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An analysis of organic market information in the EU-15:
lessons for the Irish organic sector

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Abstract

Organic farming is seen as a solution for responding to environmental, food safety and animal welfare concerns making it significant to policy makers. With current policy targets focused on increasing supply (i.e. area share), there is the expectation that supply will automatically be met with increased market share (i.e. demand). There is no understanding of the relationship between the area share and market share variables and whether area share targets will translate into increased market share, or vice versa, yet this is important for farmers in Ireland who face uncertainty in the market. Data from three consecutive years is analysed to test the relationship between the variables and generate lessons for the Irish organic sector from high market share countries.

The results indicate that a significant positive linear relationship exists between area share and market share. This provides useful information for target setting and provides strong evidence that market share targeting is warranted. Additionally the covariance analysis confirms that ‘market share’ and ‘country’ significantly influence the variation in area share. This provides the basis for a more comprehensive review and country comparison between high market share countries (Denmark and Germany) and low market share country (Ireland) as national country factors strongly impact area share and in turn market share growth.

The author concludes that interventions focused on increasing either area share or market share will have a positive impact on the other, and interventions targeting both are warranted. The factors of ‘country’ and ‘market share’ explain a high proportion of variance in area share, and therefore country factors such as national policy, government support, national branding, market structures and socio-economic factors have a substantial role to play in influencing the area share-market share relationship. The outcome of the research is a number of recommendations for Ireland around stronger national policy, balanced policy targets and organic brand development supported through government intervention.

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Chapter 1: Introduction

1.1 Introduction to the study

“The increase in production and consumption of organic food is one of the major market trends of our time” (Allen and Kovach, 2000:221)

Organic farming is often seen as a panacea for responding to environmental, food safety and animal welfare concerns. The perceived link between organic farming, on-farm processing and direct marketing, as well as the potential contribution of shorter food supply chains to rural development, make it particularly striking to policy makers (Darnhofer, 2005). Organic methods go a step further to reduce certain negative externalities associated with conventional agricultural production in terms of land and resource use, pesticides and biodiversity loss (Stolze and Lampkin, 2009). The notion that social goods like environmental preservation can be procured through the market is well established in various approaches of environmental economics and is one of the underlying theories in understanding organic markets (Allen and Kovach, 2000).

Organic foods, grown in the absence of synthetic chemicals, are one of the fastest growing segments of agricultural output worldwide (Park and Lohr, 1996). Within Europe there has been a general trend of growth in organic production (European Commission, 2014), both in the area under production and the size of the market. Organic products are now no longer a niche sector and instead represent a market of about €20 billion per year with average growth of 8% per year since 2008 in Europe, despite the global financial crisis (European Commission, 2014). Due to increasing importance in the EU's agriculture economy, the range of products offered to consumers has been significantly increased and organic products are available across specialised shops, major supermarket chains and via the internet. In Europe, sales growth in 2015 is estimated at 6% per year, with the largest markets in Germany, France and the United Kingdom (UK) (Willer & Lernoud, 2015). Organic production has gained political and institutional support through the Common Agricultural Policy (CAP), which since its reform in 2013, recognises organic practises and supports the conversion to, and the maintenance of organic farming methods (Irish Examiner, 2013; European Commission, 2014).

National strategies, targets, incentives and market mechanisms have an important role to play in the adoption of organic farming and the growth of organic markets (Daugbjerg, 2010). In Ireland, the organic sector makes up a very small component¹ of a much larger indigenous agri-food and fisheries industry², yet strong national demand is responsible for the import of 70% of Ireland's organic commodities, mainly fruit and vegetables despite appropriate climate for local production (WDC,

¹ 4.16% (Food Harvest 2020)

² Food Harvest 2020: This is the strategy for the medium-term development of the agri-food, fisheries and forestry sector for the current period to 2020.

2015). Recognising this, Ireland put forth an organic farming action plan in 2013 as the instrument to deliver on Ireland's Food Harvest 2020 target to increase the area under organic production (area share) to 5% from its current 1.3%.

This research reviews the organic market in the EU, through the market mechanisms of supply and demand. It quantifies the relationship between area share and market share, and the dynamics surrounding this relationship. It analyses area share and market share in European Union (EU) countries to establish if the 'area share' and 'market share' variables are correlated, which would allow prediction of one variable from the other. This can be used to estimate what effect the change in supply will have on demand, although this does not determine causality.

Supply is quantified through *Area Share*, the percentage of land under organic production of the total agricultural land. Demand is quantified through *Market Share*, the percentage of organic sales of the total agricultural sales. Both are commonly used concepts in agricultural reporting and have been defined in Willer and Lernoud (2015) and Latacz-Lohmann and Foster (1997).

The study builds on the statistical analysis with a review of literature to identify factors ranging from national strategies to market mechanisms, and socio-economic factors that underpin a successful organic sector. Using identified factors; two high market share countries are comparatively reviewed at a finer scale. Findings are compared to Ireland in order to draw comparisons and generate lessons for the Irish organic sector. This is important given that Irish farmers fear conversion, national demand is low, returns on investment are small, and the sector suffers from a high degree of fragmentation which hinders growth and development (Healy, 2014; Department of Agriculture, Food and the Marine, 2013).

This research makes a substantial contribution towards evaluating the current state of organic farming broadly in the EU-15 and particularly in Ireland, in an area where research has widely been limited (Willer and Lernoud, 2015). It contributes to the body of literature by establishing the existence and strength of a correlation between area share and market share, and explores additional factors that have a profound impact on organic markets (Michelsen *et al.*, 1999; and Moschitz and Stolze, 2009). This type of research focused on reviewing policy design and factors that increase demand are warranted for growth and development in the sector (Park and Lohr, 1996).

1.2 Problem Statement

With current policy targets focused on increasing supply (area share), there is the expectation that supply will automatically be met with increased market share (i.e. demand). There is no understanding of the relationship between area share and market share and what interventions focused on increasing either area share or and market share will achieve. There is also little understanding of factors that

impact the area share-market share relationship, yet certain countries appear to perform well in terms of market share while others perform poorly.

This is important for Ireland as organic imports are at 70% in Ireland (WDC, 2015) and the Irish governments' organic strategy is targeting increases in area share to grow the sector. While other market share mechanisms are mentioned in the strategy in the way of support schemes, building consumer awareness, developing export markets and on-going research and development (Department of Agriculture, Fisheries and Food, 2010), targets to increase market share and generate revenue have not been considered.

We propose that a relationship exists between market share and area share, and that countries with high market share also have high area share. We also establish if high market share countries actively focus on factors that increase market share.

1.3 Aims and Objectives of the study

The study has four objectives:

1. To establish if market share corresponds to area share (i.e. is there a significant difference in area share between high market share countries and low market share countries).
2. To test if a relationship exists between market share and area share, and establish the strength and significance of the relationship.
3. To identify factors that influences the area share-market share relationship.
4. To draw comparisons and generate lessons for the Irish organic sector from 'High' Market share countries.

1.4 Structure of the thesis

The body of the thesis is made up of five chapters. Chapter 1 introduces the topic, lays out the aims and objectives, and explains the significance of the study. Chapter 2 is a review of the literature around the topic of organic farming and its development. It also discusses the framework of the study and discusses significant gaps in the literature which this study will help to address. Chapter 3 explains the methodology of the study and describes the rationale for using a mixed method approach. Chapter 4 presents the findings of the study. It provides the results of statistical analysis and the outcomes of a review of market information in high market share countries, in comparison to Ireland. Chapter 5 wraps up the analysis with a detailed discussion of the findings and implications of the study.

Chapter 2: Literature Review

2.1 Introduction

This chapter reviews the organic farming movement, the development of the sector, market trends and the policy and legal framework prevailing in the organic sector in the EU-15. It also explains the supply-demand relationship, quantified through area share and market share. This sets the framework for testing if a significant correlation exists between area share-market share, and developing a structure to evaluate underlying influences in the market drawing on lessons from high market share countries, that have a comparative advantage in organic markets.

The organic agriculture movement began in the 1930s and 1940s in the major industrial nations of Germany, Britain, Japan and the U.S. gaining traction in the 1960s as an alternative to the increasing intensification of agriculture, particularly the use of synthetic nitrogen based composts (Lotter, 2003). Organic farming is distinguished from conventional and other forms of farming by the prescriptive legislated and voluntary standards, stringent certification procedures and production measures governing the sector (Stolze *et al.*, 2000; Răducuță, 2011). While the organic food market initially developed as a means to an end, ultimately providing compensation to producers for the internalisation of externalities; today the market is reputable and perceived as an end in itself, with development driven through state intervention (Stolze and Lampkin, 2009).

2.2 Organic Agriculture

Organic agriculture places an emphasis on environmental protection and animal welfare (Răducuță 2011). It is considered to be the original and mainstream type of agriculture compared to ‘conventional’ (industrial) agriculture which departs from natural practises (Kristiansen *et al.*, 2006; Ruttan, 1999). The environmental benefits of organic agriculture are also widely accepted in terms of sustainability, water quality, biodiversity and ecological services. In its approach, it considers the medium and long term impact of agricultural interventions on agro-ecosystems. In its techniques, it employs soil building practises such as crop rotation and intercropping, and avoids the use of pesticides and herbicides which cause groundwater pollution (Food and Agriculture Organisation, 2015). A more detailed description of organic agriculture practises is provided in Appendix A.

Agriculture as a sector is faced with the dual challenge of providing for a growing population with their rising demand for meat and high-calorie diets, while simultaneously curbing its environmental impact (Seufert *et al.*, 2012). Organic agriculture is often proposed as the solution. However the main criticism of organic agriculture is its likelihood to generate lower yields, thereby requiring more land than conventional agriculture to produce equivalent harvests. This would lead to more extensive land transformation, deforestation and biodiversity loss which would in turn undermine the very principles of sustainable organic practises (Seufert *et al.*, 2012).

Other criticisms lie in market barriers in the form of high conversion costs in adopting organic agriculture, low uptake of organic production and uncertain yields which have encouraged regulatory support, financial incentives and subsidies to promote growth and development. However, Lampkin (1999) highlights that there are a number of shortcomings to using subsidies, which include the added expense of incentives with no guaranteed return, as adoption depends primarily on perceptions about future yields. Also financial support schemes cannot ensure the economic viability of organic farm operations in the long run and more importantly subsidies and other financial incentives dissuade the recently initiated processes of agricultural market liberalization. The case of Finland is particularly significant, where subsidies introduced by government created a lucrative and attractive environment for farmers, encouraging conversion to organic production which helped Finland increase its total area under organic production by 120,000 hectares during the 1990s. However this was later abandoned in favour of free market principles to manage supply and demand, in addition to being overly costly (Pietola and Lansink, 2001).

Unethical purchasing motivations and attitudes likely underpin organic consumer purchasing decisions. This is supported in a publication by McDonagh and Prothero (2005) titled ‘the representation of food in everyday life’, where they found that food in the 21st century is wrought with paradoxes, confusion, and dilemmas. Further research by McEachern and McClean (2002) into organic consumers in Scotland supports this view where their findings correlate to consumer purchasing decisions based more on self-interest (i.e. better taste, food safety) rather than on altruistic decisions as would be expected.

