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PLOUGHING THE WRONG FURROW

The costs of agricultural exceptionalism and the precautionary principle

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Summary

The precautionary principle provides non-farming interest groups with a pseudo-official means of influencing policy. The result is a drift towards overregulation and regulatory failures which are in conflict with the efficient working of the single market.

Pressure groups have used a broad definition of the precautionary principle to bring about regulation in the areas of food standards, animal welfare and the environment which create deadweight costs and do not seem to be aligned with consumers' preferences.

Official estimates suggest that compliance with existing agricultural regulations amount to £590 million a year in England, representing an increase in total operational costs by a little more than five per cent in England. This significantly underestimates the true cost of regulations because compliance costs do not take into account the longer term, and potentially much larger, costs arising from the impact on competitiveness and the affordability of food.

Researchers estimate that overall crop yields would be around half their current levels without the use of crop protection products. Further restrictions on pesticide use would reduce crop yields across the EU and substantially increase the price of food.

If all food had to be grown organically, yields for wheat, beans and potatoes would fall by 49 per cent, 26 per cent and 44 per cent respectively, leading to prices rising by 69 per cent, 53 per cent and 192 per cent respectively. Allowing for the increased costs of feedstuffs, farm-gate prices for meat and dairy products would average out around 25 per cent higher.

In the extreme scenario in which all pesticides are banned, the UK food chain would be faced with additional raw material costs of some £7.5 billion per year. It is not suggested that all synthetic plant protection products are likely to banned. However, as current EU policy is directed towards significant reductions in synthetic crop protection products, these estimates serve to indicate that Defra's current estimate of £590 million for the total annual cost of complying with existing regulations is a significant underestimate of the potential costs.

It is unlikely that the benefits of the current regulatory burden outweigh the costs. The EU's precautionary approach discourages the development of technologies with even a low, theoretical probability of harm despite offering the likelihood of faster agricultural productivity growth. Attempts by authorities to demonstrate the positive net benefits of mandatory regulations are flawed because they do not take in the adverse effects for longer term technological advance and farm level operational efficiencies. The costs in terms of efficiency, competitiveness and living standards are likely to be high.

Introduction

The Common Agricultural Policy (CAP) is not only the European Union's (EU) most expensive policy - it is forecast to cost some €400 billion for the period 2015-2020 (EU 2013) - but is also its most complex and interventionist programme. Regulation, or more precisely 'social regulation' defined as protecting public interests such as health, safety and the environment (OECD 1997) is now the CAP's most pervasive form of intervention. Whilst regulation can serve a positive purpose, there is growing concern amongst industry participants and academics that EU agri-food regulations have become too burdensome, intrusive and stifling, with adverse consequences for productive efficiency and international competitiveness (see, for example, Macdonald 2011). It would be remiss not to recognise that a great deal of the regulatory burden falling on British farmers arises from national legislation (eg. planning and transport but the Department for Environment, Food and Rural Affairs (Defra) estimates that 53 per cent of its regulations are derived from the EU or international legislations (Defra 2015) and these are overwhelmingly focused on the production and supply of food.

The introduction in 2003 of Regulatory Impact Assessments (RIAs) designed to improve the quality of EU rule-making has not prevented continuous and steady growth in food and farming related regulations emanating from the CAP. Over the past 25 years the CAP has enlarged its role from that of administering its instruments of price support to seeking to control the way agriculture develops and interacts with its geography and society. The CAP's expansion to broadly based 'multifunctional' objectives reveals an unwieldy diversity including: food safety and standards; agricultural productivity; reducing market volatility; mitigating business risk; conserving biodiversity; alleviating climate change; environmental protection; encouraging biofuels; supporting rural development; and affirming consumers' 'right to know' centred on notions of labelling and traceability

(Jambor and Harvey 2010). Following its 2013 reform, CAP intervention has gone further, adding a mandatory condition to the receipt of direct support payments. This so called 'greening' regulation involves the micro-management of crop rotations with the aim of benefiting the environment and the climate.

