VALUMICS
Food Systems Dynamics

Research Findings Brief

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H2020 VALUMICS Project

Profitability in the European food industries

Statistical analyses

This brief summarizes the key findings from an analysis of the main drivers of profitability in the European food industries. The analysis draws on accounting data for individual enterprises' Return on Assets (ROA)

Profitability: an introduction

Classical economic models of perfect competition assume that profits above or below "normal" returns will not persist, as other firms will enter and exit the market, bidding up or down economic returns until they reach an equilibrium. In practice, however, variations in firm profitability persist within and across industries, including the agri-food sector, and explaining these patterns is an important theoretical and empirical research topic. There are broadly two sets of factors which may explain why some firms achieve higher profitability than others: "industry effects" and "firm level effects".

Industry effects are associated with the "structure-conduct-performance" framework of industrial economics theory and the pioneering work of Joe Bain[1], which in turn influenced the work of Michael Porter[2], particularly his "five forces" model. According to this approach, variations in enterprise performance stem from the characteristics of the industry to which they belong. Specifically, average rates of return will be higher in industries characterised by a high level of concentration and high barriers to entry.[3]

However, industry effects alone cannot explain variations in firm profitability, leading to a consideration of differences in firms' tangible and intangible resources for explaining variations in enterprise profitability. These "firm level effects" relate to the Resource Based View (RBV), which argues that firms with distinctive and superior (tangible and intangible) resources and capabilities achieve superior profitability.[4] In the RBV framework, resources include both tangible and intangible resources. Tangible resources relate to financial and physical factors of production while intangible resources include know-how and reputation.

While both are significant, empirical evidence to date across different sectors suggests that 'firm effects' are more important than 'industry effects' for explaining variations in enterprise profitability.[5] However, given the size and importance of the food industries in Europe, there is a need to consider the latest evidence for this sector to understand what accounts for variations in performance.

This brief focuses on understanding the determinants of EU agri-food industry profitability, using data from Bureau van Dijk's AMADEUS database, with records relating to firms in the food manufacturing/processing sector selected. It seeks to understand the relative importance of firm and industry level effects in explaining variations in food industry profitability. This is supplemented with data from Eurostat's Structural Business Statistics (SBS) to consider the profitability of the European food industries as a whole.

[1] Bain, J.S. (1968) *Industrial Organization*. 2nd edition. New York: Wiley
[2] Porter, M.E. (1980) *Competitive Strategy: techniques for analyzing industries and competitors*. New York: Free Press
[3] Slater, S.F. and Olson, E.M. (2002) 'A fresh look at industry and market analysis', *Business Horizons*, 45(1), pp. 15-22.
[4] Barney, J.B. (1991) 'Firm resources and sustained competitive advantage', *Journal of Management*, 17(1), pp. 99-120.
[5] McGahan, A.M. and Porter, M.E. (1997) 'How much does industry matter, really?', *Strategic Management Journal*, 18(1), pp. 15-30.

An Overview of Profitability of the European food industries

Industry structure

Production is fragmented with over 250,000 separate businesses operating in the EU food industry

The Eurostat's Structural Business Statistics (SBS) provide an overview of structure and performance at the sectoral level, presented according to the NACE (Nomenclature des Activités Économiques dans la Communauté Européenne) classification. Such data provide a comprehensive overview of the number of enterprises, turnover, gross margins, and number of employees in particular sectors for the EU and its Member States. Nevertheless, it does not allow for the interrogation of the performance of individual enterprises.

Table 1 presents an overview of the structure and profitability of the EU28 food industry for the years 2012-2018. This indicates that the number of enterprises operating in the EU food industry changed very little during the period. Over a quarter of a million separate businesses operate in the EU food industry and the sector has not seen the consolidation that others have witnessed. During the period 2012-2018 total turnover grew at an average rate of about 2 per cent, which is in line with the EU inflation rate. Sales growth in real terms was therefore minimal, which is consistent with a mature market. On a year-to-year basis, turnover change varied from 0.3% and 7.3% per annum.

Table 1: Overview of the structure and profitability of the EU28 Food Industry

	2012	2013	2014	2015	2016	2017	2018
Number of enterprises	265,382	264,306	268,301	265,853	265,411	259,691	265,094
Turnover (million euro)	916,000	939,000	950,000	957,000	960,000	1,030,000	1,026,034
Gross profits (million euro)	19,166	20,450	21,697	24,259	24,723	30,245	n/a
Profits as % of turnover	2.09	2.18	2.28	2.53	2.58	2.94	n/a

Source: Eurostat SBS database, n/a = not available

Industry performance

Compared to other sectors of European economies, especially services, the food industry is a low margin business. However, margins are relatively stable.