The exclusion of lower socio-economic groups and less educated groups from organic consumption is another major criticism. Research by McEachern and McClean (2002) finds that demographics influence organic purchasing decisions with lower socio-economic, less educated groups excluded from purchasing organic products due to price premiums. Rigby *et al.*, (2001) find that higher prices alienate lower income consumers, causing market-led downsizing as the organic market becomes more segmented, mainly targeting higher income earners. This alludes to a reliance on consumer demand and loyalty over necessity, which is a specious foundation for growth and expansion (McEachern and McClean, 2002). However these criticisms either seem unjustified or reflect only segmented markets, as disparate research findings by Fotopoulos and Krystallis (2002) indicate that lower income households have been found to be more loyal to organic products. Organic purchases are therefore more likely attributed to positive attitudes toward organic food irrespective of socio-economic standing (Peart, 2013)

2.3 Market development – theoretical considerations

Organic agriculture is perceived to be linked to a social movement representing an alternative to conventional agriculture (Michelsen *et al.*, 2001). Yet it is also considered to be the original and mainstream type of agriculture compared to industrial agriculture which departs from the practices that agriculture has followed since its inception (Kristiansen *et al.*, 2006). As a consequence the organic movement developed independently with its own private extension services, market development support, information, training, inspection and certification, quality assurance systems and private standards defining the sector (Moschitz *et al.*, 2004). Researchers like Moschitz *et al.*, (2004), Park and Lohr (1996) and Daugbjerg (2010) are of the view that supply side factors drive growth in the sector, proposing that growth will depend on the decisions of individual farmers, the motivations placed upon them by consumer demand, enabling policies, strategies and support, as well as overcoming market barriers caused by supply and demand factors.

In contrast, the International Livestock Research Institute (ILRI) places greater emphasis on demand factors, highlighting the need for a structured marketing framework and system to drive organic markets. Their vision is a marketing system that is comprised of a number of well-established fundamentals relating to the products and their characteristics being conveyed from producer to purchaser, the features of participants (e.g. producers, retailers, and consumers), the functions or roles each participant performs in the market and the locations, stages, timetables and physical arrangements involved (ILRI, 1995). They believe continuous evolution is necessary in order to respond to production and the nature of the goods being marketed. This demonstrates that the type of product, the number, size and mass of producers, the infrastructure, policy and institutional environments all determine the type of marketing system and the effectiveness with which it operates.

Ideally marketing and trade allow specialisation of activities, which lead to enhanced resource-use efficiency and economic growth (Johnson and Turner, 2003), which further increases the tasks and activities of marketing and creates employment and other avenues for development. However certain prerequisites are required for this market to develop including proper linkages between rural areas and urban centres of consumption, a conducive policy and institutional environment for marketers to operate effectively, and for markets to expand beyond the basic need levels of consumers and producers, to respond to a fluid relationship between supply and demand in the market (ILRI, 1995).

A third idea is presented by Michelsen *et al.*, (1999) who propose that organic production encounters a number of fundamental problems, which are unavoidable and stem from the unique circumstances surrounding the concept of organic food products. Products are seen not only as competing with other varieties of fruits, vegetables and beverages, but as competing concurrently with all products produced under non-organic conditions. This introduces some complexity to managing supply and demand in the market in terms of predicting demand and structuring marketing systems. Furthermore,

organic products, along the entire supply chain from production to processing require proper labelling to convey their organic origin (Janssen and Hamm, 2012), which introduces an additional cost into production, marketing and distribution. This also precludes a single entity from benefitting from the promotion of products under the 'organic' label, as other firms get part of the marketing effect for free. Supply also cannot respond enough in reaction to changes in demand, because of the conversion period accompanying organic farming and this creates a market that differs substantially from other market types. According to (Michelsen *et al.*, 1999); this leads to different markets developing national specialities, particularly where markets are small.

2.4 The Development of the Organic Sector

The first use of the term "organic farming" was by Lord Northbourne, in his book *Look to the Land* published in 1940 (Kristiansen *et al.*, 2006, Lotter, 2003). 'Organic' in reference to agricultural production differs across countries and regions for many reasons including different legal frameworks, variances in certification agencies, rigorous compliance requirements and traditional methods of production. It is generally defined as an approach to agriculture which highlights environmental protection, animal welfare, food quality and health, sustainable resource use and social justice objectives, while utilising the market to help support these objectives and reward the internalisation of externalities (Lampkin, 2003).

The early development of organic agriculture can be summarised into three stages as presented in Figure 1, which has developed the sector to its present position. The modern organic movement is centred on environmental issues and social concern along the full organic supply chain from inputs to manufactured products, institutions, policies and market structures (Kristiansen *et al.*, 2006). The initial stage, 1924-1970, was one of core research and documentation, at a time of extreme financial difficulty and tremendous hostility from opposing and powerful chemical lobbyists. The second stage between 1970 and 1980 was characterised by key organic symbol schemes, increased 'green' awareness driving consumer demand and an increase in the number of retail stores. Finally in 1980, organic agriculture gained approval prompting the development of national and international support, and the introduction of organic aid schemes for farmers (Tate, 1994). These stages are discussed in more detail individually and presented in Appendix B.

Figure 1: Three stages in the development of organic agriculture



2.4.1 The modern organic movement

Since the middle of the 1980s, organic farming has gained prominence, with significant attention from policy-makers, consumers, environmentalists and farmers in Europe. Government support for organic farming in recognition of its wider benefits, began in the late 1980s, with national initiatives in countries like Denmark, Austria and Switzerland, as well as programmes in a number of EU member states under the framework of the EU Extensification Programme (Commission Regulation (EEC) No. 4115/88) (Lampkin *et al.*, 1999). This turning point coincided with public concern about the negative environmental and other impacts of agricultural development, and the introduction of policies to support agri-environmental initiatives like organic farming. This was reinforced by the implementation of Council Regulation (EEC) No. 2092/91 in 1993, which provided an important basis for many of the market and policy initiatives that have followed, and has facilitated the 75% growth in organic farming in Europe over the last decade (Stolze and Lampkin, 2009). On the one hand organic farming development has become more and more an instrument of state agricultural policy, yet on the other hand policy makers are challenged as the concept of organic farming does not belong to governments to modify and adapt at will. Instead it is a concept has been developed by producers and interested stakeholders since the early 20th century and sustained by consumers through specialist markets since the 1970s (Lockeretz, 2007).

Historically, in the absence of other support, organic producers turned to the consumer to support their principles and practices. Originally the organic food market developed as a means to an end, in effect providing compensation to producers for the internalisation of externalities (e.g. environment, animal welfare), but the market is now often seen as an end in itself, as modern consumers typically see

organic food as a healthy, safe and high quality option for which they are willing to pay price premiums for products (Stolze and Lampkin, 2009).

There has also been a steady conjunction of policy objectives with the underlying goals of organic farming (Willer and Lernoud, 2015), and since the 1990s new considerations have been added to agricultural policies worldwide. An increasing number of countries, including the European Union (EU), have begun to recognise the principle of sustainability in their policies concerning the use of agricultural and natural resources. They have also sought to liberalise their agricultural sectors by reducing support policies and dismantling agricultural trade impediments (Willer and Lernoud, 2015; Andreosso-O'Callaghan, 2003). This was initiated at the Uruguay Round on Trade, and strengthened by the founding of the World Trade Organization (WTO), and is expected to continue in further, upcoming negotiation rounds on trade. Formal steps have been taken in the EU to adjust both policy and practise with the introduction of quality and environmental standards in farming through the Common Agricultural Policy (CAP). This coincided with the institutionalisation of techniques for producing differentiated versions of agricultural products such as Protected Designations of Origin (PDOs), Protected Geographical Indication (PGI), and organically produced commodities via EU regulations.

2.5 Agricultural Policy in Europe

The Common Agricultural Policy (CAP) governs all agricultural production in Europe, and forms the framework under which agricultural instruments operate. The CAP aims to achieve certain objectives; among them stabilising markets and assuring the availability of food supplies (Krause, 1998; European Commission, 2015). Organic farming is affected directly and indirectly by the CAP (Moschitz and Stolze, 2009), and for this reason, it is important to consider in this review. The CAP based on Article 39 of the Treaty of Rome signed at the end of World War II, has acted as a core driver of European integration, facilitating growth and development of the agricultural sector in Europe (Krause, 1998). Although strongly criticised during the 1980s (Fennell, 1985), it has transitioned the EU from a net importer of food commodities to a net exporter of food and one of the main players in world food markets at present (Fennell, 1985; Krause, 1998). The CAP has evolved since it was first established in 1962, with recent reform in 2013 to promote viable food production, sustainable management of natural resources and balanced development of rural areas throughout the EU (European Commission, 2015).

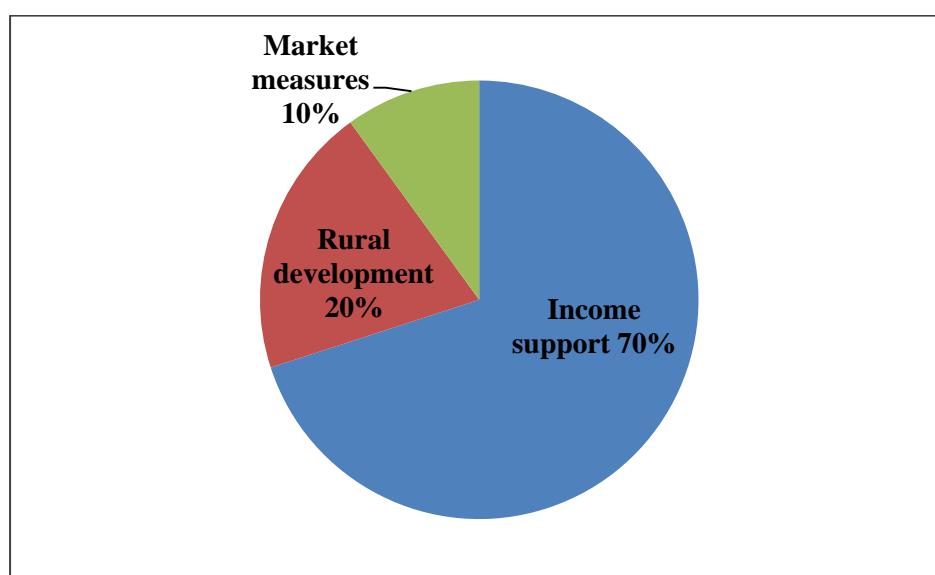
Under the CAP framework, organic farming policy networks vary widely across Europe in the network density, numbers of actors and dominance of organic farming organizations or agricultural ministries (Moschitz and Stolze, 2007). A more detailed description is provided in Appendix C.

Currently, organic farming in the EU is governed by Council Regulation (EEC) No 834/2007. Comprehensive rules regarding implementation and practise for organic products and labelling are stipulated in Council Regulation (EC) No 889/2008 (Răducuță, 2011). There have also been a number of recent developments. In 2014 the European Commission approved a new EU organic action plan and published a proposal for new organic food and farming legislation. Additionally in 2014, The European Technology Platform for Organic Food and Farming Research published priority topics for the EU's Horizon 2020 work programme for the 2016/2017 period (Willer and Lernoud, 2015). Organic actions plans, discussed further in Appendix E, are an additional emerging tool for organic market development at a local scale.

2.5.1 CAP Budget and spending

Under the CAP, EU countries are able to offer specific support in their rural development programmes to conventional farmers wishing to make the switch to organic farming encouraging greater area share in organic production (European Commission, 2015). This is a novel step towards supporting conversion and increased area share at the EU level, and is expected to become more widespread as specific aid for organic farming and the possibility of receiving aid for both converting to, and maintaining organic farming will become more widely implemented. The spending structure is described in greater detail in Figure 2 (European Commission, 2015).