The purpose of this paper is not to provide a quantitative assessment of the economic impacts of regulation on UK agriculture, partly because the authorities have already provided estimates of the farm level costs of compliance with existing regulations (see, for example, Commission (2015) and Defra (2011a)). Rather the purpose here is to explain why such exercises are likely to seriously underestimate the cumulative cost of regulations, particularly those founded on the precautionary principle.

The paper is organised as follows. The first section sets out the link between the industry's growing regulatory burden and agricultural exceptionalism in the EU. The second focuses on the growing influence of non-farming interest groups and the Commission's widespread resort to the precautionary principle. The third section, using the examples of regulations relating to pesticide use and the development of genetically modified crops, casts doubt on the authorities' frequent claims that the benefits of regulations outweigh the costs. It explains and illustrates the potentially very high costs in terms of productivity growth, competitiveness and food affordability of regulations which are not taken into account by the authorities.

1. Agricultural Exceptionalism and Regulation

In principle the EU relies on market failures to justify its regulatory interventions in the areas of food safety, animal welfare and the environment (Commission 2011). These include the asymmetric market power of buyers and sellers, risks, externalities and the provision of public goods. However, the market failure justification is not unassailable and is vulnerable to two major weaknesses (Stigler 1971). Firstly, the assessment of a market failure involves a political process that can enable relatively small groups to achieve their private aims by regulation. Secondly, regulations are not costless; they impose dead weight (or social) costs. Posner (1974) added to Stigler's work by introducing 'regulatory capture' which he defined as the process through which interest groups influence policies in order to promote their private interests. From this perspective, there is no guarantee that the number or nature of regulations will be socially optimal. We can further add that regulations are difficult to change once in place compared to the dynamic ability of markets to improve the status quo via innovation and competition (e.g. animal welfare has arguably been promoted more by changing tastes than by intervention).

The Common Agricultural Policy (CAP)

Regulatory capture is highly relevant to the CAP. The growth of regulations affecting EU agri-food businesses since the early 1990s reflects, in large measure, the increasing influence of non-farming interest-groups (Cunha and Swinbank 2009). As a result, regulation under the CAP has become less technocratic and more contentious; increasingly the outcome of a politicised trade-off between the alternative demands of groups with very different and frequently conflicting interests which can be summarised - to borrow John Peterson's perceptive phrase - as 'battles between competing advocacy coalitions' (Peterson 2009: 110). This raises the fear that such 'battles' are wasteful; neither conducive to trade, competition nor profitable economic activities. As noted in the introduction, farmers believe the dead weight costs of their regulatory burden are excessive and could be reduced without compromising safety, welfare and the environment (Macdonald, op. cit). In this section I will explore the paradox that despite farmers' objections to the CAP's growing regulatory burden, environmental regulations are used as the justification for maintaining farming's exceptional levels of support.

The increasing influence of non-farming interest-groups such as Friends of the Earth can be traced back to the 1992 'MacSharry' reform of the CAP. By the 1990s the CAP, arguably one of the most egregious examples of regulatory capture, was suffering from the cumulative effect of perennially supporting farm-gate prices above market clearing levels. Under pressure from national governments and farmers' unions the European Council had doggedly refused to countenance lowering support price levels. Inevitably the lack of action had by the end of the 1980s produced structural surpluses for the main commodities absorbing some 70 per cent of the EU budget in their storage or export subsidies. It was, however, the external threat

to the Uruguay GATT Round negotiations from countries, particularly the Cairns Group of agricultural exporting countries, suffering the adverse effects of export subsidies that finally forced the European Council to act.

