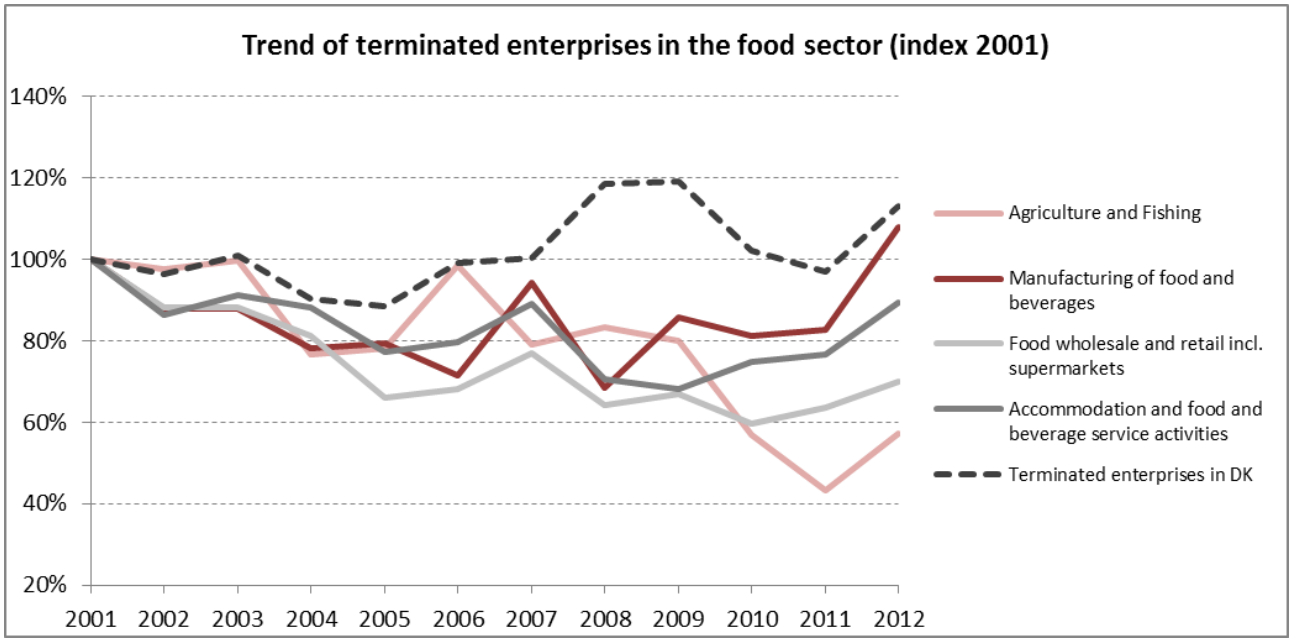
Data source: DST Business Demography by status, unit, industry (DB07 127-grouping) and time (own grouping)

Figure 4: Number of terminated enterprises in food-related industries in DK 2001-2012



Data source: DST Business Demography by status, unit, industry (DB07 127-grouping) and time (own grouping)

Figure 5: Trend of terminated enterprises in food-related industries in DK 2001-2012



Data source: DST Business Demography by status, unit, industry (DB07 127-grouping) and time (own grouping)

Table 1: Number of new and terminated enterprises in the food sector by industry (2001-2012)

Indicator	Industry (DB 07 127-grouping)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Number of new enterprises	Agriculture and horticulture	3261	2330	1962	2245	2851	1851	2059	1929	1317	1323	1844	1859
	Fishing	125	109	100	109	124	94	107	87	62	69	93	78
	Production of meat and meat products*	14	15	15	12	13	7	9	13	12	10	6	13
	Processing and preserving of fish	7	9	7	5	9	8	5	5	3	2	4	7
	Manufacture of dairy products*	4	24	2	5	9	10	9	10	3	1	4	4
	Manufacture of grain mill and bakery products	74	62	62	82	60	53	40	37	20	24	38	40
	Other manufacture of food products*	16	25	25	25	32	29	25	48	33	36	55	58
	Manufacture of beverages*	7	3	5	4	23	25	17	15	10	17	12	18
	Wholesale of cereals and feeding stuffs	50	24	46	46	42	31	29	44	29	32	37	38
	Wholesale of food, beverages and tobacco	197	179	189	180	163	147	206	152	121	140	140	160
	Supermarkets and department stores, etc.	357	289	299	295	220	251	254	262	163	186	231	206
	Retail sale of food in specialized stores	408	399	375	401	367	292	317	264	241	242	271	240
	Hotels and similar accommodation	104	92	109	114	118	105	121	100	80	83	101	69
	Restaurants*	1890	1644	1786	1792	1708	1589	1724	1461	1302	1413	1658	1570
Number of terminated enterprises	Agriculture and horticulture	4407	4267	4354	3366	3416	4289	3404	3672	3540	2504	1897	2495
	Fishing	196	227	240	166	176	238	230	166	138	115	95	136
	Production of meat and meat products*	17	9	12	9	11	7	11	10	10	9	10	13
	Processing and preserving of fish	4	13	6	7	6	3	8	5	7	9	4	8
	Manufacture of dairy products*	3	3	21	2	5	3	9	3	6	4	5	7
	Manufacture of grain mill and bakery products	114	89	81	88	81	76	92	55	62	58	62	71
	Other manufacture of food products*	17	19	13	14	20	16	21	22	35	39	38	55
	Manufacture of beverages*	0	3	3	1	0	6	5	11	13	7	9	13
	Wholesale of cereals and feeding stuffs	87	62	54	62	57	60	75	60	63	28	46	39
	Wholesale of food, beverages and tobacco	259	204	184	206	187	189	176	190	208	162	178	202
	Supermarkets and department stores, etc.	371	355	343	320	261	264	306	258	273	284	271	312
	Retail sale of food in specialized stores	514	465	504	413	309	326	392	281	279	259	288	309
	Hotels and similar accommodation	112	111	121	129	105	101	102	113	136	107	109	110
	Restaurants*	1863	1593	1682	1611	1421	1472	1659	1280	1211	1371	1403	1658

**Sub-industries with a positive number of total births minus total deaths over the entire period (2001-2012)*

Data source: DST Business Demography by status, unit, industry (DB07 127-grouping) and time

Births and deaths per size class

The number of new and terminated enterprises (see previous section) provided us with a first overview of start-up dynamics. However, so far we know little about how active (in terms of employment) these new enterprises are when they are born.

In this regard, per size-class business demography data published by EUROSTAT that is available for the observation period 2009-2012 (i.e., the post-crisis period) can tell us more about the size of enterprises when they are born, and when they die. In particular, we can look at births and deaths in the size classes zero employees, 1-4 employees, 5-9 employees, and 10 employees and above. In addition, EUROSTAT data also allows for insight into the actual numbers of persons employed vs. the number of employees in newly created businesses.

The number of persons employed refers to the total number of persons who work in the respective enterprises when they are born, and when they die. It includes working proprietors, partners and unpaid family workers working regularly in the business as well as persons who work outside the business but belong to it and are paid by it, such as sales representatives, delivery personnel, and repair and maintenance teams. It excludes manpower supplied to the unit by other enterprises, persons carrying out repair and maintenance work in the enquiry unit on behalf of other enterprises, and those on compulsory military service[3]. In contrast, the number of employees refers to only those persons employed who also have a contract of employment and formally receive compensation in the form of wages, salaries, fees, gratuities, piecework pay or remuneration in kind (temporary workers hired via employment agencies count as employees of the temporary employment agency). Consequently, enterprises that have zero employees may still have one or more persons employed. The latter are most likely the founders or their partners (family members, co-founders) that are working for the business but are not employed under a formal contract.

We will again start with the overall developments in Denmark before we look into the food sector in more detail, notably into food, beverage, and tobacco manufacturing, food-related wholesale and retail, and accommodation and food and beverage services, i.e., hotels and restaurants. However, we need to exclude agriculture and fishing since business demography data in

[3] See http://ec.europa.eu/eurostat/cache/metadata/en/sbs_esms.htm (accessed 23.01.2015)

EUROSTAT does not include the primary sector. This explains differences in the total number of new and terminated enterprises between the findings presented earlier and the findings in this chapter. Also, consider that there are some differences with regard to the industry classification and the sub-industries for which data is available.

First, Figure 6 shows the number of births and deaths as well as the number of persons employed in the population of births and deaths per size class for Denmark in total (except agriculture). Activities of holding companies are again excluded. On the right side of this combined figure, we can see the number of births and the number of employment provided by these births. Similar to what we discussed previously, we can again see the recovery of start-up activity from 2009 (20,576 births) until 2011 (26,365 births), followed by a setback in 2012 (23,627 births). We can also see that these births entailed the creation of employment for 19,017 persons in 2009, 23,379 persons in 2011, and 21,329 persons in 2012. In particular, we can see that although the majority of enterprises are born with zero employees, they nevertheless created employment for founders, co-founders, or other partners working for the business. In other words, about 80% of newly born enterprises have zero employees but account for about 60% of the self-employment generated by new enterprises. This is not surprising since start-ups tend to be operated primarily by founders and co-founders. Only between 15.2% (2009) and 17.3% (2012) of the births take place in the size class 1-4 employees, which then subsequently contribute to about 30% of the total employment generated (including employees and persons employed). Larger births are rare and account for approximately only 1% of the number of births and between about 10% of the employment created in 2009 (8.3% by the size class 5-9 employees and 2.9% by the size class 10 employees or more) and about 7% in 2012 (5.5% and 1.7% respectively).

On the left side of Figure 6, we display the number of deaths and the number of persons employed in the population of deaths. The overall trend mirrors the number of births. There is a decline in the number of total deaths from 2009 (26,305) to 2011 (22,987), followed by an increase in 2012 (27,307). Only in 2011 is the number of births higher than the number of deaths. Almost 90% of the deaths happen in size class 0. This means that most enterprises die when they are very small and do not have employees. It may also suggest that most enterprises die when they are very young (but then again we do not have information about enterprise age). Relatively few enterprises died in the bigger size classes. In terms of the number of persons employed in the population of deaths, we can see that again only in 2011 there is positive balance between the employment

created by new enterprises (23,379) and the employment 'lost' by the deaths (18,542). What is noteworthy is that during the recovery and the rebound, the number of deaths in the size class 10 employees or more went down by almost 50 % from 2009 to 2012 (from 62 to 32). We can see how this affects the total loss of employment as well as the distribution of the loss of employment across the size classes.

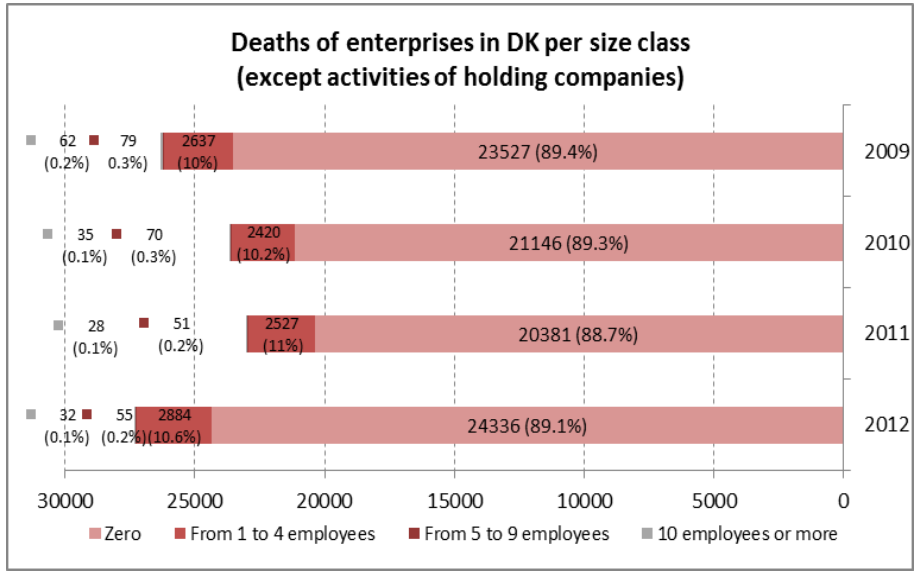
In a similar way, the remaining Figure 7 to Figure 13 presented over the following pages show the findings related to birth and death by size class for selected food-related industries. The sub-industries are slightly different from the categorization used in the previous section (no agriculture, different level of detail available in the industry classification). Specifically, Figure 7 shows the findings for manufacturing of food, beverages, and tobacco[4]. More specific data for the manufacturing sub-industries was not available. Figure 8 to Figure 11show the findings related to wholesale and retail. However, detailed data for food-related wholesale was not available. We thus needed to rely on a higher-level industry code: Wholesale trade except motor vehicles (see Figure 8). More detailed industry-level information was available for retail, and we can therefore provide insight into supermarkets and department stores (retail sale in non-specialized stores, see Figure 9), retail sale of food, beverage and tobacco in specialized stores (see Figure 10), and retail sale via stalls and markets (Figure 11). Finally, we present the findings for accommodation (Figure 12) and food and beverage service activities (Figure 13).

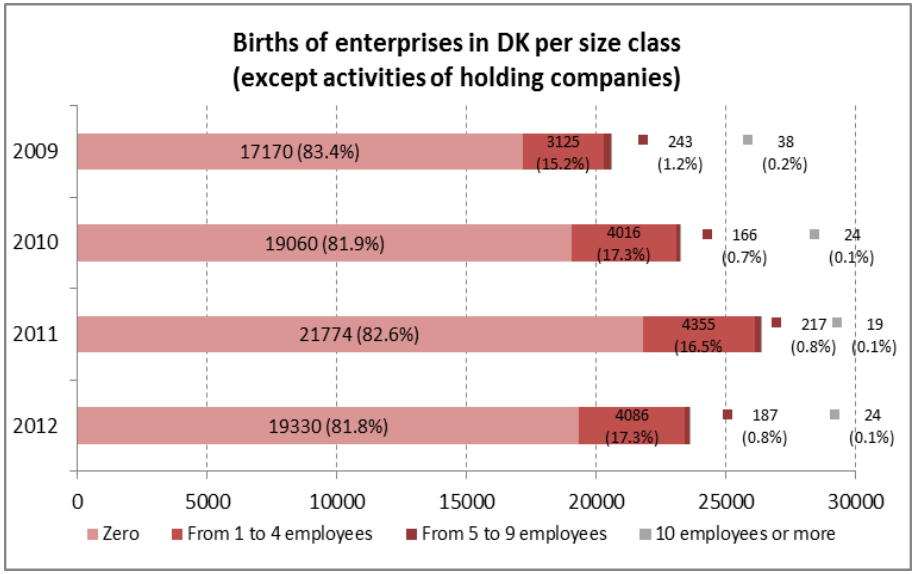
Overall, Figure 7 to Figure 13 further illustrate the findings of the previous section but provide more detailed insight into how differences between the industries are also reflected in the size of enterprises and type of employment they provide when they are born. Notably, we can see that in comparison to Denmark in total, a higher share of food manufacturing enterprises is born 'larger', i.e., close to 40% of births have at least one or more formal employee. Correspondingly, with the exception of 2012, we also see a lower share of deaths in the zero employee size class. If food manufacturing enterprises die, it is thus more likely that the death affects founders as well as employees. This is most likely due to industry requirements (production, health and safety regulations, etc.), and further supports the argument that food processing is a difficult industry for new entrants. Nevertheless, it is also the only industry with an ongoing increase in the number of births from 2009 to 2012.

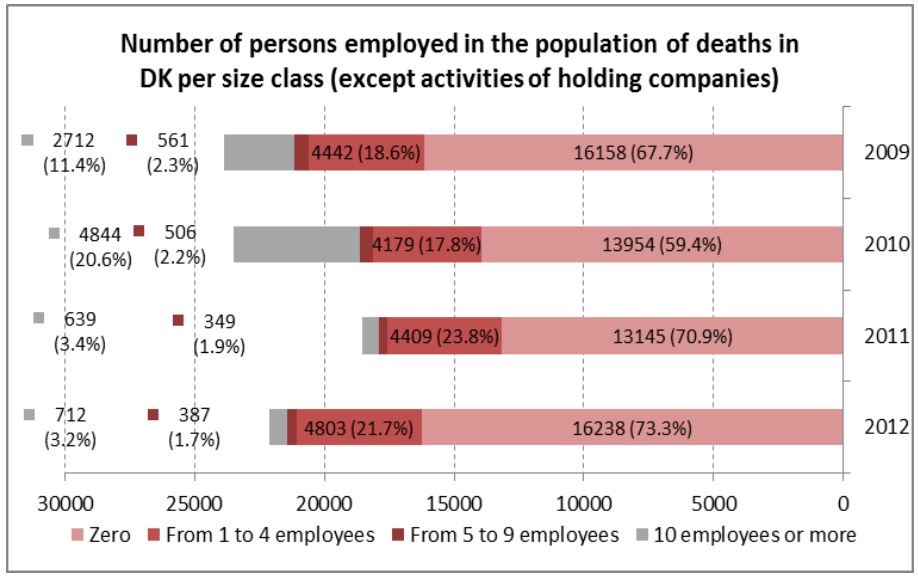
[4] Tobacco was not included in the previous section; however, births and deaths in this sub-industry account for only a very small share of the total births and deaths in the industry (manufacturing of food, beverages, and tobacco).

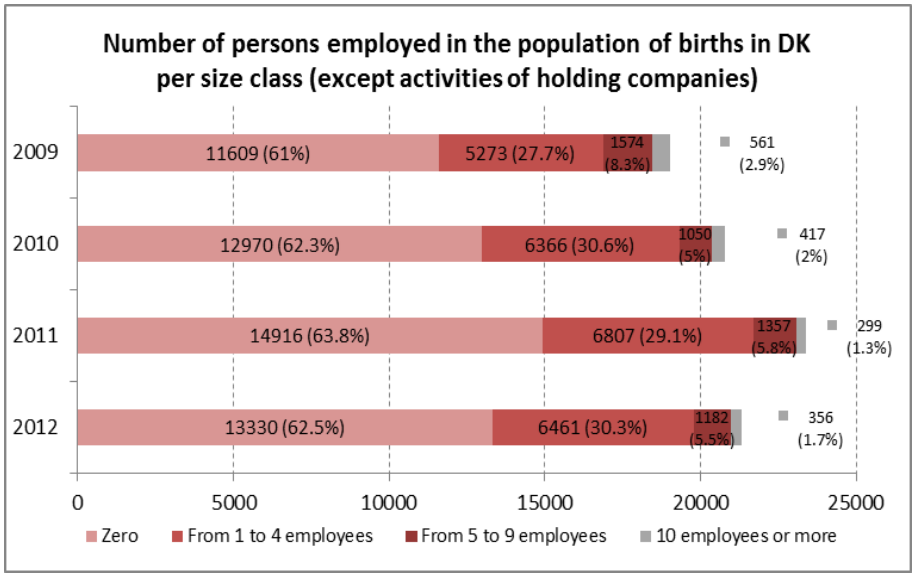
Similar but less pronounced differences can be seen in wholesale (Figure 8), retail in non-specialized stores (Figure 9), and accommodation and food and beverage service activities (Figure 12, Figure 13). The distributions in retail sale in specialized stores (Figure 10) and in retail via stalls and markets (Figure 11) point towards very small births with no or very few employees. This seems to reflect that these two sub-industries allow for births of one-person/family businesses more than the others do.

Figure 6: Number of births and deaths and number of persons employed in the population of births and deaths per size class in DK in total (2009-2012)



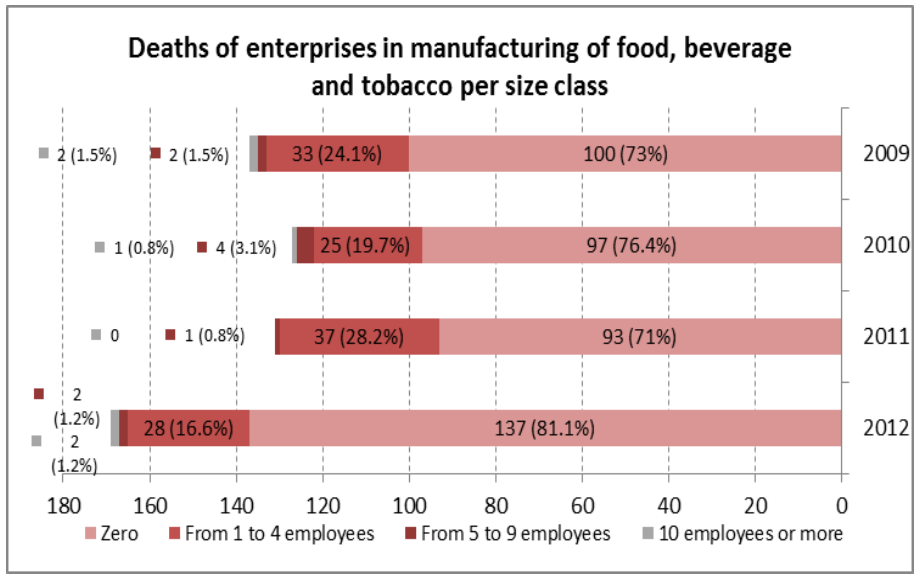


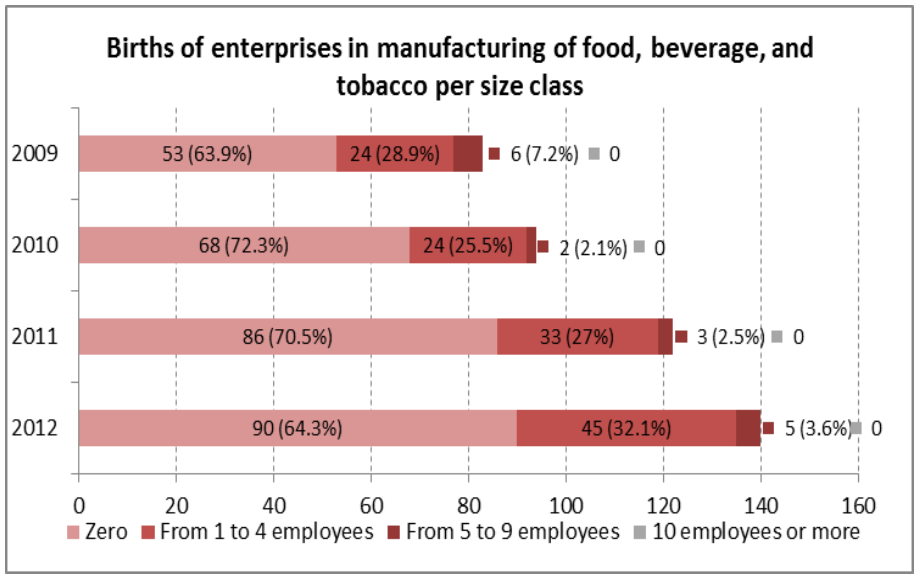


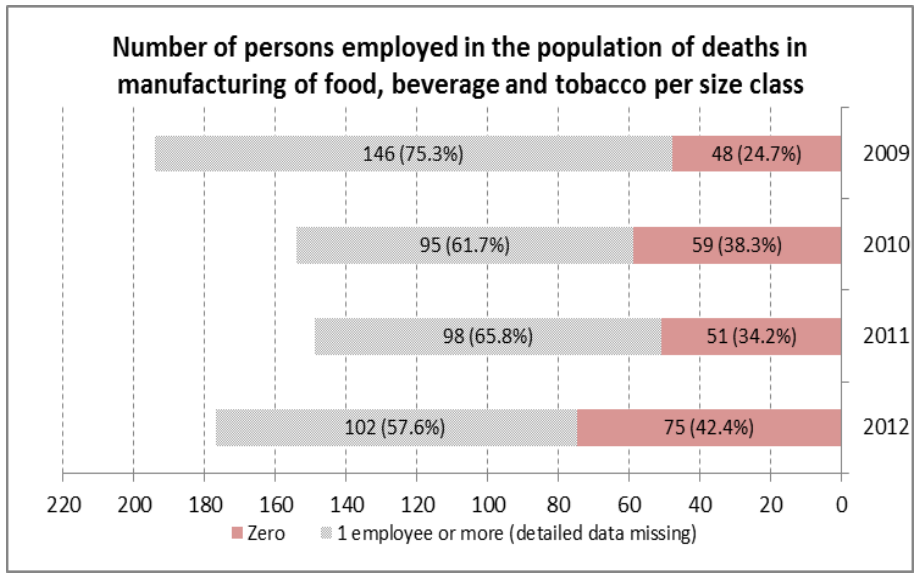


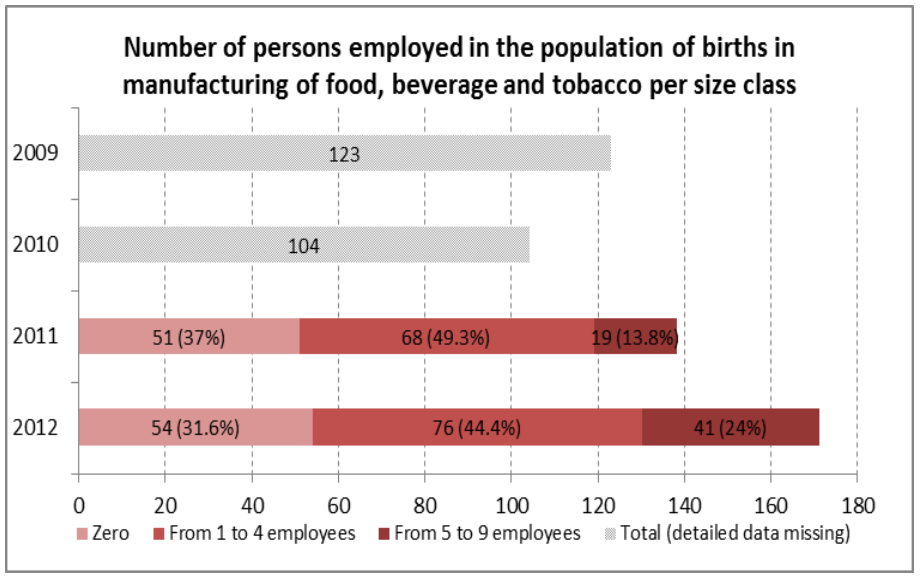
Data source: Eurostat Business demography by size class (NACE Rev. 2)

Figure 7: Number of births and deaths, number of persons employed in the population of births and deaths per size class in manufacturing of food, beverage and tobacco (2009-2012)



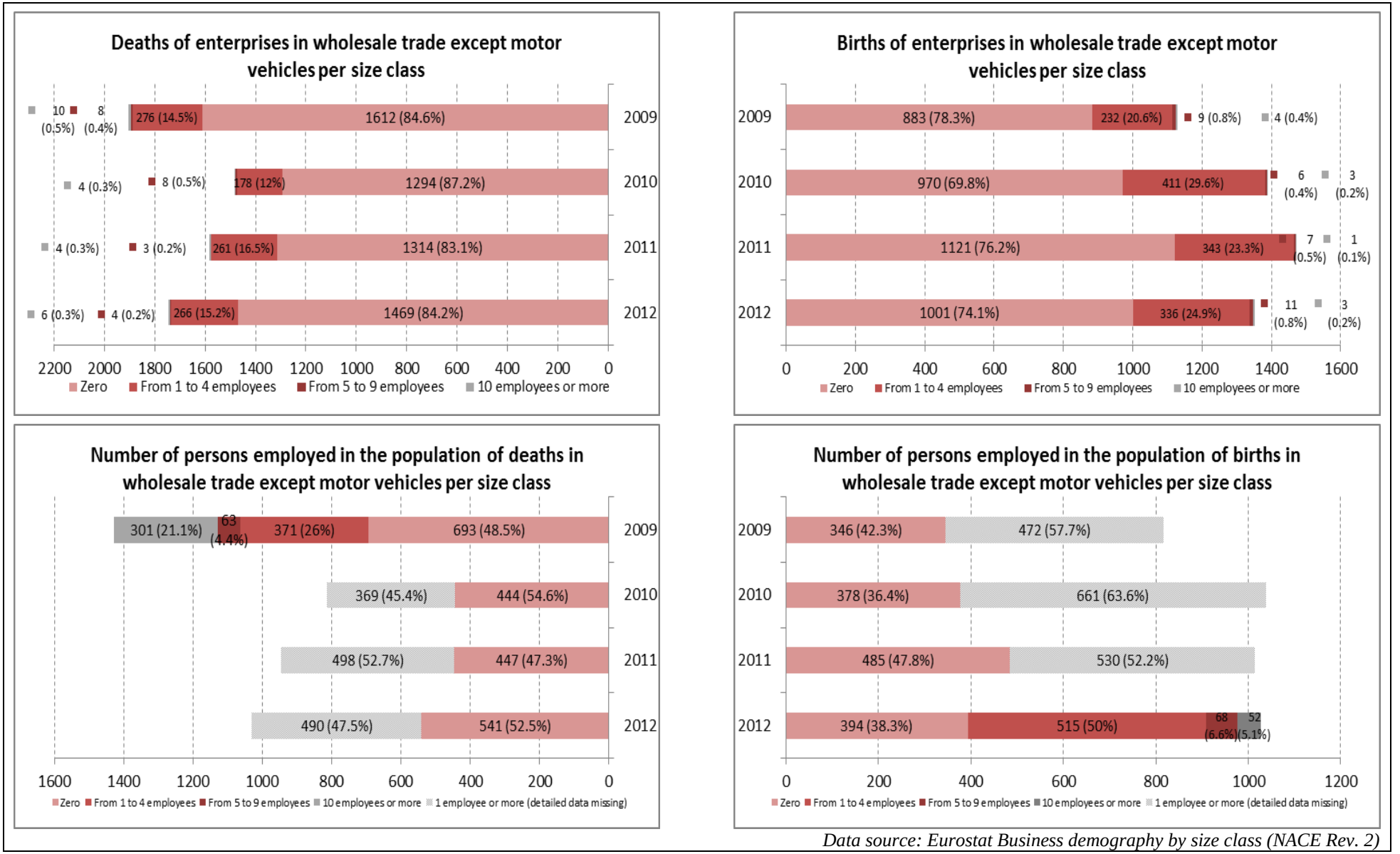






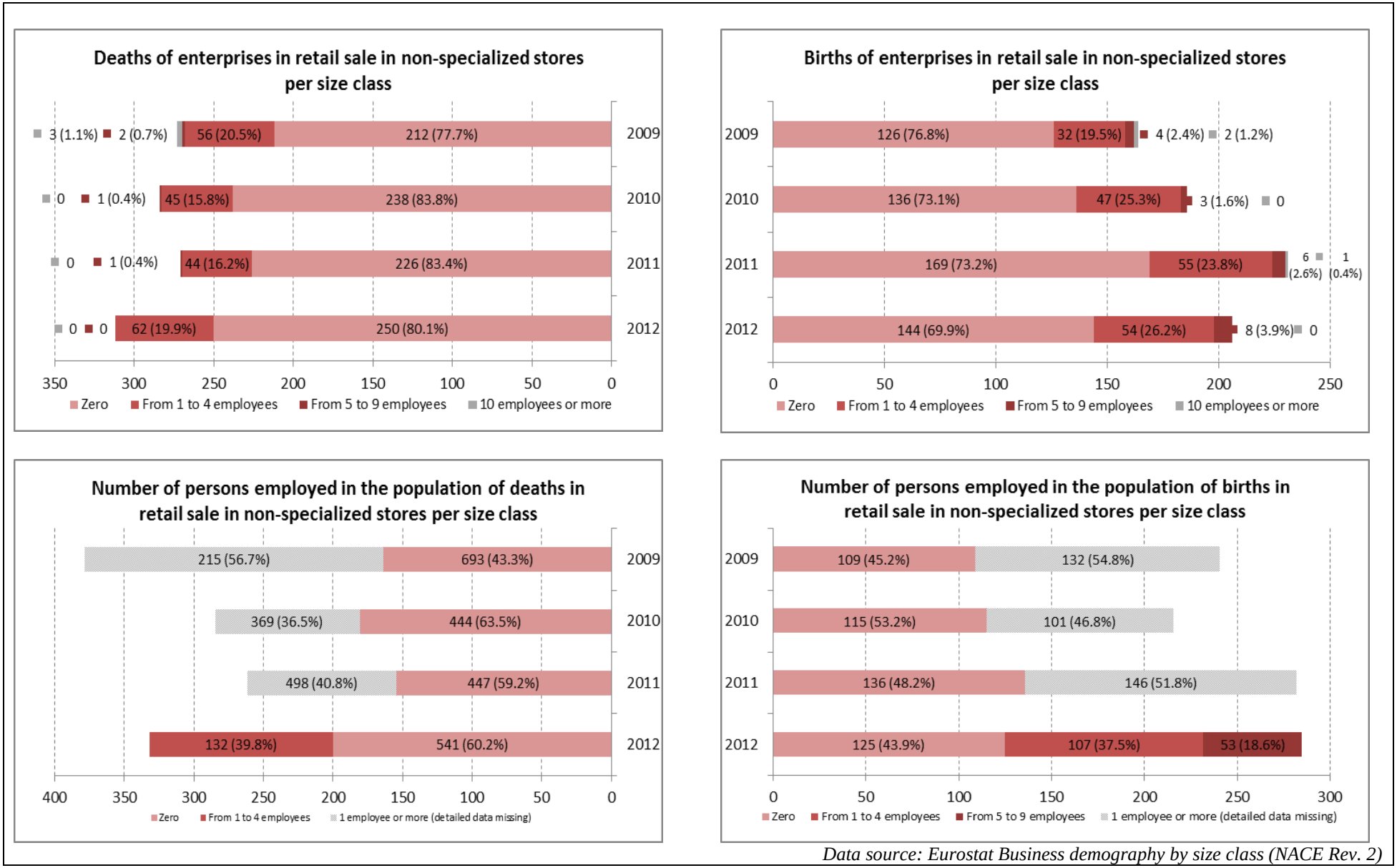
Data source: Eurostat Business demography by size class (NACE Rev. 2)

Figure 8: Number of births and deaths and number of persons employed in the population of births and deaths per size class in wholesale trade except motor vehicles (2009-2012)