Figure 2: Breakdown of projected CAP budget and spending in Europe in 2015



Current spending is tilted towards increasing supply through support for increases in the area under production, with only an insignificant portion spent on market measures, indirectly through rural development spending and directly through supporting market measures. Further information is available in Appendix D.

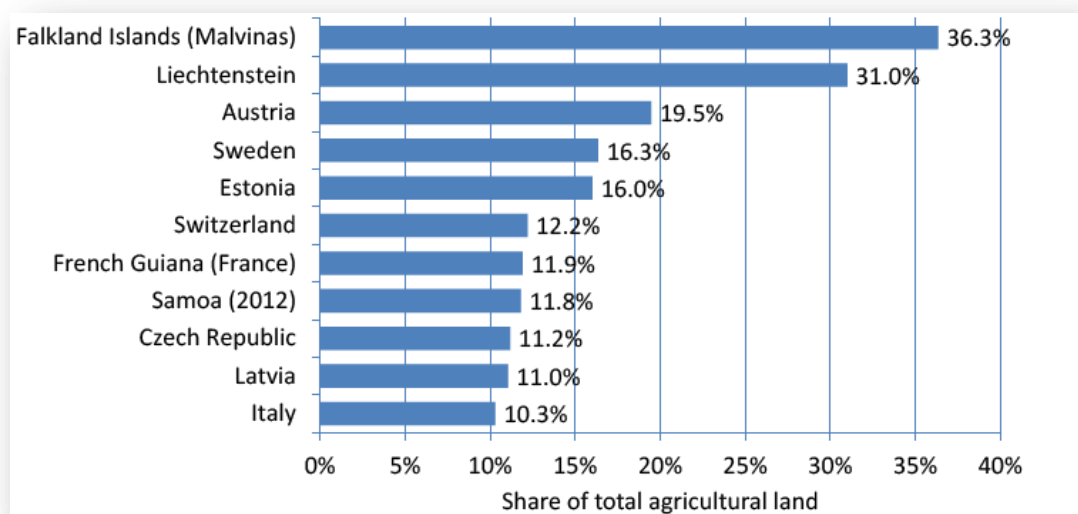
Despite reform in CAP spending, support at a broader EU level for organic farm conversion, payment schemes and market mechanisms still seems to remain relatively low and strongly tied to national initiatives. Where 70%, the largest portion of the budget is allocated to direct payments to farmers adhering to sustainable practises, these payments do not distinguish between organic and conventional farmers, particularly as organic farmers incur a greater financial burden to meet the added conditions of organic legislation and certification (Janssen and Hamm, 2012). The 10% allocated to market support measures which serves to promote and sustain market share, is less than the portion spent on supporting area share (70%) and is specifically linked to adverse weather conditions which effectively destabilises markets, instead of on efforts to support operators, retailers and processors who are important players in the organic market.

2.5.2 Trends in organic farming

The organic trend is maintaining clear resilience with 170 countries engaged in organic production in 2013 and steady growth in world sales. Consumer demand is stable and organic products to the value of 72 billion US dollars were sold in 2013 (Willer and Lernoud, 2015). Currently, organic farming is growing at 10% in advanced markets with 27% of the world's organic land in Europe. Spain, Italy, France and Germany have the largest agricultural areas under organic production, while eight EU countries had more than 10% land under organic production in 2013, with Lichtenstein (31%), Austria (19.5%) and Sweden (16.3%) recording the highest percentages (Figure 3). Organic sales growth is estimated at 6% per year, with the largest markets in Germany, France and the UK (Willer & Lernoud, 2015).

Despite this positive outlook for the organic sector, data is still under reported on market trends which threatens the sectors' ability to attract different stakeholders and hinders decision-making on the costs and benefits of organic production. The total world volume of organic production pales in comparison to the overwhelming majority of conventional products, and organic labels still face competition from other sustainability labels (Willer & Lernoud, 2015).

Figure 3: Growth of organic agricultural land in 2013



(Willer and Lernoud, 2015:40)

2.6 Supply and Demand Framework

Governments in the EU-15 pursue a number of guiding principles or policies to overtly influence supply and demand for organic farm products (Knutson *et al.*, 1998; Daugbjerg, 2010). The organic markets and the organic sector in the EU-15 are explored within this supply and demand framework in line with the proposition by Michelsen *et al.*, (1999) that the interplay between demand, supply and subsidies characterise all countries with large organic sectors and seem to be a prerequisite for market development.

The rationale for focusing on the EU-15 rests on the fact that joining an economic community like the EU opened new markets for agricultural export and provided access to alternative markets outside of domestic markets (EU matters, 2011, Tate, 1994). Selecting countries that ascended to the union in the same time period as Ireland, subject to similar policy instruments, with readily available data and consistent data collection was most appropriate for this study.

Demand-side policy instruments are directly or indirectly aimed at creating increased demand for organic products (Daugbjerg, 2010). The demand for organic agricultural products typically comes from two segments; domestic markets and export markets. Demand is sensitive to changes in income, population and consumer preferences (Knutson *et al.*, 1998), and these factors are explored in greater detail in the country reviews. A further complexity arises with the demand for agricultural products often being inelastic, with prices falling dramatically if the market is saturated and rising sharply if there are shortages (Zadocks, 1985). However, Kottila and Rönne (2008); Loureiro and Hine (2002)

also report that demand for organic products is not homogeneous and purchasing decisions are not consistent across all types of organic products at the same level.

On the other hand, supply-side policies directly or indirectly create incentives for farmers to convert to organic farming (Daughjerg, 2010). Certain supply control programs may restrict production and thereby raise prices. Interventions and programs like target price programs, subsidies and direct payments guarantee specific commodity prices irrespective of market prices, and encourage continuous production and supply (Knutson *et al.*, 1998).

Further information on the nature of government subsidies, incentives and current market conditions is available in Appendix F and Appendix G. These dynamics have impacted supply and demand in the EU-15.

2.7 Organic Market Structures

The operating environment of organic production includes a number of stakeholders along the dynamic supply chain from producers, through to processors, importers, exporters and retailers, and consumers (Willer and Lernoud, 2015; Michelsen *et al.*, 1999).

Organic markets can be understood through the marketing mix or 4Ps framework (Figure 4) first proposed by McCarthy (1964), adapted by Kotler and Armstrong (1994) and later defined in standard textbooks on global marketing management and strategy such as Lee and Carter (2005). This approach is also used by Michelsen *et al.*, (1999) in their review of the development and growth of European organic markets. It provides a framework to understand how market planning translates into practise and still remains a consistent approach today (Goi, 2009).

2.7.1 Place

The aspect of place concentrates on the sales channel (Kotler and Armstrong, 1994). The Netherlands is a good example of a country where most of the trade takes place through specialised shops. This channel provides a market that is largely separate from conventionally grown products and enables producers to distinguish products on the grounds of other characteristics (e.g. freshness, locally grown). In Austria and certain Scandinavian countries (e.g. Finland); supermarkets are the most dominant sales channel. Trade also takes place internationally, with markets for fruit and vegetables ranging more extensively due to climatic regions. International trade is particularly influenced by national organic movements and by agriculture and trade policies, harmonised standards, capacity to expand production and the presence of distribution networks (Michelsen *et al.*, 1999).

Figure 4: Marketing Mix Framework to understand organic markets



(Adapted from Michelsen *et al.*, 1999)

2.7.2 Price

Consumer and producer price premiums prevail in the sale of organic products across the EU-15, with certain products commanding higher price premiums like eggs compared to milk and beef (Willer and Lernoud, 2015). Distribution costs have an impact on prices. Where market shares are large and distribution is mainly through supermarkets (e.g. Germany) consumer prices tend to be lower (Michelsen *et al.*, 1999) as products are widely supplied and readily available. This is likely the result of a low cost strategy by retailers to keep prices low, capture higher sales volumes and achieve economies of scale.

2.7.3 Product

Three aspects of organic product definitions are presented by Michelsen *et al.*, (1999) which serve to distinguish organic products entering a market. Firstly organic products are defined via certification through various public, private and regulatory standards (e.g. EU standards introduced in 1999). Secondly, compliance with quality standards ensures food always appears attractive and consistent (e.g. fruit size and quality). Thirdly the range of products offered is an important aspect in capturing the market and meeting consumer demand. While not all organic products meet these criteria all the time, one of the purposes of quality standards and certification is to ensure consistency and quality in products reaching the market. Furthermore, this product image criteria was found to be ranked highly among Greek organic wine consumers who ascribed product and image sub-criteria such as quality

(e.g. taste, colour, aroma, delicacy), reliability and retail price, as the main advantages of the product (Fotopoulos *et al.*, 2003).

2.7.4 Promotion

Promotion refers to the communication with consumers, providing the information to encourage them to purchase a product (Michelsen *et al.*, 1999). Strong public awareness and political discussions on environment and welfare provide positive publicity for organic products. Features like strong branding help distinguish organic products from conventionally produced products, and drive the consumer purchasing of organics Briz and Ward (2009) found strong evidence of this among Spanish consumers, where the likelihood of consuming organic products increased rapidly as awareness increased. This translated directly into an increase in demand to a point. Yet in Finland, Peart (2013) identified other influencing factors such as organic consumer beliefs and attitudes.

Andreosso-O'Callaghan (2003) also find a relationship between agricultural production and country size, with the intensity of specialisation most often inversely related to country size. Larger EU states have a more diversified organic agricultural sector than smaller states. For example, Ireland and Luxembourg are extremely specialised, with Ireland focusing on milk and beef production and Luxembourg producing milk, meat and wine. In contrast Italy and France are more diversified with Italy producing fruit, vegetables, milk, beef, veal and olive oil, and France producing wine, milk, beef, wheat, fruit and vegetables (Andreosso-O'Callaghan, 2003).

2.8 Certification and Legislation

Regulation is an important aspect of the organic produce market. It serves to maintain the high ethical standards of the organic movement, to preserve consumer confidence in products, to bolster authentic organic farming and provide the basis for transporting organic produce across borders. Certification schemes are open to farmers, wholesalers and processors, who once certified are permitted to label their products with the certification symbol (Tate, 1994).

Certification bodies take on a number of different approaches within the EU-15. Germany uses separate approved certification bodies for each of its 16 states. Britain and France have set up national standards for organic certification (e.g. UK Register of Organic Food Standards – UKROFS) that register and approve organic certification bodies. In Denmark and The Netherlands, certification is carried out partly or entirely by governmental or quasi- governmental agencies (Tate, 1994).

In contrast, the organic sector in Ireland is governed by EU legislation, as opposed to national certification schemes. This is implemented by the Department of Agriculture, Food and the Marine, diminishing the value of a national brand. Farmers, growers and processors undergo a stringent annual inspection process before receiving a licence from one of the Organic Control Bodies to certify and

trade their produce as organic. Organic production is regulated by five bodies including the Irish Organic Farmers and Growers Association (IOFGA), Organic Trust, The Institute for Market ecology (IMO), Global Trust Certification Limited (GTC) and Biodynamic Agricultural Association (BDAA). All foods produced to these organic standards are permitted to be labelled as 'organic' by these bodies (Bord Bia, 2015).

2.9 Conclusion

While a common union may provide new markets and opportunities for growth in the organic sector, through standardisation and a similar legislative framework, in reality the level of state involvement and policy intervention has differed widely across the EU-15. Financial support and policy targets for the sector have been disproportionately skewed towards increasing area share over market share at the EU level, permeating to national level initiatives as well. This poses a risk for market inefficiencies unless factors that improve demand are also investigated, and a greater understanding is developed of the impact of area share targets on market share.