The 1992 reform started the process of transferring the basis of support from farm prices to annual direct payments. In principle decoupling support from prices and providing it in the form of direct income support removed the market distortions - i.e. surpluses - associated with price support. The growth of surpluses had seriously compromised, if not rendered obsolete, the argument that support was needed to ensure adequate production. It was therefore necessary for the authorities to find a new justification for continued support and this came in part as 'temporary compensation' for lower market prices and for the longer term as needed to protect the environment and promote rural development. Thus, the 1992 and subsequent reforms preserved the CAP's fundamental principle of state support for agriculture. In contrast to the US where the paradigm of agricultural exceptionalism was overthrown (Skogstad 1998) it remains intact in the EU. Swinbank and Tanner (1996: 96) concur, concluding the reforms 'were designed to maintain the revenues of the farm sector and to keep farmers on the land'.

Although EU concern for the environment can be traced back to 1972 when the Commission established a Directorate to draw up legislative proposals for environmental protection, the involvement of NGO environmental groups in the development of the CAP can be traced from a low base in 1992 to significance by 2003. In 2003 the CAP underwent another reform - colloquially referred to as the Fischler Reform - which resulted in farm support payments being decoupled from production accompanied by the introduction of cross-compliance which made support payments conditional on farms meeting environmental and animal welfare standards. Decoupling was largely a response to the impending accession of relatively poor central and eastern European countries with large agricultural sectors. However, the act of decoupling elevated, in principle, the environment and rural development to *primus inter pares* and transformed the CAP's paradigm into a regime of multifunctional regulations. The CAP's development was warmly welcomed by a coalition of environmental NGOs (Klüver 2013) but the move was also politically expedient; distracting attention from the inequitable nature of the decoupled payments. At the national level payments reflected their historical role as compensation for reductions in support prices, a fact that greatly disadvantaged the new members from the east and undermined any

pretence of balanced development. Further reform in 2008, known as the Health Check, consolidated the Fischler reforms and in the 2013 reform the regulatory burden of cross-compliance was further increased with the introduction of a crop diversification regulation.

The CAP's paradigm of multifunctional regulation underwent further expansion when a link between the neurodegenerative cattle disease, Bovine Spongiform Encephalopathy (BSE) and the fatal Creutzfeldt-Jacob disease for humans was revealed in the mid-1990s. Against a background of consumer alarm and political pressure the Commission rapidly devised a new approach to Food Safety (Commission 1997). In principle the main purpose of the new approach was consumer safety but politics demanded the rapid restoration of consumer confidence and inevitably this created scope for interest groups; indeed, it galvanised the emergence of a powerful European social movement driven by a concern that advanced science and food safety were in conflict. According to these groups BSE, genetically-modified (GM) crops and animal cloning all posed an unacceptable threat (Ansell et al. 2006). Whilst regulatory action to reassure consumers in the area of food safety was understandable, the influence of these interest groups widened the new approach beyond food safety to include not only the protection of animal and plant health but also animal welfare (Vos 2000). This broad based approach to food safety can only be understood by the recognition that regulations were being shaped by the normative, social values of non-farming interest groups. For example, the EU's *de facto* moratorium against the planting or use of GM crops can be directly attributed to interest groups, and in particular Greenpeace, who successfully mobilised public opinion and in the process politicised science by blurring the demarcation between fact and values (Ansell *op.cit.*).

Widening 'stakeholder' involvement

The current, heavily regulated EU agri-food policy owes much to the greater involvement of non-farming interest-groups in policy formation. The Commission, however, defends the regulatory burden as a response to public concerns (Commission 2011) and, despite industry concerns relating to the growing intensity of regulations, it continues to encourage even wider stakeholder involvement in policy making. At the start of the process leading to the 2013 reform, Dacian Ciolos, the Commissioner for Agriculture and Rural Development invited all interested EU citizens and organisations - whether or not they had any direct involvement in agriculture - to join the debate on future farm policy (Commission 2010). In most EU countries a large proportion of the population has a close generational affinity with farming and consequently the European Parliament's centre of gravity leans towards favouring farm support.