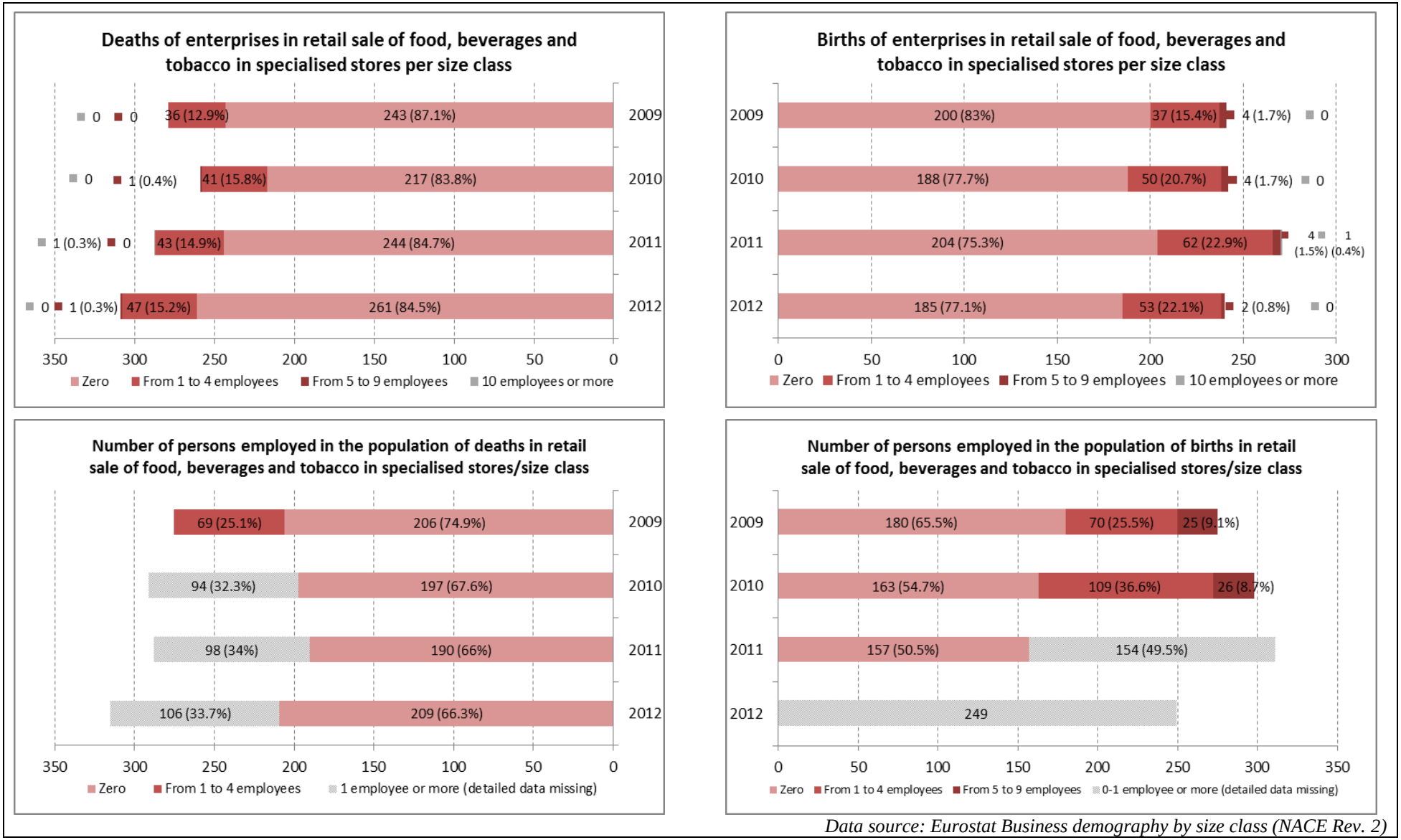
Data source: Eurostat Business demography by size class (NACE Rev. 2)

Figure 9: Number of births and deaths and number of persons employed in the population of births and deaths per size class in retail sale in non-specialised stores (2009-2012)



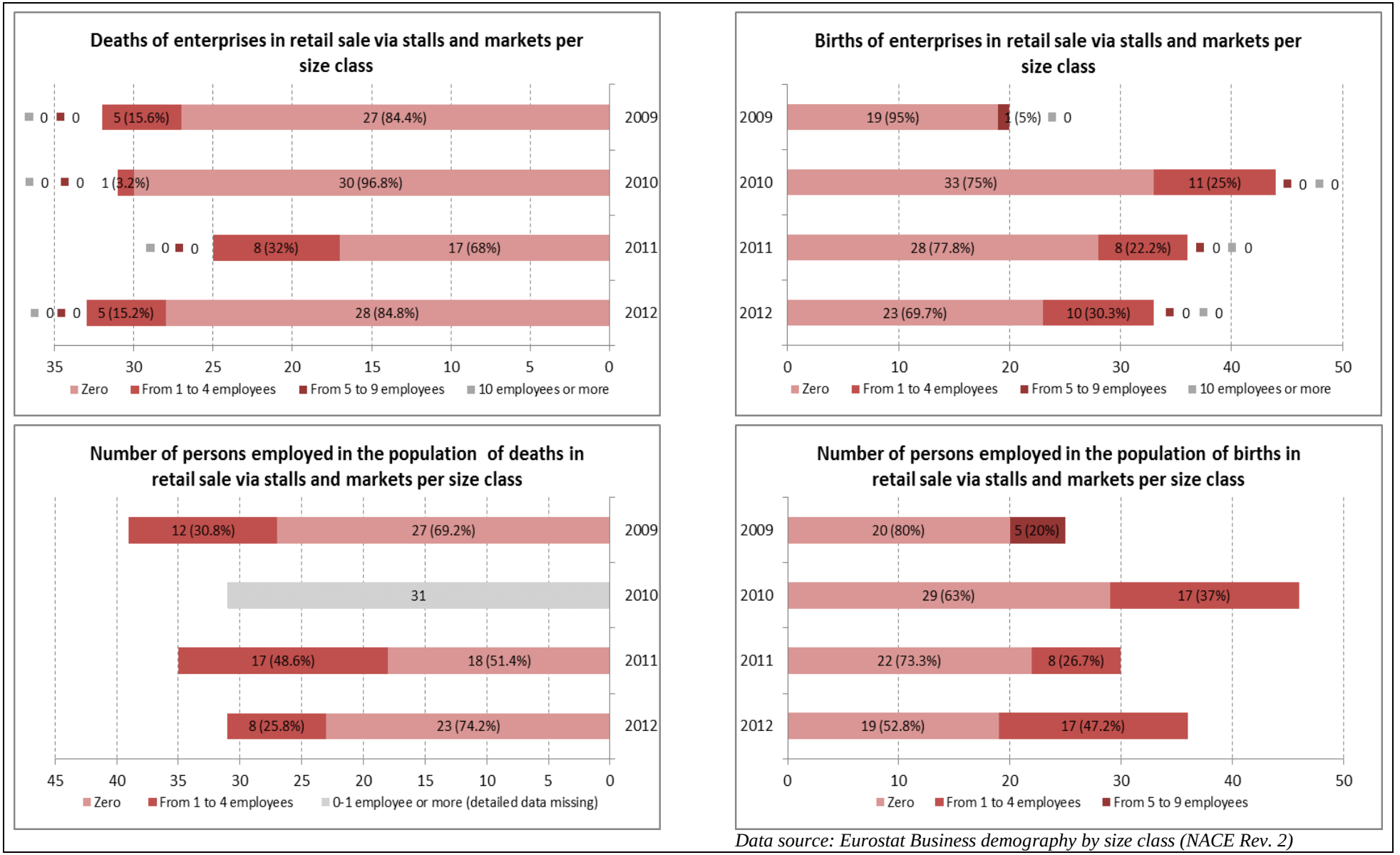
Data source: Eurostat Business demography by size class (NACE Rev. 2)

Figure 10: Number of births and deaths and number of persons employed in the population of births and deaths per size class in retail sale of food, beverages and tobacco in specialized stores (2009-2012)



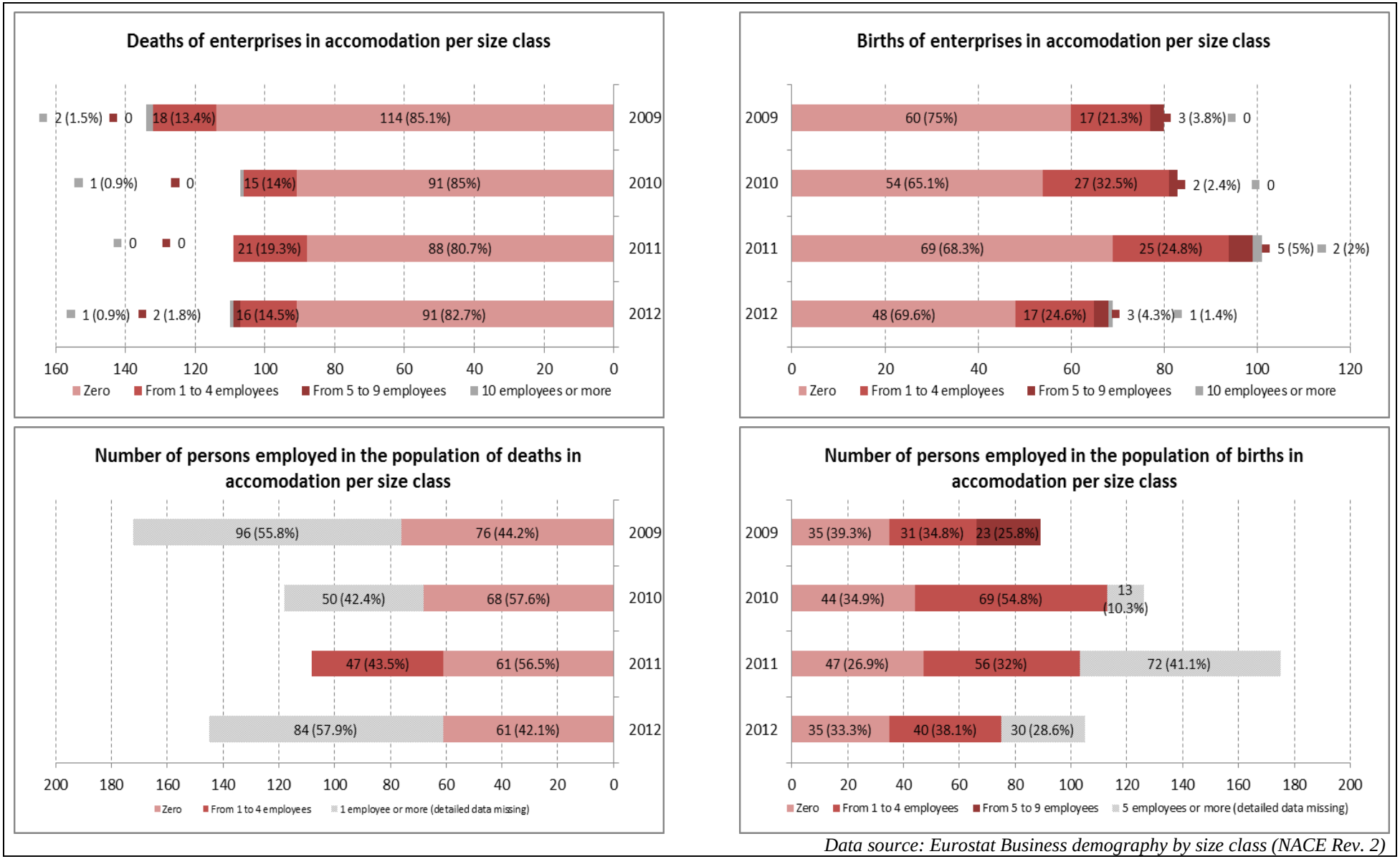
Data source: Eurostat Business demography by size class (NACE Rev. 2)

Figure 11: Number of births and deaths and number of persons employed in the population of births and deaths per size class in retail sale via stalls and markets (2009-2012)



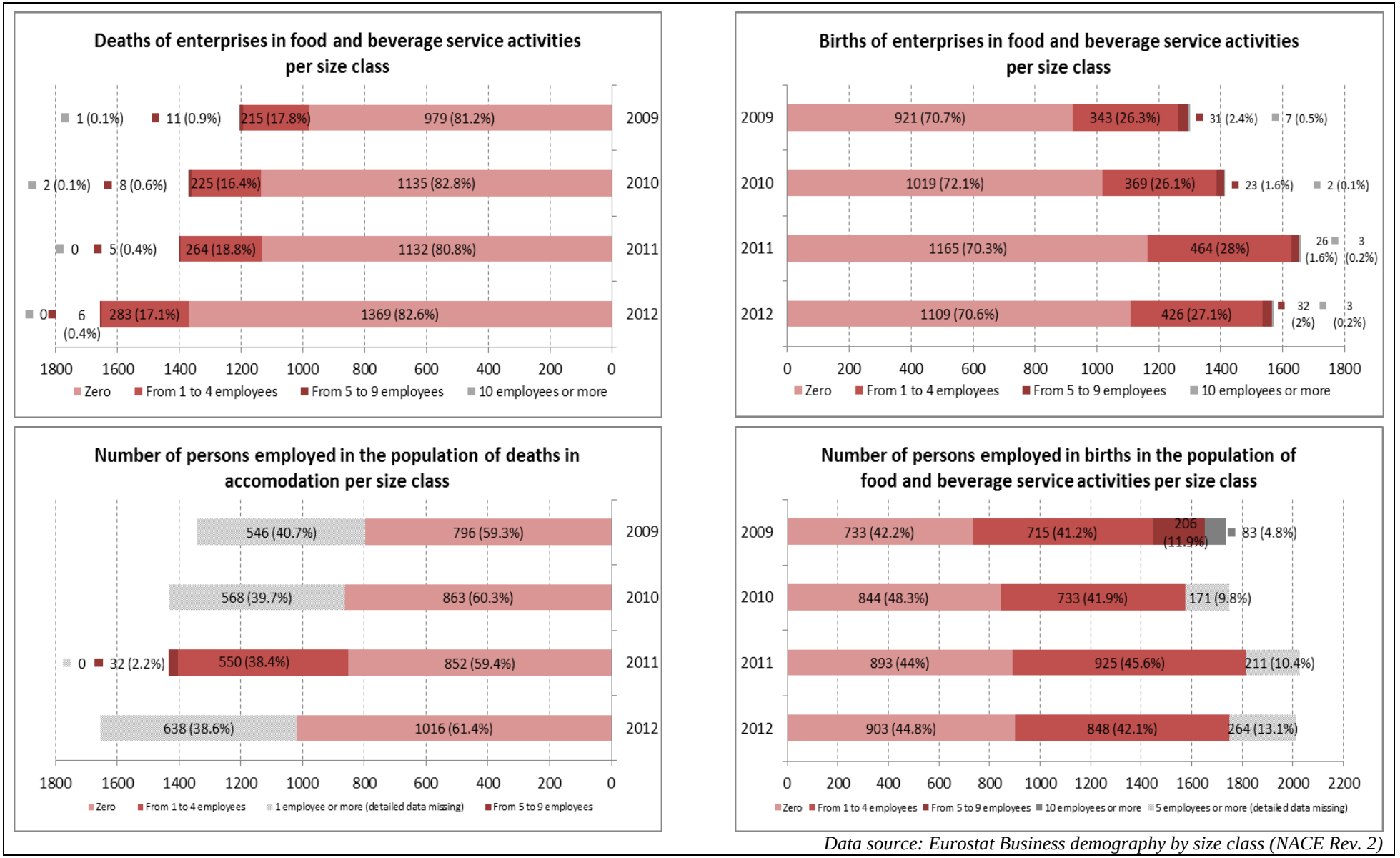
Data source: Eurostat Business demography by size class (NACE Rev. 2)

Figure 12: Number of births and deaths and number of persons employed in the population of births and deaths per size class in accommodation (2009-2012)



Data source: Eurostat Business demography by size class (NACE Rev. 2)

Figure 13: Number of births and deaths and number of persons employed in the population of births and deaths per size class in food and beverage service activities (2009-2012)



Data source: Eurostat Business demography by size class (NACE Rev. 2)

3 Growth and survival

In the previous chapter, we focused solely on the start-up dynamics in the food sector. We now turn our attention to enterprise growth[5] and survival. This is important because over the past decade entrepreneurship research has shown that only targeting a high number of start-ups is not enough. Start-ups alone are infrequent drivers of economic development because the majority of new enterprises die young or struggle to stay alive (Aldrich & Martinez, 2001; Shane, 2009; Stinchcombe, 1965), i.e., they rarely grow and the business is sustained at a level of operations which has been described as "the living dead" (Ruhnka, Feldman, & Dean, 1992). Although start-ups are important, scholars have therefore begun to emphasize that more attention needs to be paid to the formation of high-quality, high-growth companies (Shane, 2009) and understanding that growth patterns are not random (Reichstein & Jensen, 2005). This challenge has also been recognized by the Danish government (FIVU, 2012).

We therefore continue our investigation of the dynamics in the food sector through presenting our findings on survival rates, number of high growth enterprises, and size-class dynamics with regard to number of enterprises, employment, turnover, and profitability (value added). Before we present the data, we provide an overview of factors that should be discussed when interpreting it.

Determinants of growth and survival in the food sector

What drives and limits enterprise growth is at the heart of research in economics and management. The factors that influence enterprise growth and development are therefore extensively addressed in a number of literature streams differing in their assumptions, methodological approaches, and levels of analysis. We will highlight a number of factors of which some are likely of particular importance for the food sector. However, one needs to keep in mind that due to the complexity of the phenomenon, different perspectives complement each other, i.e., there is no superior approach to explain enterprise entry and survival (Geroski et al., 2010).

[5] We mainly approach growth as an increase in number of persons employed but also present data on turnover and value added (profitability).

In the entrepreneurship literature, at least four factors have been related to growth: Legitimacy, ability to innovate, capital intensity and economies of scale and scope, and place and time of birth. First, young and small enterprise tend to lack the legitimacy necessary to attract the resources that are needed for developing the business, including financial capital, skilled employees, consumer trust, and others (Aldrich & Fiol, 1994; Lounsbury & Glynn, 2001; Ueberbacher, 2014). Research therefore suggests that young and small enterprises capable of gaining legitimacy can, against all odds, enhance their chances of survival. Their ability to influence and convince others of the value creating potential of their business helps them to overcome the liabilities of newness and smallness (Aldrich, 1999; Stinchcombe, 1965). In the food sector, this aspect may be a particular barrier for SME growth. Many of the trends that open up opportunities for small enterprises remain confined to niche markets. We would expect that mainstream customers as well as investors are reluctant to commit resources to new, small food enterprises. As we have discussed before, the sector is traditionally characterized by a certain reluctance to change (Galizzi & Venturini, 1996). Among other aspects, strong brands and reputation matter, and food safety concerns create barriers that small and 'unproven' enterprises need to overcome.

Second, SME's ability to innovate has been under scrutiny with regard to its influence on enterprise survival. Here, the results are mixed. On the one side, most studies show that innovative activities in young and small enterprises have a positive influence on their growth and survival (Langerak, Rijsdijk, & Dittrich, 2009; Sinha & Noble, 2008; Srinivasan, Lilien, & Rangaswamy, 2004). In fact, innovative activity has been related to empirical findings showing that small enterprises are able to grow at a higher rate than large enterprises, thereby also generating proportionally more employment than large enterprises (Evans, 1987b; Hart & Oulton, 1996). This has been explained through size-related differences in an enterprise's ability to innovate: Large enterprises may innovate more but their perceived market power and established routines put a strain on how much they can afford to invest into change (Nelson & Winter, 1982). On the contrary, smaller enterprises are less constrained and can therefore be more aggressive innovators. However, studies also show that innovative activities entail uncertainty, which reduces an enterprise's chance of surviving (Buddelmeyer, Jensen, & Webster, 2010; Velu, 2015). More specifically, this has been related to a negative relationship between enterprise age and growth (Evans, 1987a). Young enterprises may grow more rapidly than older enterprises but they are also more likely to die. When they enter the market, they face uncertainty and need to make assumptions about their costs – which

many will get wrong, leading to a high mortality rate among young enterprises. The longer they stay in the same business, the more they learn about their cost structure and efficiency level (Evans & Jovanovic, 1989).

Third, in industries characterized by high capital intensity and economies of scale and scope (such as in food manufacturing and to a certain extent also retail and other food-related services), small enterprises are expected to experience severe survival and growth disadvantages. Industrial economics scholars have suggested that only adopting innovative growth strategies may allow them to compensate for these disadvantages (Acs & Audretsch, 1990). In this regard, human capital and knowledge assets to develop such strategies become important drivers of growth (Teece, Pisano, & Shuen, 1997).

Finally, scholars have also shown that the place and time of founding of the enterprise impacts survival and growth. First, studies show that innovative enterprises with high growth rates tend to be born in geographical proximity of similar enterprises, i.e., in regional clusters (Maskell, 1998). Second, the expectation is that enterprises created during times of unfavorable environmental conditions are unlikely to find the right structures and design the right routines, making them 'unfit' for survival (Geroski et al., 2010; Hannan & Freeman, 1984). This would imply that new and small food enterprises that were attempting to grow in the period between 2008 and 2012 had severe disadvantages. Although enterprises in the food sector may have been less affected by the financial crisis due to low income elasticities (Hansen, 2014), survival and growth may have been negatively affected by the two food crises in 2007-2008, and again in 2010-11.

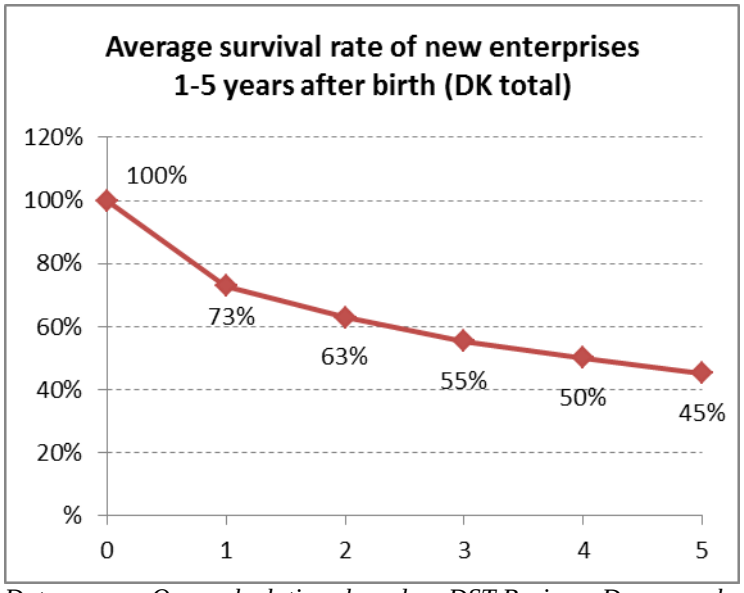
Survival rates and high growth enterprises

The literature suggests that it will be difficult, but not impossible, for new food enterprises and SMEs to survive and grow. To look into the reality of this, we will in the following chapters present data on survival rates and high growth companies, based on business demography data from Statistics Denmark and EUROSTAT. Note that differences in the availability of industry-level data among the two datasets leads to some discrepancies between the sub-industries for which we can present data for.

Enterprise survival rates in Denmark in total and in the food sector

First, we present data on the survival rates of all Danish enterprises the first 5 years of its existence (see Figure 14). As the graph shows, already in the first year 27% of enterprises are closed again (survival rate is 73%), and already at year four, half the start-ups initiated are closed down.

Figure 14: Average survival rate of new enterprises after 1-5 years (Denmark total, 2001-2011)



Data source: Own calculations based on DST Business Demography by industry (DB07 10-grouping), unit, year of beginning and time

Below we present the survival rates 1-5 years after birth in food-related industries between 2009 and 2012. The data used is from EUROSTAT (business demography). The survival rates in the sub-industries for which data is available vary: Some resemble the average survival rate in Denmark, namely, wholesale trade, except of motor vehicles and motorcycles (note that more specific data for food-related wholesale was not available), and manufacture of food products; beverage and tobacco products. Only in accommodation the survival rate is higher than the rate for Denmark in total (Figure 14). In contrast, four of the examined seven sub-industries reveal relatively low survival rates at five years after establishment. In particular, the sub-industry retail sale via stalls and markets suffers, as only 21.4% of enterprises survive a five year period.

Table 2: Survival rates in food sector divided by industries (2009-2012)

Sub-sector	***Industry (NACE Rev. 2)***	***Year (t)***	***Survival rate 1****	***Survival rate 2****	***Survival rate 3****	***Survival rate 4****	***Survival rate 5****
Manufacturing of food and beverages	Manufacture of food products; beverages and tobacco products	2009	73.08	68.57	53.79	49.66	45.11
		2010	77.11	67.69	62.86	46.97	42.18
		2011	69.15	63.86	57.69	53.33	42.42
		2012	77.87	57.45	42.17	50.00	48.57
		Average	*74.30*	*64.39*	*54.13*	*49.99*	*44.57*
Food-related wholesale and retail	Wholesale trade, except of motor vehicles and motorcycles *(note: overall survival rates for wholesale; survival rates for specific food-related industry codes not available)*	2009	70.90	56.20	48.39	45.83	46.31
		2010	73.05	60.98	51.96	47.81	43.97
		2011	75.32	61.26	54.28	45.77	43.05
		2012	75.07	61.37	53.37	48.36	40.98
		Average	*73.59*	*59.95*	*52.00*	*46.94*	*43.58*
	Retail sale in non-specialised stores	2009	73.66	58.66	49.40	42.73	38.64
		2010	76.83	59.16	52.36	46.61	39.09
		2011	76.88	60.37	43.51	41.73	42.63
		2012	77.06	63.98	48.17	35.88	35.83
		Average	*76.11*	*60.54*	*48.36*	*41.74*	*39.05*
	Retail sale of food, beverages and tobacco in specialised stores	2009	70.83	55.21	41.44	34.60	35.16
		2010	74.27	53.79	54.26	37.67	33.79
		2011	76.45	55.19	42.05	47.32	31.85
		2012	73.80	60.33	45.64	38.26	41.64
		Average	*73.84*	*56.13*	*45.85*	*39.46*	*35.61*
	Retail sale via stalls and markets	2009	65.71	32.14	14.81	17.86	17.07
		2010	50.00	48.57	28.57	29.63	25.00
		2011	70.45	35.00	42.86	32.14	18.52
		2012	58.33	56.82	30.00	37.14	25.00
		Average	*61.12*	*43.13*	*29.06*	*29.19*	*21.40*
Accommodation and food and beverage service activities	Accommodation	2009	73.00	63.64	64.76	61.86	46.49
		2010	81.25	60.00	55.37	61.90	63.56
		2011	74.70	63.75	56.00	55.37	60.00
		2012	78.22	63.86	57.50	52.00	47.93
		Average	*76.79*	*62.81*	*58.41*	*57.78*	*54.50*
	Food and beverage service activities	2009	73.99	61.02	48.46	41.39	37.11
		2010	78.19	60.92	53.31	44.62	38.52
		2011	73.96	60.29	49.42	44.66	39.77
		2012	76.60	57.82	53.61	42.30	38.69
		Average	*75.69*	*60.01*	*51.20*	*43.24*	*38.52*

**Survival rate n: Number of enterprises in the reference period (t) newly born in t-n having survived to t divided by the number of enterprise births in t-n (in %)*

Data source: EUROSTAT Business demography by size class (NACE Rev. 2)

High growth enterprises in Denmark in total and in the food sector

After survival, we now look at the number of high-growth enterprises. Table 3 shows that in 2012, 1,892 enterprises in Denmark were classified as high growth enterprises. This means that these enterprises had at least 10 employees in 2009, and then had average annual growth in number of employees greater than 10% per year between 2009 and 2012. We can see that of 1,892 high growth enterprises in Denmark, approximately 9% stem from the food sector (i.e., from the industries investigated).

Interestingly, a few sub-industries stand out with regard to high-growth food enterprises (Table 3): First, the sub-industry with the highest number of high growth enterprises is restaurants and mobile food service activities (n=35). Second, wholesale of food, beverages and tobacco with the second highest number of high growth enterprises (n=19), and third, manufacturing of bakery and farinaceous products with the third highest number (n=19). As mentioned before, EUROSTAT business demography data does not include agriculture. However, information about high growth enterprises provided by Statistics Denmark indicates that there are no high growth enterprises in agriculture[6].

[6] Information about high growth enterprises is also available via the Business Demography data from Statistics Denmark. Their statistics include agriculture; however, the publicly available data is aggregated on a less detailed industry level (only DB07 10-grouping).

Table 3: High growth enterprises in DK in total and in the food sector (t=2012)

Sub-sector	***Industry (NACE Rev. 2)***	***Population of active enterprises***	***Number and % of high growth enterprises****	***No. of employees in high growth enterprises****
DK in total	Total business economy	218,078**	1,892 (0.87%)	133,886
Manufacturing of food and beverages	Processing and preserving of meat and production of meat products	151	6 (3.97%)	556
	Processing and preserving of fish, crustaceans and molluscs	101	5 (4.95%)	399
	Processing and preserving of fruit and vegetables	62	1 (1.61%)	n/a
	Manufacture of vegetable and animal oils and fats	20	0	0
	Manufacture of dairy products	64	4 (6.25%)	207
	Manufacture of grain mill products, starches and starch products	24	0	0
	Manufacture of bakery and farinaceous products	742	19 (2.56%)	914
	Manufacture of other food products	239	2 (0.84%)	*n/a*
	Manufacture of prepared animal feeds	55	2 (3.64%)	*n/a*
	Manufacture of beverages	121	0	0
	Total: Manufacturing of food and beverages	*1,579*	*39 (2.47%)*	*2,261*
Food-related wholesale and retail	Wholesale of agricultural raw materials and live animals	504	9 (1.79%)	1,111
	Wholesale of food, beverages and tobacco	1,696	25 (1.47%)	1,667
	Retail sale in non-specialised stores	2,698	16 (0.59%)	3,274
	Retail sale of food, beverages and tobacco in specialised stores	2,295	8 (0.35%)	190
	Retail sale via stalls and markets	147	0	0
	Total: Food-related wholesale and retail	*7,340*	*58 (0.79%)*	*6,242*
Accommodation and food and beverage service activities	Hotels and similar accommodation	840	10 (1.19%)	
	Holiday and other short-stay accommodation	212	2 (0.94%)	624 ***
	Camping grounds, recreational vehicle parks and trailer parks	388	0	0
	Other accommodation	22	0	0
	Restaurants and mobile food service activities	8,354	35 (0.42%)	2002
	Event catering and other food service activities	1,538	13 (0.85%)	3375
	Beverage serving activities	2,386	6 (0.25%)	607
	Total: Accommodation and food and beverage service activities	*13,740*	*66 (0.48%)*	*6,608*

**High-growth enterprises with at least 10 employees in the beginning of their growth (in t-3)and having average annualised growth in number of employees greater than 10% per annum, over a three year period (t-3 to t)*

***Except activities of holding companies*

****Total for 'Hotels and similar accommodation' and 'Holiday and other short-stay accommodation'*

Data source: EUROSTAT Business demography (bd) by size class (for population of active enterprises), and EUROSTAT high growth enterprises (growth by 10% or more) and related employment by NACE Rev. 2

Size-class dynamics

In the following chapters we use structural business statistics data from EUROSTAT to look into size-class dynamics with regard to changes in the number of enterprises, employment provided, and turnover and value added per size class. Note that we again need to exclude agriculture from the analysis in this section. We focus on food-related manufacturing, wholesale and retail, and accommodation and food and beverage service activities. Also note that the NACE classification used by the EUROSTAT dataset again leads to some discrepancies between the sub-industries for which we can present data for (see Appendix B). Finally, note that we draw on aggregated data (per size class and industry). We can therefore only gain insight into structural dynamics.

Number of enterprises

In this chapter we present the size-class dynamics in terms of changes in the number of enterprises in the different size classes between 2008 and 2012, divided by sub-industries. First we show the data for food and beverage manufacturing, thereafter for food-related wholesale and retail, and last for hotels and restaurants (i.e., accommodation and food and beverage service activities). Note that number of enterprises is a count of the number of enterprises active during at least a part of the reference period.