It is possible to compare gross profits against gross turnover. Profits as a percentage of turnover for the years 2012 and 2017 fell between 2% and 3% (data for gross profits were not available for 2018). The average profit margin of 2.43% per year places the food industry into a low margin category, especially compared against the service sector. However, this is to be expected given the high level of competition and generally low barriers to entry that characterise the food sector.[6]

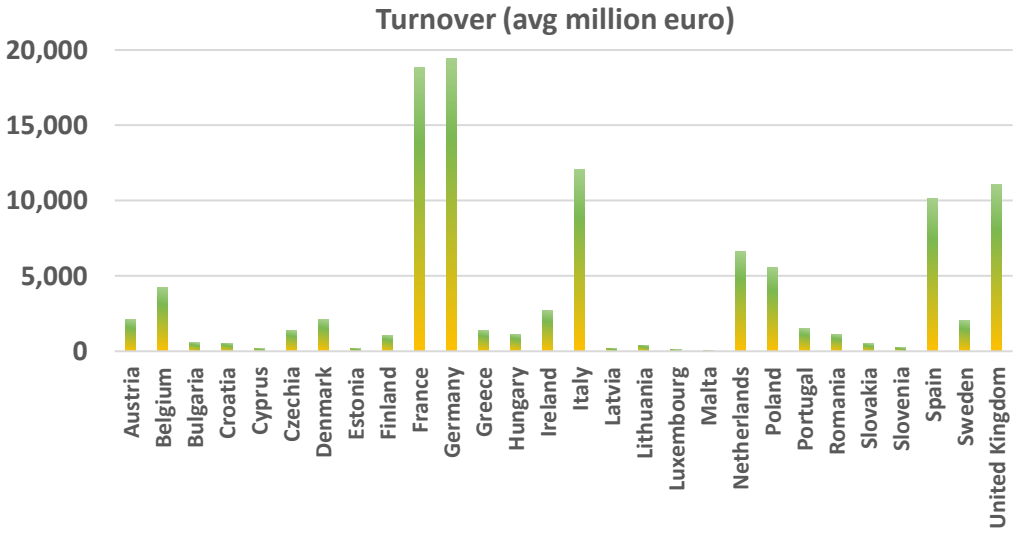
There are considerable variations in performance across the EU Member States. Considering data for the EU Member States from 2017, Figures 1 and 2 present information on turnover and gross margins, respectively. The figures cover the manufacture of food products, beverages, and tobacco. Figure 1 indicates that the five most important countries for this sector in terms of total turnover are France, Germany, Italy, UK and Spain.[7] This pattern has been stable over time. While the importance of agriculture and the food industry in the Member States in Central and Eastern Europe is generally higher, when measured in terms of their share of Gross Domestic Product, the size of food industries in terms of turnover is quite small by international standards.

[6] Gschwandtner, A. and Hirsch, S. (2018) 'What Drives Firm Profitability? A Comparison of the US and EU Food Processing Industry', *The Manchester School*, 86(3), pp. 390-416.
[7] For the period of the analysis, the United Kingdom was a Member State of the EU.

Figure 1: Turnover for manufacture of food products, beverages, and tobacco by EU Member States, 2017

Turnover

France, Germany, Italy, and Spain accounted for over 84 per cent of EU food industry turnover in 2017 (excluding the UK)