The Commission defends its 'citizens dialogue' as lending credibility to the CAP, though a more sceptical interpretation might see a desire to maintain the policy's very large budget. According to Clift and Woll (2012) it is evident that the involvement of non-farming interest groups and hence at least some of the resulting regulations amounts to cover for a policy that seeks ultimately to discriminate in favour of farmers. The participation of environmental groups is of particular importance when it comes to securing the key backing of the Commissioners for Environment and Climate Change though the outcome is almost certainly to place added (over?) emphasis on these areas when it comes to regulation.

As an exercise in efficient governance the results of the involvement of non-farming interest groups, the EP and EU citizens has been problematic. The widening of stakeholder involvement has added regulatory complexity

to the CAP but it is unclear as to whether this has delivered added value. A number of academic studies have concluded that it remains a matter of considerable debate as to whether the widening of the CAP's policy objectives since the 1990s has increased their clarity and effectiveness (Potter and Tilzey 2005; Jambor and Harvey 2010). The general conclusion of stakeholders - be they directly involved in food and farming or are non-farming interest groups - is dissatisfaction (Swinnen 2015). To take one example, environmental NGOs have expressed frustration with the crop diversification regulation they pressed for and which was introduced in the 2013 reform (see for example, FOE 2014). More worryingly, the Commission's Joint Research Centre (JRC) carried out an assessment of the impact of the regulation and concluded that the proportion of commercial farms affected either wholly or partially is just two per cent (JRC 2015). Thus, for a regulation that is complex to administer and involves a notional annual spend of €6 billion the Community receives virtually no environmental benefit.

2. Non-farming Interest Groups and the Precautionary Principle

The foregoing has argued that since the early 1990s the growing regulatory burden imposed by the CAP is, to some degree, the product of a desire to maintain the high levels of public subsidies inherent in agricultural exceptionalism. Here we consider the relationship between the intensity of regulations and the precautionary principle. The precautionary principle was originally developed to provide risk managers with a tool for decision-making on environmental threats from processes or substances that had not undergone safety evaluation or regulatory approval. It is invoked when an activity raises threats of harm to human health or the environment but the precise impact cannot be 'fully established scientifically' (Kriebel et al. 2001). In this section we consider to what extent the EU's embrace of the precautionary principle has further facilitated the involvement of non-farming interest groups which in turn has reinforced the principle's role in policy making.

The precautionary principle was explicitly introduced in the 1992 Treaty on European Union in relation to environmental policy but as the Commission (2000a) readily admits it is not tightly defined and in practice its scope has widened beyond the environment to embrace human, animal and plant health. In its defence the Commission argues that faced with imperfect scientific information and public concern 'judging what is an acceptable level of risk for society is an eminently political responsibility' (ibid.: 3).

Given that the areas of food and farming can boast some of the most vocal and influential interest groups it should not be surprising that despite the promise of RIAs to limit regulatory activity and foster deregulation, in practice their influence has been modest (Pelkmans 2012).

Despite the official desire for evidence-based, transparent and accountable policy-making there remains a propensity to accede to public demands for intervention. The precautionary principle lacks an unequivocal definition and amounts to a normative guide for policy-making under uncertainty whereby the benefit of the doubt is given to the protection against harm at the expense of business or economic interests. Thus, the precautionary principle allows the authorities to adopt measures that err on the side of caution and in this respect it enhances the power of interest groups, especially in the environmental sector, who have long promoted the principle as a way of increasing stakeholder and public involvement in policy-making (Lofstedt 2003). By providing non-farming interest groups with a pseudo-official means of influencing policy, the scope and opportunities for regulatory capture multiply. The danger of such pressure is the creation of an official mindset distrusting of market forces and more open to command-and-control. The result is a drift towards overregulation i.e., an unjustifiably wide spectrum of issues relative to expected societal benefits, and regulatory failures resulting from over intrusive, rigid or otherwise costly rules. Overregulation and regulatory failures are in conflict with the efficient working of the single market.