In Figure 15, we show how the total number of food and beverage manufacturing enterprises decreased annually between 2008 and 2012. The number of enterprises in 2008 was n=1,708 whereas in 2012 it had decreased to n=1,579 (these figures are based on aggregating the two NACE codes manufacture of food products and manufacture of beverages). In Figure 16, we show the number of enterprises in each size category indexing year 2008=100. The graph shows that in 2008, a steep decrease in the number of enterprises in all but one enterprise size classes occurred, with the smallest size class (0-9 persons employed) only dropping with a few percentages (however, note that even if absolute numbers do not change much there should be dynamics caused by births and deaths, see also previous section on start-up activity). The category from 20-49 employees increased in 2008, but we do expect that this development is impacted by the steep decrease in the two larger class sizes (from 50>250 and <250 persons employed), meaning that enterprises downsized after 2008. After two years, the number of enterprises in 2011 almost

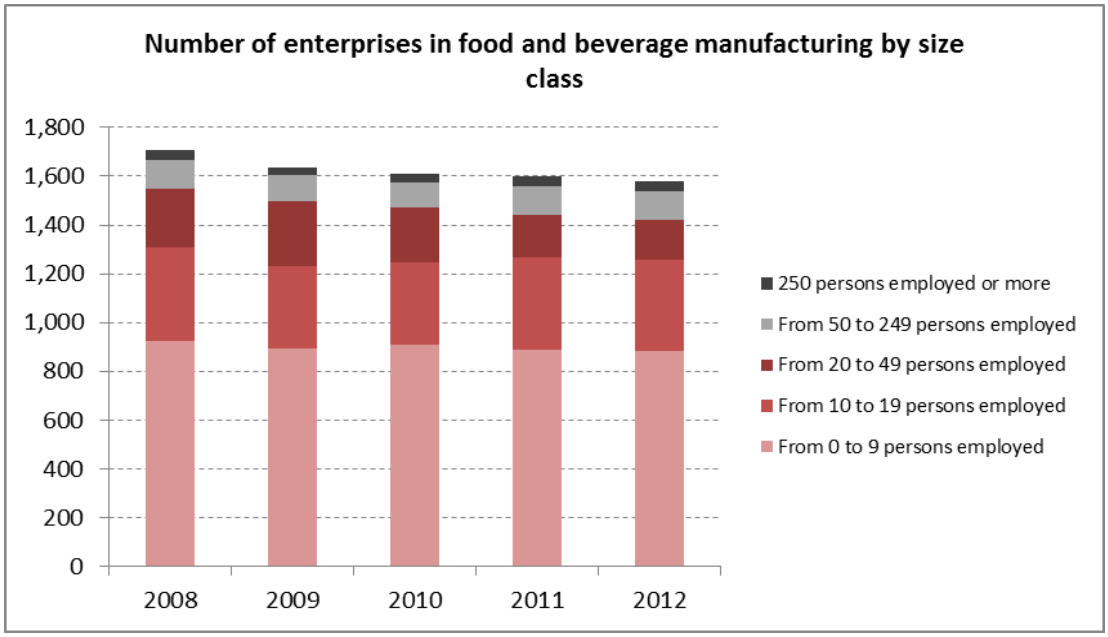
returned to the number in 2008 in most categories, except for the enterprise size group 20-49 persons employed. In this group, the number of enterprises decreased by about 30% in comparison to the number of enterprises in this size class in 2008. In Table 4, we present more detailed information on the level of sub-industries in food and beverage manufacturing. Two sub-industries stand out: The number of enterprises in manufacture of other food products was stable between 2008 and 2009, but between 2009 and 2012 the total number of enterprises increased yearly with an average of 7.5%. Manufacturing of bakery and farinaceous products stands out as well; this sub-industry is the sub-industry with the largest decrease in number of enterprises. This sub-industry became smaller in size (number of enterprises) by about 4.8% each year, leaving the sub-industry with 20% less enterprises in 2012 than in 2008. The dynamics between the size classes in this sub-industry suggest that enterprises were downsizing the number of persons employed, thereby moving from larger size classes to smaller ones.

The total number of food-related wholesale and retail enterprises also decreased during the period 2008 to 2012, from 8,072 enterprises in 2008 to 7,340 enterprises in 2012 (see Figure 17). The class-sizes however differ from that of the food-related manufacturing. In wholesale and retail the steep decrease seen in manufacturing is not apparent in 2009 nor 2010, after a decrease in number of enterprises of 5% in 2009, the number of enterprises flattens out, with a small yearly decrease of approximately 1% every year from 2009 to 2012. Also, all enterprise-sizes follow the same trend the first two years, thereafter it is indeed the number of middle sized enterprises (20-49 persons employed) that decreases, while we observe an increase in the number of micro enterprises (from 2-9 persons employed). When analyzing the more detailed data presented in Table 5 of the different types of food-related wholesale or retail, we find that the individual sub-industries contribute in different ways to the overall picture shown in Figure 17 and Figure 18. For example, the steep increase in number of small enterprises (2-9 persons employed) seems to belong to the ‘Retail-sale in non-specialized stores’ (increasing from 887 in 2010, to 1,250 and 1,235 in 2010 and 2011 respectively), the category ‘Wholesale of food, beverages and tobacco’ followed the same pattern. In contrast, the number of enterprises in the same size group decreased in ‘Retail sale of food, beverages and tobacco in specialized stores’. We also show, in Table 3, that the decrease in number of enterprises in category 50-249 persons employed mainly originates from ‘Retail sale in non-specialized stores’, while the same size class in the sub-industry ‘Wholesale of food, beverages

and tobacco' was less affected, and actually after being down a few years, managed to have a higher number of enterprises in 2012 compared to 2008 (n=61 in 2008 and n=65 in 2012).

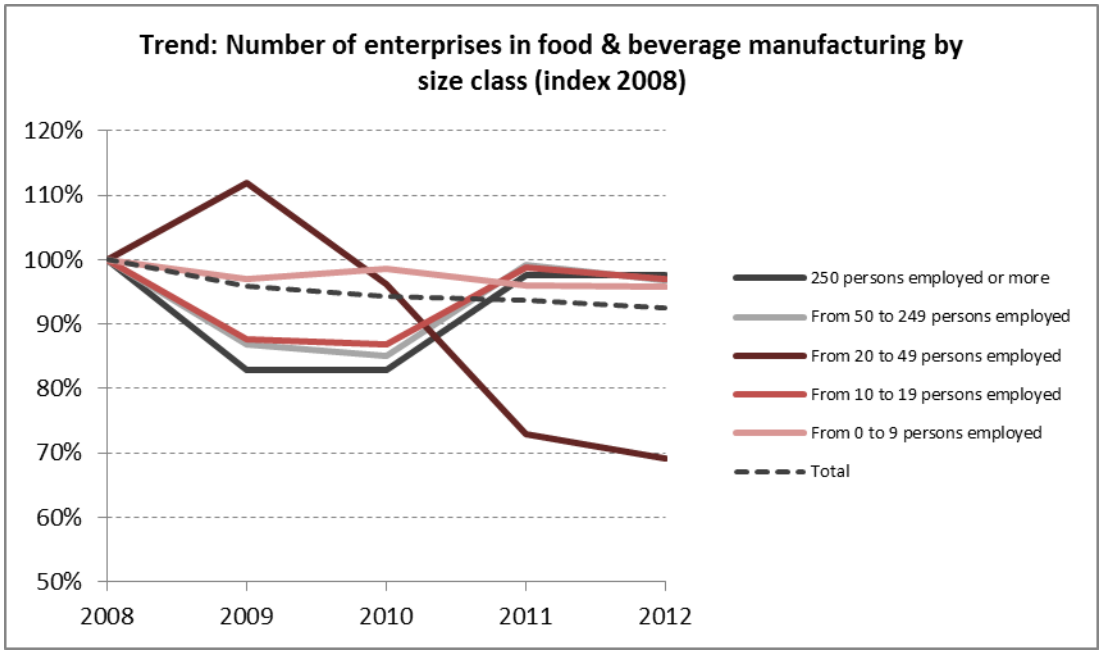
In 'Accommodation and food and beverage service activities' the development of the number of enterprises between 2008 and 2012 yet again shows a different pattern than the previous two categories. The total number of enterprises shows to be more stable over the period 2008 to 2012 (see Figure 19), the annual change is approximately 1% at the offset, and looking at the total number of enterprises this industry could therefore be said to be less affected by the financial crisis. However, when looking carefully at the changes with respect to the different size classes, the data tells a different story. The three larger size classes (20>49; 50>249; <250) have suffered, and many more enterprises have closed down than opened in these size-classes, reaching an average annual two digit decrease. In Table 6 we show the detailed data on the sub-industries. Here we find that the group 'Restaurants and mobile food service activities' together with 'Beverage serving activities' are behind the majority of the enterprises leading to the steep increase in very small enterprises. With regard to the decrease in numbers of larger enterprises, we see that two categories, 'Hotels and similar accommodation' and 'Restaurants and mobile food service activities', are the main sub-industries behind these figures. In most of the other sub-industries the trends are less pronounced.

Figure 15: Number of enterprises in food and beverage manufacturing by size class (2008-2012)



Data source: Own calculation based on EUROSTAT Structural Business Statistics (sbs) Industry by employment size class (NACE Rev. 2, B-E)

Figure 16: Size-class dynamics in food and beverage manufacturing (index=2008)



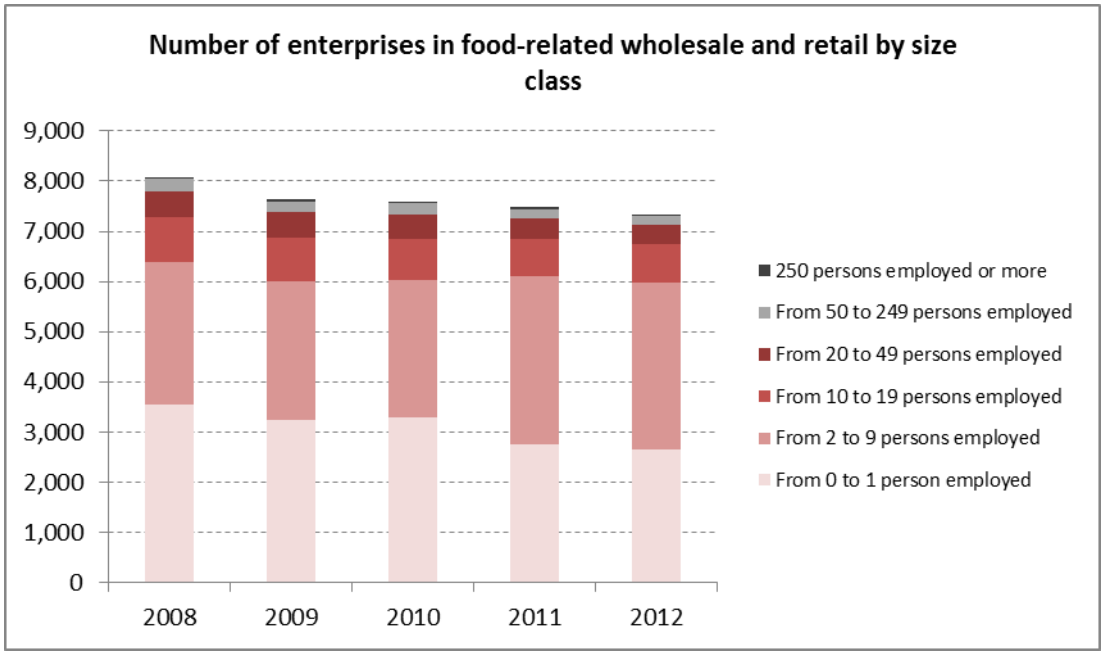
Data source: Own calculation based on EUROSTAT Structural Business Statistics (sbs) Industry by employment size class (NACE Rev. 2, B-E)

Table 4: Number of enterprises in food and beverage manufacturing per sub-industry and size class (2008-2012)

Industry (NACE Rev. 2)	*Sub-industry (NACE Rev. 2)*	*Year*	*Total*	*From 0 to 9 persons employed*	*From 10 to 19 persons employed*	*From 20 to 49 persons employed*	*From 50 to 249 persons employed*	*250 persons employed or more*
Manufacture of food	Processing and preserving of meat and production of meat products	2008	147	89	14	20	15	9
		2009	145	92	7	25	12	9
		2010	145	94	11	20	11	9
		2011	143	21	71	23	17	11
		2012	151	21	73	28	16	13
	Processing and preserving of fish, crustaceans and molluscs	2008	119	52	17	18	28	4
		2009	117	56	12	23	25	1
		2010	110	51	13	22	23	1
		2011	103	44	12	20	26	1
		2012	101	45	13	18	22	3
	Processing and preserving of fruit and vegetables	2008	51	21	9	9	8	4
		2009	54	25	7	10	10	2
		2010	59	30	8	11	8	2
		2011	58	30	7	7	10	4
		2012	62	39	4	9	7	3
	Manufacture of vegetable and animal oils and fats	2008	23	14	2	3	3	1
		2009	19	11	2	3	2	1
		2010	19	11	1	4	2	1
		2011	19	9	3	3	3	1
		2012	20	11	3	2	3	1
	Manufacture of dairy products	2008	75	50	7	6	11	1
		2009	69	48	6	6	8	1
		2010	69	49	4	6	9	1
		2011	69	24	14	17	12	2
		2012	64	21	13	16	12	2
	Manufacture of grain mill products, starches and starch products	2008	22	7	2	7	6	0
		2009	22	7	2	8	5	0
		2010	22	7	2	8	5	0
		2011	23	5	4	7	6	1
		2012	24	6	2	8	7	1
	Manufacture of bakery and farinaceous products	2008	905	431	307	140	21	6
		2009	856	395	282	153	20	6
		2010	814	386	274	128	19	7
		2011	788	481	223	60	18	6
		2012	742	447	217	54	18	6
	Manufacture of other food products	2008	193	137	15	13	18	10
		2009	193	142	11	19	12	9
		2010	203	152	14	15	13	9
		2011	230	166	22	18	15	9
		2012	239	180	23	12	18	6
	Manufacture of prepared animal feeds	2008	67	38	8	12	6	3
		2009	63	37	6	12	6	2
		2010	57	36	4	8	7	2
		2011	55	23	12	10	8	2
		2012	55	22	12	11	8	2
Manufacture of beverages	Manufacture of beverages (no sub-industries available)	2008	106	84	5	9	5	3
		2009	99	82	3	6	5	3
		2010	112	94	4	6	6	2
		2011	112	83	13	8	5	3
		2012	121	92	14	6	6	3

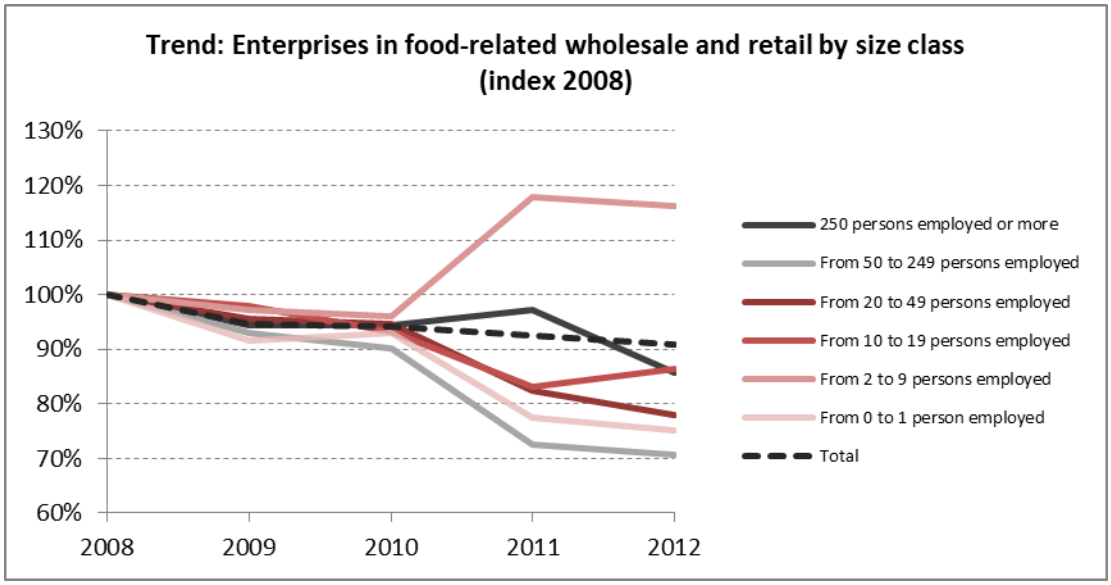
Data source: EUROSTAT Structural Business Statistics (sbs) Industry by employment size class (NACE Rev. 2, B-E)

Figure 17: Number of enterprises in food-related wholesale and retail by size class (2008-2012)



Data source: Own calculation based on EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Figure 18: Size-class dynamics in food-related wholesale and retail (index=2008)



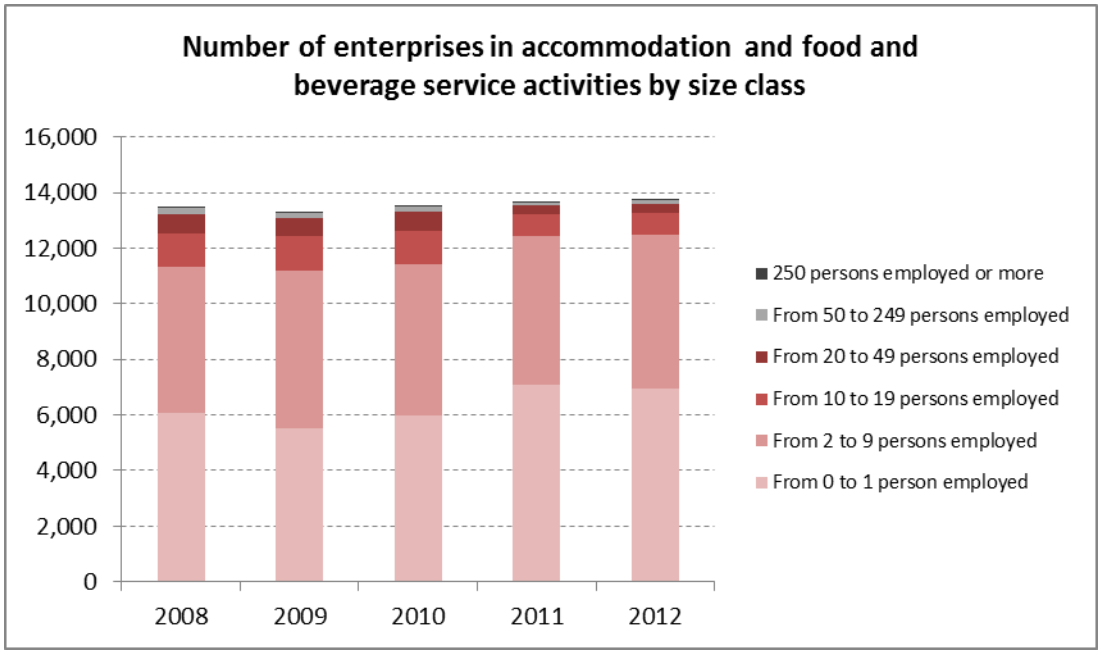
Data source: Own calculation based on EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Table 5: Number of enterprises in food-related wholesale and retail per sub-industry and size class (2008-2012)

Sub-sector	*Sub-industry (NACE Rev. 2)*	*Year*	*Total*	*From 0 to 1 person employed*	*From 2 to 9 persons employed*	*From 10 to 19 persons employed*	*From 20 to 49 persons employed*	*From 50 to 249 persons employed*	*250 persons employed or more*
Food-related wholesale	Wholesale of agricultural raw materials and live animals	2008	524	232	205	44	22	19	2
		2009	491	211	202	40	20	15	3
		2010	493	220	200	34	23	13	3
		2011	511	125	297	47	23	15	4
		2012	504	162	255	47	22	15	3
	Wholesale of food, beverages and tobacco	2008	1,757	724	669	153	140	61	10
		2009	1,686	635	721	143	124	55	8
		2010	1,703	667	708	139	124	55	10
		2011	1,692	411	889	171	145	64	12
		2012	1,696	418	883	177	142	65	11
Food-related retail	Retail sale in non-specialised stores	2008	3,136	1,162	1,004	508	284	158	20
		2009	2,909	1,004	942	506	288	150	19
		2010	2,848	1,035	887	483	280	146	17
		2011	2,764	761	1,250	422	220	95	16
		2012	2,698	708	1,235	447	205	89	14
	Retail sale of food, beverages and tobacco in specialised stores	2008	2,532	1,324	948	182	69	6	3
		2009	2,426	1,299	877	180	60	7	3
		2010	2,418	1,276	902	171	59	7	3
		2011	2,361	1,342	877	100	36	4	2
		2012	2,295	1,269	890	97	33	4	2
	Retail sale via stalls and markets	2008	123	102	17	3	0	1	0
		2009	121	97	21	2	0	1	0
		2010	135	100	32	2	1	0	0
		2011	146	108	38	0	0	0	0
		2012	147	107	40	0	0	0	0

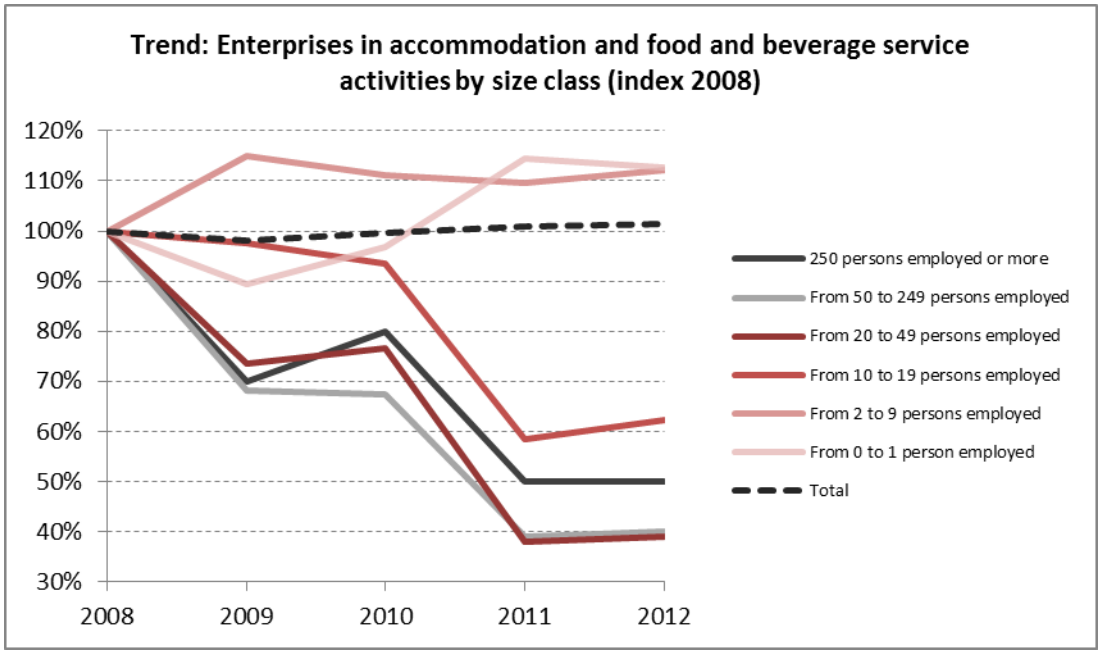
Data source: EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Figure 19: Number of enterprises in accommodation and food and beverage service activities by size class (2008-2012)



Data source: Own calculation based on EUROSTAT Structural Business Statistics (sbs) Services by employment size class (NACE Rev. 2, H-N, S95)

Figure 20: Size-class dynamics in accommodation and food and beverage service activities (index=2008)



Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Services by employment size class (NACE Rev. 2, H-N, S95)

Table 6: Number of enterprises in accommodation and food and beverage service activities per sub-industry and size class (2008-2012)

Sub-sector	*Sub-industry (NACE Rev. 2)*	*Year*	*Total*	*From 0 to 1 person employed*	*From 2 to 9 persons employed*	*From 10 to 19 persons employed*	*From 20 to 49 persons employed*	*From 50 to 249 persons employed*	*250 persons employed or more*
Accom-modation	Hotels and similar accommodation	2008	919	241	280	145	154	93	6
		2009	874	193	309	153	141	74	4
		2010	880	223	303	145	132	71	6
		2011	873	131	404	163	122	49	4
		2012	840	93	414	159	117	53	4
	Holiday and other short-stay accommodation	2008	210	105	71	19	9	5	1
		2009	205	94	79	18	9	5	0
		2010	206	102	72	18	10	4	0
		2011	214	116	76	12	7	3	0
		2012	212	124	67	13	6	2	0
	Camping grounds, recreational vehicle parks and trailer parks	2008	400	201	192	4	3	0	0
		2009	401	208	187	2	4	0	0
		2010	394	189	197	4	4	0	0
		2011	390	188	191	9	2	0	0
		2012	388	187	193	6	2	0	0
	Other accommodation	2008	18	14	3	1	0	0	0
		2009	16	14	1	1	0	0	0
		2010	23	19	3	1	0	0	0
		2011	22	17	4	1	0	0	0
		2012	22	17	5	0	0	0	0
Food and beverage service activities	Restaurants and mobile food service activities	2008	8,311	3,952	3,100	767	393	86	13
		2009	8,127	3,548	3,353	786	354	76	10
		2010	8,234	3,809	3,216	747	376	74	12
		2011	8,281	4,702	2,975	429	138	31	6
		2012	8,354	4,653	3,044	464	155	32	6
	Event catering and other food service activities	2008	1,549	888	529	70	43	15	4
		2009	1,491	821	545	67	38	15	5
		2010	1,545	903	511	69	40	18	4
		2011	1,604	948	546	55	33	18	4
		2012	1,538	878	540	68	31	17	4
	Beverage serving activities	2008	2,093	656	1,084	236	91	24	2
		2009	2,172	648	1,182	235	86	19	2
		2010	2,236	726	1,167	225	96	20	2
		2011	2,286	968	1,199	86	25	7	1
		2012	2,386	1,002	1,259	94	23	7	1

Data source: EUROSTAT Structural Business Statistics (sbs) Services by employment size class (NACE Rev. 2, H-N, S95)

Employment

Before we investigate size-class dynamics in more detail, we first look at the total number of persons employed and the average size of enterprises in the different industries. For this purpose, Table 7 provides an overview of the total number of enterprises, total number of persons employed, and the corresponding average size of enterprises per (sub-)industry.

In Table 7 we show that an overall reduction in number of persons were experience in the food-related enterprises between 2008 and 2012, only in wholesale the total number of persons employed increased. The largest absolute losses are observed in retail (supermarkets) and in accommodation and food and beverage service activities. The development in the average enterprise size (based on total number of persons employed divided by the number of enterprises in the sub-industry) between 2008 and 2012 also differs depending on sub-industry, also here the wholesale sub-sector stands out as enterprise average size increase during this period. This already gives indications of how the size structure/size-class dynamics has developed between 2008 and 2012. Looking at the figures comparing the average enterprise size classes across sub-industries we see, not surprisingly, that in manufacturing the average enterprise size is larger than that of wholesale and retail. In food manufacturing, enterprises average size remained stable, whereas in beverages, average enterprise size got smaller, the trend of microbreweries could be driving this trend. In wholesale, the average enterprise size increased, whereas in retail the average enterprise size decreased. The number of enterprises in the 'Accommodation' category decreased, and so did the number of employees in the sub-sector as well. In contrast, the number of restaurants increased, yet the number of employees decreased. These overall trends hint very different size structure dynamics, which can be seen in Figure 8 to 14.

In Figure 21 we show the number of persons employed in the food[7] manufacturing sub-sector divided by enterprise size class. It shows that larger enterprises (>250 employees) employ more than half of the persons employed in the sub-sector. The largest absolute losses in employment were in the large companies just after the financial crisis 2008, thereafter already in 2010 and 2011 the employment got almost to the same level as prior to the crises. In Figure 22 we present the development in the food manufacturing industry, here it shows that very small enterprises were employing more

[7] We leave out the category of beverages as detailed data was unavailable.

people in 2012 than in 2008, whereas the medium sized enterprises (from 20-49 employees) have decreased annually since their height in 2009.

In Figure 23 and Figure 24 we turn towards food-related wholesale and retail. From Figure 23 we can see that the absolute largest losses in employment over the period of time studied happened in the large enterprises (>250 employees), whereas the other enterprise size classes, relatively seen, did not change much. However, this picture changes when looking at Figure 24, where we show the pattern of employment divided by enterprise size class using 2008 as index. All enterprise size classes do, relatively to the absolute number in their category, follow the same decreasing pattern as the very large enterprises; the only enterprise size that increased their share of employees in 2010 relative to 2008 is enterprises with 2 to 9 employees.

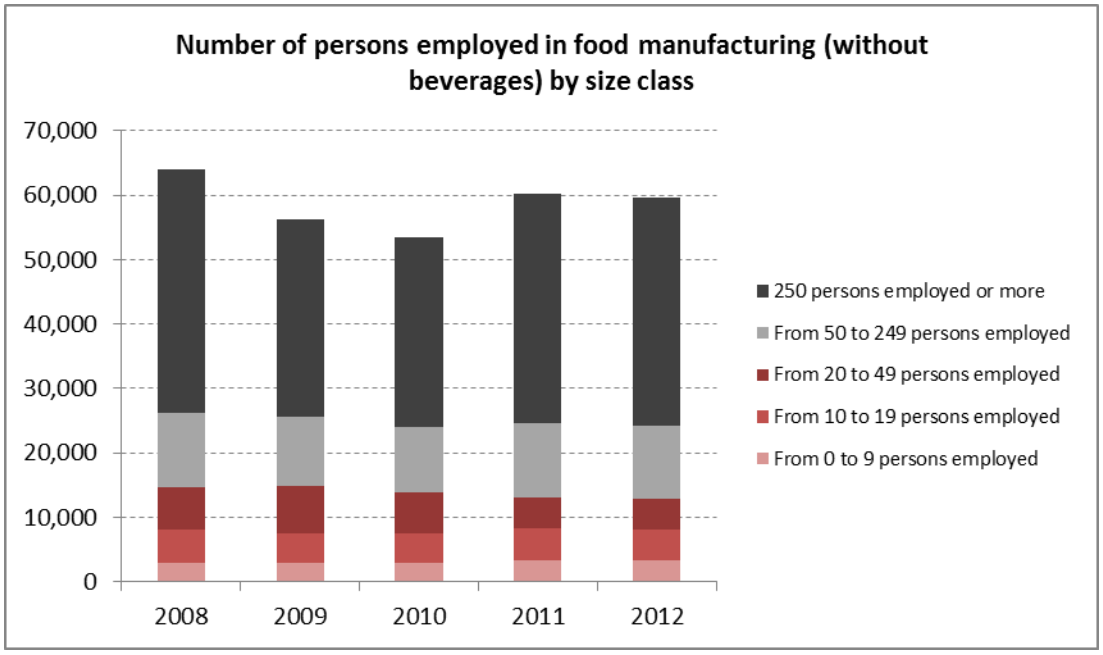
In Figure 25 and Figure 26 we show the developments in number of employees in the categories 'Accommodation and food and beverage service activities'. Figure 25 shows that the total number of employees decreased from almost 100,000 employees to 65,000 employees from 2008 to 2012. The large reductions in employees is observed mainly in the larger enterprise sizes (see Figure 26), showing that the medium sized enterprises (10-19; 20-49;50-250) are the size categories where the reductions are relatively more than the largest enterprise size group (>250 employees), while the smallest enterprise size group (0-1 person employed) is the only group which grew over the period in terms of number of employees, however, this figure being of relatively little importance in respect to the sub-sector's total number of persons employed.