Until the recent CAP reform in 2013, which spurred the development of national organic actions and strategies, policy support for organic practises was largely unrealised, except in countries which adopted a commercial focus at an early stage. Although a positive upward trend in sales growth and area share is evident, the process of market development has been heterogeneous and the sector itself is faced with a number of complexities around pricing and promotion due to stringent certification and monitoring requirements, among other challenges.

State intervention, national strategies, financial incentives, market structures and market mechanisms are only some of the factors that seem to play an important role in market development to increase market share.

Chapter 3: Methodology

3.1 Background

The purpose of this study is to examine the relationship between two continuous variables; area share, an indicator of supply and market share, an indicator of demand³ in the EU-15. The literature has indicated that the interplay between these variables is important to inform policy goals and achieve growth in the sector.

High MS appears to be related to high AS. We therefore test for a difference in area shares, between high and low MS countries. A small sample of 14 countries is used to perform a T-test, in order to establish a difference in means. The hypothesis to be tested is as follows:

$$H_0: \quad AS \text{ (High MS countries)} \neq AS \text{ (Low MS countries)}$$

$$H_1: \quad AS \text{ (High MS countries)} = AS \text{ (Low MS countries)}$$

Secondly we aim to establish if a relationship exists between market share and area share, and what is the strength and significance of this relationship. This was initially tested using a regression analysis (which determines causality), although this does not account for the internal variation within the variables, and a Pearson's correlation coefficient was computed instead. The hypothesis to be tested is as follows:

$$H_0: \quad \text{There is no relationship between area share and market share}$$

$$H_1: \quad \text{A relationship exists between area share and market share}$$

3.2 Design and Sample Selection

The research uses a mixed method incorporating both quantitative and qualitative approaches. A sample of data pertaining to MS and AS for 15 EU countries was obtained for three years (2011-2013) from various sources (Appendix I, Table 5), or was calculated by the author using the equations for area share and market share below.

$$\text{Area share} = 100 \times (\text{total area under organic production} \div \text{total agricultural area}) \quad (1)$$

$$\text{Market share} = 100 \times (\text{total organic sales} \div \text{total agricultural sales}) \quad (2)$$

The raw data is presented in Appendix I, Table 6. All statistical analyses were computed using the SAS 9.3 (2011) statistical programme and results are presented in Appendix I.

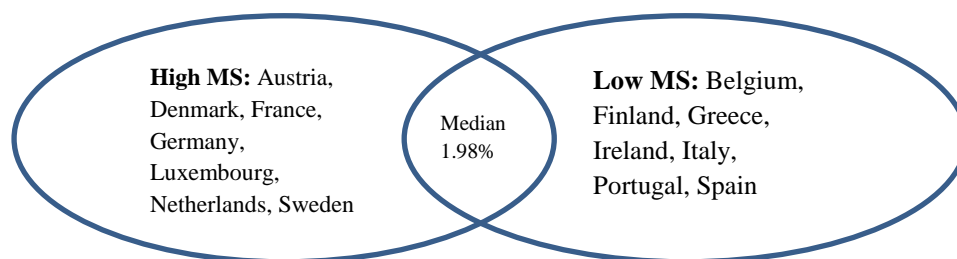
³ The acronyms 'MS' is used to refer to Market Share and 'AS' to refer to Area Share

3.3 Data Analysis

3.3.1 Pooled T-Test

The means across three years for each country were computed for AS and MS and analysed using the SAS PROC T-TEST procedure to test for a difference in means. Data were tested for conformation to normality and the test itself includes an analysis for homogeneity of variance. The median MS (1.98) was calculated using the Mean MS values for all countries, and countries were grouped based on this. Countries with Mean MS above the median point were categorised as “High” MS countries and below the median point as “Low” MS countries. The results are displayed in Figure 5.

Figure 5: Categorisation of EU countries based on market share



3.3.2 Correlation Analysis

The strength of the linear relationship between MS and AS was tested by computing a Pearson's correlation coefficient, using the SAS PROC CORR procedure. Fourteen countries were used in the analysis (excluding the UK where data was unavailable for MS).

3.3.3 Covariance Analysis

When a relationship was established, the analysis of covariance model using the SAS PROC GLM procedure was computed to establish to what extent other variables explain the variance in AS. For this analysis, the specific values for AS and MS for each year and country, as presented in Appendix I Table 6, were used.

3.3.4 Country review and analysis of market factors

Two countries; Demark and Germany were selected from the “High” MS countries for further review. A ranking and scoring method was constructed to objectively appraise the performance of each country against each factor. This methodology was developed in line with guidance from the Northern Ireland Guide to expenditure appraisal and evaluation (Department of Finance and Personal, 2015). Ten factors were individually ranked on 5-point qualitative scale from robust to arbitrary. Each country is assessed against each factor (based on literature) and categorised on a qualitative scale. While qualitative ranking is often sufficient to determine performance⁴ a numerical scoring system

⁴ Department of Finance and Personal (2015)

(scale) offers greater comparative ability. Therefore each factor was also ranked on a numerical scale from ‘Arbitrary’ (1) to ‘Robust’ (5). The qualitative rank, description and numerical score information is provided in Table 1. The numerical scoring enables quick comparison of country performance at each factor level, as well as overall, when the total score is calculated out of 50 and converted to a percentage.

Table 1: Description and explanation of the scoring system

Rank	Description	Score
Robust	Strong, powerfully built, long lasting, exceptional standard.	5
Good	High, superior standard	4
Moderate	Average, ordinary, minimum standard.	3
Poor	Lacking, defective, insufficient standard	2
Arbitrary	Random, inconsistent in effort	1

3.4 Limitations

Detailed analysis of AS and MS can only take place where data is reported and readily available. However in practice studies are constrained by a variety of factors, most notably small sample sizes, varying methods of collection and lack of data reporting. Scientific methodology therefore prescribes that good practices are employed to gain sufficient data that can be extrapolated to make predictions about general trends and relationships. Appendix H further discusses some of the limitations experienced.

Chapter 4: Findings

4.1 Pooled T-Test

The pooled T-test results (Table 2) reveal no significant difference between the means of the two groups ($p > 0.05$), therefore we reject the null hypothesis at the 95% CI, and fail to establish that there is a significant difference in AS between countries with High MS and Low MS

Table 2: Summary statistics of T-test for comparison of AS Means

Category	N	Mean	DF	Value	p-value
Bad (Low) MS	7	6.1620			
Good (High) MS	7	8.1539			
Diff (1-2) Pooled		-1.9918	12	T-value: -0.73	0.4778
Equality of Variances				F-value: 6.20	0.0430

4.2 Pearson's correlation coefficient

The Pearson's correlation coefficient provides an alternative method of testing the strength of the linear relationship between AS and MS. The results indicate that AS and MS are positively correlated ($r = 0.48429$, $p = 0.0793$), although the result is not significant at the 95% CI, most likely due to the small sample size. This means that for every 1% increase in one variable, a corresponding 0.48% increase is expected in the other variable (up to a point); however this gives no indication of causality. Given how close the coefficient is to 0.5, it may be regarded as a large correlation coefficient according to Hemphill (2003).

This result only holds true at the 90% CI interval and not at the 95% CI interval, likely as a result of the small sample size, although the result is still valid. We therefore fail to reject the null hypothesis (H_0) at the 95% CI, but reject it at the 90% CI as there is a significant relationship (between AS and MS) at this level.

4.3 Analysis of Covariance

The analysis of covariance model was computed to understand to what extent the variance in AS is attributed to other factors namely MS, Year and Country, and what proportion of the variance is explained by these variables. The results are presented in Table 3.

Table 3: Summary of Analysis of Covariance Results

Variable	R ²	F-value	<i>p-value</i>
MS	0.165318	7.13	0.0113*
Year	0.180410	2.49	0.0765
MS ^x Year	0.191675	1.52	0.2121
Country	0.952676	33.07	<0.0001*
MS ^x Country	0.954292	14.24	<0.0001*

*Significant p-value at the 95% CI

Three variables yield a significant result. We can explain 16% of the variation in AS by the MS, 95% by country and 95% by the interaction of MS ^x Country. This allows us to conclude that MS and Country are strong influencing factors on AS.

4.4 Country level analysis and review of market information

The comprehensive literature review (Chapter 2) revealed 10 factors that likely influence the AS-MS relationship in the EU-15. These factors explained in Table 4 are ranked and scored for each country (see chapter 3, Section 3.34) and results are presented in Table 4.

Denmark yielded the highest score at (46/50) 92% with the most progressive, forward looking policy of all three countries. Germany's strength lies in its market mechanisms where it has a notably high number of producers and processors, which also correlates to its large agricultural land area for production. Germany's final score is calculated at (38/50) at 78%. Ireland scored the lowest of all three countries overall at (29/50) 58%, yet scored highly in the socio-economic factor.

Table 4: A review of factors impacting organic demand - Scoring System Robust (5), Good (4), Moderate (3), Poor (2), and Arbitrary (1)

Source	Factor	Source/Factor Description	Denmark Score: 92%	Germany Score: 78%	Ireland Score: 58%
			Country Ranking: No.1 = 5, No.2 = 5, No. 3 = 4, No. 4 = 5, No. 5 = 5, No. 6 =4, No. 7 = 5, No. 8 = 5, No. 9 = 4, No. 10 = 4 (Total = 46)	Country Ranking: No. 1 = 3, No. 2 = 4, No. 3 = 3, No. 4 = 4, No. 5 = 1, No. 6 = 5, No. 7 = 5, No. 8 = 4, No. 9 = 5, No. 10 = 4 (Total = 38)	Country Ranking: No. 1 = 4, No. 2 = 4, No. 3 = 2, No. 4 = 3, No. 5 = 3, No. 6 = 3, No. 7 = 2, No. 8 = 1, No. 9 = 2, No. 10 = 5 (Total = 29)
Daugbjerg, 2010; Moschitz <i>et al.</i> , 2004	1. Presence of a National strategy	Sources: Sagener, 2015; Ministry of Food, Agriculture & Fisheries, Denmark, 2015; Department of Agriculture Food & Marine, 2013	Denmark's long-term national strategy is robust and balanced with 6 objectives, equally weighted to increasing and supporting area share and market share.	Germany has plans for a future strategy organic farming plan.	Ireland has developed a short term organic farming action plan 2013-2015, which is supported by the Food Harvest 2020 strategy. It contains key issue to address and actions across the different organic products catering to addressing supply and demand.
	2. National regulatory support (inspection and quality assurance, standards)	Sources: Sagener, 2015; Ministry of Food, Agriculture & Fisheries, Denmark, 2015; Department of Agriculture Food & Marine, 2013	National regulatory support and budget commitment to training, research and quality assurance. A unique government certification label.	National certification bodies and labels (e.g. Bioland and Bio-Siegel).	National regulatory support through Bord Bia and national certification bodies. Commitment to training.
	3. Clearly stipulated national targets	Sources: Sagener, 2015; Ministry of Food, Agriculture & Fisheries, Denmark, 2015; Department of Agriculture Food & Marine, 2013	Target to double area share from 2007 figure by 2020.	Target of 20% organic cropland, verbally committed.	Re-emphasises on 2007 target to increase area share to 5%, in 2013.
	4. Provision of National financial incentives	Sources: Sagener, 2015; Ministry of Food, Agriculture & Fisheries, Denmark, 2015; Department of Agriculture Food & Marine, 2013; Saunders and Schmid, 2013	Financial incentives with large committed national budgets in addition to EU support.	Implements an on-going action plan with specific budget commitments to the Federal Organic Farming Scheme, in addition to payments under EU greening payment scheme.	Supports organic schemes at EU level. No financial commitment stated in policy.
	5. National objectives towards increased training	Sources: Sagener, 2015; Ministry of Food, Agriculture & Fisheries, Denmark, 2015; Department of Agriculture Food & Marine, 2013	National training objective and budget commitment.	Verbal intention to train young farmers, yet no current mention of budget commitment.	National commitment to training. No budget allocation.
ILRI, 1995	6. Market mechanisms (Source: Willer and Lernoud, 2015: 66)	No. producers	2677	22506	1400
		No. Processors	517	12062	204
		No. exporters	No Data	No Data	1
		No. Importers	No Data	297	31
Michelsen <i>et al.</i> , 1999; ILRI, 1995; Tate, 1994	7. Market structures	Place	Specialist stores and supermarkets.	Specialist stores and supermarkets.	Specialist stores and supermarkets.
		Price	Higher price premiums (diversified organic products)	Higher price premiums (diversified organic products)	Lower price premiums (mainly milk and beef)
		Promotion	Diversified. Sector is of national importance.	Diversified. Sector is of national importance.	Specialised. Sector is not of national importance.
		Product	Early adopter. Leader in EU policy and practise. Strong government labelling brand.	Early adopter. Leader in development of organic labels. Strong national organic brands.	Adopter of EU policy and practise. National brand strength relatively weak.
Michelsen <i>et al.</i> , 1999; Lockeretz, 2007	8. Market cohesion and evolution	Source: Daugbjerg <i>et al.</i> , 2008; Mann, 2003	Government driven. Act of 1987 followed by continuous evolution and change.	Government driven. Agrarwende in 2001.	Self-Organisation. Irish organic growers association in the 1980s.
Andreosso-O'Callaghan, 2003	9. Size of total agricultural land in 2013	Source: Willer and Lernoud, 2015	262173	1015626	54122
Stolze & Lampkin, 2009; Krause, 1998; Knutson <i>et al.</i> , 1998	10. Socio-economic factors	GDP per capita (supports price premiums) (Source: CIA, 2015)	\$ 44 300 USD	\$ 44 700 USD	\$ 46800 USD
McEachern & McClean (2002)		Quality of Life Index (Source: Economist, 2005)	7.796	7.048	8.333