Food standards

Food safety provides a demonstration of this regulatory drift. No rational person would deny the use of regulations to limit the spread of food-borne illnesses such as E. coli and Salmonella, where the scientific evidence suggests their application would be effective and proportional. However, the identification of the fatal, neurodegenerative disease, BSE in the mid-1990s and the authorities' apparent ignorance - at the time the British government maintained that BSE was not transmissible to humans - contributed significantly to pressure for direct action (Hoffmann 2010). The result was a White Paper on food safety (Commission 2000b) setting out a roadmap for EU legislative reform. Significantly, the White Paper separated risk assessment from risk management. The former was to be based on scientific advice and would be the responsibility of a new European Food (Safety) Authority (EFSA) operating independently of the European legislative and executive institutions (Commission, Council, Parliament) and EU Member States, while the latter would lie with the more political European Commission. The White Paper stated that the new legal framework, by covering the whole of the food chain, would facilitate rapid, effective, safeguarding measures in response to health emergencies. The policy was to be underpinned by scientific advice but - significantly - went on to point out that the 'precautionary principle will be used where appropriate' (ibid.: 3).

The involvement of the Commission and its propensity for the precautionary principle inevitably imparts a normative character to risk assessment and hence the likelihood that interest groups will usurp scientists and economists to broaden the focus of food safety legislation. Indeed, the White Paper outlined 84 legislative and policy initiatives and in so doing demonstrated the risk of overregulation inherent in actions driven by crisis and fear. Evidence for this suspicion is provided by the substitution, in the years that followed the White Paper's publication, of the phrase 'food standards'

for ‘food safety’ in Commission communications. Food standards legislation now encompasses a wide variety of issues including not only safety, but also nutrition, labelling, packaging and pesticide residues. To take but one example, labelling regulation may have the laudable aim of providing consumers with sufficient information with which to make informed choices, but nutritional advice is frequently contested e.g., alcohol, and there are issues concerning the amount of information required coupled with size and clarity that do not sit easily with consistent branding and smaller packaging.

Animal welfare

If food safety is now subject to the threat of overregulation, the threat is more of a reality in the areas of animal welfare and the environment. While the commitment of policy-makers to a multifunctional agriculture is no doubt genuine this does not justify, per se, resort to regulatory intervention in these areas; particularly when much of the pressure for action is not based on objective scientific evidence. Where scientific and/or economic considerations are hard to measure and/or contested, interest groups often apply emotional criteria when attempting to justify the need for regulation. A good example is Compassion in World Farming's exposure of instances of bad practice on intensive livestock farms as part of its successful campaign to persuade the EU to regulate GM crops, particularly in animal feeds. In principle, in the case of food safety - as opposed to food standards - a structured approach has been adopted whereby an attempt is made to assess the risks to human health and the best means for their control identified. This approach is not without its difficulties (see, for example, Melkonyan and Schubert 2009) nor is it free from the attentions of interest groups but the difficulties of attempting to apply a similar approach to animal welfare and the environment are considerable.

There are many new and developing aspects of these areas where science is not appropriate or the level of scientific understanding is insufficient to undertake a rigorous risk analysis. Relatively few people have direct experience of farming and perceptions relating to the relationship between farming, animal welfare and the environment are in many instances subjective. To the extent that professional, well-resourced non-farming interest groups (e.g., Compassion in World Farming and Greenpeace) are successful in their campaigns on specific issues it creates a bias towards opinion-based policy employing ideology, emotion and the selective use of evidence - see, for example, the letter from 107 Nobel laureates calling on Greenpeace to 'abandon their

campaign against “GMOs” in general and Golden Rice in particular’ (Achenbach 2016).