Table 7: Total number of persons employed and average size of enterprises in the food sector per industry (2008-2012)

Sub-sector	*Industry (NACE Rev. 2)*	*Year*	*Total number of enterprises*	*Total number of persons employed*	*Average size of enterprises*
Manufacturing of food and beverages	Manufacture of food products	2008	1,602	63,919	39.9
		2009	1,538	56,185	36.5
		2010	1,498	53,389	35.6
		2011	1,488	60,246	40.5
		2012	1,458	59,660	40.9
	Manufacture of beverages	2008	106	4,662	44
		2009	99	4,275	43.2
		2010	112	3,954	35.3
		2011	112	4,891	43.7
		2012	121	4,653	38.5
Food-related wholesale and retail	Wholesale of agricultural raw materials and live animals	2008	524	4,868	9.3
		2009	491	4,459	9.1
		2010	493	4,445	9
		2011	511	6,387	12.5
		2012	504	5,229	10.4
	Wholesale of food, beverages and tobacco	2008	1,757	20,218	11.5
		2009	1,686	18,474	11
		2010	1,703	19,161	11.3
		2011	1,692	22,817	13.5
		2012	1,696	23,264	13.7
	Retail sale in non-specialized stores	2008	3,136	104,633	33.4
		2009	2,909	102,382	35.2
		2010	2,848	101,984	35.8
		2011	2,764	75,407	27.3
		2012	2,698	73,823	27.4
	Retail sale of food, beverages and tobacco in specialized stores	2008	2,532	11,115	4.4
		2009	2,426	10,398	4.3
		2010	2,418	10,413	4.3
		2011	2,361	7,542	3.2
		2012	2,295	7,438	3.2
	Retail sale via stalls and markets	2008	123	257	2.1
		2009	121	257	2.1
		2010	135	252	1.9
		2011	146	213	1.5
		2012	147	221	1.5
Accommodation and food and beverage service activities	Accommodation	2008	561	22,064	14.3
		2009	509	19,644	13.1
		2010	533	19,462	12.9
		2011	452	16,772	11.2
		2012	421	16,740	11.5
	Food and beverage service activities	2008	5,496	74,921	6.3
		2009	5,017	72,784	6.2
		2010	5,438	74,821	6.2
		2011	6,618	47,991	3.9
		2012	6,533	50,363	4.1

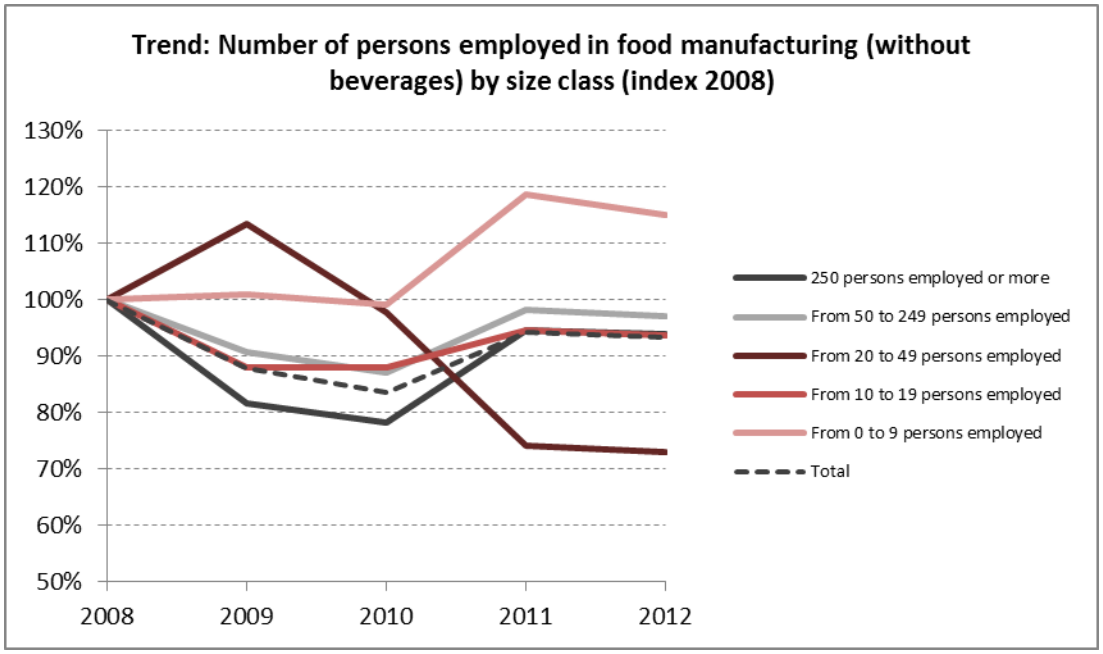
Data source: EUROSTAT Structural Business Statistics (sbs) Industry, distributive trades and services by employment size class (NACE Rev. 2)

Figure 21: Number of persons employed in food manufacturing (without beverages) by size class (2008-2012)



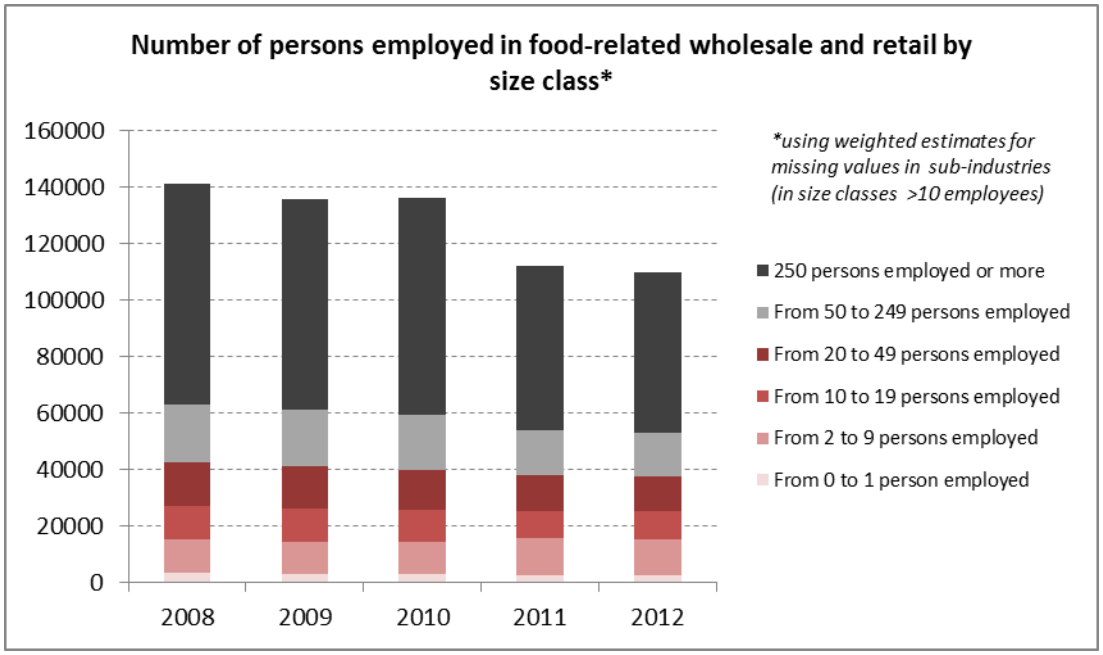
Data source: EUROSTAT Structural Business Statistics (sbs) Industry by employment size class (NACE Rev. 2, B-E)

Figure 22: Size-class dynamics for employment in food manufacturing (without beverages) (index=2008)



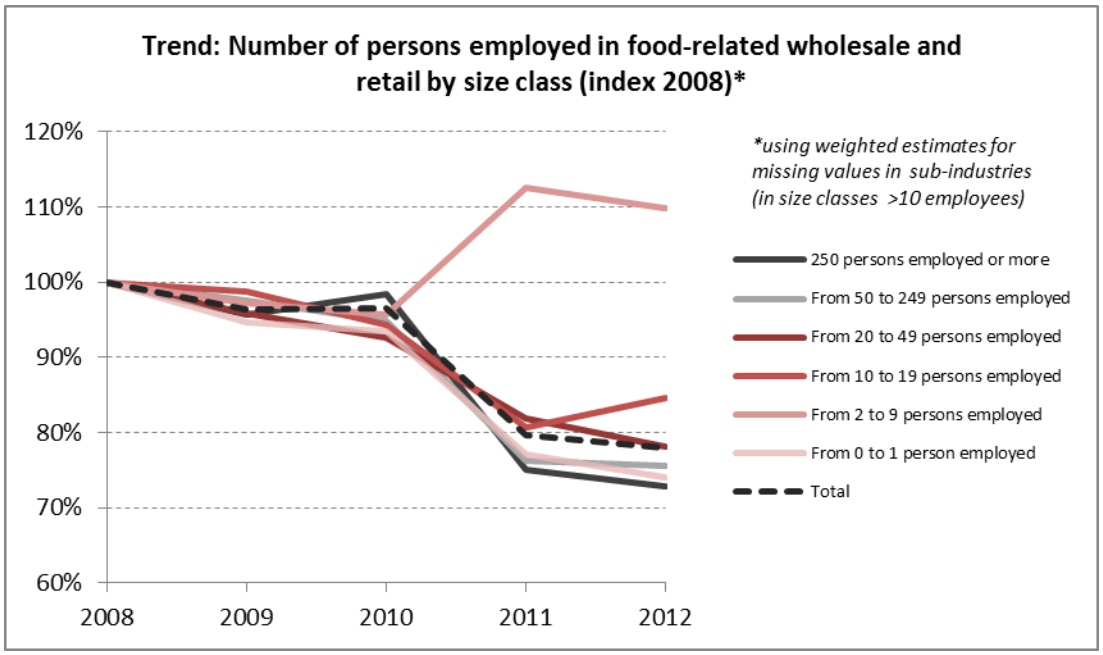
Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Industry by employment size class (NACE Rev. 2, B-E)

Figure 23: Number of persons employed in food-related wholesale and retail by size class (2008-2012)



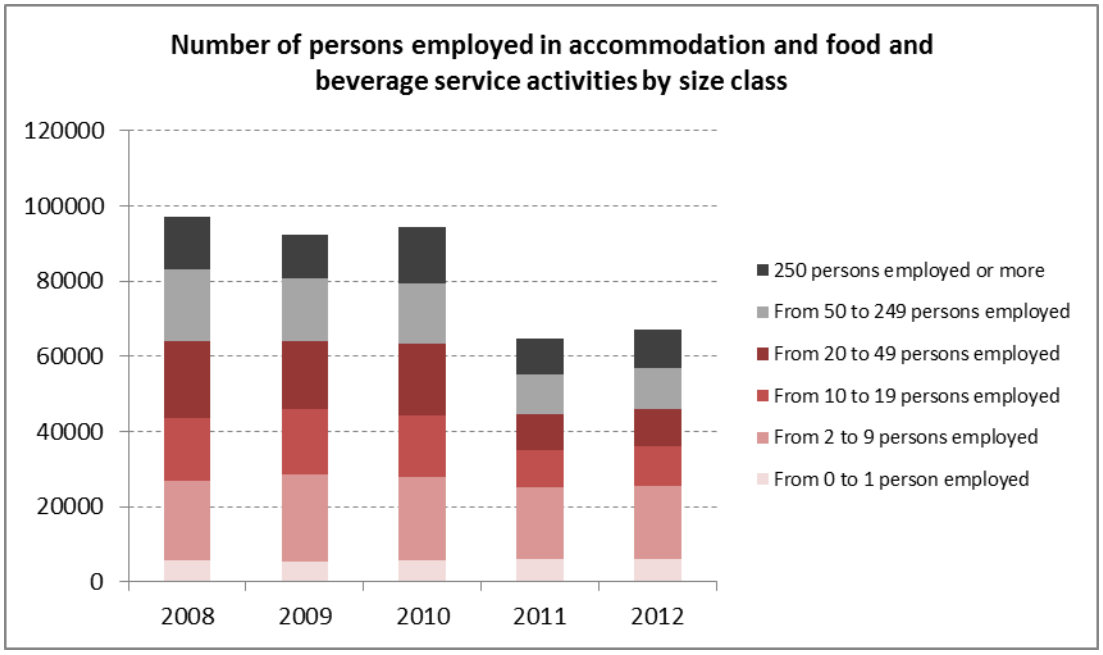
Data source: Own calculations and estimates based on EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Figure 24: Size-class dynamics for employment in food-related wholesale and retail (index=2008)



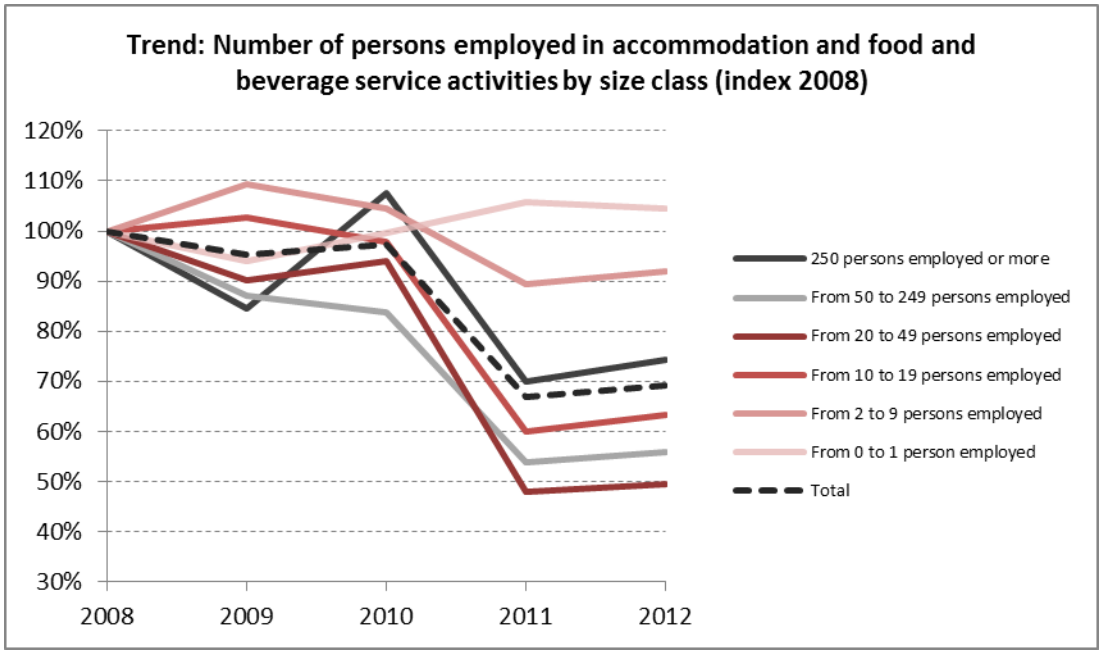
Data source: Own calculations and estimates based on EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Figure 25: Number of persons employed in accommodation and food and beverage service activities by size class (2008-2012)



Data source: EUROSTAT Structural Business Statistics (sbs) Services by employment size class (NACE Rev. 2, H-N, S95)

Figure 26: Size-class dynamics for employment in accommodation and food and beverage service activities (index=2008)



Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Services by employment size class (NACE Rev. 2, H-N, S95)

Turnover and Value added

In this chapter we present the size-class dynamics for turnover and value added (profitability) divided by sub-industries. Note that according to EUROSTAT, turnover comprises the totals invoiced by the observation unit during the reference period, and this corresponds to market sales of goods or services supplied to third parties; it includes all duties and taxes on the goods or services invoiced by the unit with the exception of the VAT invoiced by the unit to its customer and other similar deductible taxes directly linked to turnover; it also includes all other charges (transport, packaging, etc.) passed on to the customer. Price reductions, rebates and discounts as well as the value of returned packing must be deducted. Turnover is expressed in millions of EURO[8]. Value added at factor costs is the gross income from operating activities after adjusting for operating subsidies and indirect taxes. Value adjustments (such as depreciation) are not subtracted. Value added is expressed in millions of EURO.

Again, we first show the aggregated data for total turnover and total value added as well as average turnover and value added per enterprise in the food sector, excluding agriculture (Table 8). Then we focus on the more detailed datasets on turnover and value added in the sub-industries investigated (see Figure 27 to Figure 38, and Table 9 to Table 16).

First, Table 8 provides an overview of how the sector performs and illustrates the importance of the different sub-sectors in the value chain. Note that Manufacture of food products is still the most important sub-industry (total turnover and total value added), followed by Retail sale in non-specialised stores and Wholesale of food, beverages and tobacco. Note that the average Accommodation enterprise has a significantly higher turnover (ca. 4 Mio EUR in 2012) than the average restaurant (730.000 EUR in 2012) but that the two sub-industries combined account for only about 25% of the turnover that stems from food and beverage manufacturing and 15% of the turnover from wholesale and retail combined.

In more detail, Figure 27 and Figure 28 illustrate that SMEs in food manufacturing seem to have been rather resistant to the economic crises starting in 2008. While larger companies lost 15-20 %

[8] See https://circabc.europa.eu/sd/a/325dd343-f594-4c77-81aa-7e0f896cc16f/Exchange%20rates%201995-2012%20_EMIS%20file.pdf for annual average exchange rates vis-à-vis the euro.

of turnover from 2008 to 2009, the turnover coming from SMEs was on average less affected. Larger companies fully regained the loss of turnover in 2011, and in 2012 they were 10 per cent above the pre-2008 level, which was the highest level of all size groups. One explanation why SMEs in the sub-sector seem to be less sensitive to economic crises than larger companies might be that it is more difficult for SMEs with only few employees to reduce the labour force, which will result in a more constant level of employment. Another explanation might be that SMEs are more flexible with less fixed assets, which gives opportunities to adapt to changing economic conditions more rapidly. Finally, the management and owners of SMEs are economic buffers, and by that they will stabilize the economic development of the enterprises. In this regard, note that there were dynamics between the different SME size classes, notably a decrease in turnover in the micro-sized and very small enterprise classes (less than 20 persons employed) and an increase in the larger SME classes (above 20 and above 50 persons employed). Next, note that turnover per person is increasing with increasing size of companies. This indicates economies of scale and more efficient use of labour input by larger enterprises – but also means that SMEs are more labour-intensive (see persons employed/1 Mio EUR in turnover). For detailed numbers, see Table 9.

Figure 29 and Figure 30 illustrate the developments in turnover in food-related wholesale and retail (based on aggregating turnover within the respective wholesale and retail sub-industries). We can see a fairly stable development with only a slight increase in total turnover since 2008. Nevertheless, dynamics between the size classes suggest that there has been a shift towards larger enterprises, mainly in the sub-industries Wholesale of food, beverages and tobacco (see Table 10 for details) and Retail sale in non-specialised stores (see Table 11 for details). Not surprisingly, wholesale in general seems to be comparably low in labour intensity across the size classes (about 1 person employed per 1 Mio EUR in turnover, see Table 10), while the retail sub-industries seem to downsize (with remaining enterprises increasing efficiency) but nevertheless still remain labour-intensive across the size classes (Table 11).

Figure 31 and Figure 32 show the developments in turnover in the accommodation and food and beverage service activities (aggregated). We can see a slight downturn followed by a recovery in total turnover between 2008 and 2012. Size-class dynamics suggest a relative increase in activity among the one-person and micro enterprises (less than 10 persons employed). If we look at the sub-industries in more detail, total turnover in Accommodation has slightly decreased since 2008 while total turnover in Food

and beverage service activities has slightly increased. Much of the relative increase in turnover among the one-person and micro enterprises (less than 10 persons employed) seems to stem from food and beverage service activities. However, note that both Accommodation and Food and Beverage Service Activities seem to have become more productive and less labor-intensive in terms of turnover per person employed and persons employed per 1 Mio EUR in turnover (see Table 12). This development seems to be most pronounced in the size classes 10 to 19, 20 to 49, and 50 to 249 persons employed, thereby reflecting the corresponding reduction in the number of companies and the number of employees (see previous chapters). In other words, especially restaurants downsized and became more efficient.

There are similar patterns with regard to the development of value added in the years 2008-2012 divided by sub-industry (see Figure 33 to Figure 38, and Table 13 to Table 16). Overall, however, value added seems to be less effected by the food crises and the financial crises, indicating a certain level of price transmission in the value chain. However, note again that there are dynamics between the different SME size classes.

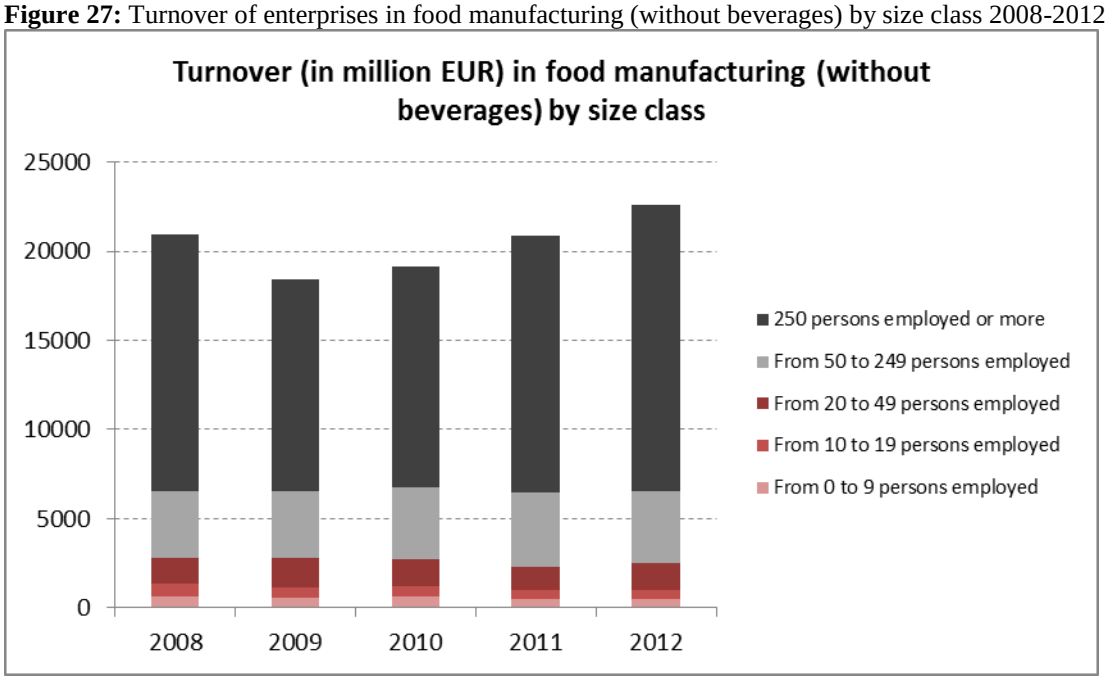
In general, turnover and value added in food enterprises seem to have been rather unaffected by the financial crises. As other studies show (Hansen, 2014), companies in the food industry do not seem to suffer so much from economic crises, and the profit from the food industry will only change modestly compared to changes in other sub-sectors. Low income elasticities can explain this stabilization impact from food enterprises. In terms of the changes that we see, we would assume that the developments of turnover and value added in the years 2008-2012 were less driven by the financial crisis than by the food crises (in 2007-2008 and in 2010-11) for the up-stream industries (manufacturing), and conversely, more driven by the financial crisis than by the food crisis in the down-stream industries (trade and services). This is because the food crises entailed price increases and price fluctuations for agricultural products, which account for a bigger share of the total costs in enterprises down-stream the value chain (when assuming that the corresponding price fluctuations hit both small and large companies equally).

Table 8: Turnover and value added (in Mio EUR) in the food sector per industry (2008-2012)

Sub-sector	Industry (NACE Rev. 2)	Year	Total turnover (Mio EUR)	Turnover/ enterprise (Mio EUR)	Total value added (Mio EUR)	Value added/ enterprise (Mio EUR)
Manufacturing of food and beverages	Manufacture of food products	2008	20987.5	13.10	4053.8	2.53
		2009	18439.5	11.99	3761.1	2.45
		2010	19145.4	12.78	3895.7	2.60
		2011	20859.0	14.02	3701.9	2.49
		2012	22616.5	15.51	3819.8	2.62
	Manufacture of beverages	2008	1516.7	14.31	358.4	3.38
		2009	1427.7	14.42	427.7	4.32
		2010	1638.3	14.63	444.3	3.97
		2011	1416.4	12.65	443.7	3.96
		2012	1401.7	11.58	424.5	3.51
Food-related wholesale and retail	Wholesale of agricultural raw materials and live animals	2008	4955.5	9.46	382.3	0.73
		2009	5209.4	10.61	327.1	0.67
		2010	5800.1	11.76	382.2	0.78
		2011	5595.0	10.95	443.4	0.87
		2012	5412.2	10.74	403.3	0.80
	Wholesale of food, beverages and tobacco	2008	19507.7	11.10	1487.1	0.85
		2009	18614.9	11.04	1516	0.90
		2010	20330.6	11.94	1517	0.89
		2011	18769.7	11.09	1807.9	1.07
		2012	18742.1	11.05	1768.6	1.04
	Retail sale in non-specialized stores	2008	18583.2	5.93	2835.5	0.90
		2009	18667.8	6.42	2818.7	0.97
		2010	18920.5	6.64	2766.2	0.97
		2011	19321.7	6.99	2702.1	0.98
		2012	19609.7	7.27	2606.1	0.97
	Retail sale of food, beverages and tobacco in specialized stores	2008	1236.1	0.49	309.8	0.12
		2009	1124.9	0.46	261.7	0.11
		2010	1173.4	0.49	283	0.12
		2011	1190.1	0.50	278.8	0.12
		2012	1194.7	0.52	267.8	0.12
	Retail sale via stalls and markets	2008	30.9	0.25	5.3	0.04
		2009	28	0.23	3.8	0.03
		2010	30.4	0.23	5.9	0.04
		2011	40.6	0.28	7.9	0.05
		2012	41	0.28	8	0.05
Accom-modation and food and beverage service activities	Accommodation	2008	1849.8	3.30	850.8	1.52
		2009	1732.0	3.40	733.4	1.44
		2010	1618.0	3.04	690.9	1.30
		2011	1670.9	3.70	712.9	1.58
		2012	1708.0	4.06	746.3	1.77
	Food and beverage service activities	2008	4363.0	0.79	1826.6	0.33
		2009	4146.5	0.83	1712.4	0.34
		2010	4185.9	0.77	1721.3	0.32
		2011	4534.0	0.69	1842.9	0.28
		2012	4737.6	0.73	1948.8	0.30

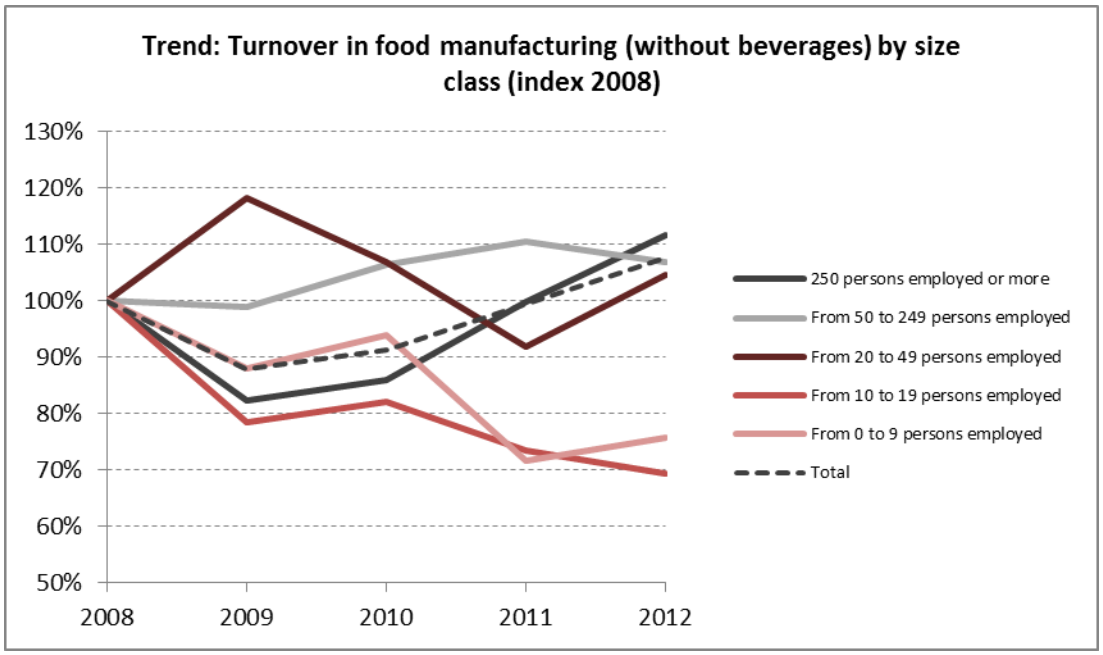
Data source: EUROSTAT Structural Business Statistics (sbs) Industry, distributive trades and services by employment size class (NACE Rev. 2)

Figure 27: Turnover of enterprises in food manufacturing (without beverages) by size class 2008-2012



Data source: EUROSTAT Structural Business Statistics (sbs) Industry by employment size class (NACE Rev. 2, B-E)

Figure 28: Size-class dynamics for turnover in food manufacturing /without beverages) (index=2008)



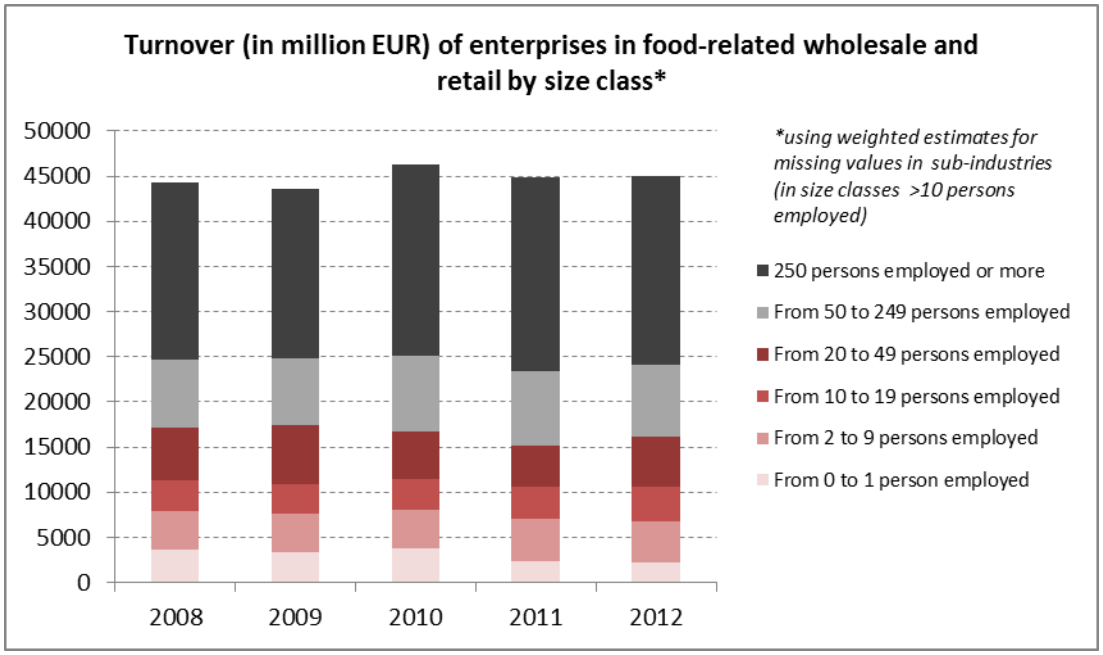
Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Industry by employment size class (NACE Rev. 2, B-E)

Table 9: Turnover, turnover per person employed, and persons employed/mio EUR turnover in manufacturing of food and beverages per size-class (2008-2012)

Industry (NACE Rev. 2)	*Indicator*	*Year*	*Total*	*From 0 to 9 persons employed*	*From 10 to 19 persons employed*	*From 20 to 49 persons employed*	*From 50 to 249 persons employed*	*250 persons employed or more*
Manufacture of food products	Turnover (in Mio EUR)	2008	20987.5	659.3	698.8	1414.8	3794.5	14420.1
		2009	18439.5	580.7	548.8	1671.9	3752.6	11885.6
		2010	19145.4	619.4	573.7	1513.5	4035.4	12403.4
		2011	20859.0	472.5	513.1	1299.5	4191.5	14382.5
		2012	22616.5	498.8	485.2	1481.1	4056.9	16094.5
	Turnover per person employed (in thousand EUR)	2008	328.3	230.5	134.1	216.9	324.3	383.3
		2009	328.2	201.0	119.7	225.9	353.1	387.4
		2010	358.6	218.6	125.1	237.3	396.5	421.7
		2011	346.2	139.3	104.0	268.6	365.0	404.0
		2012	379.1	151.5	99.2	311.2	357.5	455.0
	Persons employed per 1 Mio EUR in turnover	2008	3.0	4.3	7.5	4.6	3.1	2.6
		2009	3.0	5.0	8.4	4.4	2.8	2.6
		2010	2.8	4.6	8.0	4.2	2.5	2.4
		2011	2.9	7.2	9.6	3.7	2.7	2.5
		2012	2.6	6.6	10.1	3.2	2.8	2.2
Manufacture of beverages	Turnover (in Mio EUR)	2008	1516.7	37.9	7.2	n/a	n/a	n/a
		2009	1427.7	50.3	n/a	68.5	206.0	n/a
		2010	1638.3	55.2	n/a	89.7	365.5	n/a
		2011	1416.4	33.2	n/a	90.4	203.6	n/a
		2012	1401.7	49.3	n/a	83.2	195.3	n/a
	Turnover per person employed (in thousand EUR)	2008	325.3	225.6	121.8	n/a	n/a	n/a
		2009	334.0	310.3	n/a	374.2	467.1	n/a
		2010	414.3	363.0	n/a	479.7	504.9	n/a
		2011	289.6	112.1	n/a	321.7	448.5	n/a
		2012	301.3	155.0	n/a	397.9	399.5	n/a
	Persons employed per 1 Mio EUR in turnover	2008	3.1	4.4	8.2	n/a	n/a	n/a
		2009	3.0	3.2	n/a	2.7	2.1	n/a
		2010	2.4	2.8	n/a	2.1	2.0	n/a
		2011	3.5	8.9	n/a	3.1	2.2	n/a
		2012	3.3	6.5	n/a	2.5	2.5	n/a

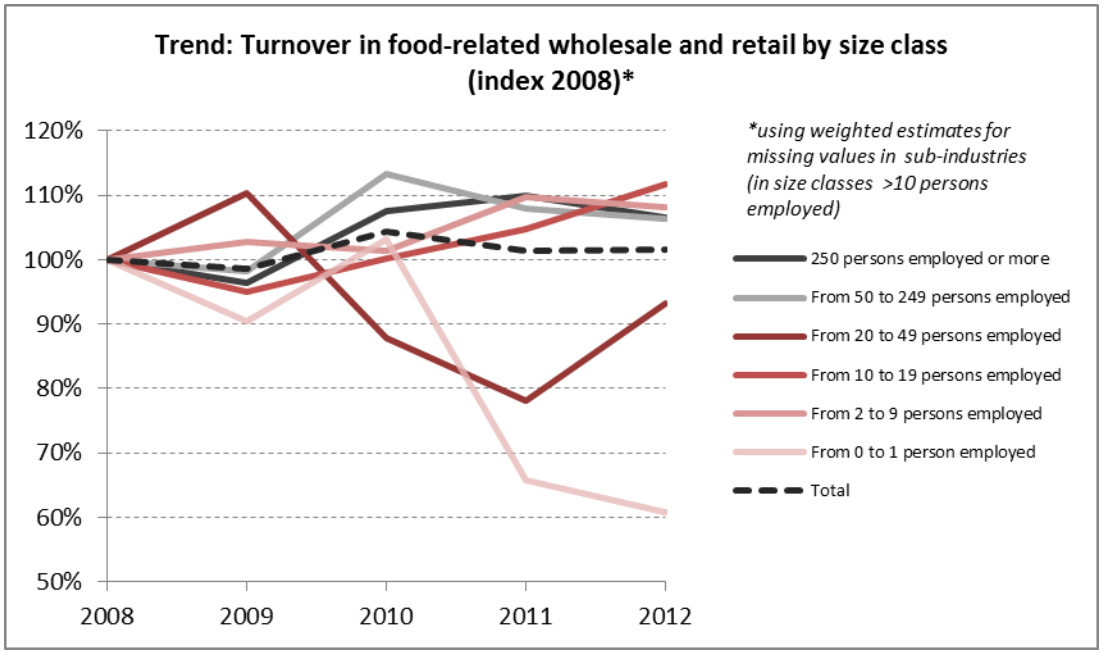
Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Industry by employment size class (NACE Rev. 2, B-E)

Figure 29: Turnover of enterprises in food-related wholesale and retail by size class (2008-2012)



Data source: Own calculations and estimates based on EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Figure 30: Size-class dynamics for turnover in food-related wholesale and retail (index=2008)



Data source: Own calculations and estimates based on EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Table 10: Turnover, turnover per person employed and persons employed/Mio EUR turnover in food-related wholesale per size class (2008-2012)

