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How Competitive is the EU's Agri-Food Sector? An Introduction to a Special Feature on EU Agri-Food Competitiveness

David Harvey, Carmen Hubbard, Matthew Gorton and Barbara Tocco[1]

Food is integral to the cultural identities of most European Member States. The degree to which European policy and the agri-food industry delivers safe, affordable food, maintaining traditional specialities and international markets, while at the same time preserving and strengthening rural economies, is an important test of the EU's overall competence. Particular concerns about EU competitiveness surround the New Member States (NMS) from Central and Eastern Europe, which typically possess greater numbers of small farms, a larger proportion of the rural workforce engaged in agriculture, and legacies from their communist histories. In this general context, the recently completed COMPETE project[2] had two ambitious objectives: (1) to identify the conception and indicators of competitiveness; and (2) to evaluate current competitiveness of European food supply chains and investigate its determinants. The project aimed to contribute to a deeper understanding of competitiveness and make policy recommendations for its improvement. This Special Feature illustrates some of the outcomes of this project.

There is no universal definition of competitiveness, partly reflecting the term's application to many different levels of the economy, from the individual firm to whole economies. Domazet (2012, pp. 294–295), for example, considers that the competitiveness concept at the firm level is straightforward, defined as 'the ability of firms to consistently and profitably produce products that meet the requirements of an open market in terms of price [and] quality'. At the national economy level, the World Economic Forum (WEF), for instance, defines '*competitiveness as the set of institutions, policies, and factors that determine the level of productivity of a country*. The level of productivity, in turn, sets the level of prosperity that can be reached by an economy. It also determines the rates of return obtained by investment in an economy, which are the fundamental drivers of its growth rates. In other words, a more competitive economy is one that is likely to grow faster over time' (WEF, 2013, p. 4, authors' emphasis).

Two major groups of determinants of firm competitiveness are typically identified within the economic literature: endogenous and exogenous. Endogenous determinants can be controlled by the firm and include ownership structure, factor intensities, characteristics of labour (e.g. age, education, gender and experience), product specialisation and diversification, and production and marketing strategies. Exogenous determinants of competitiveness include, for example, resource endowments, institutional and governance structures, transport and communication links, health, education and research environments and macroeconomic management. However, the interactions between and relative saliences of these determinants have received relatively little attention, particularly for the agri-food sector.

World Economic Forum (WEF) (2013) presents the results of the European Commission's Regional Competitiveness Index (RCI), 'which was inspired by the (WEF's) Global Competitiveness Index' (p. 25).[3] The results illustrate the basic propositions that peripheral regions lag behind the central cores, both within countries and at the country level. Regions surrounding capital cities generally outperform

[1] David Harvey and Carmen Hubbard are with the School of Agriculture, Food and Rural Development (and also with the Centre for Rural Economy) at Newcastle University. Email: david.harvey@newcastle.ac.uk for correspondence. Matthew Gorton and Barbara Tocco are at the Business School, Newcastle University, UK.

[2] COMPETE was a EU Seventh Framework Programme project for research, technological development and demonstration under grant agreement No. 312029, 2012–2015.

[3] 'The index covers a wide range of issues, and includes innovation, quality of institutions, availability and usage of infrastructure (comprising digital networks), and measures of health and human capital' (World Economic Forum (WEF), 2013, p. 27). See also http://ec.europa.eu/eurostat/statistics-explained/index.php/Regional_competitiveness_statistics (Last accessed 26 September 2016.)

the rest of the country, with the exception of Germany, reflecting the relatively recent unification, and also Italy and the Netherlands to a lesser extent. The results also suggest that central and northern EU countries generally outperform their southern and eastern neighbours, also exhibited at the country level by Italy.

The apparent implications of this index at the EU level are that: (1) the competitiveness of the EU's agri-food sector would be expected to lag that of the core sectors of the economy, since much of the agri-food sector is likely to happen in the peripheries of the economy, rather than at the core; and (2) that the agri-food sectors of the core economies of the EU (including the Nordic countries) would be expected to exhibit greater competitiveness than those of the more peripheral states. This general proposition is apparently well illustrated by Čechura *et al.* (2017) who examine productivity trends in the EU dairy sector. Using farm-level data over the period 2004–2011, the authors find evidence that dairy farm total factor productivity (TFP) is increasing throughout the EU, though from higher levels in the old Member States (OMS). However, they do not find evidence that the poorer performing farms are catching up with their more competitive peers in any of the regions and countries of the EU. Only in the Czech Republic, Slovakia and some regions in Hungary are signs of a catching up process observed. The authors also note that these regions are characterised by larger scale enterprises, which appear better able to capture the opportunities of ongoing technical change.