These issues are very much to the fore in animal welfare regulation. Economists cite ‘willingness-to-pay’ as a vehicle for providing an accurate reflection of peoples’ moral concerns and values (see, for example, Harvey and Hubbard 2013). From this perspective it is frequently observed that stated concern over animal welfare does not necessarily translate into purchase decisions (Toma et al. 2011). Surveys which find around 70 per cent of EU consumers are concerned about animal welfare (Swinbank 2000) or rate ethical food production important (Defra 2011b) should be contrasted with others showing that only five per cent of consumers include animal welfare as one of their major concerns when buying food (Swinbank *op.cit*). In the UK less than five per cent of total food sales are for products with some ethical or environmental claims (Mintel 2015). The apparent gap between consumers’ stated attitudes and purchasing behaviour does not justify regulatory intervention. In practice, market processes are constantly testing consumers’ preferences e.g., the growth of the market for free range eggs. It is, however, obvious that the authorities have not been prepared to leave animal welfare to market forces; indeed, the UK was in the vanguard of action to over-ride the market with its 1996 proposal to place a formal obligation on the EU to give full regard to animal welfare in matters relating to agriculture, transport, research and the Single Market (Bennet 1997).

In the ensuing years animal welfare legislation has evolved. Ingenbleek et al. (2012) attributes the growth of regulations in this area to the involvement of animal-interest groups; an attribution that should be set alongside the doubts of experts that evidence has genuinely replaced opinion when setting regulations in this area (FAWC 2014). Few would question regulatory intervention when it comes to cruelty but the situation is less clear when it comes to suffering when intervention is driven by emotion or ethics (see, for example, Dawkins 2008). Indeed, the outcomes can be perverse as demonstrated by the ban on growth promoters in the EU. Based on the precautionary principle (Casewell, et al. 2003) the effect, in the view of a number of experts, has been a deterioration in animal welfare and ‘the veterinary use of therapeutic antibiotics, which are identical to those used in human medicine, has increased …[creating] … a theoretical hazard to human health’ (ibid.: 2).

The environment

If the foregoing raises doubts about the extent to which the current suite of EU animal welfare regulations results in standards that are consistent with the preferences of consumers, the situation is even more nuanced when it comes to the environment. The influence of the precautionary principle has grown because of the perception - almost certainly aided by the activities of interest groups - that the contribution of scientific research to solving problems such as ecosystem degradation and climate change was not rapid enough to provide effective solutions (Kriebel, *op. cit.*). The right of governments to act where preliminary objective scientific evaluation indicates that there are reasonable grounds for concern is not questioned, but its use by interest groups to increase their influence on policy should raise unease. In reality, it has become central to the regulatory burden on agriculture, particularly in the area of environmental protection, and a key influence on the development of the multifunctional policy paradigm.

As with animal welfare, it is difficult to accurately measure how aligned environmental regulations are with consumers' preferences. Consumer surveys suggest a growing demand for products produced using environmentally friendly production methods (Yates 2009) and the market is redolent with so called 'green' foods. Yet when it comes to food produced organically - in theory using production systems that minimise demands on the natural environment - EU consumers devote less than three per cent of food and non-alcoholic expenditure to such products (EPRS 2015). Despite the involvement of the EU in regulating organic standards it would appear that consumers balk at paying a price premium. Matters are further complicated by the fact that the concept of a multifunctional agricultural industry - ie. delivering public goods alongside food - is itself subject to widely varying interpretations and interest group appropriation. Non-farming interest groups who viewed multifunctional regulations as placing the provision of environmental public goods at the core of the justification for

continuing financial support to farmers now express frustration that they are losing ground to the farming lobby (Potter and Tilzey 2007). In the ‘battles between competing advocacy coalitions’ (Peterson 2009: 110) the regulatory burden would appear to be protecting agricultural exceptionalism rather than delivering public goods.

3. The impact of regulation on food prices

One consequence of the growth of agri-food regulations has been a concerted effort by the authorities to improve the effectiveness and transparency of regulations; the objectives being both to control compliance costs and to mitigate any adverse effects for the food chain's efficiency and competitiveness. In pursuit of this objective the Commission (2011) carried out a large scale study to provide quantification of the compliance costs at the farm level of food safety, animal welfare and environmental regulations. The study used case studies involving a variety of farm types in different EU countries and expressed the costs as percentages of total production costs. Table 1 shows the broad ranges revealed by the study but as they are drawn from different farm types in different countries the results cannot sensibly be summed or averaged.