Industry (NACE Rev. 2)	*Indicator*	*Year*	*Total*	*From 0 to 1 person employed*	*From 2 to 9 persons employed*	*From 10 to 19 persons employed*	*From 20 to 49 persons employed*	*From 50 to 249 persons employed*	*250 persons employed or more*
Wholesale of agricultural raw materials and live animals	Turnover (in Mio EUR)	2008	4955.5	751.7	798.6	501.3	495.2	n/a	n/a
		2009	5209.4	680.9	1138.3	528.1	553.8	1156.5	1151.7
		2010	5800.1	831.8	959.3	575.4	n/a	1151.8	n/a
		2011	5595.0	675.8	804.3	662.5	405.7	1224.1	1822.6
		2012	5412.2	770.8	746.0	569.4	438.4	n/a	n/a
	Turnover per person employed (in thousand EUR)	2008	1018.0	3370.9	1008.3	820.5	807.9	n/a	n/a
		2009	1168.3	3289.3	1470.7	985.3	959.8	830.8	1183.7
		2010	1304.8	4097.5	1245.9	1270.1	n/a	967.1	n/a
		2011	876.0	5406.0	768.9	1040.1	585.4	851.3	744.5
		2012	1035.0	5207.9	823.4	886.9	702.6	n/a	n/a
	Persons employed per 1 Mio EUR in turnover	2008	1.0	0.3	1.0	1.2	1.2	n/a	n/a
		2009	0.9	0.3	0.7	1.0	1.0	1.2	0.8
		2010	0.8	0.2	0.8	0.8	n/a	1.0	n/a
		2011	1.1	0.2	1.3	1.0	1.7	1.2	1.3
		2012	1.0	0.2	1.2	1.1	1.4	n/a	n/a
Wholesale of food, beverages and tobacco	Turnover (in Mio EUR)	2008	19507.7	2404.4	2133.8	1342.1	3763.7	4400.4	5463.4
		2009	18614.9	2143.1	2010.5	1067.3	4180.4	4188.4	5025.2
		2010	20330.6	2437.3	2139.2	1260.8	3080.6	5499.5	5913.3
		2011	18769.7	1298.1	2096.7	1210.2	2542.2	5551.2	6071.4
		2012	18742.1	1043.0	2089.5	1324.9	3436.8	5566.9	5281.1
	Turnover per person employed (in thousand EUR)	2008	964.9	3722.0	779.1	639.4	915.5	797.0	1070.8
		2009	1007.6	3565.9	690.2	536.3	1118.7	808.4	1240.2
		2010	1061.0	3982.6	745.1	660.8	819.7	1053.7	1233.7
		2011	822.6	3166.0	574.4	540.2	593.6	905.6	994.7
		2012	805.6	2495.1	582.5	557.4	801.5	817.1	913.5
	Persons employed per 1 Mio EUR in turnover	2008	1.0	0.3	1.3	1.6	1.1	1.3	0.9
		2009	1.0	0.3	1.4	1.9	0.9	1.2	0.8
		2010	0.9	0.3	1.3	1.5	1.2	0.9	0.8
		2011	1.2	0.3	1.7	1.9	1.7	1.1	1.0
		2012	1.2	0.4	1.7	1.8	1.2	1.2	1.1

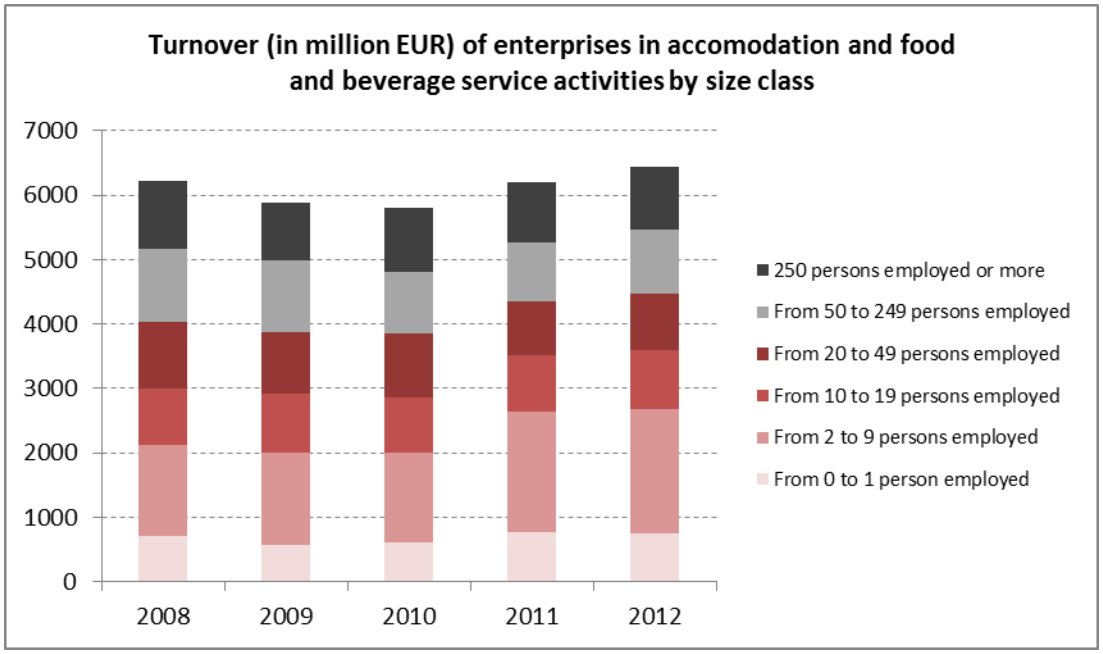
Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Table 11: Turnover, turnover per person employed and persons employed/Mio EUR turnover in food-related retail per size class (2008-2012)

Industry (NACE Rev. 2)	*Indicator*	*Year*	*Total*	*From 0 to 1 person employed*	*From 2 to 9 persons employed*	*From 10 to 19 persons employed*	*From 20 to 49 persons employed*	*From 50 to 249 persons employed*	*250 persons employed or more*
Retail sale in non-specialised stores	Turnover (in Mio EUR)	2008	18583.2	269.8	866.6	1402.5	1413.5	1902	12728.8
		2009	18667.8	253.9	806.7	1484.9	1557.3	1976.7	12588.3
		2010	18920.5	259.9	786.2	1421.1	1421.6	1826.8	13204.9
		2011	19321.7	163.1	1274	1573	1485.9	1291.7	13534
		2012	19609.7	149.1	1239.8	1800.1	1449.9	1219.6	13751.2
	Turnover per person employed (in thousand EUR)	2008	177.6	237.9	190.1	204.8	162.5	142.7	181.7
		2009	182.3	253.9	188.5	216.2	178.7	150.8	184
		2010	185.5	256.6	196.5	215.3	167.7	143.1	191
		2011	256.2	214.3	236.5	286.7	224.1	161.7	275.3
		2012	265.6	210.6	238	309	235	161.9	284.2
	Persons employed per 1 Mio EUR in turnover	2008	5.6	4.2	5.3	4.9	6.2	7.0	5.5
		2009	5.5	3.9	5.3	4.6	5.6	6.6	5.4
		2010	5.4	3.9	5.1	4.6	6.0	7.0	5.2
		2011	3.9	4.7	4.2	3.5	4.5	6.2	3.6
		2012	3.8	4.7	4.2	3.2	4.3	6.2	3.5
Retail sale of food, beverages and tobacco in specialised stores	Turnover (in Mio EUR)	2008	1236.1	216	429.9	n/a	177.2	60.8	n/a
		2009	1124.9	214.4	390.6	186.1	158.9	n/a	n/a
		2010	1173.4	231.6	399.3	189.3	n/a	46.2	n/a
		2011	1190.1	248.9	454.2	156.2	139.7	n/a	n/a
		2012	1194.7	244.1	482.6	151.8	123.2	n/a	n/a
	Turnover per person employed (in thousand EUR)	2008	111.2	178.1	118.2	n/a	88.4	119.8	n/a
		2009	108.2	173.9	114.7	79.9	89.9	n/a	n/a
		2010	112.7	197.2	113.6	83.3	n/a	107.9	n/a
		2011	157.8	215.8	147.5	123	135.1	n/a	n/a
		2012	160.6	225.8	154.9	121.1	128.5	n/a	n/a
	Persons employed per 1 Mio EUR in turnover	2008	9.0	5.6	8.5	n/a	11.3	8.4	n/a
		2009	9.2	5.8	8.7	12.5	11.1	n/a	n/a
		2010	8.9	5.1	8.8	12.0	n/a	9.3	n/a
		2011	6.3	4.6	6.8	8.1	7.4	n/a	n/a
		2012	6.2	4.4	6.5	8.3	7.8	n/a	n/a
Retail sale via stalls and markets	Turnover (in Mio EUR)	2008	30.9	13.9	8.3	n/a	0	n/a	0
		2009	28	12.1	11.6	n/a	0	n/a	0
		2010	30.4	13.1	13.5	n/a	n/a	0	0
		2011	40.6	17	23.7	0	0	0	0
		2012	41	17.6	23.3	0	0	0	0
	Turnover per person employed (in thousand EUR)	2008	120.3	149.9	140.7	n/a	0	n/a	0
		2009	109	135.6	143.3	n/a	0	n/a	0
		2010	120.6	148.5	118.2	n/a	n/a	0	0
		2011	190.8	168.1	211.4	0	0	0	0
		2012	185.3	187.5	183.7	0	0	0	0
	Persons employed per 1 Mio EUR in turnover	2008	8.3	6.7	7.1	n/a	0.0	n/a	0.0
		2009	9.2	7.4	7.0	n/a	0.0	n/a	0.0
		2010	8.3	6.7	8.4	n/a	n/a	0.0	0.0
		2011	5.2	5.9	4.7	0.0	0.0	0.0	0.0
		2012	5.4	5.3	5.5	0.0	0.0	0.0	0.0

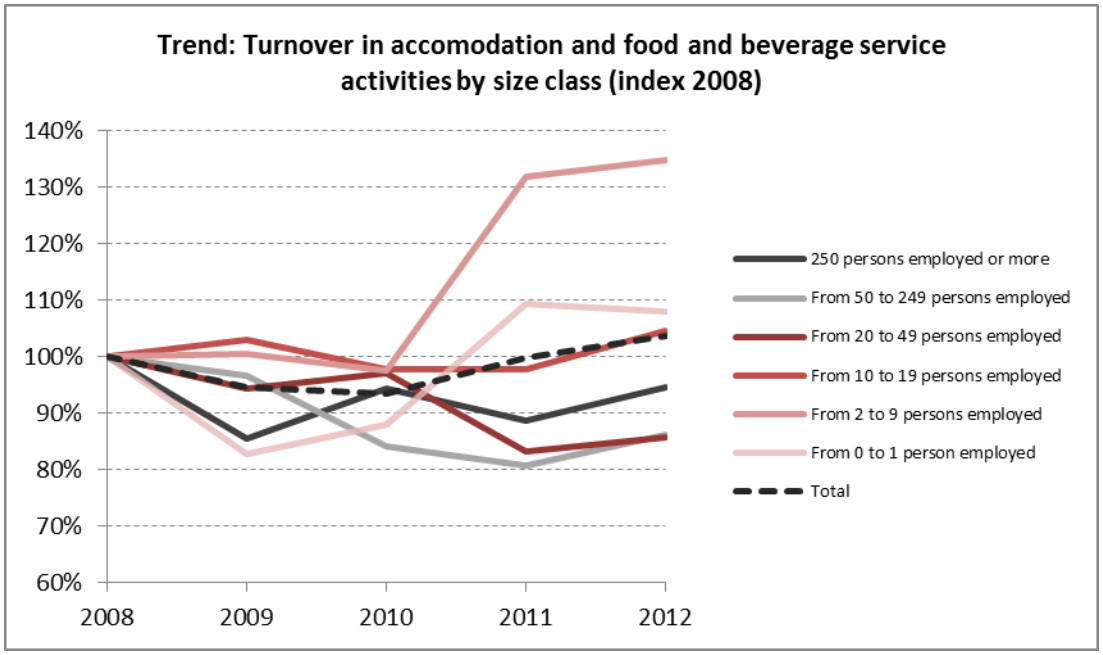
Data source: EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Figure 31: Turnover of enterprises in accommodation and food and beverage service activities by size class (2008-2012)



Data source: EUROSTAT Structural Business Statistics (sbs) Services by employment size class (NACE Rev. 2, H-N, S95)

Figure 32: Size-class dynamics of turnover in accommodation and food and beverage service activities (index=2008)



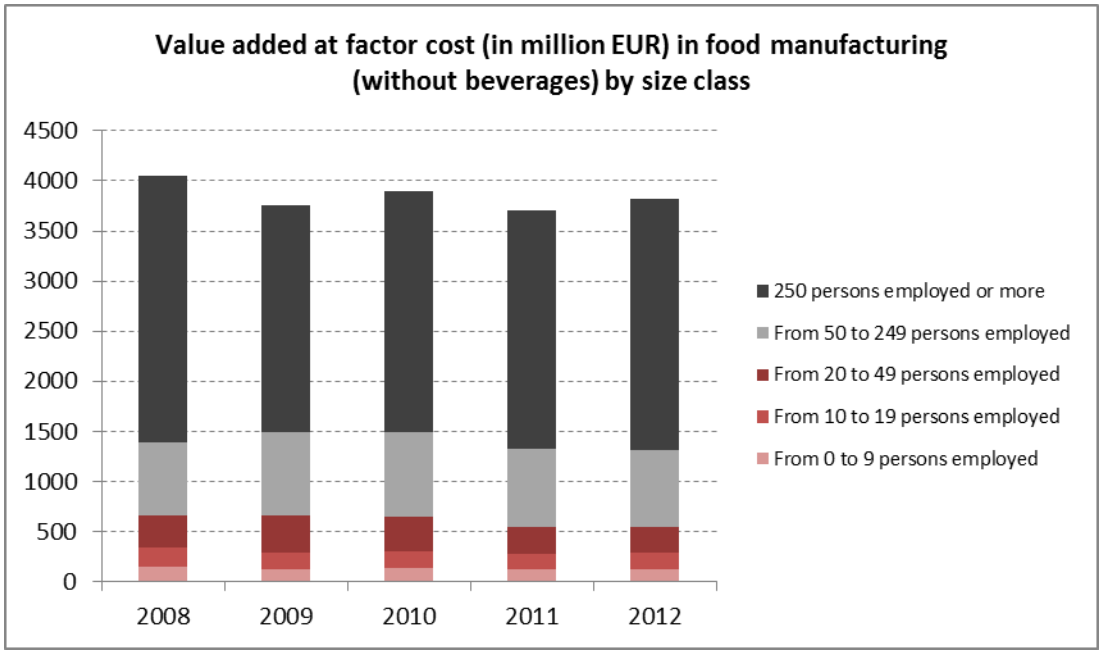
Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Services by employment size class (NACE Rev. 2, H-N, S95)

Table 12: Turnover, turnover per person employed and persons employed/mio EUR turnover in accommodation and food and beverage service activities (2008-2012)

Industry (NACE Rev. 2)	*Indicator*	*Year*	*Total*	*From 0 to 1 person employed*	*From 2 to 9 persons employed*	*From 10 to 19 persons employed*	*From 20 to 49 persons employed*	*From 50 to 249 persons employed*	*250 persons employed or more*
Accom-modation	Turnover (in Mio EUR)	2008	1849.8	188.9	220.3	171.2	327.1	638.2	304.2
		2009	1732	147.9	217.9	187.1	344.2	612	222.9
		2010	1618	150.9	218.3	175.5	336	470.1	267.1
		2011	1670.9	140.8	247.1	216.7	364.8	449.7	251.8
		2012	1708	138.7	245	214.4	363.7	474.3	271.9
	Turnover per person employed (in thousand EUR)	2008	83.8	357	106.3	73.1	64.6	74.1	88.4
		2009	88.2	296.3	96.3	76.7	70.6	86.4	89.8
		2010	83.1	302.4	98.8	76.6	74.2	70.6	81.6
		2011	99.6	351.9	99.8	86.7	88	93.1	104
		2012	102	371.8	98.3	88.3	92.1	94.5	109.7
	Persons employed per 1 Mio EUR in turnover	2008	11.9	2.8	9.4	13.7	15.5	13.5	11.3
		2009	11.3	3.4	10.4	13.0	14.2	11.6	11.1
		2010	12.0	3.3	10.1	13.0	13.5	14.2	12.3
		2011	10.0	2.8	10.0	11.5	11.4	10.7	9.6
		2012	9.8	2.7	10.2	11.3	10.9	10.6	9.1
Food and beverage service activities	Turnover (in Mio EUR)	2008	4363	511.4	1202.3	711	691.8	503.9	742.6
		2009	4146.5	432	1212.3	721.1	616.7	492.4	671.9
		2010	4185.9	464.8	1168.5	687.3	652.8	491.2	721.2
		2011	4534	625.7	1629.9	645.2	483	472.5	677.7
		2012	4737.6	618.3	1674.7	707.8	508.7	509.8	718.3
	Turnover per person employed (in thousand EUR)	2008	58.2	97.9	62.9	49.3	45.8	47.1	71.6
		2009	57	87.9	58.1	48.8	46.3	50.6	73.2
		2010	55.9	88.9	58.6	48.7	45.3	51.5	62.2
		2011	94.5	110	99.1	85.5	87.4	85	93.8
		2012	94.1	109.6	98.5	86.4	84.7	88.5	92.4
	Persons employed per 1 Mio EUR in turnover	2008	17.2	10.2	15.9	20.3	21.8	21.2	14.0
		2009	17.6	11.4	17.2	20.5	21.6	19.7	13.7
		2010	17.9	11.3	17.1	20.5	22.1	19.4	16.1
		2011	10.6	9.1	10.1	11.7	11.4	11.8	10.7
		2012	10.6	9.1	10.1	11.6	11.8	11.3	10.8

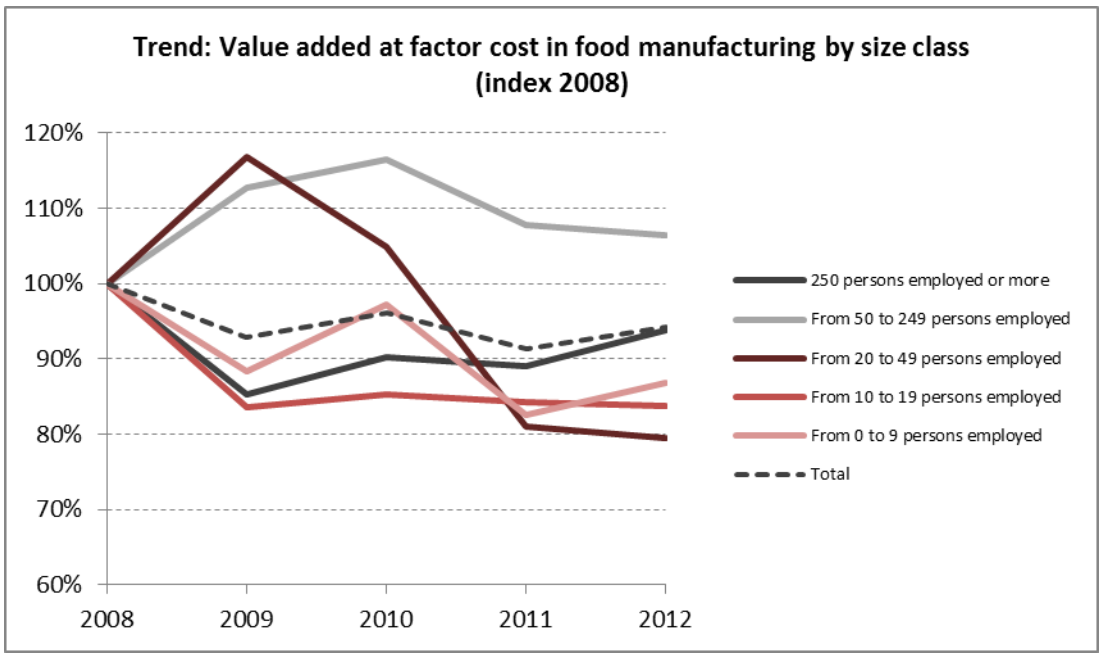
Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Services by employment size class (NACE Rev. 2, H-N, S95)

Figure 33: Value added by enterprises in food manufacturing (without beverages) by size class (2008-2012)



Data source: EUROSTAT Structural Business Statistics (sbs) Industry by employment size class (NACE Rev. 2, B-E)

Figure 34: Size-class dynamics for value added in food manufacturing (without beverages) (index=2008)



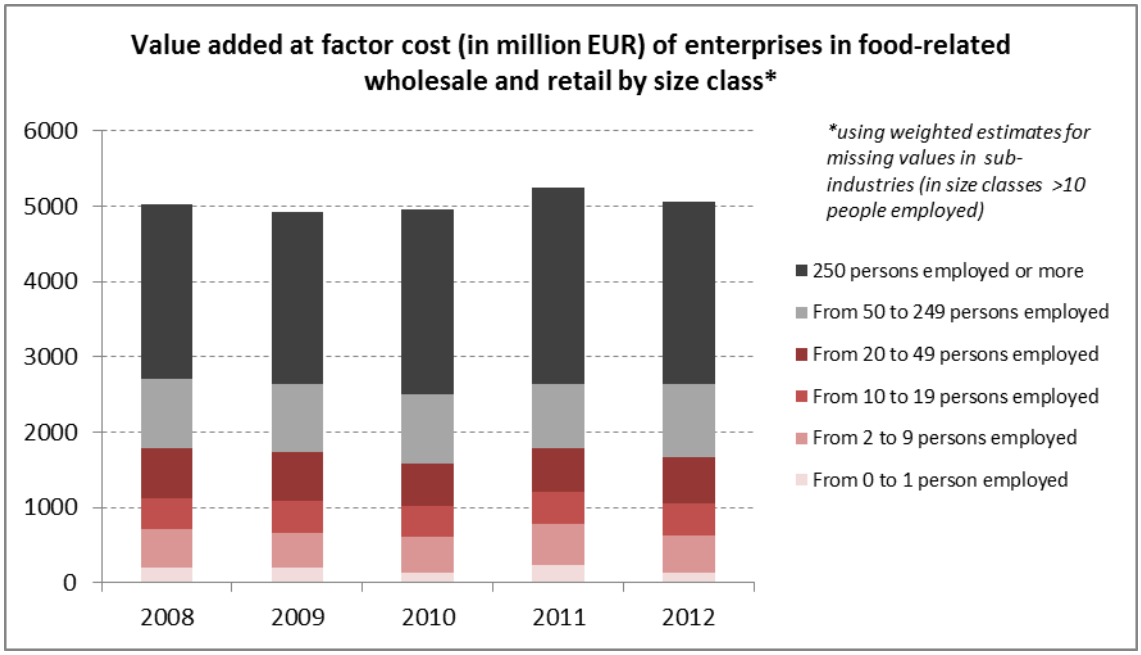
Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Industry by employment size class (NACE Rev. 2, B-E)

Table 13: Value added, value added per person employed, and persons employed/mio EUR value added in manufacturing of food and beverages (2008-2012)

Industry (NACE Rev. 2)	*Indicator*	*Year*	*Total*	*From 0 to 9 persons employed*	*From 10 to 19 persons employed*	*From 20 to 49 persons employed*	*From 50 to 249 persons employed*	*250 persons employed or more*
Manufacture of food products	Value added (in Mio EUR)	2008	4053.8	145.6	191.7	321.8	729.9	2664.9
		2009	3761.1	128.6	160.2	375.8	823.2	2273.4
		2010	3895.7	141.5	163.3	337.7	850.5	2402.7
		2011	3701.9	120.2	161.4	260.9	786.8	2372.6
		2012	3819.8	126.3	160.4	255.5	776.7	2500.9
	Value added per person employed (in thousand EUR)	2008	63.4	50.9	36.8	49.3	62.4	70.8
		2009	66.9	44.5	34.9	50.8	77.4	74.1
		2010	73.0	49.9	35.6	52.9	83.6	81.7
		2011	61.4	35.4	32.7	53.9	68.5	66.7
		2012	64.0	38.4	32.8	53.7	68.4	70.7
	Persons employed per 1 Mio EUR in value added	2008	15.8	19.6	27.2	20.3	16.0	14.1
		2009	14.9	22.5	28.6	19.7	12.9	13.5
		2010	13.7	20.0	28.1	18.9	12.0	12.2
		2011	16.3	28.2	30.6	18.5	14.6	15.0
		2012	15.6	26.1	30.5	18.6	14.6	14.1
Manufacture of beverages	Value added (in Mio EUR)	2008	358.4	10.6	2.8	n/a	n/a	n/a
		2009	427.7	14.2	n/a	16.4	41.9	n/a
		2010	444.3	14.9	n/a	19.6	84.2	n/a
		2011	443.7	9.7	n/a	21.8	44.9	n/a
		2012	424.5	15.6	n/a	17.6	47.5	n/a
	Value added per person employed (in thousand EUR)	2008	76.9	62.9	46.8	n/a	n/a	n/a
		2009	100.1	87.4	n/a	89.4	95.1	n/a
		2010	112.4	98.2	n/a	104.6	116.3	n/a
		2011	90.7	32.7	n/a	77.4	98.9	n/a
		2012	91.2	49.1	n/a	84.1	97.2	n/a
	Persons employed per 1 Mio EUR in value added	2008	13.0	15.8	21.1	n/a	n/a	n/a
		2009	10.0	11.4	n/a	11.2	10.5	n/a
		2010	8.9	10.2	n/a	9.5	8.6	n/a
		2011	11.0	30.5	n/a	12.9	10.1	n/a
		2012	11.0	20.4	n/a	11.9	10.3	n/a

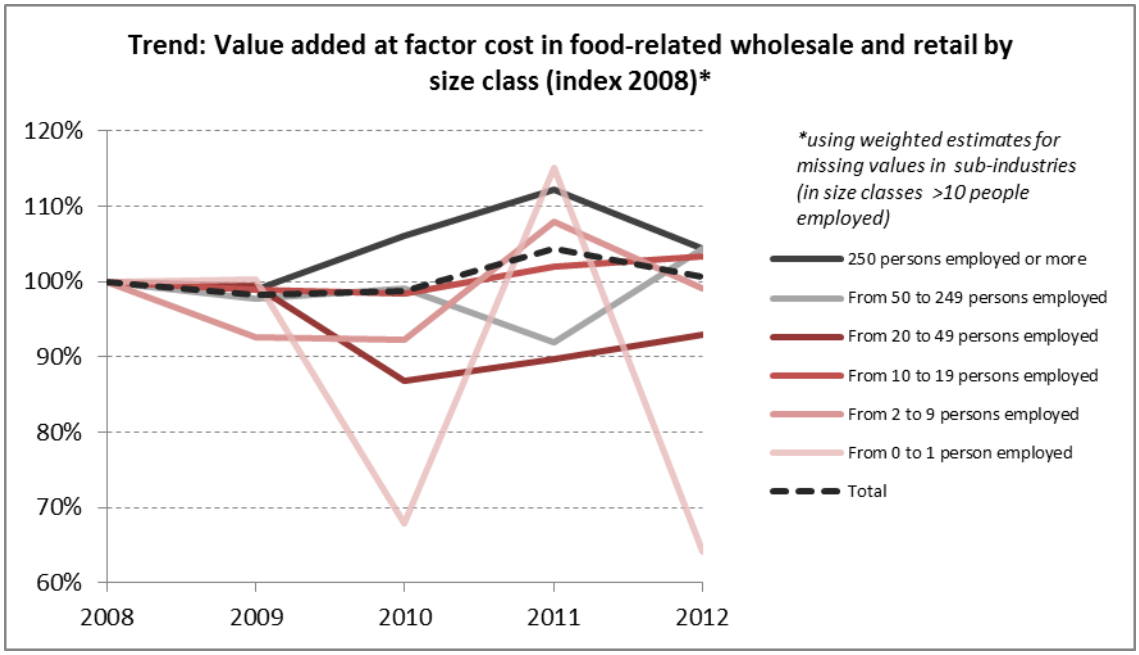
Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Industry by employment size class (NACE Rev. 2, B-E)

Figure 35: Value added by enterprises in food-related wholesale and retail by size class (2008-2012)



Data source: Own calculations and estimates based on EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Figure 36: Size-class dynamics for value added in food-related wholesale and retail (index=2008)



Data source: Own calculations and estimates based on EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Table 14: Value added, value added per person employed, and persons employed/Mio EUR in value added in food-related wholesale (2008-2012)

Industry (NACE Rev. 2)	*Indicator*	*Year*	*Total*	*From 0 to 1 person employed*	*From 2 to 9 persons employed*	*From 10 to 19 persons employed*	*From 20 to 49 persons employed*	*From 50 to 249 persons employed*	*250 persons employed or more*
Wholesale of agricultural raw materials and live animals	Value added (in Mio EUR)	2008	382.3	18.6	60.1	41.0	43.4	n/a	n/a
		2009	327.1	16.3	56.0	36.9	40.9	110.5	66.5
		2010	382.2	16.1	57.4	42.5	n/a	113.6	n/a
		2011	443.4	11.2	56.1	42.9	43.5	127.6	162.1
		2012	403.3	29.8	56.6	41.0	46.4	n/a	n/a
	Value added per person employed (in thousand EUR)	2008	78.5	83.2	75.9	67.2	70.8	n/a	n/a
		2009	73.4	78.8	72.4	68.9	70.8	79.4	68.3
		2010	86.0	79.5	74.6	93.8	n/a	95.4	n/a
		2011	69.4	89.7	53.6	67.4	62.7	88.8	66.2
		2012	77.1	201.1	62.5	63.8	74.4	n/a	n/a
	Persons employed per 1 Mio EUR in value added	2008	12.7	12.0	13.2	14.9	14.1	n/a	n/a
		2009	13.6	12.7	13.8	14.5	14.1	12.6	14.6
		2010	11.6	12.6	13.4	10.7	n/a	10.5	n/a
		2011	14.4	11.2	18.6	14.8	15.9	11.3	15.1
		2012	13.0	5.0	16.0	15.7	13.4	n/a	n/a
Wholesale of food, beverages and tobacco	Value added (in Mio EUR)	2008	1487.1	114.5	202.5	131.4	321.7	437.4	279.5
		2009	1516.0	119.0	203.3	131.6	329.9	431.5	300.6
		2010	1517.0	55.7	196.9	134.6	274.6	481.2	374.0
		2011	1807.9	159.5	202.7	146.2	274.3	493.8	531.4
		2012	1768.6	47.4	171.5	145.6	309.6	652.5	442.1
	Value added per person employed (in thousand EUR)	2008	73.6	177.3	73.9	62.6	78.2	79.2	54.8
		2009	82.1	198.0	69.8	66.1	88.3	83.3	74.2
		2010	79.2	91.0	68.6	70.5	73.1	92.2	78.0
		2011	79.2	389.1	55.5	65.2	64.0	80.6	87.1
		2012	76.0	113.3	47.8	61.2	72.2	95.8	76.5
	Persons employed per 1 Mio EUR in value added	2008	13.6	5.6	13.5	16.0	12.8	12.6	18.3
		2009	12.2	5.1	14.3	15.1	11.3	12.0	13.5
		2010	12.6	11.0	14.6	14.2	13.7	10.8	12.8
		2011	12.6	2.6	18.0	15.3	15.6	12.4	11.5
		2012	13.2	8.8	20.9	16.3	13.9	10.4	13.1

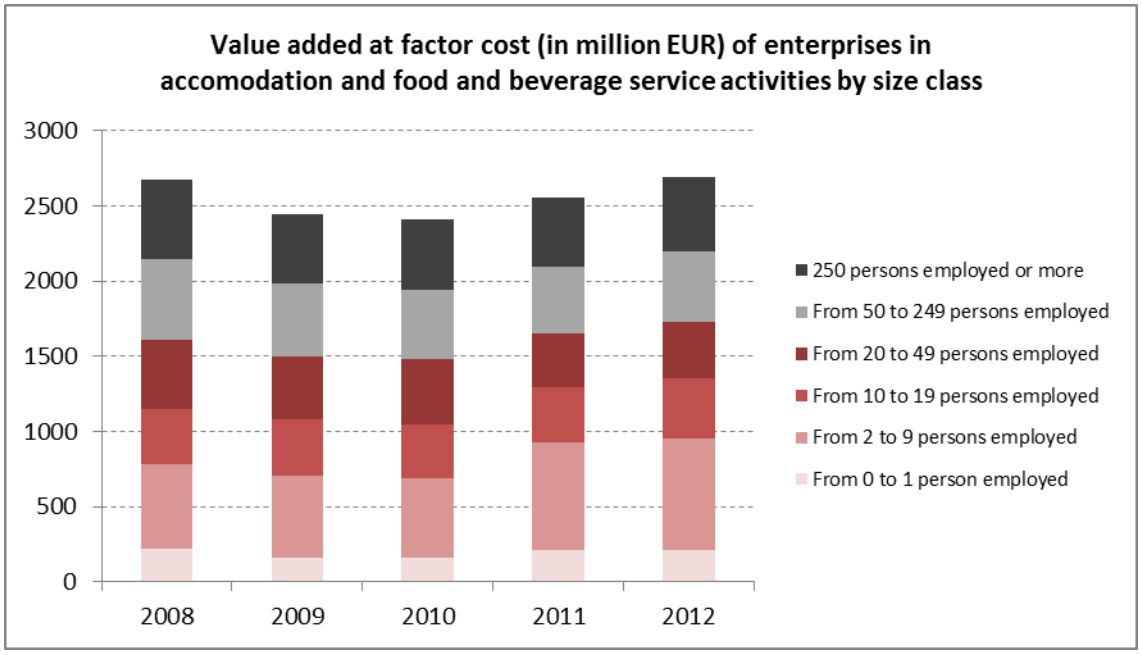
Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Table 15: Value added, value added per person employed, and persons employed/Mio EUR in value added in food-related retail (2008-2012)