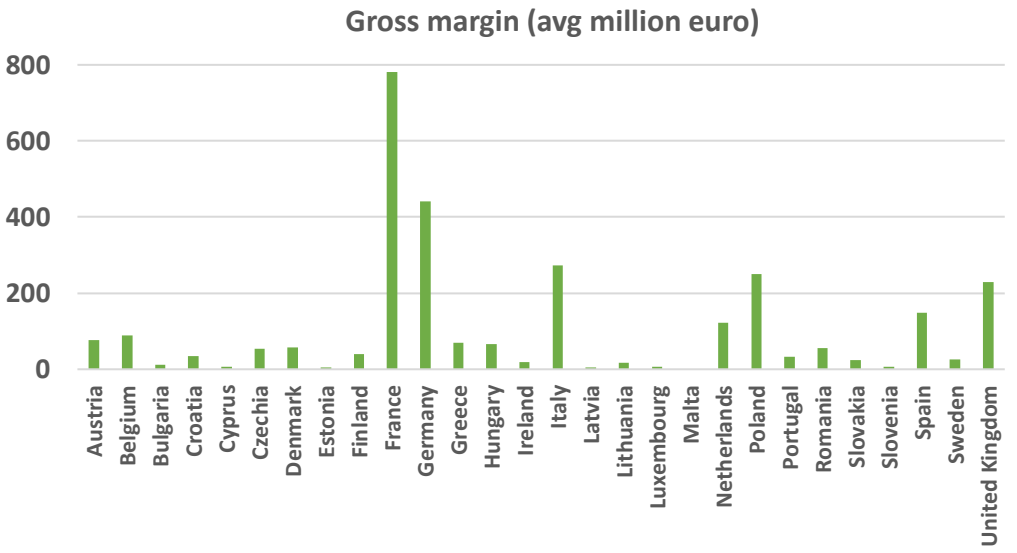
Source: own construction based on Eurostat SBS database

In terms of total gross margin, the same five countries are most important apart from Poland recording higher levels than Spain (Figure 2).

Figure 2: Gross margin for manufacture of food products, beverages, and tobacco by EU Member States, 2017

Gross margin

In terms of gross margin (cumulative), France, Germany, Italy, and Poland perform best.



Source: own construction based on Eurostat SBS database

Analysis of AMADEUS data on profitability in the European Food industries

EU firm profitability data was sourced from Bureau van Dijk's AMADEUS database. AMADEUS is a pan-European data platform, which includes financial statement data and other operational data of companies in the EU countries.

Data analysed

Accounting records for food industry enterprises for the years 20212 to 2017.

The AMADEUS dataset comprises firms of all legal forms (e.g., limited partnership, private, publicly quoted on the market and cooperatives) and size. In AMADEUS, an industry is captured using NACE codes. To extract records from AMADEUS, we used 3-digit NACE codes for the manufacturing of food, including meat, fish, vegetable and animal oils and fats, dairy, milling and baking, animal feeds and processing and preserving of fruits and vegetables.

Data extraction from AMADEUS occurred during 2019 and given the availability of records for the previous 10 years, firm performance was traced back to 2010. However, data for the most recent years (2018 and 2019) was patchy as, for many firms, the information had yet to be updated. Therefore, the analysis focuses on the period 2012 to 2017. After cleaning the database for missing entries, the valid sample stood at 8,645 firms.

The analysis employed Hierarchical Linear Modelling (HLM). [8] The HLM method allows data to be classified into two or more levels. Following a review of the literature and the availability of the data in the AMADEUS database, we developed the structural model at level 1 (firm) and level 2 (industry/sector). The level 1 variables considered included a firm's market share, age, size of firm, short term debt risk and number of employees. For Level 2 (industry) we consider degree of market concentration (the market share of the four largest firms in that branch of the food industry) and industry growth, measured in terms of change in sales.

The models were estimated using the software HLM6 (Hierarchical Linear and Nonlinear Modelling).[9]

Results

Both industry and firm level factors affect food industry profitability

The HLM analysis indicates that industry factors matter. Specifically:

- *Market concentration has a positive effect on return on assets.*
- *Growth of sales in an industry has a positive effect on return on assets.*

Firm level factors also matter. We find that:

- *Market share has a positive effect on return on assets.*
- *Firm age has a negative effect on return on assets*
- *Firm size has a positive effect on return of asset.*
- *Short-term risk has a negative effect on return on assets.*
- *Number of employees has a positive effect on return on assets, but it is not statistically significant.*
- *Market concentration positively moderates the relationship between market share and return on assets*

Lessons for managers

The results have practical significance to food industry managers. Specifically, the results suggest three main strategies for food industry companies to increase profitability:

[8] For a technical discussion of the modelling, please see Aditjandra, P., Pang, G., Ojo, M., Gorton, M. and Hubbard, C. (2019) Report on statistical analysis of agribusiness profitability. VALUMICS "Understanding Food Value Chains and Network Dynamics", funded by European Union's Horizon 2020 research and innovation programme GA No 727243. Deliverable: D5.4, Newcastle University, UK, 48 pages.