Chapter 5: Discussion, Implications and Conclusion

5.1 Discussion and Implications

The results of the T-test for difference in means does not find a significant difference between the AS means of High MS and Low MS countries, and therefore we fail to establish that High MS is related to High AS. This leads us to conclude that other factors are likely influencing the relationship between the variables, although further testing is warranted using a larger data set over a longer time period.

However, the correlation analysis confirms that a significant linear relationship exists between area share and market share at the 90% CI with a positive linear relationship (correlation) between the two variables. Therefore any target to increase one variable would be met with an increase in the other variable (to a point). This provides useful information for target setting around area share and market share and provides strong evidence that market share targeting is warranted.

Additionally the covariance analysis confirms that the variables of 'MS' and 'Country' are significant in explaining the variance in AS, indicating that a significant relationship exists between these variables, particularly the 'Country' variable which explain 95% of the variation in AS. This finding leads us to conclude that country factors strongly influence AS and based on the positive correlation, the AS-MS relationship as well. Therefore a review of High MS countries is warranted to further understand the success underpinning their sectors.

The findings are useful in the context of organic strategy targets in EU countries, including Denmark⁵ and Ireland⁶, which specifically refer to supply targets to increase area share, overlooking demand and growth in market share. According to Lockeretz, (2007), this focus on supply targets is likely due to governments' ability to influence and control supply, through its national policies supporting incentives and conversion subsidies, with less control over demand, market structures and consumer behaviour. Targets to increase demand prove more difficult in the organic sector where governments' ownership and influence over the sector is weak given the origin of the organic movement (Lockeretz, 2007; Stolze and Lampkin, 2009). On the other hand, there is contradictory evidence from Denmark where governments' ownership over the organic sector was established early in the 20th century with the promulgation of the Organic Farming Act in 1987. This provided the architecture to successfully grow the market for organic food, and infiltrate every avenue of food across the retail sector (e.g. school kitchens and restaurant menus). This also enabled Denmark to diversify the production of organic products, making Denmark one of the most successful countries in the EU in terms of organic market share (Daugbjerg, 2010).

⁵ Ministry of Food, Agriculture & Fisheries, Denmark, 2015

⁶ Department of Agriculture Food & Marine, 2013

Ireland's organic sector makes up only a small component of Ireland's agricultural sector. In 2002, Howlett *et al.* reported that Ireland's food market at 0.4% was relatively small in comparison to the EU average of 2% at the time, and with the recent global financial crisis not much would have changed. The impact of quantifying a positive linear relationship between area share and market share indicates that spending to increase one variable will translate into increases in the other variable and more revenue for organic market players, although this needs further exploration as causality has not been established. This evidence is particularly significant in Ireland which is poised to grow its organic sector, yet is challenged by farmers who still fear conversion due to low national demand and low returns on investment (Healy, 2014; Department of Agriculture, Food and Marine, 2013).

With a strong positive correlation between the variables and 48% of the correlation explained by their interaction, it looks promising that increasing area share will correlate with growth in average projected sales (market share), however a more significant increase in area share is required to match the 6% market share growth expected in other EU countries. As we learn from Denmark's current organic policy, a definitive budget targeting demand side factors to grow market share is as equally important as supporting supply (area share) measures.

Ireland's high score in the quality of life index and GDP per capita compared to Germany and Denmark indicates that the consumer base is wealthy and conscious enough to pay any price premiums associated with organic foods. Grunert and Kristensen (1994) and Peart (2013) report that higher income consumers are more likely to purchase organic food, and in larger quantities, and more likely to hold positive attitudes toward organic food production. This belief is not unwarranted (Lairon, 2009). However Fotopoulos and Krystallis (2002) report inconsistencies to this trend indicating that higher incomes do not necessarily lead to a higher organic purchase rate, and lower income households have been found to be more loyal to organic products (Fotopoulos and Krystallis, 2002). This incongruous view indicates that the marketing of organic foods is necessary across all levels of the public and private sector, age groups and demographics (e.g. private companies, restaurants, schools and hospital kitchens) which has been the Danish approach. Also, providing organic products in mainstream supermarkets, available to all and at affordable prices is effective in line with the German approach.

The health and lifestyle benefits linked with organic eating have been well documented by the French Agency for Food and Safety (AFSSA). They report that 94–100% of organic food does not contain any pesticide residues. Organic plant products contain more minerals (e.g. Fe, Mg) and anti-oxidant micronutrients (e.g. phenols and salicylic acid), and 50% less nitrates than non-organic fruit and vegetables. Organic animal products contain more polyunsaturated fatty acids (healthier fats) than non-organic meat products (Lairon, 2009). This provides strong evidence for the health, welfare and

lifestyle benefits of organic eating, in addition to the high quality standards associated with organic food production.

5.1.1 Denmark

The strength of Denmark's organic sector lies in its clear targets and objectives to increase area share and market share, as well as the provision of national funds towards training, research and marketing needs. Denmark's early legislation has evolved regularly to meet the needs of a changing market and consumer base, and set the platform to grow specific organic product sectors in line with national demand (Daugbjerg, 2010). Denmark currently spearheads organic policy and practise at the EU level. The strong government support, as well as the involvement of market players from private companies to public institutions and even individual stakeholders serves to improve efficiency and develop operators along the entire supply chain. This approach, together with a high quality of life, a wealthy population, a single strong national organic logo (brand) developed in 1989, and national pride communicated strongly in its agricultural strategy towards organic, healthy living and sustainability, all align well with organic production and contribute to its high market share compared to other EU countries. The national organic brand is renowned, known by 98% of all Danish consumers, who carry confidence in the quality and origin of products carrying the logo (Ministry of Environment and Food, 2015).

The Danish organic farming policy laid down the basic structure for Danish organic farming, including the provision of extension services, research and farmer education (Daugbjerg, 2010). Direct supply-side policy instruments were instigated in as early as 1994, through permanent subsidies to ease farmers' conversion from conventional to organic farming. Policies have also evolved to encourage specific groups to convert, with subsidies aimed at livestock producers' between 1989-1994, and at arable farmers and pig producers later in the 1990s. In 2008, the total turnover in the Danish organic food market reached 6.6 % and according to the latest market share data Denmark has the highest market share at 8 % (Appendix I, Figure 6). This is the result of a unique architecture together with an emphasis on demand creating measures, careful market analysis and forecasting (Daugbjerg, 2010).

The Danish organic sector is characterised by a commercial focus with careful market analysis to track and predict changes in consumer demand for products, appropriate forecasting to inform supply-side policies, and quick and effective action and policy adjustment (within a short 2-5 year period) in line with market conditions. This alludes to strong political will, good governance, clear organisational arrangements, accountability, collaboration and cooperation within the sector. Daugbjerg (2010) highlights that the success of the Danish model lies in government's commercial approach from the onset, where it focused on developing and creating local demand, meeting the public's need for trustworthiness, credibility and product variety. This commercial focus has been

maintained even as environmental benefits have been acknowledged and incorporated legislatively, underpinning the success of their organic sector (Daugbjerg, 2010; Daugbjerg *et al.*, 2008).

5.1.2 Germany

The strength of Germany's national certification labels, like Bioland and Bio-Siegel, as well as a population with a high quality of life provide for a large consumer base willing to pay the price premiums associated with organic agricultural production (McEachern and McClean, 2002). The German government's support for organic production through its early adoption of organic practises, the promulgation of the Agrarwende policy in 2001 (Mann, 2003), readily available organic products in supermarkets, as well as the high degree of evolution and cohesion within the organic market most likely serve to generate a high percentage of organic agricultural sales in the domestic market (Brenes Muñoz *et al.*, 2011). An unanticipated result is Germany's lack of an overall national organic strategy and poor national financial incentives at present, although it has established a highly responsive action plan with corresponding budget commitments towards its Federal Organic Farming Scheme, which is used to finance research and information measures within the sector (Saunders and Schmid, 2013). This approach may be the result of historical reasons where Germany has operated at a federal state level with different organic labels and practises followed in different states. This negatively impacted Germany's final score which was lower than Denmark.

Michelsen *et al.*, (1999) regard Germany's organic market structure as highly functional and based on free market principles as prices adapt to shifting supply and demand functions. Like Denmark, the German government views the market as a better means of determining production, relinquishing government involvement over time once the sector was established, which has served to make Germany a market leader in terms of market share in Europe (Gultekin *et al.*, 2013).

Politically, like Denmark, Germany favours the organic market and works towards influencing consumer's decision between conventionally and organically produced food via supply-side policy instruments, where organic farmers receive a per hectare premium from local government. The federal ministry promotes demand-side instruments actively marketing organic food by creating and distributing a seal of approval for organic farming products in cooperation with food retailers and consumer associations. In a similar approach to Denmark, this suggests strong organisational involvement, clear roles and responsibilities and cooperation among role players at local and federal government levels, together with a commercial approach to organic farming (Brenes Muñoz *et al.*, 2011; Mann, 2003).