Industry (NACE Rev. 2)	*Indicator*	*Year*	*Total*	*From 0 to 1 person employed*	*From 2 to 9 persons employed*	*From 10 to 19 persons employed*	*From 20 to 49 persons employed*	*From 50 to 249 persons employed*	*250 persons employed or more*
Retail sale in non-specialised stores	Value added (in Mio EUR)	2008	2835.5	24.9	126.9	181.7	239.8	360.2	1901.8
		2008	2818.7	25.1	110.9	183.3	236.1	350.2	1913.2
		2009	2766.2	23.4	109.4	169.6	210.1	312.3	1941.5
		2010	2702.1	14.5	163.1	188.6	231.7	220.7	1883.3
		2011	2606.1	11.8	149.5	196.5	220.5	205.2	1822.7
	Value added per person employed (in thousand EUR)	2008	27.1	22	27.8	26.5	27.6	27	27.1
		2009	27.5	25.1	25.9	26.7	27.1	26.7	28
		2010	27.1	23.1	27.3	25.7	24.8	24.5	28.1
		2011	35.8	19.1	30.3	34.4	35	27.6	38.3
		2012	35.3	16.6	28.7	33.7	35.7	27.2	37.7
	Persons employed per 1 Mio EUR in value added	2008	36.9	45.5	35.9	37.7	36.3	37.0	36.8
		2009	36.3	39.8	38.6	37.5	36.9	37.4	35.8
		2010	36.9	43.3	36.6	38.9	40.4	40.9	35.6
		2011	27.9	52.5	33.0	29.1	28.6	36.2	26.1
		2012	28.3	60.0	34.8	29.6	28.0	36.7	26.5
Retail sale of food, beverages and tobacco in specialised stores	Value added (in Mio EUR)	2008	309.8	36.4	115.6	n/a	53.1	18.1	n/a
		2009	261.7	34.4	96.8	60.5	47	n/a	n/a
		2010	283	36	100.8	62.5	n/a	12.9	n/a
		2011	278.8	38.2	120.8	47.3	41.3	n/a	n/a
		2012	267.8	34.6	119.6	47.3	35.5	n/a	n/a
	Value added per person employed (in thousand EUR)	2008	27.9	30	31.8	n/a	26.5	35.7	n/a
		2009	25.2	27.9	28.4	26	26.6	n/a	n/a
		2010	27.2	30.7	28.7	27.5	n/a	30.2	n/a
		2011	37	33.2	39.2	37.2	39.9	n/a	n/a
		2012	36	32	38.4	37.8	37.1	n/a	n/a
	Persons employed per 1 Mio EUR in value added	2008	35.9	33.3	31.5	n/a	37.7	28.1	n/a
		2009	39.7	35.8	35.2	38.5	37.6	n/a	n/a
		2010	36.8	32.6	34.9	36.4	n/a	33.2	n/a
		2011	27.1	30.2	25.5	26.8	25.0	n/a	n/a
		2012	27.8	31.2	26.0	26.5	27.0	n/a	n/a
Retail sale via stalls and markets	Value added (in Mio EUR)	2008	5.3	2.5	1.7	n/a	0	n/a	0
		2009	3.8	2.7	2	n/a	0	n/a	0
		2010	5.9	2.6	2.7	n/a	n/a	0	0
		2011	7.9	3.2	4.7	0	0	0	0
		2012	8	2.7	5.3	0	0	0	0
	Value added per person employed (in thousand EUR)	2008	20.6	26.6	28.3	n/a	0	n/a	0
		2009	14.8	30.5	24.4	n/a	0	n/a	0
		2010	23.6	30.1	23.6	n/a	n/a	0	0
		2011	37	31.4	42	0	0	0	0
		2012	36.2	28.9	41.6	0	0	0	0
	Persons employed per 1 Mio EUR in value added	2008	48.5	37.2	34.7	n/a	0.0	n/a	0.0
		2009	67.6	33.0	40.5	n/a	0.0	n/a	0.0
		2010	42.7	33.8	42.2	n/a	n/a	0.0	0.0
		2011	27.0	31.6	23.8	0.0	0.0	0.0	0.0
		2012	27.6	34.8	24.0	0.0	0.0	0.0	0.0

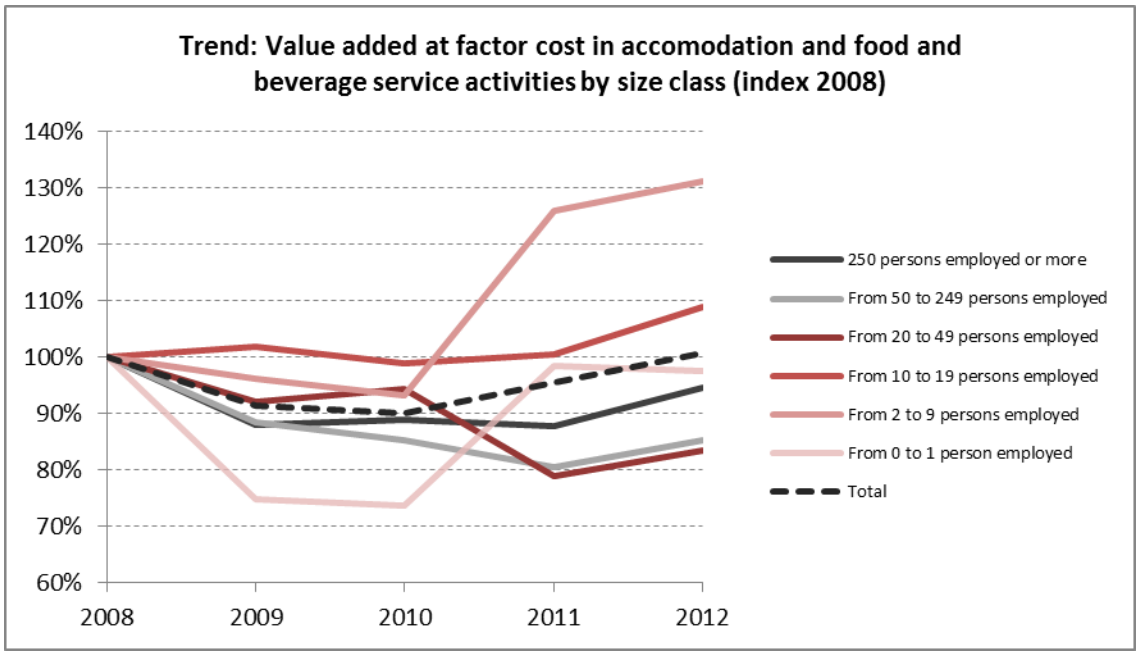
Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Distributive trades by employment size class (NACE Rev. 2, G)

Figure 37: Value added by enterprises in accommodation and food and beverage service activities by size class (2008-2012)



Data source: EUROSTAT Structural Business Statistics (sbs) Services by employment size class (NACE Rev. 2, H-N, S95)

Figure 38: Size-class dynamics in value added in accommodation and food and beverage service activities (index=2008)



Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Services by employment size class (NACE Rev. 2, H-N, S95)

Table 16: Value added, value added per person employed, and persons employed/mio EUR in value added in accommodation and food and beverage service activities (2008-2012)

Industry	*Indicator*	*Year*	*Total*	*From 0 to 1 person employed*	*From 2 to 9 persons employed*	*From 10 to 19 persons employed*	*From 20 to 49 persons employed*	*From 50 to 249 persons employed*	*250 persons employed or more*
Accom-modation	Value added (in Mio EUR)	2008	850.8	70.5	95	69.1	151.2	316.3	148.8
		2009	733.4	48.3	96	73.1	154.4	257.3	104.2
		2010	690.9	45	94.7	74.3	139.8	227.3	109.9
		2011	712.9	43.4	96.5	96.7	158.4	218.3	99.6
		2012	746.3	43.3	103.9	95.5	161	230.6	112.1
	Value added per person employed (in thousand EUR)	2008	38.6	133.3	45.8	29.5	29.9	36.7	43.2
		2009	37.3	96.8	42.4	30	31.7	36.3	42
		2010	35.5	90.2	42.9	32.4	30.9	34.1	33.5
		2011	42.5	108.6	39	38.7	38.2	45.2	41.1
		2012	44.6	116	41.7	39.3	40.8	45.9	45.2
	Persons employed per 1 Mio EUR in value added	2008	25.9	7.5	21.8	33.9	33.5	27.2	23.1
		2009	26.8	10.3	23.6	33.4	31.6	27.5	23.8
		2010	28.2	11.1	23.3	30.8	32.4	29.3	29.8
		2011	23.5	9.2	25.7	25.9	26.2	22.1	24.3
		2012	22.4	8.6	24.0	25.4	24.5	21.8	22.1
Food and beverage service activities	Value added (in Mio EUR)	2008	1826.6	147.4	472	293	306.6	228.7	379
		2009	1712.4	114.7	449.9	295.2	267.1	224.7	360.8
		2010	1721.3	115.5	433.9	283.9	291.9	237.1	359
		2011	1842.9	171	617.7	266.9	202.6	220.3	364.3
		2012	1948.8	169.4	639.5	298.7	220.8	233.7	386.7
	Value added per person employed (in thousand EUR)	2008	24.4	28.2	24.7	20.3	20.3	21.4	36.5
		2009	23.5	23.4	21.6	20	20.1	23.1	39.3
		2010	23	22.1	21.8	20.1	20.2	24.9	31
		2011	38.4	30.1	37.6	35.4	36.7	39.6	50.4
		2012	38.7	30	37.6	36.5	36.8	40.6	49.8
	Persons employed per 1 Mio EUR in value added	2008	41.0	35.4	40.5	49.2	49.2	46.8	27.4
		2009	42.5	42.8	46.4	50.1	49.8	43.3	25.5
		2010	43.5	45.3	45.9	49.7	49.4	40.2	32.3
		2011	26.0	33.3	26.6	28.3	27.3	25.2	19.8
		2012	25.8	33.3	26.6	27.4	27.2	24.6	20.1

Data source: Own calculations based on EUROSTAT Structural Business Statistics (sbs) Services by employment size class (NACE Rev. 2, H-N, S95)

Summary: SMEs contribution to employment, turnover and value added

If we compare the findings in the previous chapters, the importance of SMEs seems to differ much among different sub-sectors and on the measure of importance. In Table 17, we therefore compare the contribution of SMEs to the total number of enterprises, employment, turnover and value added per sub-sector and industry (for t=2012).

Table 17: SMEs' share of total number of enterprises, employment, turnover and value added (in %, for 2012)

Sub-sector	***Industry (NACE Rev. 2)***	***SMEs* share of total number of enterprises***	***SMEs* share of total employment***	***SMEs* share of total turnover***	***SMEs* share of total value added***
Manufacturing of food and beverages	Manufacture of food products	97.46%	40.71%	28.84%	34.53%
	Manufacture of beverages**	97.52%	25.94% *(estimate)*	25.65% *(estimate)*	21.24% *(estimate)*
Food-related wholesale and retail	Wholesale of agricultural raw materials and live animals	99.40%	64.95%	68.08%	68.16%
	Wholesale of food, beverages and tobacco**	99.35%	75.15% *(estimate)*	71.82% *(estimate)*	75.01% *(estimate)*
	Retail sale in non-specialised stores	99.48%	34.47%	29.88%	30.06%
	Retail sale of food, beverages and tobacco in specialised stores**	99.91%	89.04% *(estimate)*	87.51% *(estimate)*	92.25% *(estimate)*
	Retail sale via stalls and markets	100.00%	100.00%	100.00%	100.00%
Accommodation and food and beverage service activities	Accommodation	99.73%	85.19%	84.08%	84.99%
	Food and beverage service activities	99.91%	84.57%	84.84%	80.16%

**SMEs = enterprises with less than 250 persons employed*
***using weighted estimates for missing values*

Data source: Own calculations and estimates based on EUROSTAT Structural Business Statistics (sbs) Industry, distributive trades and services by employment size class (NACE Rev. 2)

Table 17 shows that the importance of SMEs (in terms of number of enterprises, employment provided, turnover, and value added) increases when moving down-stream in the value chain: Manufacturing of food and beverages is dominated by large companies, while food and beverage service activities are dominated by SMEs.

SMSs are most important – not surprisingly – when we measure by number of total enterprises. More than 97 % of all enterprises are SMEs and more than 99 % of all enterprises in food-related wholesale and retail as well as accommodation and food and beverage service activities are SMEs.

In terms of employment, more than 40 % of the total employment in Manufacture of food products and an estimated ¼ of the total employment in Manufacture of beverages is in SMEs. Also here, the role of SMEs is generally increasing when we move down-stream and look at the wholesale, retail and service activities (with the exception of Retail sale in non-specialised stores).

SMEs contribute about 30% to total turnover in food and beverage manufacturing and about 35% to total value added in Manufacture of food products (estimate for Manufacture of beverages is a little over 20%). Except for Retail sale in non-specialised stores, this share again increases in trade and services (consider especially accommodation and food and beverage service activities, where more than 80% of the total turnover and value added comes from SMEs).

What is remarkable is that SMEs' share of total value added seems to be bigger than their share of total turnover: For SMEs, value added equals 20,2 % of turnover, while the share is only 15,4 % for large enterprises. This illustrates that SMEs are more labour-intensive and added value-intensive than larger enterprises.

4 Innovativeness

Innovation is known as a key driver of economic growth and the specific instrument of entrepreneurship (Drucker, 1985). However, innovation and entrepreneurship in the process of starting new businesses are two different things, even though they are related to each other and sometimes used interchangeably (Autio, Kenney, Mustar, Siegel, & Wright, 2014). Because of this association, governments in many regions have implemented policies which are meant to stimulate innovation through entrepreneurship, with the thought that as long as new ventures were created, innovations would come along. However, just as most start-ups do not grow, they are not necessarily innovative: Empirical literature shows that the majority of new ventures do not produce innovations. Based on data from 80 countries, The Global Entrepreneurship Monitor survey reports that less than 30% of new ventures are innovative (Reynolds et al., 2005). In addition to investigating start-up activity, innovative activity of existing enterprises is therefore the next issue we need to look into to understand the dynamics in the food sector and the role SMEs play in it.

For this purpose, we will first provide an overview of the difficulties SMEs face during the innovation process and why it still is import for them to innovate, different types of innovation, and the determinants of innovative activity in businesses. Then we present our findings from investigating which types of enterprises (with particular focus on enterprise size) in the Danish food sector are innovative.

The process of innovation is uncertain – but important for start-ups and SMEs

Prior literature has focused mainly on describing the journey of creating technological innovations. Below, we highlight what this literature tells us about the journey of creating innovations. We do this to link it to the understanding of why many enterprises, especially SMEs, might fail to succeed. Innovation is a journey into the unknown. Teece (1996) describes the journey as a search for a new product and a market opportunity, along a path which is characterized by uncertainty, path dependency, cumulativeness, irreversibility, technological interrelatedness, tacitness, and inappropriability. *Uncertainty* relates to both unpredictable changes (Koopmans, 1957) and decision makers lack of knowledge of how agents in the market will act (Koopmans, 1957), and often it can be seen to arise from opportunistic behavior (Williamson, 1975). *Path*

dependence refers to the technological paradigm of innovations on a certain trajectory (Dosi, 1982). *Cumulativeness* refers to the relationship between the new innovation and prior innovations, how new innovations 'stand on the shoulders' of prior innovations (Green & Scotchmer, 1995; Scotchmer, 2004). *Irreversibility* relates to the development of a new innovation introduced as a competing product along a certain trajectory, in which the new product outcompetes the old (Tushman & Anderson, 1986). *Interrelatedness* refers to the subsystems in which the innovation is created which are important for outcomes, for example the way the different departments in an enterprise coordinate to co-develop a new innovation. *Tacitness* refers to the tacitness of the knowledge related to the innovation embedded in the individual inventor behind the innovation, which it is difficult to codify (Kogut & Zander, 1993; Polanyi, 1962). *Inappropriability* refers to the effort injected into developing the innovation which may not be rewarded appropriately due to imperfect assignment of intellectual property (IP) rights, for example in patents and/or copyrights, or lack of enforcement possibilities. With these properties of innovation, it is not surprising that not all innovations are successful, and empirical studies show that only few innovations really succeed to navigate this multifaceted and complex pathway of challenges. In terms of technological innovations we know that the value of innovations follows a highly skewed distribution which approximates well to a log-normal distribution function, as most technological innovations have very little or no value, and very few innovations are of high value (e.g. Cassiman, Veugelers, & Zuniga, 2008; Cockburn & Henderson, 1996; Gambardella, Harhoff, & Verspagen, 2008; Giuri et al., 2007; Harhoff & Hoisl, 2007; Harhoff, Scherer, & Vopel, 2003; Jaffe, 1986). To put it in figures, in an analysis of 7,752 European patents across macro-technological classes, less than 10% were estimated at worth more than 10 million Euro (Giuri et al., 2007). In terms of patents originating from Danish enterprises, we see the same log-normal distribution of valuable innovations as on an international level (Alkaersig, Beukel, & Reichstein, 2015).

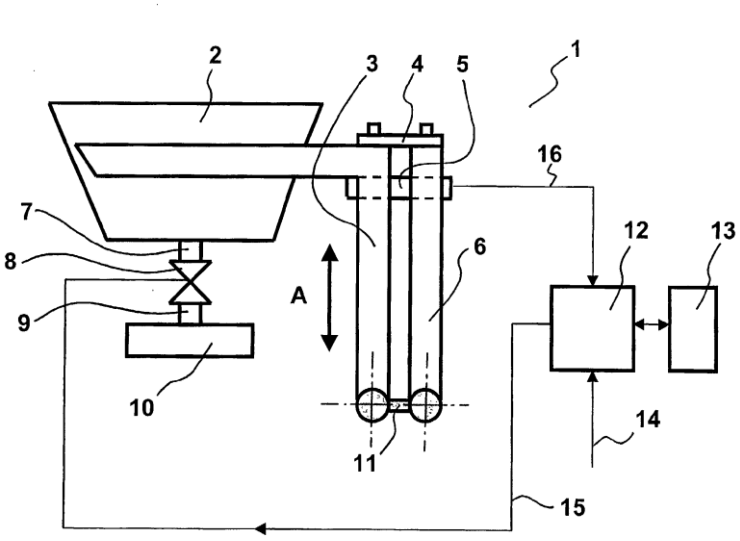
So why do we encourage innovation, especially entrepreneurial innovations in start-ups and SMEs, when the journey towards successful innovation path is barricaded with complications and challenges, and research shows that only few succeed? The reason why entrepreneurial innovations is important is that on the one hand society wishes to reap the benefits from new innovations while on the other hand new and small enterprises have a different set of growth opportunities if building a business based on innovations. Research shows that survival rates of entrepreneurial businesses are affected by their innovative activities. In particular, studies show that entrepreneurs basing their business on radical innovations are more likely to survive because the

entrepreneur is able to gain a higher market share (Langerak et al., 2009; Sinha & Noble, 2008; Srinivasan et al., 2004) and can benefit from radical innovations that are sometimes so 'disruptive' that they can change the market and give the new and small enterprise a competitive advantage (Danneels, 2004).

Types of innovation

The central topic of this part of the report is product-related innovations that can be observed through looking into the enterprises' intellectual property rights (IPR) registrations. We divide them into three categories: 1) technological innovations or patents; they represent recombination of existing resources and are by far the most debated and probably best understood type of innovation; 2) new names which enterprises use for linking user/consumer awareness of a given product to a specific and identifiable name (registered brands and trademarks); and 3) aesthetic innovations which are novel ways of shaping a product. This focus on three product or service related innovations influences the methodological approaches applied, but limits the report in the sense that it does not include considerations on other types of innovations, such as organizational or administrative innovations (e.g. Aiken & Hage, 1971; Collins, Hage, & Hull, 1988; Hage, 1999; Ruef, 2002), or innovations understood as diffusion, and adaptations of new behaviors in organizations (Hage, 1999). In terms of method, we follow standard measuring methods by observing technological innovations as patent applications, aesthetic innovations as design right registrations and novel names and figures by observing enterprises trademark registration activities. Prior studies have often focused solely on explaining technological outcome as innovation outcome, not taking both aesthetic and names and figures into account. However, by combining the three types of innovations in this report, we can compare also the innovation activities in the less technology intensive food industries. Below we exemplify each of the types of innovation.

Technological innovations in the food sector can be many things, but to exemplify we use an example from the Danish firm Bogballe A/S, which is located in Uldum, Jutland, between Vejle and Horsens. Bogballe A/S produces machines used in the agricultural sector. We observe one of their technological innovations in the dataset we report on in this chapter, the technological innovation is their 'System for fully automatic dosage in agricultural machinery' which is protected



by Patent EP1123648B1 (see drawing of the technological innovation copied from patent to the left). According to the patent, their system fulfills a unique position as it enables a more precise weighing system than what was available at the time of invention. In the patent the technological innovation is described in the following way: *"It is the object of the present invention to provide a system comprising only one weighing cell and no reference cell, which system during operation hereof based on the continuous weighing of the amount of material in a supply container is capable of carrying out automatic comparisons between a target dosage and an actual dosage, and where said system based on said comparison is able to perform an automatic adjustment of dosage means, and thereby provide optimal correspondence between a target dosage and an actual dosage."*

Trademarks are used for connecting consumers/users with a given product. To exemplify we present a trademark (trademark no# VR200900048) registered by F. Uhrenholt Holding A/S which is a family owned enterprise with headquarters in Middelfart. The firm sells food products and ingredients. Uhrenholt writes the following on their website[9]: *"Reliability, tailor-made service and ability to spot and seize opportunities together with our partners have made Uhrenholt a preferred partner for many years."* Uhrenholt thus reaches out to new customers/partners by having a strong brand.

[9] http://uhrenholt.com/ (last accessed 30 January 2015)

To exemplify aesthetic innovations we present a recent innovation (design no# DA 2011 00105-0001) done by a small firm, J-R maskin og stålkonstruktion v/Jeff Ramsgaard, located in Stenstrup on Funen. The innovation is a topping paster to be used for food products (see pictures from the design registration below). As one can see it is not the technical innovation that is the core in this product, but rather the design of the topping paster, to be used for e.g. ketchup, mayonnaise, and so on.

Determinants of innovation

The entrepreneurship literature highlights six main areas that influence entrepreneurial innovation (Autio et al., 2014): Industry and technological context, organizational context, institutional and policy context, social context, temporal context, and spatial context. *Industry and technological contexts* literature explains that new innovative products are most likely to occur in the early stages of product life cycles (Abernathy & Utterback, 1978a; Anderson & Tushman, 1990). Also in the early stages of an industry, new entrants and many imitators tend to join the market (Aldrich & Fiol, 1994). As the industry reaches maturity, enterprises start allocating fixed resources towards innovative activities, which results in innovative outcome (Acs & Audretsch, 1988). Additionally, the nature of the technology which the entrepreneurial enterprises innovate is influential for the success of bringing forward new innovations. *Organizational context* explains how the experience, skillset and knowledge of entrepreneurial enterprises influences their behavior. For example, the prior experience of the enterprise founders and managers (previous position, which type of organization and the context of the previous employment) has influence on entrepreneurial innovative output (Agarwal & Shah, 2014; Buenstorf & Klepper, 2009; Liu & Stuart, 2014). With regards to *institutional and policy context*, different levels of institutional influences need to be taken into account. On the one hand, formal institutions such as law and regulation would be a factor influencing economic outcomes and opportunity costs of innovation. On the other hand, also institutions that operate on the normative and cultural-cognitive levels can

influence innovative outcomes through prevailing norms and perceptions of legitimacy and social desirability (Autio et al., 2014).

Regarding *social context* the focus of research has been on how the network of entrepreneurs, such as cooperation partners, financing partners (e.g. venture capital, business angels and private banking), customers and large incumbent enterprises, influence the entrepreneurial innovative capacities (Dubini & Aldrich, 1991; Garud & Karnoe, 2003; Hoang & Antoncic, 2003). The interaction between the above mentioned stakeholders and the entrepreneurs are crucial for knowledge transfer and its' effects on entrepreneurial innovation.

The *temporal context* of the industry has also shown to be influential. The temporal context refers to the lifecycle of industries and enterprises: Most industries and enterprises are said to evolve through growth, maturity and decline. Hence, age of the industry and age of the enterprise matter for its innovative output (Wright & Stigliani, 2013). On a macro level, nations evolve as laws and regulations change, especially when comparing emerging economies with more stable ones (Hoskisson, Wright, Filatotchev, & Peng, 2013). In the same way, the ecosystem of entrepreneurship needs to evolve over time. During this process, the success of prior entrepreneurs and innovative firms influences a region's culture and spurs further innovative activity.

Lastly, the *spatial context* refers to the geographical connectedness of an area (Welter, 2011). It looks at whether enterprises are born global or local, how local distribution systems are set-up and to which degree mobility among entrepreneurs is possible. The six contextual factors mentioned above therefore are influential for whether entrepreneurship will also create innovation.

Technological innovation in the food industry

Against this backdrop, we now first look into how enterprises in the food-related industry created technological innovations. Using intellectual property (IP) register data from the Danish Patent and Trademark Office and World Intellectual Property Organization, we collect all patent applications handed in by Danish enterprises between 2000 and 2010 in either Denmark (through the national Danish office) or through the Patent Cooperation Treaty and via the European Patent Office. Patent applications have for decades been used for measuring technological innovative outcome. However, there are some known negative side-effects from using this measure:

First, if an enterprise decides to keep the innovation secret (and protect it as a trade secret) the technological innovation will not be observed in this data (Cohen, Nelson, & Walsh, 2000). Second, if the enterprise decides not to hand in a patent application, given that the enterprise is resource constrained or does not wish to conduct its business based on a patent, it cannot be observed. Nevertheless, despite these apparent drawbacks, this data is the best we have at hand to measure technological innovative activities in the food related sub-sectors.

We link the individual patents to enterprise level data in DST, and by using the DB07 127-grouping we identify the industry in which the IP active enterprise belonged. It is also via DST that we link the individual enterprises to enterprise size, age and export. We take the number of enterprises divided by industry from the publically available DST business demographics.

In Table 18 we show the number enterprises within each sub-industry which were active in technological innovation. We count an enterprise as being technologically innovative if it has handed in one or more patents during the period 2000-2010. We count the number of enterprises in each of the subindustries (following the same categories as presented in the previous chapters, when using the DST data): Primary production (2 sub-industries, including agriculture and fisheries), food and beverage manufacturing (6 sub-industries, including production of meat and meat products, processing and preserving of fish, manufacture of dairy products, manufacture of grain mill and bakery products, other manufacture of food products, manufacture of beverages), food-related wholesale and retail (4 sub-industries, including wholesale of cereals and feeding stuffs, wholesale of food, beverage and tobacco, supermarkets and department stores etc., and retail sale of food in specialized stores), and accommodation (hotels etc.) and food and beverage service activities (2 sub-industries).

On this basis, Table 18 shows us that in agriculture, 25 enterprises have produced one or more technological innovations during the period 2000-2010. Unfortunately, the total number of enterprises in this category was not identifiable. In other food manufacturing, 20 enterprises produced a technological innovation, accounting for 6.91% of the yearly average of number of enterprises in the industry. In preservation of fish, 3 enterprises out of 122 enterprises, accounting for 2.46%, did. Most other sub-sectors show very little activity in terms of technological innovations (but we would also expect to see relatively few active enterprises in retail, food and

beverage service activities[10] and accommodation (hotels, etc.), given the low-tech context of these sectors). The results confirm this, as no enterprises in retail, nor in accommodation have any technological innovation output, and only one restaurant (out of more than 11,000 restaurants) does.

Since technological innovations within the food-sector do not seem to be an everyday commonality, we may expect that those enterprises capable of inventing new technologies for the sector have different capabilities than the average food sector firm[11]. Data restrictions do not let us explain what these capabilities are but we may assume that one or more of the factors mentioned above could have improved their ability to innovate.

[10] Restaurants can be highly active in developing new recipes for dishes. However, recipes are usually published or protected by trade secrets. We do therefore not expect technological innovation activities in restaurants.
[11] This, however, we cannot test, as we do not have access to firm-level data on a matched control group.

Table 18: Innovative activities by enterprises in the Danish food industry

		(a)	(b)	(c)	(d)	(e)	(f)	(g)
Sub-sector	**Industry (DB07 127-grouping)**	**Average number of enterprises in industry per anno (2000-2010)**	**Number of enterprises with technological innovation experience in industry (2000-2010)**	**Percentage of enterprises with technological innovation experience**	**Number of enterprises with new name or logo experience in industry (2000-2010)**	**Percentage of enterprises with new name or logo experience**	**Number of enterprises with aesthetic experience in industry (2000-2010)**	**Percentage of enterprises with aesthetic innovation experience**
Primary production	Agriculture	n.a.	25	n.a.	161	n.a.	21	n.a.
	Fishing	n.a.	0	0.00%	0	0.00%	0	0.00%
Manu-facturing of food and beverages	Production of meat and meat products	148	2	1.35%	21	14.21%	0	0.00%
	Processing and preserving of fish	122	3	2.46%	23	18.84%	0	0.00%
	Manufacture of dairy products	69	1	1.46%	11	16.01%	1	1.46%
	Manufacture of grain mill and bakery products	1,057	3	0.28%	43	4.07%	1	0.09%
	Other manufacture of food products	289	20	6.91%	136	47.01%	10	3.46%
	Manufacture of beverages	69	2	2.89%	66	95.28%	2	2.89%
Food-related wholesale and retail	Wholesale of cereals and feeding stuffs	597	5	0.84%	51	8.54%	3	0.50%
	Wholesale of food, beverages and tobacco	1,793	6	0.33%	265	14.78%	8	0.45%
	Supermarkets and department stores, etc.	3,268	0	0.00%	24	0.73%	0	0.00%
	Retail sale of food in specialized stores	2,835	0	0.00%	46	1.62%	1	0.04%
Accommodation and food and beverage service activities	Hotels and similar accommodation	1,533	0	0.00%	40	2.61%	1	0.07%
	Restaurants	11,881	1	0.01%	192	1.62%	5	0.04%

Data source: Patents (WIPO, DKPTO, EPO), Trademarks (CTM, DKPTO), Designs (OHIM, GERMANY, DKPTO) and DST industry (DB07 127-grouping)

Technological innovations per size class

In Table 19, we present the percentage of the enterprises active in technological innovations (defined as enterprises that have applied for at least one patent between 2000 and 2010) divided by enterprise size classes. It shows that when counting activity by the number of enterprises engaged in patenting in each enterprise size category, SMEs are taking up 81% of the activities; however, the average enterprise size is 267 employees. With a standard deviation of 920 it is highly skewed due to a few very large observations. It should be noted that there is a positive correlation between enterprise size and number of patents applied, meaning that one can observe that large enterprises tend to apply for more patents than small enterprises. In the Danish food industry this is also the case: Of the enterprises with technological innovation experience, only four enterprises had applied for more than 10 patents each over the observation period 2000-2010 (namely 11, 21, 32 and 378 patents), whereas the remaining 60 enterprises had less than 10 patents each, and 38 enterprises had only one technological innovation in the period. Also, note that there are many more enterprises in the smaller size classes than the larger size classes (see chapter 2 and 3). Thus, Table 19 would look much different if the percentage had been normalized by the total number of enterprises in the given size class.

Table 19: Percentage of enterprises active in technological innovations divided by enterprise size classes in food-related industries (n=52)

Size class	***Percentage of enterprises active in technological innovations (2000-2010)***
0-9 employees	27%
10-19 employees	8%
20-49 employees	17%
50-249 employees	29%
more than 250 employees	19%

Data source: Patents (WIPO, DKPTO, EPO) and DST enterprise size

In Table 20 column (c), (d), and (e) we present the average, minimum and maximum enterprise size of the enterprises which have technological innovation experience, i.e., which have applied for at least one patent between 2000 and 2010. Two industries stand out: 'Agriculture' and 'Other manufacture of food products', as they have 20 and 25 enterprises respectively that have created at least one technological innovation in the period of observation. We therefore look more carefully at the enterprise size of these two industries. The average enterprise size of technological

innovative enterprises is 42 employees in ‘Agriculture’, whereas it is 271 employees in ‘Other manufacture of food products’. The size distribution is not normally distributed. Having a closer look at the data, it shows that only 5 out of the enterprises (27% of the sample) in ‘Other manufacture of food products’ have less than 50 employees, 8 enterprises between 50 and 250, and 5 are large enterprises (> 250employees). In contrast the patenting enterprises in ‘Agriculture’ have a maximum size of 265 employees (one enterprise equaling 5% of the sample), whereas all other enterprises are below 250 employees. In ‘Agriculture’ 83% of the patenting active enterprises have below 50 employees, and 50% even below 10 employees. When comparing the two most active sub-industries it is by far SMEs (micro and small) that are the main driver behind technological innovations in ‘Agriculture’, whereas technological innovative activities in ‘Other manufacture of food products’ mainly are done by SMEs (small and medium) and large enterprises.

For the remaining sub-industries only few enterprises within each category have been technologically innovative during 2000-2010. However, our attention is drawn to two categories: In the dairy industry only one very large enterprise is active, and also in meat manufacturing both observed enterprises have more than 250 employees. In the remaining industries the technologically innovative activities are divided between a range of enterprise sizes, however, they are skewed towards SMEs. For example, all three patenting active enterprises in the preservation of fish industry have between 31-65 employees, in the grain mill sector they are three SMEs (between 59 and 116 employees), in the ‘Wholesale of cereals’ they are four micro enterprises and one SME, while in ‘Wholesale of foods’ we find one large enterprise, two micro enterprises and two SMEs. Even though the number of enterprises is few, we know from the chapter of start-up and growth that these industries do have large enterprises that employ many people. The analysis of the patenting activities in the food-related industries, however, shows that depending on sub-industry, technological innovations are mainly driven by SMEs. The data therefore shows that indeed the food sector is diversified in terms of which sub-industries are technologically innovative, and more interestingly, that certain sub-industries have a strong presence of smaller enterprises with technological innovation capabilities.

Table 20: Enterprise size and innovative activities by enterprises in the Danish food industry

		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
Sub-sector	**Industry (DB07 127-grouping)**	**Average number of enterprises in industry per anno (2000-2010)**	**Number of enterprises with technological innovation (measured by patents) experience (2000-2010)**	**Mean enterprise size of enterprises with technological innovation activities**	**Min**	**Max**	**Number of enterprises with trademark registration experience (2000-2010)**	**Mean**	**Min**	**Max**	**Number of enterprises with aesthetic experience (measured by design rights) (2000-2010)**	**Mean**	**Min**	**Max**
Primary production	Agriculture	n.a.	25	42	1	265	161	21	1	265	21	14	1	48
	Fishing	n.a.	0	0	0	0	0	0	0	0	0	0	0	0
Manu-facturing of food and beverages	Production of meat and meat products	148	2	406	292	521	21	496	8	6,640	0	0	0	0
	Processing and preserving of fish	122	3	46	31	65	23	74	1	237	0	0	0	0
	Manufacture of dairy products	69	1	6,495	0	6,495	11	422	1	6,495	1	6,495	0	6,495
	Manufacture of grain mill and bakery products	1,057	3	88	59	116	43	115	2	722	1	59	0	59
	Other manufacture of food products	289	20	271	8	1,667	136	107	1	1,667	10	277	32	1,148
	Manufacture of beverages	69	2	94	0	94	66	85	1	1,800	2	1,385	970	1,800
Food-related wholesale and retail	Wholesale of cereals and feeding stuffs	597	5	32	3	115	51	44	1	480	3	2	0	2
	Wholesale of food, beverages and tobacco	1,793	6	127	5	373	265	34	1	1,087	8	78	1	373
	Supermarkets and department stores	3,268	0	0	0	0	24	2,963	1	31,047	0	0	0	0
	Retail sale of food in specialized stores	2,835	0	0	0	0	46	36	1	470	1	0	0	0
Accom-modation, food & beverage services	Hotels and similar accommodation	1,533	0	0	0	0	40	67	1	539	1	0	0	0
	Restaurants	11,881	1	3	0	0	192	51	1	934	5	99	1	386

Data source: Patents (WIPO, DKPTO, EPO), Trademarks (CTM, DKPTO), Designs (OHIM, GERMANY, DKPTO) and DST industry (DB07 127-grouping)

**It should be noted that we do not have observations of enterprise size for all innovative enterprises*.

Technological innovations and newly established enterprises

Entrepreneurial enterprises are often entering the market because they have identified an unmet need of a technical product. In this next section, we look into the age of the enterprises behind the technological innovations in the food sector. We measure the age of the enterprise in year 2010 and define that an enterprise is 'newly established' if the enterprise was 10 years or younger in 2010. In this case we know that the enterprise has established its business in the period (2000-2010), where it also was technologically innovative. Based on this definition, we find that 39.02% of the technologically innovative enterprises were newly established.