[9] Raudenbush, S.W. and Bryk, A.S. (2002) *Hierarchical Linear Models Applications and Data Analysis Methods.* Second edition. Thousand Oaks, CA: Sage

Size and market share

Business size and market share matter, with larger firms, in average, achieving significantly higher returns.

1) Increase market share while increasing market concentration to achieve greater profitability.

One strategy to improve profitability focuses on market concentration and increasing market share. This is consistent with conventional economic models of markets, where profits are higher in the case of a monopoly than oligopoly, which in turn generates higher returns for firms than the case of perfect competition.

Market concentration is influenced by product attributes, the presence of economies of scale, barriers to entry, the degree of diversification of demand, the stage of development of the industry, industry history and policies. In some branches of the food industry, there is a tendency to relatively low market concentration. The main reasons include short shelf life (such as fresh products only having a limited shelf life), inability to realise economies of scale, fragmented production base and high storage and transportation costs.[10]

Although the food industry faces many adverse market concentration factors, enterprises in the food industry can also take some measures to improve market share. One way is mergers and acquisitions (M&A). Empirical evidence indicates growing market concentration at the EU level, and this has been replicated for firms in the USA.[7]

Debt and profitability

Short term debt is associated with a lower return on assets

2) Enterprises should make long-term plans to reduce short-term debt risks and improve their profitability.

From the perspective of traditional accounting, short-term liabilities are one of the essential sources of corporate financing. Short-term lending can help companies increase cash flow, buy assets, expand production, quickly and effectively occupy the market, and maintain day-to-day operations. Long-term borrowing, on the other hand, is used more for product development, and projects with longer investment return cycles. Moreover, the interest rate for long-term borrowing is typically higher, which needs to be supported by projects with higher returns. If strategic investments or public offerings are needed, the board's equity will be diluted, and disputes often arise. Therefore, for enterprises, in order to expand cash flow, the best way is to carry out short-term borrowing. However, it is worth noting that short-term debt has to be repaid in a very short period of time, so liquidity problems often arise. If the company encounters operational difficulties, it may not be able to afford interest and principal payments, resulting in increased risk of default, or even bankruptcy/liquidation.

For food industry enterprises, short-term lending is more likely to have uncontrollable factors associated with it, because of turbulence in the economic environment and the pressures it places on short term liabilities. Ideally, food industry enterprises should have a longer-term plan for their capital and ensure sufficiently cash flow to cope with market fluctuations. Highly geared enterprises are exposed to a higher degree of risk and this is reflected in the ROA data.

Seek out high growth niches

While margins are typically low in the food industry there are niches which register higher growth and offer better returns

3) Seek out high growth niches to maximise the effect of size on profitability

Overall, the food industry is a low margin business with sales for meat, dairy and wheat-based products like bread static or in decline. However, within the food industry there are niches that witness high growth and increasing consumer demand. For example, in many EU countries the demand for convenient, ready to eat vegan foods is growing. Our analysis indicates that the effect of having a high market share on firm profitability is magnified in branches of the food industry that demonstrate higher market growth. While gaining a high share of a particular market is beneficial for a company's profitability, effects will be greater in branches of the food industry that are growing.

[10] Sexton, R.J. and Xia, T. (2018) 'Increasing Concentration in the Agricultural Supply Chain: Implications for Market Power and Sector Performance', *Annual Review of Resource Economics*, 10(1), pp.229-251

Concluding remarks

Generally, the food industry is a low margin business and there is much interest in understanding what drives variations in businesses' return on assets. The literature identifies the importance of both industry and firm level factors, and we investigate both. Based on AMADEUS data between 2012 and 2017, our study finds that both industry and firm level factors are significant. Through the data analysis, we consider three strategies for managers in the European food industry who wish to improve profitability.

Key findings of the analysis of European food industry profitability

- ***The European food industries are characterized generally by low margins***
- ***Both firm and industry effects explain variations in firm-level profitability***
- ***Larger firms in the food industry are generally more profitable***
- ***Lower returns are witnessed where there are many, smaller firms competing***
- ***Short term debt is associated with lower returns***
- ***While margins are generally low, growth niches exist which offer opportunities for higher profitability***

Key sources for further information

This brief is compiled by Gorton, M.[a], Aditjandra, P.[a], Pang, G.[b], Ojo, M.[a], and Hubbard, C.[a] from: a) Newcastle University, and b) University of Birmingham, presenting results from analysis reported in VALUMICS Deliverable D5.4,

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