In contrast, Baráth and Fertő (2017), examining trends in agricultural productivity at the sector aggregate level for 23 EU Member States, do find evidence of some slow convergence between the OMS and NMS. Nevertheless, these authors confirm the general proposition that the OMS demonstrate greater productivity than their NMS peers. The annual rate of change in total factor productivity appears to be negative over the 2004–2013 period on average in the OMS, while positive in the NMS on average, though there are major differences between countries within each of these large groups. In particular, these authors, using Data Envelopment Analysis (DEA), are able to decompose the rates of change in TFP into its components, and find that structural change has tended to reduce rather than assist improvements in TFP. They do not find significant change in farm technical efficiency across the EU, with Germany, Slovenia (both negative) and the UK (positive) being the exceptions. As they remark, these apparent differences deserve more intensive investigation.

There is a major consequence of the perpetual adaptation and adjustment condition of any economic system for the empirical analysis of these systems. The measurement (identification and estimation) of productivity is a primary example. Apart from the fact that this measurement depends on strong assumptions about homogeneity of inputs and outputs, common production functions, prices and opportunity costs, it is also fundamentally a comparative static concept. What can we infer from any estimates of differences in efficiency (however defined) between different economic entities (however framed)? There are three possible interpretations of these estimated differences.

First, and frequently ignored, is that we have estimated them wrongly, and the differences we think we identify are spurious; artifacts of our data and methods. Both Čechura *et al.* (2017) and Baráth and Fertő (2017) take steps to ensure that their empirical approaches respect the underlying theory, especially that of homogeneous products and production environments. The former use a meta-frontier approach explicitly accounting for farm heterogeneity, and the latter classify countries according to their production characteristics, and then use the theoretically consistent Färe-Primont TFP index.[4] However, even if we can be sure that we have identified genuine differences in efficiencies, what do these actually mean? Since they are irreducibly comparative static estimates, they constitute a snap-shot of the condition of our entities on their evolutionary path towards a distant equilibrium. In effect, we observe these firms, sectors or countries moving from a prior equilibrium, which they have never been at, towards a future equilibrium, which they will never reach. Their evolutionary path is co-evolutionary with the relevant policy and political climate and their particular socio-economic environment.

The second interpretation of measured differences in efficiencies is that they must be expected to change. We might imagine that with the appropriate panel data (as in both Čechura *et al.*, 2017 and Baráth and Fertő, 2017) we can identify correlates with the directions and patterns of change, but without a theory of how such changes happen, these will remain correlates only. We might also imagine that cross-sectional differences reflect different positions on some form of common trajectory of change, and that correlates with these different positions are also indicative of the trajectory position. But, again, we need a theory about how entities move on what sort of trajectory to make any sense of the estimates of differential efficiencies.

[4] It is, typically, these difficulties that 'explain' the wide variation in estimates of productivity (TFP) found in the literature for apparently the same countries and regions over the same time periods, as noted, for example, by Matthews (2014).

In the case of the EU dairy farm sector in particular, we can imagine that the existence of dairy quotas (fixed at the farm and national levels) has severely constrained structural adjustment of farm types and sizes, as well as regional distributions of dairy production in the EU. Indeed, as Čechura *et al.* (2017) note, since the April 2015 abolition of dairy quotas, there are signs that dairy production is moving from the less productive states towards the more productive regions (especially Denmark and the Netherlands). These authors also find signs that countries which have a high TFP (Denmark and the Netherlands) are also those where suitability for milk production is relatively homogeneous. We can also imagine that future reform of the Common Agricultural Policy (particularly further reduction or even elimination of direct payments) may assist structural reform of the EU farm sector as a whole, and further convergence of productivity rates.