In Table 21, we present the average age of the food-related innovative enterprises. While 'Agriculture' and 'Other manufacture of food products' showed differences in terms of the size of the enterprises behind the technological innovations, the average enterprise age for the two groups is 20 and 21 years respectively, both with approximately one third of the technological innovation active enterprises being newly established ventures at the time of innovation. This is a little less than the industries with less technologically innovative enterprises. It therefore seems that newly established enterprises are an important contributor to technological innovations in the food-related industries; however, at the same time it is important to remember that over half of the innovative active enterprises still belong to the category of incumbent enterprises, enterprises which also are more active when counting number of technological innovations.

Technological innovations and exports

We now turn our attention to whether the patenting enterprises also are exporting. Denmark is a small country and gaining revenue from export is therefore an imperative for many enterprises in order to grow. Most of the technological innovation active enterprises are indeed also exporting enterprises, as shown in Table 22. It shows that the percentage of the technical innovative active enterprises that also are exporting, divided by industry. We can see that on average, 80.77% of the patent active enterprises (technological innovations) were also exporting. There is a strong correlation between being export active and technologically innovative, only in wholesale and agriculture we find patenting active enterprises that are not exporting (<100%).

Table 21: Enterprise age and innovative activities by enterprises in the Danish food industry

		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
Sub-sector	**Industry (DB07 127-grouping)**	**Average number of enterprises in industry per anno (2000-2010)**	**Number of enterprises with technological innovation experience in industry (2000-2010)**	**Mean Age (in years) of enterprises with innovation activities**	**Min**	**Max**	**Number of enterprises with trademark registration experience in industry (2000-2010)**	**Mean**	**Min**	**Max**	**Number of enterprises with aesthetic experience (measured by design rights) in industry (2000-2010)**	**Mean**	**Min**	**Max**
Primary production	Agriculture	n.a.	25	20	6	111	161	19	3	111	21	19	5	37
	Fishing	n.a.	0	0	0	0	0	0	0	0	0	0	0	0
Manu-facturing of food and beverages	Production of meat and meat products	148	2	30	11	50	21	20	3	54	0	0	0	0
	Processing and preserving of fish	122	3	20	17	25	23	18	4	62	0	0	0	0
	Manufacture of dairy products	69	1	11	0	0	11	21	3	52	1	11	0	0
	Manufacture of grain mill and bakery products	1,057	3	41	10	78	43	20	2	94	1	34	0	0
	Other manufacture of food products	289	20	21	4	87	136	20	2	95	10	18	3	35
	Manufacture of beverages	69	2	10	6	14	66	16	3	56	2	11	11	11
Food-related wholesale and retail	Wholesale of cereals and feeding stuffs	597	5	21	11	32	51	20	3	105	3	7	5	9
	Wholesale of food, beverages and tobacco	1,793	6	9	3	20	265	18	3	89	8	24	7	75
	Supermarkets and department stores, etc.	3,268	0	0	0	0	24	18	4	69	0	0	0	0
	Retail sale of food in specialized stores	2,835	0	0	0	0	46	10	2	35	1	18	0	0
Accom-modation, food & beverage services	Hotels and similar accommodation	1,533	0	0	0	0	40	15	3	62	1	12	0	0
	Restaurants	11,881	1	8	0	0	192	10	2	51	5	17	4	27

Data source: Patents (WIPO, DKPTO, EPO), Trademarks (CTM, DKPTO), Designs (OHIM, GERMANY, DKPTO) and DST industry (DB07 127-grouping)

**It should be noted that we do not have observations of age for all innovative enterprises.*

Table 22: Exports and innovative activities by enterprises in the Danish food industry

		(a)	(b)	(c)	(d)	(e)	(f)	(g)
Sub-sector	**Industry (DB07 127-grouping)**	**Average number of enterprises in industry per anno (2000-2010)**	**Number of enterprises with technical innovation (measured by patents) experience in industry (2000-2010)**	**Percentage of technological innovative enterprises that export**	**Number of enterprises with trademark registration experience in industry (2000-2010)**	**Percentage of enterprises with trademark experience that export**	**Number of enterprises with aethestic experience (measured by design rights) in industry (2000-2010)**	**Percentage of enterprises with aesthetic experience that export**
Primary production	Agriculture	n.a.	25	61%	161	55%	21	80%
	Fishing	n.a.	0	0	0	0	0	0
Manufacturing of food and beverages	Production of meat and meat products	148	2	100%	21	75%	0	0
	Processing and preserving of fish	122	3	100%	23	90%	0	0
	Manufacture of dairy products	69	1	100%	11	82%	1	100%
	Manufacture of grain mill and bakery products	1,057	3	100%	43	59%	1	100%
	Other manufacture of food products	289	20	100%	136	81%	10	100%
	Manufacture of beverages	69	2	100%	66	61%	2	100%
Food-related wholesale and retail	Wholesale of cereals and feeding stuffs	597	5	80%	51	80%	3	50%
	Wholesale of food, beverages and tobacco	1,793	6	76%	265	70%	8	83%
	Supermarkets and department stores, etc.	3,268	0	0	24	55%	0	0
	Retail sale of food in specialized stores	2,835	0	0	46	22%	1	0
Accommodation and food and beverage service activities	Hotels and similar accommodation	1,533	0	0	40	7%	1	0
	Restaurants	11,881	1	100%	192	4%	5	0%

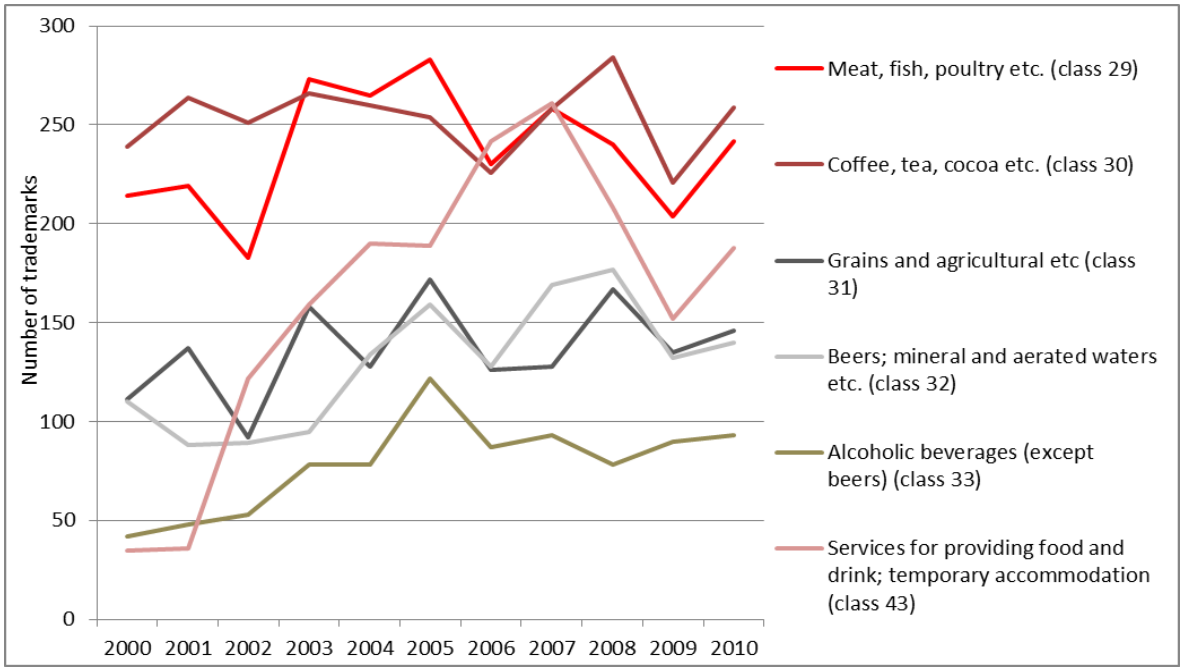
Data source: Patents (WIPO, DKPTO, EPO), Trademarks (CTM, DKPTO), Designs (OHIM, GERMANY, DKPTO) and DST industry (DB07 127-grouping)
**It should be noted that we do not have observations of enterprise export activities for all innovative enterprises.*

Logos and brand: Enterprise size, age and exports

Brands and logos are used as signals in the market: Enterprises use them to create a profile which the consumer can relate to and which lowers the search cost for consumers. Trademarks do not only concern business to consumer products, but also business to business. Trademark registrations can be seen as a measure for an enterprise's innovative activities in connecting the enterprise's products or services to the market place. Trademarks are in general widely used, as any enterprise could have a potential benefit from distinguishing its products or services from competitors.

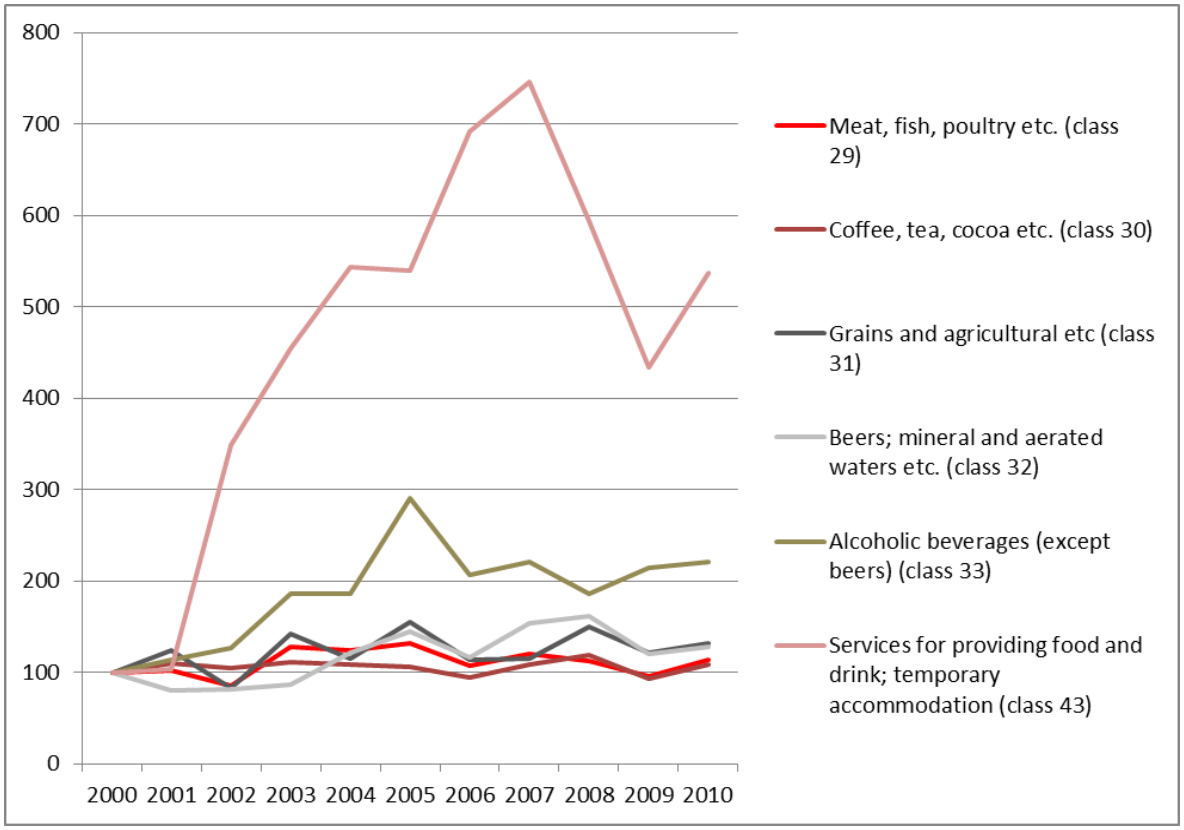
In Figure 39 we show the number of trademarks applied over time, and in Figure 40 we show trademark applications keeping year 2000 as index 100. We divide the different types of trademarks by NICE classification. The NICE classification identifies the domain which the trademark covers (see Appendix B). Figure 39 and Figure 40 show that between 2000 and 2010, there was an increase in the number of trademarks applied at the Danish trademark and patent office by Danish enterprises within food related areas. In particular, trademark registrations within 'Services for providing food and drink and temporary accommodation' (NICE class 43) increased comparatively to the other domains over the period. However, note that the steep increase is based on a a very low number of trademark registrations (<50). 'Alcoholic beverages' (NICE class 33) also experienced a steep increase, whereas all other domains remained relatively stable, with 1 digit increase per year.

Figure 39: Number of Danish trademarks applied in the food sector (from 2000-2010)



Data source: Danish Patent and Trademark Office and NICE classification

Figure 40: Index of Danish trademark registrations in food sector (from 2000-2010; 2000=Index)



Data source: Danish Patent and Trademark Office and NICE classification

The high number of registered Danish trademarks in the food sector is also reflected when analyzing the data on the number of enterprises engaged in these activities in the food industries investigated. In Table 18, column (d) and (e), we show the number of enterprises divided in food subindustries that were active in trademark registrations over the period 2000-2010. As the numbers indicate, this type of innovative activity is by far more common than that of technological innovations. In Table 23 below, we present the percentage of the enterprises active in trademark registrations 2000-2010 divided by enterprise size classes. It shows that when counting activity by the number of enterprises engaged in trademarking in each enterprise size category, micro enterprises and SMEs are taking up 93% of the activities. The average enterprise size, however, is 157 employees, and with a standard deviation of 1,347 it is highly skewed due to a few very large enterprises. In comparison to patenting, trademarking is much more common, and smaller enterprises are even more active. We expect this as the resources needed for creating and registering a trademark is much less than that of patents. Again, it should be noted that there is a correlation between enterprise size and number of trademark innovations, meaning that larger enterprises tend to apply for a higher number of trademarks than smaller enterprises, although this is not reflected in the presentation of the data here.

Table 23: Percentage of enterprises active in trademark registrations divided by enterprise size class (n=737)

Size class	***Percentage of enterprises active in trademark registrations (2000-2010)***
0-9 employees	40%
10-19 employees	14%
20-49 employees	21%
50-249 employees	18%
More than 250 employees	7%

Data source: DKPTO, CTM and DST enterprise size

When analyzing the trademark active enterprises by sub-industry we find large differences, and not only differences related to the sub-industry's type of business (i.e. primary production, manufacturing, wholesale and retail, and services). First, in between the sub-industries within manufacturing, we see a large variance in activities: While an astonishing 95.28% of all enterprises in the 'Manufacturing of beverage' are active, it is only 47.01% for 'Other manufacture of food products', 16.01% for 'Manufacture of dairy

products' and 4.07% for 'Manufacturers of grain mill and bakery products'. One might think that the differences were driven by enterprise size, however, as Table 20 column (g) shows, this is not the case. In Table 21 column (c) we see that the beverage sub-industry is on average younger than that of the other manufacturing sub-industries. This in combination with the large focus on acquisitions in the beverage industry could be factors which have influenced the high level of activities, as many small enterprises have identified good reasons for linking trademarks with a strong presence in the market. Retail, accommodation and food and beverage service activities are only to a very low degree engaged in this type of activity (less than 3% of enterprises), even though one could expect that differentiating ones product or service by the use of branding and/or logos could be beneficial.

In terms of the age of enterprises when applying for trademarks (see Table 21) we find that 47.31% of the enterprises applying for trademarks were new established enterprises (defined as enterprises that were 10 years or younger in 2010). This means that newly established enterprises in the food sector account for almost half of the trademark activities when measuring the activity as per active enterprise, thus it is even higher than that of patent active firms. The age of the trademark registering enterprises differs depending on sub-industry, however, most fall in the range between 10 and 20 years. 'Accommodation' and 'food and beverage service activities' stand out, as 72% of the trademark active firms were newly established enterprises in the observation period.

In Table 22, column (e), we present the percentage of the trademark active enterprises that are also exporting, on average we find that 54.63% of the trademark active firms were also exporting. This number is low compared to that of the patenting active firms, in which 80.77% of the enterprises were exporting. The percentage of trademark active enterprises that are also exporting varies, as a few sub-industries show much trademark activity yet keep their business activities within Denmark (e.g. accommodation and food and beverage service activities).

Aesthetic innovations: enterprise size, age and exports

Together with technological innovations and brand names, also the shape of a product or a product packaging can be an innovation that brings value to a certain product. In general, aesthetic innovations have been generated in design intensive industries such as clothing, ICT and furniture. However, empirical studies show that also manufacturing industries of more traditional and less-design intensive products utilize design innovations to differentiate their products and thereby ask for a higher price in the market. In this chapter, we therefore use design registrations as a measure for aesthetic innovations (designs) in the food industry.

In Table 18, column (f) and (g) we show that also the sub-industries focusing on technical innovations, namely 'Agriculture', 'Other manufacture of food products' and 'Wholesale of food, beverages and tobacco' also are the sub-industries in which aesthetic innovations are more pronounced, even though they on average are less compared to technological innovations and trademark active enterprises.

In Table 24 we present the enterprise size distribution of the aesthetic innovative enterprises. Again we see, as with technological innovations and trademark active enterprises, that the active enterprises are small, for aesthetically innovative firms more than 80% are SMEs (micro, small, and medium-sized).

Table 24: Percentage of enterprises active in trademark registrations divided by enterprise size class (n=39)

	Percentage of enterprises active in aesthetic innovations (2000-2010)
0-9 employees	36%
10-19 employees	10%
20-49 employees	21%
50-249 employees	15%
more than 250 employees	18%

Data source: Designs (OHIM, GERMANY, DKPTO) and DST enterprise size

In Table 20 column (k) we show the average size of the enterprises in aesthetics innovation and find that there are differences in terms of the size distribution,

depending on the sub-industry investigated. Whereas the enterprises behind the aesthetic innovations within ‘Agriculture’ and ‘Wholesale of food, beverages and tobacco’ are smaller than the enterprises behind the technological innovations, the same average size of technological and aesthetics innovations are found for the enterprises in the ‘Other manufacture of food products’.

Also looking at the age indicator does not propose that for certain subindustries the average age increases (Table 21). On average, we find that 39.62% of the aesthetic innovative firms are newly established firms, resembling the average age for the technologically innovative firms. However, it is important to keep in mind the low number of observations; hence any conclusions are difficult to reach.

Finally, the enterprises engaged in aesthetic innovations are also associated with exports: In Table 22 column (g) we show the percentage of enterprises with aesthetic innovations that also conduct exports, divided by sub-industry. On average, 76.32% of the enterprises active in aesthetic innovations export. This number is very close to that of the technologically innovative enterprises.

5 Summary and study limitations

In this report, we have investigated how start-ups and SMEs in the Danish food sector perform in terms of a) new and terminated enterprises (2001-2012) and size of enterprises when they are born (2009-2012), b) survival rates and high growth enterprises as well as size-class dynamics with regard to number of enterprises, employment, turnover, and value added (2008-2012), and c) innovative activities of SMEs in the food sector (2001-2010).

As we show in the above in-depth descriptive statistics, the trends of certain food related sub-industries are not preferable – and it should be in our interest to secure that the further development of these particular sub-industries does not follow their downwards trend. This is important because the data presented suggests that there are many jobs at stake while high growth and innovative activity remain rare events. The next step to understand the mechanisms driving these trends would therefore be to take a closer look at determining factors within each industry and in-between industries using firm-level data and a difference-in-difference approach. We are convinced that such an analysis would show that firms in the different sub-sectors and industries have responded to the food crises and the financial crisis in 2008 heterogeneously, and that certain types of response are more favorable in creating growth and jobs than others. Further studies would therefore provide an in-depth understanding of entrepreneurship and innovation drivers and barriers in the food sector, linking them directly to potential policy implications. To conclude the report, we therefore first summarize the main descriptive findings before we outline the limitations of this study and suggest avenues for further research.

Food start-ups and SMEs: How important are they?

Our findings show that start-ups and SMEs in the food sector do create employment and are also somewhat surprisingly active innovators (albeit few in total). SMEs stand behind a majority of the innovation activity when measuring the activity by the size and age of active enterprises in the sector. Hence, SMEs do play a role for innovation in the sector. Also, newly established enterprises showed to be a main contributor to innovative activities. On average, 39,02% of the patenting active enterprises,

47,31% of the trademark active enterprises and 39,62% of the enterprises behind aesthetics innovations, were newly established during the observation period 2000 and 2010. These figures show that entrepreneurship and innovation are connected and suggest that newly established enterprises influence the dynamics and development of the food sector.

With regard to employment, we find that new food enterprises are 'born larger' than the average new enterprise in Denmark, i.e., individual start-ups in the food sector are more likely to create both self-employment and wage-employment than the average start-up. Their survival rates show patterns similar to the Danish average, and food and beverage manufacturing enterprises even seem to have a slightly higher than average 5-year survival rate. If they survive, food SMEs also tend to remain labour-intensive. Although turnover and value added per person tends to be higher in large enterprises (indicating economies of scale and more efficient use of labour input), growth among SMEs may then create proportionally more employment than growth among larger enterprises. In this regard, there are also several high growth companies in the investigated food sub-sector – according to the data, in 2012 there were 39 high-growth companies in food and beverage manufacturing, 58 in food-related wholesale and retail, and 66 in accommodation and food and beverage service activities.

However, at least three aspects still need to be taken into account: 1) There is an overall decrease in the total number of persons employed in all investigated sub-sectors except wholesale (2008-2012); 2) high-growth and innovation are very rare events when considering the total number of SMEs in the sector; and 3) there are differences between the observed size-class dynamics in the sub-sectors investigated. Notably, we observe a general tendency of a shift towards bigger firms in manufacturing and in food-related wholesale and retail. However, some sub-industries show an opposite trend towards smaller firms, such as manufacture of beverages and manufacturing of grain mill and bakery products. Furthermore, enterprises in the hotels and restaurant industry seem to have been suffering. Not only has there been a greater decline in the number of new enterprises created than in the number of enterprises terminated, the larger firms, which have likely been in business for many years, are also downsizing.

Moreover, our chapter on innovations in the Danish food-sector shows intriguing differences between industries and size classes for the different types of innovations we observe. In terms of technological innovations (patents), we observed only little overall activity in the food sector as a whole. However, two sub-industries stand out: Agriculture, and manufacturing of other food products. In agriculture, the technologically innovative enterprises were smaller in size (i.e., micro and small) than those in the manufacturing of other food products (small and medium-sized), whereas their age groups differed only slightly. Trademarks on the other hand were relatively popular, especially among micro enterprises (40% of the trademark active firms showed to have less than 10 employees). One particularly active sub-industry in creating trademarks is manufacturing of beverages, where we find that the majority (95%) of enterprises are trademark active. Evidently, trademarks really matter for competitiveness in this sub-industry.

To summarize this, we provide overviews of insights gained into start-up and SME dynamics in each of the four investigated food sub-sectors, i.e., agriculture and fisheries, manufacturing of food and beverages, food-related wholesale and retail, and accommodation and food and beverage service activities (hotels and restaurants):

Summary: Agriculture and fisheries

- High number of births and deaths: On average more than 2,000 (agriculture) and close to 100 (fishing) enterprises were started but close to 3,500 (agriculture) and 180 (fishing) enterprises were also terminated each year (2001-2012)
- Annual number of new and terminated enterprises is on the decline (-43% from 2001 to 2012)
- No high growth companies in 2012
- Lack of data on size-class dynamics
- <u>But:</u> SMEs are innovating, especially micro- and small-sized enterprises have experience with technological innovations (patenting)
- In agriculture there is a strong presence of both trademark active (n=161) and aesthetic innovation active enterprises (N=21), it is by far micro- and SMEs that are behind the technological innovations, as only one technological innovative enterprise firm has over 250employees and 36% of the enterprises are newly established.

Summary: Manufacturing of food and beverages

- On average 18% increase in start-ups between 2001-2012, but development varies by sub-industry: New enterprises in 'Other Food manufacturing' and 'Manufacture of beverages' are driving this increase while in 'Manufacture of grain mill and bakery products' there has been a decrease in start-up activity by 46% during this period.
- On average 10% decrease in terminations, driven by a drop in terminated grain mill and bakery manufacturing enterprises (correlating with drop in start-ups) and a drop in terminated enterprises in meat manufacturing. Consider that the two sub-industries that outperformed the other sub-industries in terms of start-ups (beverages and other food products, see above) also grew in terms of the number of terminated firms per year.
- Food and beverage manufacturing enterprises stood out in the food-sector in terms of high growth enterprises (39 enterprises in 2012, i.e., 2,47% of the population of firms in this sub-sector)
- In 2012, SMEs represented 97.5% of the total number of enterprises in the sub-sector while providing about 40% (food manufacturing) / 25% (estimate for beverages) of the total employment in the sub-sector. They contributed close to 30% and 35% (food manufacturing) / about 25% and 21% (estimates for beverages) to the total turnover / value added generated by the sub-sector (more than 178 Billion DKK in turnover / more than 31 Billion DKK in value added).
- We observe a growth in value added per persons employed in the sub-sector but size-class dynamics show different patterns for food and beverage manufacturing: While the average food manufacturing enterprise grew, the average beverage manufacturing enterprise got smaller (in terms of persons employed/enterprise).
- Even though all enterprises in the different sub-industries may benefit from engaging in technological innovations (differentiate products, be more competitive), patenting activity is unevenly distributed. With the exception of 'Other food manufacturing' enterprises, less than 3% of the active enterprises have patenting experience. Likewise, activity in aesthetic innovation and trademarks are unevenly distributed among the sub-industries (notably, 95% of beverage manufacturers have experience with trademarks).

Summary: Food-related wholesale and retail

- Food-related wholesale and retail has experienced the highest percentage decline in start-ups over the period (average of minus 37% in the period 2001 to 2012). However, also the termination of enterprises declined (average minus 30% in the period 2001 to 2012).
- High growth firms are seldom in wholesale and retail - accounting for less 0.79% of the total population of enterprises.
- In 2012, SMEs represented more than 99% of the total number of enterprises in the sub-sector while also providing about 70% (wholesale) / 35% (non-specialised retail) / close to 90% and more (specialised retail) of the total employment in the sub-sector. They contributed about 70% (wholesale) / 30 % (non-specialised retail) / and 90% (specialised retail) to the total turnover and value added generated by the sub-sector (close to 335 Billion DKK in turnover and more than 37 Billion DKK in value added).
- The average wholesale enterprise increased in size, while the average retail enterprise declined in size (in terms of persons employed/enterprise) along with a reduction in the total number of retail enterprises in all size classes.
- Wholesale and retail enterprises managed to grow in terms of value added per employee between 2008 and 2012 – although retail suffered a decline in terms of total annual turnover.
- Only few enterprises are technological innovative in this sub-industry, and the activity is only within wholesale not within retail. In contrast both wholesale and retail enterprises are relatively active in trademark registrations, Wholesale in food, beverages and tobacco enterprises stands out as 14,78% of enterprises belonging to this sub-industry is active.

Summary: Accommodation and food and beverage services (hotels and restaurants)

- On average, we observe an 18% decline in new start-ups in the period 2001 and 2010, whereas the number of terminated companies on average declined by 10%. In the food and beverage service activities (restaurants etc.), this results in an enterprise size dynamic in which the number of one-person enterprises (0-1 person employed) increases while all other size classes decline in number of enterprises.
- A total of 66 enterprises in the sub-sector (accommodation and food/beverage services) were high growth enterprises in 2012, accounting for 0,48% of the total population of enterprises in the sub-sector.
- In 2012, SMEs represented more than 99% of the total number of enterprises in the sub-sector while also providing about 85% of the total employment in the sub-sector. They contributed about 85% to the total turnover and about 85% (accommodation) / 80% (food and beverage services) to the total value added generated by the sub-sector (close to 48 Billion DKK in turnover and about 20 Billion DKK in value added).
- In terms of employment, we observe a decrease in the total number of persons employed in the sector. Overall, size-class dynamics point towards fewer and smaller enterprises, i.e., the average size in terms of person employed per enterprise decreases.
- Turnover and value added developed differently depending on the sub-industry; in accommodation, total turnover and total value added dropped but average turnover and value added per enterprise increased. In contrast, total turnover and total value added in food and beverage services (restaurants etc.) increased, whereas average turnover and value added per enterprise remained more stable (2008-2012).
- Patterns of innovative activity in the sub-sector differ from patterns observed in the other sub-sectors: When taking the large amount of enterprises into account, there is very little activity within any of the types of innovations studied. Interestingly, however, we observe that 72% of the trademark active enterprises in the sub-sector were newly established during the observation period (2000-2010).

Limitations and further work

In this report it is described how start-ups and SMEs in the food sector performed between 2000 and 2012 (with a focus on the post-crisis period between 2008 and 2012). We have focused on main indicators, such as start-ups and terminated enterprises, size of enterprises when born, survival rates, high growth enterprises, size-class dynamics, employment, turnover, value added and innovative activities. In addition, we have provided a framework for interpreting their performance.

In addition to any limitations that apply to the datasets used (see also Appendix A), the limitations of our study are threefold. First, we provide a general overview of start-ups and SME dynamics in the food sector. In doing so, we create a baseline for further work focusing on the role of SMEs in specific industries (such as manufacturing of other food products, or restaurants), and in specific size classes (micro vs. small and medium-sized enterprises). Moreover, we also not had sufficiently fine-grained industry data to investigate the development in industries that provide inputs and support the food sector, such as agricultural inputs (chemicals, fertilizers, services such as veterinarians, etc.) and food-related manufacturing (food packaging, machines for food processing, etc.). This would be necessary to provide input for questions such as which sectors and size classes policy support measures should target.

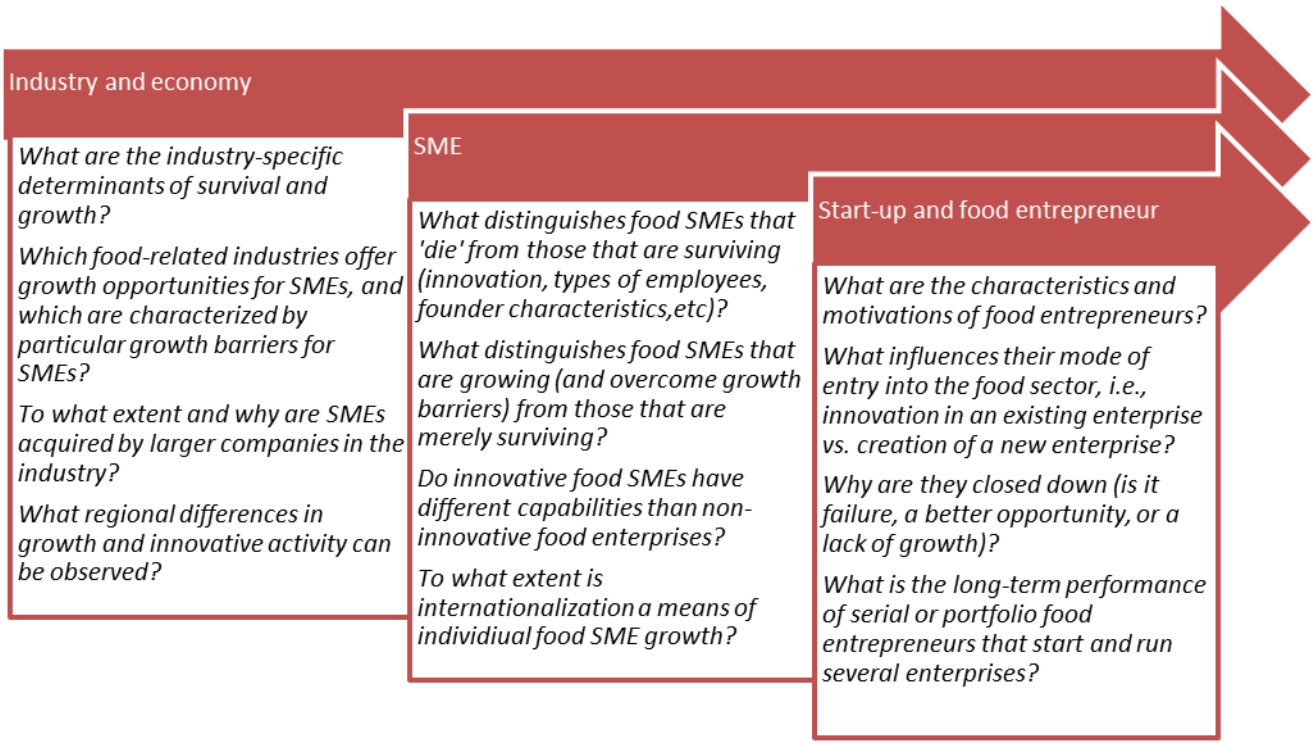
Second, the report excludes data from the past two years (2013-2014) and the past four years for innovative activity (2011-2014), during which there were several interesting developments affecting the food sector. For example, a fairly large number of new beers entered the market in 2014. Another interesting development could be that due to ongoing economic difficulties in 2011 and 2012, consumers may have focused more on "everyday luxuries", such as a dinner in a restaurant, than on larger investments, for example an expensive vacation. It would therefore be necessary to look into more recent data once it becomes available (or alternatively, collect and analyze primary data).