5.1.3 Ireland

Ireland fairs poorly in comparison to other EU countries, with only 1.3% (52 793 ha) under organic agricultural production in 2013. It has the lowest area share under production, together with very few producers, low retail sales and low market share behind its organic sector, in comparison to larger, fast growth countries like Italy, and established markets like Germany and Denmark (Appendix I, Figure 6). Ireland's small land mass, compared with other European countries has led to specialised production towards beef and milk (Andreosso-O'Callaghan, 2003), with little feasibility and national support to develop other organic products. While this may appear to present a challenge to market development; demand for organic products is not homogeneous and customers do not procure all categories of organic products at the same level (Kottila and Rönni, 2008; Loureiro and Hine, 2002). For example, in 2003 the market share of organic potatoes in Germany was approximately 5% whereas cheese was at 0.8% (Gultekin *et al.*, 2013), and Schrock (2012) identified differences in consumer demand for organic and conventional milk. With the abolishment of milk quotas in 2015 (Minister Coveney, 2015), Ireland's niche focus on milk production and particularly on organic milk presents an opportunity to catalyse growth of its organic market, with econometric data from Germany indicating organic milk demand is highly price-inelastic, with little variation in demand with changing prices (Schrock, 2012). Furthermore, Ireland fares well in the socio-economic category, slightly better than both Germany and Denmark, indicating that the population may be wealthy and lifestyle conscious enough to pay the price premiums associated with organic products.

While Ireland has developed a national strategy, its targets remain purely descriptive. Government legislation in comparison to other EU counterparts is weak, and instead the organic sector appears to be based more on self-organisation, lacking cohesion with other national industries to develop a robust supply chain (Howlett *et al.*, 2002). The sector has therefore failed to evolve to meet consumer needs, in the way other markets (e.g. Germany) have matured (Schrock, 2012). National support for organic production is low, possibly because national organic labelling brands are weak and relatively unknown compared to the Danish and German brands in their respective countries.

However, there has been significant growth in the Irish agriculture sector overall with further growth expected (Minister Coveney, 2015). There are approximately 1,721 registered organic farmers in Ireland, producing over 100 organic products, valued at more than €99 million per year in retail sales. Despite organic agriculture receiving support via grants and awards like the National Organic Awards, there is still fear of conversion, low national demand and uncertain return on investment together with a high degree of fragmentation within the industry which is hindering retailers ability to source steady stock levels (Healy, 2014; Department of Agriculture, Food and the Marine, 2013). This contrasts the situation in Denmark where, in the past, subsidies were actively targeted at specific types of farmers, in line with projected demand, which ensured a guaranteed market and marketing channels

for products. In Germany the situation is similar, where conversion is generously supported at local government and federal government levels to meet demand. A recent survey of Irish organic consumers revealed that consumers are sensitive to high prices, product diversity, product volume, and product variety in Ireland (Horgan-Jones, 2014). This implies that prices are still too high compared to conventional products and there is limited variety on offer to consumers, thereby hindering organic purchases.

Despite a positive outlook for the organic sector, and agricultural exports in general making up 70% of Ireland's exports (Minister Coveney, 2015), 70% of its organic commodities are still imported into the country, despite appropriate climate for local production. This undermines the very ethos of organic production which is based on environmental protection and sustainable resource use. It also indicates considerable scope to expand organic production to cater for domestic demand as well as for export. An opportunity also exists for close engagement and knowledge transfer in the Irish sector given the close geographical proximity of organic producers in the west of Ireland (WDC, 2015).

The performance and steady growth of the organic sectors in countries like Germany and Denmark is underpinned by the careful use of policy instruments by Government to influence supply and demand, as well as established organisational structures, evolving policy conditions and a focus on understanding and responding to the local market. This provides a number of potential lessons for Ireland's organic sector, which would begin with focusing more equitably on market share as well as area share in national policy interventions.

5.2 Conclusion

In conclusion, this study makes a novel contribution to knowledge, testing the relationship between area share and market share and establishing the impact of an increase in one variable on the other. Area share constitutes the most widely used supply side target within organic farming strategy in Europe, yet an extensive literature review finds that the relationship between the two variables had not been tested before. The study confirms a positive relationship between area share and market share, and identifies 'country' as a strong influencing factor in the variation of area share. This provides the evidence that national initiatives need to be strengthened to influence area share and in turn market share growth. In this aspect, the study finds that Ireland's current organic initiatives are weak and short term in their approach. Ireland requires a robust long term strategy targeting supply and demand side factors to match the approach of Denmark. Both Denmark and Germany established their national organic sectors at a much earlier time and Ireland has a considerable amount of catching up to do.

Certain practical steps, with proven success in Denmark and Germany, can be taken by the Irish government. Firstly, the role of government is required initially on the policy side to establish a

stronger national organic brand that is recognised, trusted and consistently demanded by consumers. Furthermore promoting organic consumption campaigns based on documented health and environmental benefits would ignite consumer awareness for organic products. As consumers become more organically aware, their demand for organic products increases, incentivising new organic producers to enter the market, with the platform to price and sell products and diversify organic product lines beyond simply meat and milk. Existing organic meat and milk producers would have the foundation to sell and price their products accordingly, increasing the attractiveness of the organic market, away from conventional production. Products would become more readily available in retail outlets and more efficient, shorter supply chains and distributions networks would develop to cater for the shorter shelf life of organic products.

Incentivising the involvement of the private sector would encourage more research and development, relieving the burden on government. This would also intensify research to enumerate the mineral, vitamin and health benefits of organic products as the basis for reinforcing government's commitment to organic living. These measures, when implemented conjointly with a long-term and integrated vision in mind, would serve Ireland well to meet demand, lower organic imports and raise market share at national level, while also ensuring Irish people experience improved health and longevity.

5.3 Recommendations for further research

This study is based on three years of market share and area share data from 15 EU countries. A larger data set over a longer period would more conclusively sanction the positive area share – market share relationship, prove causality in the relationship and provide the basis for decision-making. This is the first recommendation for further research.

A committed budget and spending is necessary within the Irish organic sector to support both growth in demand and supply. A more thorough analysis of the level of spending on area share required to reach desired levels of market share, and vice versa, and tracking and reporting the returns on investment is necessary, in order to illicit further and future financial support and growth in the sector. This is second recommendation for further research.

This study identifies that organic products may provide a number of health benefits. If the health benefits indeed hold true, potential research lies in establishing the net gain in public health and welfare, for increased government spending on organic market interventions. This is the third recommendation for further research.

Further collection and analysis of econometric data from Ireland to establish if the same holds true for Irish milk consumers, in terms of high price-inelastic demand, will determine if Ireland's existing organic meat and milk sectors can be used as a framework from which to grow organic market share. This is the fourth recommendation for further research.

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Appendices

Appendix A: Description of Organic Practises

The aim of organic agriculture is to enhance ecological processes that foster plant nutrition, safeguard soil and water resources, and avoid the use of artificial chemical pesticides and fertilisers. Organic systems exclude agrochemicals and reduce other external inputs to improve the environment and farm economics (Pimentel *et al.*, 2005). Additionally the application of production techniques that restore and maintain soil fertility largely through crop rotations, crop residues, animal manure, legumes, green manure, off-farm organic wastes, and measures of biological pest control also increase soil productivity, tillage and nutrient supply, while controlling insects, weeds and other pests. Inspections are carried out during all stages of production and marketing, through an officially recognised and supervised scheme in each EU-member state (Baillieux and Scharpe, 1994).

Organic animal production makes provision for sufficient free movement, fresh air, natural daylight, water, fodder and protection against weather conditions. Clear rules are set for indoor housing conditions, relating to artificial lighting and sufficient resting areas with natural bedding material according to animal needs. Breeding goals abide by natural birth and embryo transfer techniques, and the use of genetically engineered species or breeds are proscribed (Stolze *et al.*, 2000).

Appendix B: Developmental stages of organic production

Stage 1: Core research and documentation

Organic agriculture developed from a number of key experts in the field working in different parts of the globe. The work of Sir Humphrey Davy and Justus von Liebig first challenged the principles of inorganic fertilisers, the driver behind the agricultural revolution, with their work on the chemical basis for plant nutrition and soil fertility (Kristiansen *et al.*, 2006). Research on Biodynamic Agriculture was advanced by Rudolph Steiner leading to the first organic certification and labelling system known as ‘Demeter’ in 1924 (Rundgren, 2002). Robert McCarrison and Sir Albert Howard advanced the ‘law of return’ identifying complex linkages between the health of soil and the health of the plants and animals fed by that soil, and advocating for returning manures to the land. This also led to the development of the Indore process, a method of composting in response to local Indian conditions where Howard conducted his work. This coincided with Rodale’s research in the US in the 1930s highlighting the importance of restoring and protecting the natural health of the soil to preserve and improve human health. He promoted that a relationship existed between healthy soil, healthy food and healthy people (Lampkin, 1994; Kristiansen *et al.*, 2006).

In Japan, Mokichi Okada and Masanobu Fukuoka advanced practises around nature farming (Setboonsarng and Gilman, 1999). Lady Eve Balfour’s work on the ‘Haughley experiment’ in the

United Kingdom compared organic and non-organic production, where significantly better soil quality and plant production was noted in organic plots (Blakemore, 1996). Hans and Maria Mueller pioneered research on organic agriculture advancing Steiner's work on biodynamic agriculture which led to the development of organic-biological farming methods in the 1950s. These methods became more formalised in the 1970s and led to the development of the 'Bioland' trademark in Germany (Haccius and Lünzer, 2000).

Stage 2: Increased green awareness

As organic agriculture has evolved, increased levels of self-organisation, certification and coordination have emerged, leading to the establishment of associations such as the Rodale Institute in the USA, Soil and Health in New Zealand, the Soil Association in the UK and the International Federation of Organic Agriculture Movements (IFOAM) in 1972, which remains the only global organic non-governmental organisation (Kristiansen *et al.*, 2006).

Organic agriculture reached a turning point with the publication of *Silent Spring* by Rachel Carson (1962) opening the world to the damage of pesticides and other toxins to the global environment. This provoked new points of view on issues of human population growth, the global economy and environmental consequences. This was a turning point for organic agriculture and the start of both the modern organic and environmental movements (Kristiansen *et al.*, 2006).

Stage 3: Organic Aid and support for farmers

Rapid growth of the organic sector took place in the 1980s. This was underpinned by the escalation of agriculture as a national political issue, as well as a result of public concern around environmental destruction, and the intensification of livestock production (e.g. battery hens), food health issues (e.g. bacterial contamination), increasing public awareness of industrial food production and processing systems, increasing wealth and disposable income and the perception that eating organic was fashionable among higher socioeconomic groups. Organic production offered an alternative as a cleaner, safer food source, leading to considerable increases in organic food consumption (Kristiansen *et al.*, 2006).

This was also facilitated with the introduction by the EU of organic farming support schemes, EU regulation of organic farming (Reg. EEC No 2092/91) and increasing involvement of state authorities in organic farming issues (e.g. training, education, advice, information). As a result, after years of being in opposition to mainstream agriculture, organic farming became an instrument of agricultural policy (Dabbert *et al.* 2004; Moschitz *et al.*, 2004).

Demand and production continued to grow exponentially around the world at approximately 20–30% per year, driven by market conditions such as growing demand and opportunity for export earnings,

available labour to satisfy supply, and in some instances political support from governments, aid agencies and NGOs driving farmers towards market orientated decisions and towards organic agricultural production. This was matched with formal political and legislative recognition to bring organic agriculture under legislative control. Intergovernmental agreements to facilitate international organic trade emerged and the creation of systems for certification standards followed (Kristiansen *et al.*, 2006).

During the 1990s there was enormous growth in sales through supermarkets, with increasing amounts of organic produce being transported large distances to satisfy demand in affluent countries. Public concern around food scares, new advances in genetic engineering, and demand for information helped invigorate research activities, provide extension and training to farmers, and encourage closer cooperation between environmentally aligned organisations (Kristiansen *et al.*, 2006).