The third possible interpretation of estimated differences is that these differences are evidence of some sort of market (or political) failure, since the market should equate efficiencies (values of marginal products) at the margin and in equilibrium. Given the strong probabilities of the first two interpretations, adherence to the third is rather unlikely. Even so, without identifying the equilibrating mechanisms which we suppose are being violated, our information on efficiency differences remains largely empty of substantive implication. In addition, both data and theoretical limitations typically prevent the analysis of social efficiency, let alone effectiveness, which should properly take account of externalities such as animal welfare, environmental condition and services, and human health and welfare, especially in the case of the food system.

Much of the applied economics literature on competitiveness in the downstream, marketing, processing and retail chain of the agri-food sector deals with marketing margins and price transmission (Lloyd, 2017). Lloyd warns us that 'simple' examination of price transmission coefficients between the farm gate and retail is seldom reliable evidence of the competitiveness of the chain, despite a common presumption that less than complete transmission, or asymmetry in price pass through, are signs of uncompetitive behaviour.

In distinct contrast to the focus on productivity of the first two papers in this feature, Materia *et al.* (2017), focus on innovation in the EU food chain, specifically on whether innovation is sourced from in-house R&D efforts or outsourced. They make use of the major EU-EFIGE/Bruegel-UniCredit dataset, which cover, inter alia, 1,258 agri-food firms across seven EU Member States (Austria, France, Germany, Hungary, Italy, Spain and the UK) and combine quantitative and qualitative information on firms' characteristics and activities. These numerous items are split into six sections (proprietary structure of the firm; structure of the workforce; investment, technological innovation and R&D; internationalisation; finance; markets and pricing). Most data relate to 2008, though they also include recall data for earlier years, and expectations for 2009. Using a bivariate probit model, the authors do not find that adoption of in-house and outsourced innovative activity or strategy is correlated, despite the fact that almost half the sample adopts both strategies. They show that process innovation has a positive and significant correlation with both outsourced and in-house generated innovation. However, product innovation shows a significantly negative correlation with the outsourcing decision but positive for the in-house strategy, possibly reflecting the specific value of product innovation to firms, which needs to be protected through patents, copyrights and registration of trademarks.

Product innovation is presumably directed towards the quality of products in some sense, which in turn is also likely to reflect the underlying or background competitive conditions surrounding firms. Bojnec and Fertő (2017) examine the unit values of EU agri-food exports at the six digit level (789 product groups), using pooled data from 2000–2011, as an indication of quality of exports. Focusing on the supply side conditions (those of the exporters) rather than the demand side, they find that the unit values of exports are positively associated with economic development and size of population of the exporter, and negatively associated with revealed comparative advantage (measured as a symmetrical version of the Balassa index) and bilateral trade costs (estimated using an inverse gravity framework). Income distribution and income inequalities appear to have little role in quality specialisation as reflected in unit values. These authors conclude that: 'On the supply-side, achieving higher unit values for exports requires investment into research, development and innovation activities, in addition to having favourable factor endowments. The level of economic development (income per capita, or the purchasing power of the population), and market size appear to be important. The direction of causality between supply-side factors in export quality specialisation and demand-side factors that relate to the quality of imports – along with the role of incomes and income inequalities – are issues for further research'.

Olper *et al.* (2017) investigate the possible links between trade (specifically in inputs to the agri-food system) and firm productivity. They ask whether increases in imported intermediate inputs improve domestic firms' productivity performance. These gains could be due to productivity growth achieved through input complementarities, lower input costs, and/or access to new and higher quality inputs.

While substantial data limitations restrict the extent to which this proposition can be tested, Olper *et al.* (2017) make use of US detailed input/output data to measure a consistent index of upstream import penetration, which they argue will be valid for the EU to the extent that technology is comparable between the US and the EU food processing industry. They use firm-level data for food firms in France and Italy (36,000 firms over the 2004–2012 period) to estimate firm-level TFP separately for the Italian and French food firms, and for each of 10 industries. Italian food firms showed, on average, a higher TFP level than the French firms (which are represented by a relatively greater number of small firms). They also improved their TFP at 0.5% per annum over the period, with an increasing number of exporting firms and a growing share of export revenues. In contrast, French exports declined, showing a 3.1% decline in productivity per year over the same period. Between 2003 and 2011, the average measure of vertical import penetration was around 0.5 for both Italy and France. Among the Italian firms, vertical penetration both increased over time and was also significantly greater than horizontal import penetration. Again in contrast, vertical penetration was barely greater than horizontal, and decreased over time in France, reflecting differences in comparative advantage.