Third, we mainly looked into performance outcomes and structural dynamics. Why some SMEs perform better than others as well as what the socio-economic

implications of their performance are subject to further investigation. Notably, over the past decades, global offshoring of production in the Danish food manufacturing sector has increased. This development has influenced the turnover, profit and employment in Denmark. SMEs are generally less likely to choose global offshoring, as it – still – requires a certain level of production to benefit from relocating production to other countries with lower costs. This may have two implications: On one hand, the significant share of SMEs will limit global offshoring and, by that, limit negative impacts on domestic employment in the short run. On the other hand, SMEs may not be able to fully improve their international competitiveness through global offshoring, which may negatively affect performance in the long run.

In Figure 41, we therefore outline a number of interesting questions further work could address to study the determinants of entry, SME growth, and innovation in SMEs in the food sector. Answers to these questions can provide input for designing policy measures customized to support the types of food entrepreneurs and food SMEs that are particularly important for sustained performance. However, this type of analyses requires a panel dataset, build by firm-level data linked to employee data (education, experience, etc.) linked to innovation data, for all firms in the Food sector. The first step in building a unique food sector data base has been taken, as the innovation data has been gathered and linked to enterprise data, as presented in this report, however, further work on linking this data to all enterprises data is needed, in order to compare the innovative active enterprises with the remaining food enterprises and understand the mechanisms behind the dynamics in the sector. Below we highlight just few of the questions that could be a natural next step in understanding unravelling the connection between entrepreneurship, SME, innovation and industry dynamics.

Figure 41: Questions for further research



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Appendix A: Data sources

Statistics Denmark (DST)

For presenting the number of new and terminated enterprises between 2001 and 2012, we were drawing on publicly available business demography data from Statistics Denmark, in particular the following data set:

- Business demography by industry (DB07 127-grouping), status and unit (2001-2012)

Source: www.statbank.dk (last accessed 31 January 2015)
Quality declaration: http://www.dst.dk/en/Statistik/dokumentation/declarations/business-demography.aspx (last accessed 31 January 2015)

Eurostat (EUROSTAT)

EUROSTAT Business demography

For presenting births and deaths per size class, survival rates, and number of high growth enterprises, we were drawing on publicly available Business demography data from Eurostat, in particular the following data sets:

- Business demography by size class (from 2004 onwards, NACE Rev. 2)
- High growth enterprises (growth by 10% or more) and related employment by NACE Rev. 2

Source: http://ec.europa.eu/eurostat/web/structural-business-statistics/entrepreneurship/business-demography (last accessed 31 January 2015)
Quality declaration: http://ec.europa.eu/eurostat/cache/metadata/en/bd_esms.htm (last accessed 31 January 2015)

EUROSTAT Structural business statistics

For presenting size-class dynamics, we were drawing on publicly available annual Structural Business Statistics with a break down by size class from Eurostat, in particular the following data sets:

- Industry by employment size class (NACE Rev. 2, B-E)
- Distributive trades by employment size class (NACE Rev. 2, G)
- Services by employment size class (NACE Rev. 2, H-N, S95)

Source: http://ec.europa.eu/eurostat/web/structural-business-statistics/structural-business-statistics/sme (last accessed 31 January 2015)
Quality declaration: http://ec.europa.eu/eurostat/cache/metadata/en/sbs_esms.htm (last accessed 31 January 2015)

Patent, trademark and design rights data

For presenting innovativeness by Danish food enterprises we draw on data from:

- Danish Patent and Trademark Office www.dkpto.dk
- OHIM https://oami.europa.eu/ohimportal/en/
- WIPO http://www.wipo.int/portal/en/index.html
- German design register data (prior April 2003 there was no European community design registration (RCD by OHIM), prior 2003 we therefore observe the Danish food firms international design registrations by observing their design registrations in Germany http://dpma.de/english/designs/search/index.html

Appendix B: Industry classifications

DB07 and DB03

Table 25: Industry codes for DB07 and DB03

Sub-sector	DB07	DB07 titel	DB03	DB03 titel
Agriculture	01.11.00	Dyrkning af korn (undtagen ris), bælgfrugter og olieholdige frø	01.11.10	Kornavl
	01.11.00	Dyrkning af korn (undtagen ris), bælgfrugter og olieholdige frø	01.12.10	Gartnerier
	01.12.00	Dyrkning af ris	01.11.90	Agerbrug i øvrigt
	01.13.00	Dyrkning af grøntsager og meloner, rødder og rodknolde	01.11.90	Agerbrug i øvrigt
	01.13.00	Dyrkning af grøntsager og meloner, rødder og rodknolde	01.12.10	Gartnerier
	01.14.00	Dyrkning af sukkerrør	01.11.90	Agerbrug i øvrigt
	01.15.00	Dyrkning af tobak	01.11.90	Agerbrug i øvrigt
	01.16.00	Dyrkning af tekstilplanter	01.11.90	Agerbrug i øvrigt
	01.19.00	Dyrkning af andre etårige afgrøder	01.11.90	Agerbrug i øvrigt
	01.19.00	Dyrkning af andre etårige afgrøder	01.12.10	Gartnerier
	01.21.00	Dyrkning af druer	01.13.00	Dyrkning af frugt og bær, nødder og krydderiplanter
	01.22.00	Dyrkning af tropiske og subtropiske frugter	01.13.00	Dyrkning af frugt og bær, nødder og krydderiplanter
	01.23.00	Dyrkning af citrusfrugter	01.13.00	Dyrkning af frugt og bær, nødder og krydderiplanter
	01.24.00	Dyrkning af kernefrugter og stenfrugter	01.13.00	Dyrkning af frugt og bær, nødder og krydderiplanter
	01.25.00	Dyrkning af andre træfrugter, bær og nødder	01.13.00	Dyrkning af frugt og bær, nødder og krydderiplanter
	01.26.00	Dyrkning af olieholdige frugter	01.13.00	Dyrkning af frugt og bær, nødder og krydderiplanter
	01.27.00	Dyrkning af planter til fremstilling af drikkevarer	01.13.00	Dyrkning af frugt og bær, nødder og krydderiplanter
	01.28.00	Dyrkning af krydderiplanter, aromaplanter og lægeplanter	01.12.10	Gartnerier
	01.28.00	Dyrkning af krydderiplanter, aromaplanter og lægeplanter	01.13.00	Dyrkning af frugt og bær, nødder og krydderiplanter
	01.29.00	Dyrkning af andre flerårige afgrøder	02.01.00	Skovbrug
	01.30.00	Planteformering	01.12.20	Planteskoler
	01.41.00	Avl af malkekvæg	01.21.10	Malkekvæghold
	01.42.00	Avl af andet kvæg og bøfler	01.21.90	Anden kvægavl
	01.43.00	Avl af heste og dyr af hestefamilien	01.22.10	Stutterier
	01.44.00	Avl af kameler og dyr af kamelfamilien	01.25.90	Opdræt af andre dyr
	01.45.00	Avl af får og geder	01.22.20	Fåre- og gedeavl
	01.46.10	Avl af smågrise	01.23.00	Svineavl
	01.46.20	Produktion af slagtesvin	01.23.00	Svineavl
	01.47.00	Fjerkræavl	01.24.00	Fjerkræavl
	01.49.10	Kenneler	01.25.30	Kenneler
	01.49.20	Avl af pelsdyr mv.	01.25.10	Pelsdyravl
	01.49.20	Avl af pelsdyr mv.	01.25.20	Biavl
	01.49.20	Avl af pelsdyr mv.	01.25.90	Opdræt af andre dyr

	01.50.00	Blandet drift	01.30.00	Planteavl kombineret med husdyravl (blandet drift)
	01.61.00	Serviceydelser i forbindelse med planteavl	01.41.10	Landbrugsmaskinstationer
	01.62.00	Serviceydelser i forbindelse med husdyravl	01.42.00	Servicevirksomhed i forbindelse med husdyravl undtagen dyrlægevirksomhed
	01.62.00	Serviceydelser i forbindelse med husdyravl	28.52.00	Almindelige maskinforarbejdningsprocesser
	01.63.00	Forarbejdning af afgrøder efter høst	01.41.10	Landbrugsmaskinstationer
	01.63.00	Forarbejdning af afgrøder efter høst	01.41.90	Servicevirksomhed i forbindelse med agerbrug i øvrigt
	01.64.00	Forarbejdning af frø/sædekorn til udsæd	15.61.20	Industriel fremstilling og forædling af frø
	01.70.00	Jagt, fældefangst og serviceydelser i forbindelse hermed	01.50.00	Jagt, fangst og servicevirksomhed i forbindelse hermed
Fishing	03.11.00	Havfiskeri	05.01.00	Fiskeri
	03.12.00	Ferskvandsfiskeri	05.01.00	Fiskeri
	03.21.00	Havbrug	05.02.00	Dambrug og fiskeavl
	03.22.00	Ferskvandsbrug	05.02.00	Dambrug og fiskeavl
Manufacturing of food and beverages	10.11.10	Forarbejdning af svinekød	15.11.10	Svineslagterier
	10.11.10	Forarbejdning af svinekød	15.11.40	Destruktionsanstalter og benmelsfabrikker
	10.11.90	Forarbejdning af andet kød	15.11.20	Kreaturslagterier
	10.11.90	Forarbejdning af andet kød	15.11.30	Tarmrenserier
	10.11.90	Forarbejdning af andet kød	15.11.40	Destruktionsanstalter og benmelsfabrikker
	10.11.90	Forarbejdning af andet kød	15.13.90	Kødforarbejdning i øvrigt
	10.12.00	Forarbejdning og konservering af fjerkrækød	15.12.00	Fjerkræslagterier
	10.13.00	Produktion af kød- og fjerkrækødprodukter	15.13.90	Kødforarbejdning i øvrigt
	10.20.10	Fremstilling af fiskemel	15.20.30	Fiskemelsfabrikker
	10.20.20	Forarbejdning og konservering af fisk, krebsdyr og bløddyr, undtagen fiskemel	15.20.10	Fiskehermetik-, fiskefars- og fiskefiletfabrikker
	10.20.20	Forarbejdning og konservering af fisk, krebsdyr og bløddyr, undtagen fiskemel	15.20.20	Røgning og saltning af fisk
	10.31.00	Forarbejdning og konservering af kartofler	15.31.00	Forarbejdning og konservering af kartofler
	10.32.00	Fremstilling af frugt- og grøntsagssaft	15.32.00	Fremstilling af frugt- og grønsagssaft
	10.39.00	Anden forarbejdning og konservering af frugt og grøntsager	15.33.00	Forarbejdning og konservering af frugt og grønsager i øvrigt
	10.39.00	Anden forarbejdning og konservering af frugt og grøntsager	51.31.00	Engroshandel med frugt og grønsager
	10.41.00	Fremstilling af olier og fedtstoffer	15.41.00	Fremstilling af råolier og fedtstoffer
	10.41.00	Fremstilling af olier og fedtstoffer	15.42.00	Fremstilling af raffinerede olier og fedtstoffer
	10.42.00	Fremstilling af margarine o.l. spiselige fedtstoffer	15.43.00	Margarinefabrikker mv.
	10.51.00	Mejerier samt ostefremstilling	15.51.10	Mejerier samt ostefremstilling
	10.51.00	Mejerier samt ostefremstilling	15.51.20	Mælkekondenseringsfabrikker
	10.52.00	Fremstilling af konsumis	15.52.00	Fremstilling af konsumis
	10.61.00	Fremstilling af mølleriprodukter	15.61.10	Fremstilling af mølleriprodukter
	10.62.00	Fremstilling af stivelse og stivelsesprodukter	15.62.00	Fremstilling af stivelse og stivelsesprodukter
	10.71.10	Industriel fremstilling af brød; kager mv.	15.81.10	Brødfabrikker
	10.71.20	Fremstilling af friske bageriprodukter	15.81.20	Bagerforretninger

	10.72.00	Fremstilling af tvebakker og kiks; fremstilling af konserverede kager, tærter mv.	15.82.00	Fremstilling af kager og kiks
	10.73.00	Fremstilling af makaroni, nudler, couscous og lignende dejvarer	15.85.00	Fremstilling af pastaprodukter og lignende varer
	10.81.00	Fremstilling af sukker	15.83.00	Sukkerfabrikker og -raffinaderier
	10.82.00	Fremstilling af kakao, chokolade og sukkervarer	15.84.00	Chokolade- og sukkervarefabrikker
	10.83.00	Forarbejdning af te og kaffe	15.86.00	Forarbejdning af te og kaffe
	10.84.00	Fremstilling af smagspræparater og krydderier	14.40.00	Saltudvinding
	10.84.00	Fremstilling af smagspræparater og krydderier	15.87.00	Krydderimøller, fremstilling af smagspræparater mv.
	10.85.00	Fremstilling af færdigretter	15.13.10	Fremstilling af færdigretter
	10.85.00	Fremstilling af færdigretter	15.20.10	Fiskehermetik-, fiskefars- og fiskefiletfabrikker
	10.85.00	Fremstilling af færdigretter	15.33.00	Forarbejdning og konservering af frugt og grønsager i øvrigt
	10.86.00	Fremstilling af homogeniserede produkter og diætmad	15.88.00	Fremstilling af homogeniserede produkter og diætmad
	10.89.00	Fremstilling af andre fødevarer i.a.n.	15.13.10	Fremstilling af færdigretter
	10.89.00	Fremstilling af andre fødevarer i.a.n.	15.89.10	Fremstilling af kosttilskud
	10.89.00	Fremstilling af andre fødevarer i.a.n.	15.89.20	Fremstilling af andre fødevarer i øvrigt
	10.91.00	Fremstilling af færdige foderblandinger til landbrugsdyr	15.71.10	Fremstilling af færdige foderblandinger til landbrug og pelsdyravl
	10.91.00	Fremstilling af færdige foderblandinger til landbrugsdyr	15.71.20	Fremstilling af færdige foderblandinger til dam- og havbrug
	10.92.00	Fremstilling af færdige foderblandinger til kæledyr	15.72.00	Fremstilling af færdigt foder til kæledyr
	11.01.00	Destillation, rektifikation og blanding af alkohol	15.91.00	Fremstilling af spiritus
	11.01.00	Destillation, rektifikation og blanding af alkohol	15.92.00	Fremstilling af råsprit
	11.01.00	Destillation, rektifikation og blanding af alkohol	51.34.20	Engroshandel med vin og spiritus
	11.02.00	Fremstilling af vin af druer	15.93.00	Fremstilling af vin
	11.02.00	Fremstilling af vin af druer	51.34.20	Engroshandel med vin og spiritus
	11.03.00	Fremstilling af cider og anden frugtvin	15.94.00	Fremstilling af frugtvin undtagen fra druer
	11.04.00	Fremstilling af andre ikke-destillerede gærede drikkevarer	15.95.00	Fremstilling af vermouth mv.
	11.05.00	Fremstilling af øl	15.96.00	Bryggerier
	11.06.00	Fremstilling af malt	15.97.00	Maltfabrikker
Food-related wholesale and retail	46.21.00	Engroshandel med korn, uforarbejdet tobak, såsæd og foderstoffer	51.21.00	Engroshandel med korn, såsæd og foderstoffer
	46.21.00	Engroshandel med korn, uforarbejdet tobak, såsæd og foderstoffer	51.25.00	Engroshandel med råtobak
	46.22.00	Engroshandel med blomster og planter	51.22.00	Engroshandel med blomster og planter
	46.23.00	Engroshandel med levende dyr	51.23.00	Engroshandel med levende dyr
	46.24.00	Engroshandel med huder, skind og læder	51.24.00	Engroshandel med råhuder, skind og læder
	46.31.00	Engroshandel med frugt og grøntsager	51.31.00	Engroshandel med frugt og grønsager
	46.31.00	Engroshandel med frugt og grøntsager	51.38.90	Anden specialiseret engroshandel med føde-, drikke- og tobaksvarer
	46.32.00	Engroshandel med kød og kødprodukter	51.32.00	Engroshandel med kød og kødprodukter

	46.33.00	Engroshandel med mejeriprodukter, æg samt spiselige olier og fedtstoffer	51.33.00	Engroshandel med mejeriprodukter, æg, spiseolier og fedtstoffer
	46.34.10	Engroshandel med øl, mineralvand, frugt- og grøntsagssaft	51.34.10	Engroshandel med øl og mineralvand
	46.34.10	Engroshandel med øl, mineralvand, frugt- og grøntsagssaft	51.34.90	Engroshandel med frugt- og grønsagssaft mv.
	46.34.20	Engroshandel med vin og spiritus	51.34.20	Engroshandel med vin og spiritus
	46.35.00	Engroshandel med tobaksvarer	51.35.00	Engroshandel med tobaksvarer
	46.36.00	Engroshandel med sukker, chokolade og sukkervarer	51.36.00	Engroshandel med brød, kager, sukker, chokolade og sukkervarer, fx slik
	46.37.00	Engroshandel med kaffe, te, kakao og krydderier	51.37.00	Engroshandel med kaffe, te, kakao og krydderier
	46.38.10	Engroshandel med fisk og fiskeprodukter	51.38.10	Engroshandel med fisk og fiskeprodukter
	46.38.90	Specialiseret engroshandel med fødevarer i.a.n.	51.38.30	Engroshandel med helsekostprodukter
	46.38.90	Specialiseret engroshandel med fødevarer i.a.n.	51.38.90	Anden specialiseret engroshandel med føde-, drikke- og tobaksvarer
	46.39.00	Ikke-specialiseret engroshandel med føde-, drikke- og tobaksvarer	51.39.00	Ikke-specialiseret engroshandel med føde-, drikke- og tobaksvarer
	47.11.10	Købmænd og døgnkiosker	52.11.10	Kolonialhandel
	47.11.10	Købmænd og døgnkiosker	52.11.20	Døgnkiosker
	47.11.20	Supermarkeder	52.11.30	Supermarkeder
	47.11.30	Discountforretninger	52.11.40	Discountforretninger
	47.19.00	Anden detailhandel fra ikke-specialiserede forretninger	52.12.10	Varehuse
	47.19.00	Anden detailhandel fra ikke-specialiserede forretninger	52.12.20	Stormagasiner
	47.21.00	Frugt- og grøntforretninger	52.21.00	Frugt- og grøntforretninger
	47.22.00	Slagter- og viktualieforretninger	52.22.00	Slagter- og viktualieforretninger
	47.23.00	Fiskeforretninger	52.23.00	Fisk- og vildtforretninger
	47.24.00	Detailhandel med brød, konditori- og sukkervarer	52.24.10	Brødudsalg
	47.24.00	Detailhandel med brød, konditori- og sukkervarer	52.24.20	Chokolade- og konfektureforretninger
	47.25.00	Detailhandel med drikkevarer	52.25.00	Vinforretninger
	47.26.00	Tobaksforretninger	52.26.00	Tobaksforretninger
	47.29.00	Anden detailhandel med fødevarer i specialforretninger	52.27.10	Osteforretninger
	47.29.00	Anden detailhandel med fødevarer i specialforretninger	52.27.30	Helsekostforretninger
	47.29.00	Anden detailhandel med fødevarer i specialforretninger	52.27.90	Detailhandel med føde-, drikke- og tobaksvarer fra specialforretninger i øvrigt
Accommodation and food and beverage service activities (i.e., hotels and restaurants)	55.10.10	Hoteller	55.10.10	Hoteller
	55.10.20	Konferencecentre og kursusejendomme	55.10.20	Konferencecentre og kursusejendomme
	55.20.00	Ferieboliger og andre indlogeringsfaciliteter til kortvarige ophold	55.21.00	Vandrehjem
	55.20.00	Ferieboliger og andre indlogeringsfaciliteter til kortvarige ophold	55.23.10	Feriecentre
	55.20.00	Ferieboliger og andre indlogeringsfaciliteter til kortvarige ophold	55.23.90	Andre faciliteter til korttidsophold
	55.30.00	Campingpladser	55.22.00	Campingpladser

55.90.00	Andre overnatningsfaciliteter	55.23.90	Andre faciliteter til korttidsophold
56.10.10	Restauranter	55.30.10	Restauranter
56.10.20	Pizzeriaer, grillbarer, isbarer mv.	55.30.20	Cafeterier, pølsevogne, grillbarer, isbarer mv.
56.21.00	Event catering	55.52.00	Catering og diner transportable
56.29.00	Anden restaurationsvirksomhed	55.30.90	Selskabslokaler, forsamlingshuse mv.
56.29.00	Anden restaurationsvirksomhed	55.51.00	Kantiner
56.29.00	Anden restaurationsvirksomhed	55.52.00	Catering og diner transportable
56.30.00	Cafeér, værtshuse, diskoteker mv.	55.40.10	Værtshuse, bodegaer mv.
56.30.00	Cafeér, værtshuse, diskoteker mv.	55.40.20	Diskoteker og natklubber
56.30.00	Cafeér, værtshuse, diskoteker mv.	55.40.90	Caféer og kaffebarer mv.

Source: Statistics Denmark

NACE Rev. 2

Table 26: Industry codes for NACE Rev. 2 (Source: EUROSTAT)

Level	Code	Description
1	C	MANUFACTURING
2	**10**	**Manufacture of food products**
3	***10.1***	***Processing and preserving of meat and production of meat products***
4	10.11	Processing and preserving of meat
4	10.12	Processing and preserving of poultry meat
4	10.13	Production of meat and poultry meat products
3	***10.2***	***Processing and preserving of fish, crustaceans and molluscs***
4	10.20	Processing and preserving of fish, crustaceans and molluscs
3	**10.3**	**Processing and preserving of fruit and vegetables**
4	10.31	Processing and preserving of potatoes
4	10.32	Manufacture of fruit and vegetable juice
4	10.39	Other processing and preserving of fruit and vegetables
3	**10.4**	**Manufacture of vegetable and animal oils and fats**
4	10.41	Manufacture of oils and fats
4	10.42	Manufacture of margarine and similar edible fats
3	***10.5***	***Manufacture of dairy products***
4	10.51	Operation of dairies and cheese making
4	10.52	Manufacture of ice cream
3	***10.6***	***Manufacture of grain mill products, starches and starch products***
4	10.61	Manufacture of grain mill products
4	10.62	Manufacture of starches and starch products
3	***10.7***	***Manufacture of bakery and farinaceous products***
4	10.71	Manufacture of bread; manufacture of fresh pastry goods and cakes
4	10.72	Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes
4	10.73	Manufacture of macaroni, noodles, couscous and similar farinaceous products
3	***10.8***	***Manufacture of other food products***
4	10.81	Manufacture of sugar
4	10.82	Manufacture of cocoa, chocolate and sugar confectionery
4	10.83	Processing of tea and coffee
4	10.84	Manufacture of condiments and seasonings
4	10.85	Manufacture of prepared meals and dishes
4	10.86	Manufacture of homogenised food preparations and dietetic food
4	10.89	Manufacture of other food products n.e.c.
3	***10.9***	***Manufacture of prepared animal feeds***
4	10.91	Manufacture of prepared feeds for farm animals
4	10.92	Manufacture of prepared pet foods
2	**11**	**Manufacture of beverages**
3	11.0	Manufacture of beverages
4	11.01	Distilling, rectifying and blending of spirits
4	11.02	Manufacture of wine from grape

4	11.03	Manufacture of cider and other fruit wines
4	11.04	Manufacture of other non-distilled fermented beverages
4	11.05	Manufacture of beer
4	11.06	Manufacture of malt
4	11.07	Manufacture of soft drinks; production of mineral waters and other bottled waters
2	12	Manufacture of tobacco products
1	G	WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES
2	**46**	**Wholesale trade, except of motor vehicles and motorcycles**
3	46.1	Wholesale on a fee or contract basis
4	46.11	Agents involved in the sale of agricultural raw materials, live animals, textile raw materials and semi-finished goods
4	46.12	Agents involved in the sale of fuels, ores, metals and industrial chemicals
4	46.13	Agents involved in the sale of timber and building materials
4	46.14	Agents involved in the sale of machinery, industrial equipment, ships and aircraft
4	46.15	Agents involved in the sale of furniture, household goods, hardware and ironmongery
4	46.16	Agents involved in the sale of textiles, clothing, fur, footwear and leather goods
4	46.17	Agents involved in the sale of food, beverages and tobacco
4	46.18	Agents specialised in the sale of other particular products
4	46.19	Agents involved in the sale of a variety of goods
3	***46.2***	***Wholesale of agricultural raw materials and live animals***
4	46.21	Wholesale of grain, unmanufactured tobacco, seeds and animal feeds
4	46.22	Wholesale of flowers and plants
4	46.23	Wholesale of live animals
4	46.24	Wholesale of hides, skins and leather
3	***46.3***	***Wholesale of food, beverages and tobacco***
4	46.31	Wholesale of fruit and vegetables
4	46.32	Wholesale of meat and meat products
4	46.33	Wholesale of dairy products, eggs and edible oils and fats
4	46.34	Wholesale of beverages
4	46.35	Wholesale of tobacco products
4	46.36	Wholesale of sugar and chocolate and sugar confectionery
4	46.37	Wholesale of coffee, tea, cocoa and spices
4	46.38	Wholesale of other food, including fish, crustaceans and molluscs
4	46.39	Non-specialised wholesale of food, beverages and tobacco
3	46.4	Wholesale of household goods
4	46.41	Wholesale of textiles
4	46.42	Wholesale of clothing and footwear
4	46.43	Wholesale of electrical household appliances
4	46.44	Wholesale of china and glassware and cleaning materials
4	46.45	Wholesale of perfume and cosmetics
4	46.46	Wholesale of pharmaceutical goods
4	46.47	Wholesale of furniture, carpets and lighting equipment
4	46.48	Wholesale of watches and jewellery
4	46.49	Wholesale of other household goods
3	46.5	Wholesale of information and communication equipment

4	46.51	Wholesale of computers, computer peripheral equipment and software
4	46.52	Wholesale of electronic and telecommunications equipment and parts
3	46.6	Wholesale of other machinery, equipment and supplies
4	46.61	Wholesale of agricultural machinery, equipment and supplies
4	46.62	Wholesale of machine tools
4	46.63	Wholesale of mining, construction and civil engineering machinery
4	46.64	Wholesale of machinery for the textile industry and of sewing and knitting machines
4	46.65	Wholesale of office furniture
4	46.66	Wholesale of other office machinery and equipment
4	46.69	Wholesale of other machinery and equipment
3	46.7	Other specialised wholesale
4	46.71	Wholesale of solid, liquid and gaseous fuels and related products
4	46.72	Wholesale of metals and metal ores
4	46.73	Wholesale of wood, construction materials and sanitary equipment
4	46.74	Wholesale of hardware, plumbing and heating equipment and supplies
4	46.75	Wholesale of chemical products
4	46.76	Wholesale of other intermediate products
4	46.77	Wholesale of waste and scrap
3	46.9	Non-specialised wholesale trade
4	46.90	Non-specialised wholesale trade
3	***47.1***	***Retail sale in non-specialised stores***
4	47.11	Retail sale in non-specialised stores with food, beverages or tobacco predominating
4	47.19	Other retail sale in non-specialised stores
3	***47.2***	***Retail sale of food, beverages and tobacco in specialised stores***
4	47.21	Retail sale of fruit and vegetables in specialised stores
4	47.22	Retail sale of meat and meat products in specialised stores
4	47.23	Retail sale of fish, crustaceans and molluscs in specialised stores
4	47.24	Retail sale of bread, cakes, flour confectionery and sugar confectionery in specialised stores
4	47.25	Retail sale of beverages in specialised stores
4	47.26	Retail sale of tobacco products in specialised stores
4	47.29	Other retail sale of food in specialised stores
3	***47.8***	***Retail sale via stalls and markets***
4	47.81	Retail sale via stalls and markets of food, beverages and tobacco products
4	47.82	Retail sale via stalls and markets of textiles, clothing and footwear
4	47.89	Retail sale via stalls and markets of other goods
1	I	ACCOMMODATION AND FOOD SERVICE ACTIVITIES
2	**55**	**Accommodation**
3	55.1	Hotels and similar accommodation
4	55.10	Hotels and similar accommodation
3	55.2	Holiday and other short-stay accommodation
4	55.20	Holiday and other short-stay accommodation
3	55.3	Camping grounds, recreational vehicle parks and trailer parks
4	55.30	Camping grounds, recreational vehicle parks and trailer parks
3	55.9	Other accommodation
4	55.90	Other accommodation
2	**56**	**Food and beverage service activities**

3	56.1	Restaurants and mobile food service activities
4	56.10	Restaurants and mobile food service activities
3	56.2	Event catering and other food service activities
4	56.21	Event catering activities
4	56.29	Other food service activities
3	56.3	Beverage serving activities
4	56.30	Beverage serving activities

Source: EUROSTAT[12]

[12] http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=NACE_REV2 (Last accessed 31 January 2015)

NICE classifications (Source: WIPO[13])

Class 29: *Meat, fish, poultry and game; meat extracts; preserved, frozen, dried and cooked fruits and vegetables; jellies, jams, compotes; eggs; milk and milk products; edible oils and fats.*

Class 29 includes mainly foodstuffs of animal origin as well as vegetables and other horticultural comestible products which are prepared for consumption or conservation.

This Class includes, in particular:

- milk beverages (milk predominating).

This Class does not include, in particular:

- certain foodstuffs of plant origin (consult the Alphabetical List of Goods);
- baby food (Cl. 5);
- dietetic food and substances adapted for medical use (Cl. 5);
- dietary supplements (Cl. 5);
- salad dressings (Cl. 30);
- fertilised eggs for hatching (Cl. 31);
- foodstuffs for animals (Cl. 31);
- live animals (Cl. 31).

Class 30: *Coffee, tea, cocoa and artificial coffee; rice; tapioca and sago; flour and preparations made from cereals; bread, pastry and confectionery; edible ices; sugar, honey, treacle; yeast, baking-powder; salt; mustard; vinegar, sauces (condiments); spices; ice*.

Class 30 includes mainly foodstuffs of plant origin prepared for consumption or conservation as well as auxiliaries intended for the improvement of the flavour of food.

This Class includes, in particular:

- beverages with coffee, cocoa, chocolate or tea base;
- cereals prepared for human consumption (for example, oat flakes and those made of other cereals).

This Class does not include, in particular:

- certain foodstuffs of plant origin (consult the Alphabetical List of Goods);
- salt for preserving other than for foodstuffs (Cl. 1);
- medicinal teas and dietetic food and substances adapted for medical use (Cl. 5);
- baby food (Cl. 5);
- dietary supplements (Cl. 5);
- raw cereals (Cl. 31);
- foodstuffs for animals (Cl. 31).

[13] Website: http://web2.wipo.int/nicepub/edition-20150101/classheadings/?pagination=no&lang=en&explanatory_notes=show (accessed January 2015)

Class 31: *Grains and agricultural, horticultural and forestry products not included in other classes; live animals; fresh fruits and vegetables; seeds; natural plants and flowers; foodstuffs for animals; malt.*

Class 31 includes mainly land products not having been subjected to any form of preparation for consumption, live animals and plants as well as foodstuffs for animals.

This Class includes, in particular:

- raw woods;
- raw cereals;
- fertilised eggs for hatching;
- mollusca and crustacea (live).

This Class does not include, in particular:

- cultures of micro-organisms and leeches for medical purposes (Cl. 5);
- dietary supplements for animals (Cl. 5);
- semi-worked woods (Cl. 19);
- artificial fishing bait (Cl. 28);
- rice (Cl. 30);
- tobacco (Cl. 34).

Class 32: *Beers; mineral and aerated waters and other non-alcoholic beverages; fruit beverages and fruit juices; syrups and other preparations for making beverages.*

Class 32 includes mainly non-alcoholic beverages, as well as beer.

This Class includes, in particular:

- de-alcoholised beverages.

This Class does not include, in particular:

- beverages for medical purposes (Cl. 5);
- milk beverages (milk predominating) (Cl. 29);
- beverages with coffee, cocoa, chocolate or tea base (Cl. 30).

Class 33: *Alcoholic beverages (except beers).*

This Class does not include, in particular:

- medicinal beverages (Cl. 5);
- de-alcoholised beverages (Cl. 32).

Class 39: *Transport; packaging and storage of goods; travel arrangement.*

Class 39 includes mainly services for the transport of people, animals or goods from one place to another (by rail, road, water, air or pipeline) and services necessarily connected with such transport, as well as services relating to the storing of goods in a warehouse or other building for their preservation or guarding.

This Class includes, in particular:

- services rendered by companies exploiting stations, bridges, rail-road ferries, etc., used by the transporter;

- services connected with the hiring of transport vehicles;
- services connected with maritime tugs, unloading, the functioning of ports and docks and the salvaging of wrecked ships and their cargoes;
- services connected with the packaging and parcelling of goods before dispatch;
- services consisting of information about journeys or the transport of goods by brokers and tourist agencies, information relating to tariffs, timetables and methods of transport;
- services relating to the inspection of vehicles or goods before transport.

This Class does not include, in particular:

- services relating to advertising transport undertakings such as the distribution of prospectuses or advertising on the radio (Cl. 35);
- services relating to the issuing of travellers' cheques or letters of credit by brokers or travel agents (Cl. 36);
- services relating to insurances (commercial, fire or life) during the transport of persons or goods (Cl. 36);
- services rendered by the maintenance and repair of vehicles, nor the maintenance or repair of objects connected with the transport of persons or goods (Cl. 37);
- services relating to reservation of rooms in a hotel by travel agents or brokers (Cl. 43).

Class 43: Services for providing food and drink; temporary accommodation.

Class 43 includes mainly services provided by persons or establishments whose aim is to prepare food and drink for consumption and services provided to obtain bed and board in hotels, boarding houses or other establishments providing temporary accommodation.

This Class includes, in particular:

- reservation services for travellers' accommodation, particularly through travel agencies or brokers;
- boarding for animals.

This Class does not include, in particular:

- rental services for real estate such as houses, flats, etc., for permanent use (Cl. 36);
- arranging travel by tourist agencies (Cl. 39);
- preservation services for food and drink (Cl. 40);
- discotheque services (Cl. 41);
- boarding schools (Cl. 41);
- rest and convalescent homes (Cl. 44).