Appendix C: Institutional involvement

Organic farming became institutionalized via EU Regulation 2092/1991 as amended by Regulation 1804/1999, which first promoted the concept of sustainable development, health and environment, and sought to address farm surpluses which impacted farm incomes (Genius *et al.*, 2006). This was followed by the proclamation of EC Regulation 2092/91 in 1993 defining organic crop production. It was matched with the prevalent application of policies to support the conversion to and continuance of organic farming as part of the agri-environment programme (EC Reg. 2078/92), and this led to the expansion of land under production. This legal framework provided the basis for the agri-food sector in the EU to rapidly respond to increasing demand for organic food across Europe, while also delivering the financial basis to overcome professed and real barriers to conversion from conventional to organic production (Lampkin, 1999).

The European Parliament and the Council are responsible for adopting regulations on organic farming. The Commission regulations are developed in cooperation with the Regulatory Committee on organic production, involving representatives of all EU countries. The Regulatory committee was set up to ensure close cooperation with the authorities responsible for the organic sector and ensure consistent application of the appropriate EU laws (European Commission, 2015).

The Advisory Group on Organic Farming is another organisation that supports Commission decision making on organic farming. It is made up of representatives of technical and business interest groups such as the International Federation of Organic Agriculture Movements (IFOAM), the European Consumers' Organisation (BEUC), the Committee of Professional Agricultural Organisations/General Confederation of Agricultural Cooperatives in the European Union (COPA/COCEGA) and the Confederation of Yeast (COFALEC). While the Commission may consult this committee, their recommendations and decisions are not binding on the Commission. However, this approach to

cooperation facilitates information sharing and knowledge exchange towards further development of organic farming policy (European Commission, 2015).

A number of other organisations, policy makers, market actors and donors are involved in the EU organic market, in collecting and reporting data and influencing policy and practise (Willer & Lernoud, 2015). Key players include; The Research Institute of Organic Agriculture (FIBL), the International Institute of Sustainable Development (IISD) and the International Trade Centre (ITC). Within the EU, the recently funded EU Organic Data Network Project funded under the 7th Framework Programme for Research, Technological Development and Demonstration aims to increase the transparency of the European organic food market through the availability of market intelligence data to meet the requirements of policy makers and market players involved in organic markets (FIBL, 2014). This has a strong impact on policies and targets set at national level around area share and market share. At a local level Participatory Guarantee systems (PGS) have been supported as quality assurance systems, targeting small producers on a local scale. They facilitate knowledge exchange, trust and create social networks (Willer & Lernoud, 2015).

According to IFOAM, a strong proponent of PGS, transparency and support to local economies are two key benefits offered by organic quality assurance systems (IFOAM, 2006). Small holder farmers who produce organically are often excluded from organic certification because of the paperwork and high cost involved in administration visits by organic certifiers. Being a locally driven system, PGS supports and encourages producer groups to work together to improve their farming practices through the sharing of knowledge and experiences which strongly contributes to increasing area share under organic production. PGS are also regionally appropriate, specific to individual communities, cultural environments, geographic locations and markets (IFOAM, 2006). They involve lower costs than export focused third party certification systems and have less administration costs overall. These characteristics contribute to serve and support increased involvement in organic markets and production by these small holder farmers (IFOAM, 2006). PGS support to local economies is seen as tool for improving socio-economic and ecological conditions by encouraging small scale production and processing plants. This serves to increase the number of players in the organic market (e.g. operators, processors and retailers) which directly impacts market share.

Appendix D: CAP Budget and Spending

The largest portion of the budget (70%) is spent on supporting increases in area share, as income support for farmers and assistance for complying with sustainable agricultural practices. Farmers adhering to strict standards relating to food safety, environmental protection and animal health and welfare are eligible to receive direct payments, fully financed by the EU. An amendment under the June 2013 reform, allows for 30% of direct payments to be linked to European farmers' compliance with sustainable agricultural practices which are beneficial to soil quality, biodiversity and the environment generally, such as crop diversification, the maintenance of permanent grassland or the preservation of ecological areas on farms. This portion is available to organic farmers whose approaches provide for soil quality, biodiversity and the environment protection. A smaller portion (20%) is spent on rural development measures to help farmers modernise their farms and become more competitive, contributing to the diversification of farming and non-farming activities and the vitality of rural communities. This is an important focus area as diversification and modern equipment impacts market supply as a wider selection of products, shortened supply chains and faster production is achieved. Sauer and Park (2009) find strong evidence for a positive relationship between subsidy payments and an increase in farm efficiency, and technology improvements and a declining probability of organic market exit. These payments are partly funded by the member countries, and generally extend over a number of years. The smallest portion of the budget (up to 10%) is allocated to market-support measures following adverse weather conditions or natural disasters which effectively destabilise markets. All three areas of budget spending are closely interrelated. For example, direct payments provide farmers with a steady income and reward them for providing environmental benefits which are in the public interest. Likewise, rural development measures make it easier to modernise farms while encouraging diversification of activities in rural areas. Sustainable farming practises such as preservation of ecological areas and natural grassland serves to increase farm resilience against natural disasters.

Appendix E: Organic Action Plans

Organic action plans are seen as an important organic market development tool in the EU, which aim to ensure sustainable development of the organic sectors at national levels (Willer and Lernoud, 2015). Stark differences are noted between countries based on the level of development of their organic sector and the types of actions promoted. In some countries like England, an organic action plan existed only for a certain time period, while in Austria the plan has been continually updated, and in Germany an on-going action plan is being implemented (Saunders and Schmid, 2013).

The Irish national action plan for the period 2013-2015, sets out four objectives aimed at increasing the production base in Ireland, with the view to replace potential imports with Irish organic produce, to promote awareness of the potential export market, to seek to develop sustainable export markets for

Irish organic produce as supplies become available and to identify issues which are impeding the growth of the organic sector with an emphasis on developing solutions. The plan sets out broad actions, short, medium and long-term timeframes, as well as roles and responsibilities, and is seen as an important instrument to achieve growth of the organic sector as set out in the Food Harvest 2020 report, to enable Ireland to achieve the target of 5% land area under organic production (Department of Agriculture, Food and Marine, 2013).

Comparing the Irish action plan to other countries who have achieved high market share and area share in the case of Denmark and relatively high market share in the case of Germany; Denmark has very specific objectives, actions, budgets and timelines committed and Germany's plan remains highly responsive and well financed. The Danish organic action plan identifies strengthening the collaboration between the local and regional authorities and various ministries through a series of 67 new initiatives, with a specific budget of DKK 400 million in 2015 to contribute to reaching government's target of doubling the area share under organic agricultural production by 2020. Among their initiatives, they focus on increasing collaboration between government departments and making organic options available on the menus of hospitals, canteens and nurseries (Ministry of Food, Agriculture and Fisheries of Denmark, 2015). Germany which implements an on-going and therefore highly responsive action plan has specific budget commitments to the Federal Organic Farming Scheme, which is used to finance research and information measures within the sector (Saunders and Schmid, 2013).

Appendix F: Government subsidies and incentives

Organic agriculture still only represents a small portion of the total utilized agricultural area in most European countries (Genius *et al.*, 2006). This modest involvement in organic agriculture is not unexpected given the riskiness for new farmers and uncertainty surrounding output and production for given inputs. This coupled with price uncertainties which arise from fragmentation and poor information dissemination within the industry, leads to ill-informed production decisions, which in turn hinder retailers and processors ability to find consistent stock levels to drive growth and meet demand for organic products (Clunies-Ross and Cox, 1994; Wilson, 1997; Department of Agriculture, Food and Marine, 2013). In order to cope with the problem of low adoption rates, several EU countries have promoted organic farming via subsidy-driven policies which are summarized in EU Regulation 1257/1999.3, specifically direct subsidies which require conversion of at least a portion of farm land to continued organic production. Conversion subsidies expanded organic farming considerably throughout Europe in the initial years, although financial incentives in the form of direct subsidies (whereby the central government essentially 'shares' the risk of adoption) have been more commonly and effectively implemented as a method of overcoming farmers' adverse perceptions (Lampkin and Padel, 1994). Finland implemented this programme successfully in the early 1990s

which helped them increase their total arable land under organic production by 120,000 hectares between 1990 and 2000, although this was later put on hold, despite its success, due to the high cost burden on state funds (Pietola and Lansink, 2001). Denmark saw an increase (from 2.8% in 1997 to 6.4 % in 2002) in the share of organic farms as a percentage of all farms, due to preferential policies targeting conversion (Moschitz *et al.*, 2004; Daugbjerg, 2010). The option of promoting technological adoption in the farming sector is also promising (Genius *et al.*, 2006), although in the past technological advancement has led to the production of surpluses, which has in turn prompted the introduction of quotas and real price reductions for products (Lampkin, 1990) which are still in place today (e.g. EU milk quotas). This technological adoption is delivered through the improvement of farmers' allocative ability through informational incentives that change their perceptions about the profit-effectiveness of new farming technologies. Despite fixed initial costs, informational incentives may be less costly than financial incentives in the long-term as information spreads throughout farming communities formally and informally (Genius *et al.*, 2006).

Although information and subsidy policies may speed up adoption and diffusion of new technologies, Stoneman and David (1986) have shown that subsidy policies may produce welfare losses in the form of income transfers from other sectors of the economy. Certain studies analysing EU policies related to organic farming (e.g. Lohr and Salomonsson, 2000) found that market services and information sources rather than subsidies are more effective in encouraging organic adoption throughout the EU, in contrast to other research by Lampkin and Padel (1994). Although the relevant EU Regulations include various measures to provide farmers with the necessary information required to improve their respective expertise on organic technologies (e.g., extension provision), subsidy-driven policies have remained the primary incentive for organic conversion throughout the EU (Lampkin, 1999).

Appendix G: Market Conditions

Europe is still in recovery after the global financial crisis and EU countries are showing mixed growth rates in organic markets. France, Netherlands, Finland and Germany have displayed growth in organic food sales, yet countries like Spain and the UK are showing minimal growth. Organic food sales account for 1% of total food sales in the EU, with the largest market for organic products in Germany and the highest market share (at 6%) for organic food in Denmark and Austria (Willer and Lernoud, 2015) (Appendix 8).

Trends in the market on the supply side differ somewhat. On the one hand, Dutch agri-food companies display continued consolidation and growth across Europe, mainly facilitated through acquisitions. There has been further growth in private food retailers which have turned out to be highly successful in countries like Denmark as private labels generate more than 50% of organic food sales. Yet, the German market displays a somewhat different trend with discounters offering lower prices than conventional supermarkets and capturing most of the sales (Willer and Lernoud, 2015).

Fruit and vegetables are the pioneer organic products in Europe, yet Ireland contributes very little in the way of production (Department of Agriculture, Food and Marine, 2013). They account for between one third and one fifth of many national organic markets, and are especially strong in Italy, Norway, Sweden, and Germany. All over Europe the organic market is dominated by fresh products compared to the conventional markets. In many north European countries animal products, especially milk and dairy products institute a high share of all organic products sold (Willer and Schaak, 2014). Meat and meat products are very successful in some countries, with approximate market shares around 10% in Belgium, the Netherlands, Finland and France. Conversely, in many countries, the meat and the meat product market is not yet well developed due to the lack of manufacturing capability and the high price of surpluses compared to conventional products (Willer and Schaak, 2014). Beverages, mainly wine, constitute an important part of the organic market and cover nearly 15% in countries like France. Grain mill products (dry products), which are easily sold and stored in the supermarkets, have high shares in Finland and Norway. Bread and bakery products have high importance in the organic product range, accounting for around 10% in the Netherlands, France, Finland, Sweden and Germany. Eggs retain high market shares across Europe with statistics of 20% in Switzerland and an average of 10% in most EU countries. The sale of eggs reflects the high degree of consumer concern regarding animal welfare and also shows their readiness to pay comparatively higher price premiums for organic eggs (Willer and Schaak, 2014).