These authors find clear evidence of a positive productivity effect of imports, especially of intermediate inputs (vertical penetration), which have a five times greater effect than horizontal imports. They also find that imports at the extensive margin (new products) are more important for productivity improvement than more imports of the same products, especially in Italy. Finally, they find that firms with higher initial levels of productivity gain more from import competition than their less productive rivals.

The final paper in this feature (Dawson *et al.*, 2017) deals with the issue of exporter pricing behaviour for the EU wheat market, and estimates the relationships between export unit values and exchange rates over the period 2000–2013. While there is good evidence of meaningful long-run relationships between exchange rates and export unit values, they do not find any evidence of differential price mark-ups in the major EU export markets, with the exceptions of Belarus and Iceland, where their results imply that exporters price to stabilise unit values in the local currencies. In particular, these authors compare the fixed effects model, typically used in these analyses, with more rigorous fully modified and dynamic models, finding that the fixed effects model tends to indicate more widespread pricing-to-market (PTM) behaviour. They caution researchers that attention needs to be paid to the time series properties of the empirical variables to avoid spurious results from these analyses.

The papers in this special feature illustrate the range of studies generated by the EU COMPETE project[5] and mostly conform to our preconceptions: that the OMS are generally more productive than their NMS peers; innovation and quality improvement are important and are fostered by trade and international competition; that structural change is as important, if not more so, than 'simple' technological change among existing firms and that innovative firms tend to preserve their advantage, at least in the short to medium term. A much more complete synthesis of the project's many studies and findings is provided by Tocco *et al.* (2015), who conclude that: '*the competitiveness of the EU's agri-food sector largely mirrors macroeconomic and social indicators for general competitiveness, such as the World Economic Forum's Global Competitiveness Index (GCI)*' (p. 28), echoing the presumption above.

However, it is also apparent that the economic theory and practice on the issues of competition and competitiveness do not always correspond well with political concerns. Political concerns can become preoccupied with the problems of structural adjustment and the 'losers' from economic development, seeking to ameliorate the socio-economic signals and pressures for such adjustment, rather than assisting with development and change. Popular perceptions of competition frequently include a notion of 'winner takes all' akin to sporting and first-past-the-post voting systems.

On the other hand, the simple economic presumption of the optimality of 'perfect competition' typically ignores the fact that the basic principles of trade are fundamental to the whole of micro-economic theory, i.e. the continual pursuit of individual, firm and industry comparative advantages to better satisfy the demands of consumers (tempered by the state's exercise of collective norms and objectives). Trade and exchange are driven by heterogeneity, in both consumption and production preferences, as well as in resource endowments. Economic competition, at least in the textbook sense, does not generate winners and losers per se. Both economic and natural competition result in 'optimum' use of available resources, governed in the natural case by the laws of bio-physics and in the (socio) economic case by the purchasing power and preferences of consumers. In the latter case, the power of consumers is typically moderated by collective action, often through governments. Indeed, the long

[5] The set of working papers produced by COMPETE are available on the project website: http://www.compete-project.eu/publications/working-papers.html.

arm of the law is necessarily attached to Adam Smith's invisible hand of the market, simply to define and enforce contracts and outlaw theft.

Competition operates through a continual search for the best fit between capabilities of firms and the demands of their surrounding environments, including competitors. Adaptation and innovation are key components of the process. Successful competitive strategies involve finding niches in which the particular specialised and innate capabilities of firms can thrive both in spite of and because of those competitors. Socio-economic competition develops this basic strategy into more formal trade, relying on the principles of comparative advantage in the first instance, subsequently developing into the resource-based theory of the firm (e.g. Barney, 1996). In particular, competitiveness, as a process rather than a state, relies on technological innovation and structural change, and depends on heterogeneity, both amongst resources and the preferences of both producers and consumers. In this sense, it appears that competitiveness will necessarily depart substantially from the economic textbook conception of 'perfect'. We strongly suggest that further exploration of competitiveness at the sector and firm levels needs to focus more on the processes of socio-economic competition than on its current or past states, and that an evolutionary perspective may well be more suitable to this exploration than the conventional comparative static, neoclassical economic framework of competition.

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