Appendix H: Study Limitations

Certain constraints were experienced during the study:

1. **Data constraints:** “Differing methods of data collection for market and trade data has been highlighted as a major constraint to statistical comparisons between countries” (Willer and Lernoud, 2015:64). This was experienced in this study, and missing data caused the UK to be excluded from the analysis.
2. **Access, availability, and reliability:** Information used in the country comparison was sourced from peer reviewed journal articles, published reports, and websites of reputable organisations to try to ensure a high degree of reliability. While care was taken in selecting data sources, the level of accuracy and reliability could be not determined as all data sources were secondary.
3. **Model assumptions:** Ideally models benefit from previous knowledge by specifying what is already known about the sector being studied, and using the data to estimate what is unknown (Wood, 1994; 2001). In reality previous knowledge is often supplemented by various assumptions when a model is built (Gross *et al.*, 2005). This carries a number of benefits (e.g. greater statistical power for estimating unknown factors) and costs. The cost is that the estimates are reliant on the appropriateness of the assumptions, and at times the assumptions

can affect the deductions drawn in indirect but important ways (Wood and Thomas, 1999).
This trade-off is well acknowledged.

Appendix I: Area Share and Market Share Data

Table 5: Data sources for Area Share and Market share data

Area Share			Market Share		
2011(%)	2012(%)	2013 (%)	2011(%)	2012(%)	2013 (%)
Willer & Lernoud (2013: 219)	computed by author	Willer & Lernoud (2013: 183)	OrganicDataNetwork Survey 2012-2014 based on national data sources and Eurostat (2015)	OrganicDataNetwork Survey 2012-2014 based on national data sources and Eurostat (2015)	Willer & Lernoud (2013: 183)

Table 6: Raw data for Area Share and Market Share

Country	Area Share (AS)			Market Share (MS)					1.98
	2011	2012	2013	2011	2012	2013	Mean MS	Mean AS	Category
Austria	19.7	18.8	19.5	.	6.5	6.5	6.50	19.32	good
Belgium	4.3	4.4	4.6	1.4	1.5	1.6	1.50	4.43	bad
Denmark	6.1	6.6	6.4	7.6	7.6	8	7.73	6.36	good
Finland	8.2	8.7	9.0	2	1.6	1.6	1.73	8.62	bad
France	3.6	3.6	3.9	2.3	2.4	2.6	2.43	3.69	good
Germany	6.1	6.2	6.4	.	3.7	3.7	3.70	6.24	good
Greece	3.7	11.1	4.6	0.4	0.4	0.4	0.40	6.48	bad
Ireland	1.3	1.2	1.3	.	0.7	0.7	0.70	1.25	bad
Italy	8.6	8.9	10.3	.	1.45	2	1.73	9.26	bad
Luxembou	2.8	3.2	3.4	3.3	3.1	3.2	3.20	3.12	good
Netherland	2.4	2.6	2.6	2	2.3	2.4	2.23	2.54	good
Portugal	5.8	5.6	8.1	0.2	0.2	0.2	0.20	6.49	bad
Spain	6.5	6.8	6.5	0.95	0.99	1	0.98	6.60	bad
Sweden	15.4	15.8	16.3	4.1	3.9	4.3	4.10	15.82	good

*United Kingdom was removed from the analysis as MS data was missing for all three years

* Median MS = 1.98 was used to set the category threshold for good (High MS) or bad (Low MS)

Figure 6: Organic data for the European union - including the EU-15

	Country	Area [ha]	Area share [%]	Producers	Retail sales [Mio €]	Market share [%]	€/person
EU [EU15]	Austria	526'689	19.5%	21'810	1'065	6.5%	127
	Belgium	62'529	4.6%	1'487	403	1.6%	36
	Denmark	169'298	6.4%	2'589	917	8.0%	163
	Finland	206'170	9.0%	4'284	215	1.6%	
	France	1'060'756	3.9%	25'467	4'380	2.6%	
	Germany	1'060'669	6.4%	23'271	7'550	3.7%	93
	Greece	383'606	4.6%	23'433	60	0.4%	5
	Ireland	52'793	1.3%	1'263	99	0.7%	22
	Italy	1'317'177	10.3%	45'969	2'020	2.0%	31
	Luxembourg	4'448	3.4%	212	84	3.2%	157
	Netherlands	49'394	2.6%	1'646	840	2.4%	
	Portugal	271'532	8.1%	3'308	21	0.2%	2
	Spain	1'610'129	6.5%	30'502	998	1.0%	21
	Sweden	500'996	16.3%	5'584	1'018	4.3%	106
	United Kingdom	567'751	3.3%	3'918	2'065		33
EU [EU15] total		7'843'937	6.1%	194'743	21'735		
EU [EU13]	Bulgaria	56'287	1.8%	3'854	7		1
	Croatia	40'641	3.1%	1'608	104	2.2%	25
	Cyprus	3'923	2.7%	719	2		2
	Czech Republic	474'231	11.2%	3'910	70	0.7%	7
	Estonia	151'256	16.0%	1'553	22	1.6%	17
	Hungary	140'292	3.3%	1'673	25	0.3%	2
	Latvia	200'433	11.0%	3'473	4	0.2%	2
	Lithuania	166'330	5.7%	2'555	6	0.2%	2
	Malta	37	0.4%	12			
	Poland	661'956	4.3%	25'944	120	0.2%	3
	Romania	288'261	2.1%	15'315	80	0.7%	4
	Slovakia	166'700	8.8%	365	4	0.2%	1
	Slovenia	38'665	8.4%	3'049	49	1.8%	24
EU [EU13] total		2'389'010	4.7%	64'030	492		

(Willer and Lernoud, 2015:183)

Results of T-Test: High MS and Low MS countries

Figure 7: Results of T-Test: High MS and Low MS countries

The TTEST Procedure						
Variable: Mean_AS						
Category	N	Mean	Std Dev	Std Err	Minimum	Maximum
bad	7	6.1620	2.6806	1.0132	1.2549	9.2627
good	7	8.1539	6.6748	2.5228	2.5360	19.3249
Diff (1-2)		-1.9918	5.0862	2.7187		

Category	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
bad		6.1620	3.6828 8.6412	2.6806	1.7274 5.9029
good		8.1539	1.9807 14.3270	6.6748	4.3012 14.6983
Diff (1-2)	Pooled	-1.9918	-7.9153 3.9317	5.0862	3.6472 8.3960
Diff (1-2)	Satterthwaite	-1.9918	-8.2769 4.2932		

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	12	-0.73	0.4778
Satterthwaite	Unequal	7.8864	-0.73	0.4850

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	6	6	6.20	0.0430

(SAS 9.3, 2011)

Results of Pearson's Correlation Analysis

Figure 8: Statistical results of Pearson's Correlation analysis

The CORR Procedure						
2 Variables:		MS AS				
Simple Statistics						
Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
MS	14	2.65214	2.23663	37.13000	0.20000	7.73000
AS	14	7.15857	4.99386	100.22000	1.25000	19.32000

Pearson Correlation Coefficients, N = 14 Prob > r under H0: Rho=0		
	MS	AS
MS	1.00000	0.48429
		0.0793
AS	0.48429	1.00000
	0.0793	

(SAS 9.3, 2011)

Results of Analysis of Covariance

Figure 9: Results for Covariance analysis (MS variable)

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	135.1182577	135.1182577	7.13	0.0113
Error	36	682.2049002	18.9501361		
Corrected Total	37	817.3231579			

R-Square	Coeff Var	Root MSE	AS Mean
0.165318	62.37582	4.353175	6.978947

Source	DF	Type I SS	Mean Square	F Value	Pr > F
MS	1	135.1182577	135.1182577	7.13	0.0113

Source	DF	Type III SS	Mean Square	F Value	Pr > F
MS	1	135.1182577	135.1182577	7.13	0.0113

(SAS 9.3, 2011)

Figure 10: Results for Covariance analysis (Year variable)

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	147.4531736	49.1510579	2.49	0.0765
Error	34	669.8699843	19.7020584		
Corrected Total	37	817.3231579			

R-Square	Coeff Var	Root MSE	AS Mean
0.180410	63.60128	4.438700	6.978947

Source	DF	Type I SS	Mean Square	F Value	Pr > F
MS	1	135.1182577	135.1182577	6.86	0.0131
Year	2	12.3349159	6.1674579	0.31	0.7333

Source	DF	Type III SS	Mean Square	F Value	Pr > F
MS	1	131.0503014	131.0503014	6.65	0.0144
Year	2	12.3349159	6.1674579	0.31	0.7333

(SAS 9.3, 2011)

Figure 11: Results for Covariance analysis (MS*Year variable)

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	156.6606897	31.3321379	1.52	0.2121
Error	32	660.6624682	20.6457021		
Corrected Total	37	817.3231579			

R-Square	Coeff Var	Root MSE	AS Mean
0.191675	65.10658	4.543754	6.978947

Source	DF	Type I SS	Mean Square	F Value	Pr > F
MS	1	135.1182577	135.1182577	6.54	0.0155
Year	2	12.3349159	6.1674579	0.30	0.7438
MS*Year	2	9.2075161	4.6037581	0.22	0.8014

Source	DF	Type III SS	Mean Square	F Value	Pr > F
MS	1	112.7510345	112.7510345	5.46	0.0259
Year	2	0.7120426	0.3560213	0.02	0.9829
MS*Year	2	9.2075161	4.6037581	0.22	0.8014

(SAS 9.3, 2011)

Figure 12: Results for Covariance analysis (Country variable)

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	14	778.6441334	55.6174381	33.07	<.0001
Error	23	38.6790245	1.6816967		
Corrected Total	37	817.3231579			

R-Square	Coeff Var	Root MSE	AS Mean
0.952676	18.58163	1.296802	6.978947

Source	DF	Type I SS	Mean Square	F Value	Pr > F
MS	1	135.1182577	135.1182577	80.35	<.0001
Country	13	643.5258757	49.5019904	29.44	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
MS	1	0.2776422	0.2776422	0.17	0.6883
Country	13	643.5258757	49.5019904	29.44	<.0001

(SAS 9.3, 2011)

Figure 13: Results for Covariance analysis (MS*Country variable)

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	22	779.9649528	35.4529524	14.24	<.0001
Error	15	37.3582051	2.4905470		
Corrected Total	37	817.3231579			

R-Square	Coeff Var	Root MSE	AS Mean
0.954292	22.61296	1.578147	6.978947

Source	DF	Type I SS	Mean Square	F Value	Pr > F
MS	1	135.1182577	135.1182577	54.25	<.0001
Country	13	643.5258757	49.5019904	19.88	<.0001
MS*Country	8	1.3208193	0.1651024	0.07	0.9997

Source	DF	Type III SS	Mean Square	F Value	Pr > F
MS	1	0.03477804	0.03477804	0.01	0.9075
Country	8	1.89700297	0.23712537	0.10	0.9989
MS*Country	8	1.32081933	0.16510242	0.07	0.9997

(SAS 9.3, 2011)