Table 1: Ranges of estimated increases in costs arising from compliance:

Cost of compliance with:	Grazing: Dairy, beef and sheep	Intensive livestock: Pigs and poultry	Arable crops: Wheat, and fruit
Environmental legislation	2.1% - 0	4.7% - 0	4.1% - 0
Animal welfare	0.8% - 0.3	3.5% - 2.0	n/a
Food safety and animal health	1.5% - 0.1	4.4% - 0.2	0.7% - 0

The study acknowledged that these additional costs are likely to adversely affect international competitiveness and trade balances but argued that they should be set against the potential benefits for society of higher standards. However, the study confined itself to only a theoretical outlining of the gains; it did not attempt any quantification of the benefits. Rather it relied on academic papers and rather disingenuously argued that, as EU production costs are significantly higher than those in third countries, the absence of the additional costs of compliance would result in only a limited

improvement in terms of cost competitiveness. Defra (2013) carried out a similar study for farm businesses in England and estimated the total annual cost of complying with existing regulations was £590 million in 2011. Set against total operating costs for the industry of some £11 billion this suggests that compliance with existing regulations currently increases total operational costs by a little more than five per cent. The authors of the Defra study point out that the costs of regulation vary significantly between sectors of the agricultural industry and, like the EU study, it does not provide any monetised estimates of the expected benefits for either farm businesses or society.

While such estimates of the impact on production costs are informative, they are nevertheless partial; indeed, they amount to a significant underestimate of the true cost of regulations because they fail to take account of any longer term lessening in productivity growth and/or international competitiveness. A snapshot of the additional annual cost - albeit at the business or industry level - does not provide guidance as to the cumulative impact of regulations on farming operations as well as innovation and scientific research. Assessing the cumulative impact of regulations with respect to operational efficiency and technological advance is exceedingly difficult, particularly in the presence of farm support policies (see, for example, Lichtenberg and Zilberman 1986; Alston and James 2002). While a specific regulatory proposal can certainly be examined for its impact on current productivity,[1] the degree to which cumulative restrictions affect the longer term competitive performance of the agricultural industry and more generally the agri-food chain have not been the subject of research by either the Commission or the UK government.

A full account of these potential longer term costs is beyond the scope of this paper, but it is an important issue as a slowing in the rate of productivity growth translates to relatively higher prices and thus a curbing of social welfare. Quite correctly, interest-groups set the costs of regulations against the positive benefits (e.g. animal welfare) but not only are the benefits exceedingly difficult to accurately measure - consumers seem unwilling to pay higher prices for these benefits - but compliance costs do not take into account the longer term, and potentially much larger costs arising from the impact on competitiveness and the affordability of food. These longer term opportunity costs start with the potentially adverse impact on farm level crop and animal experimentation and spread upstream to

1 For example, the impact of the 2013 crop diversification regulation.

scientific research. European farming systems aspire to be internationally competitive but to achieve this aim they will need the support of science and technology. The dangers of making some areas of experimentation and research less attractive need to be set against the comprehensive and persuasive body of evidence that has been amassed 'demonstrating that the world as a whole and individual nations have benefited enormously from productivity growth in agriculture, a substantial amount of which has been enabled by technological change resulting from public and private investments in agricultural R&D' (Alston 2010: 19).

The concern here is not only the potential, longer term opportunity costs of regulations but also the danger that the use of the precautionary principle has unnecessarily widened the burden and hence the longer term deadweight costs of regulation. Where science confirms a probability of actual harm the use of designated products and/or processes should be strictly controlled or, if the evidence is sufficient, banned. But researchers must believe that if science discovers a way to reduce the probability of harm, unnecessary hurdles will not be placed in the way of commercialising the new knowledge. Such confidence is lacking where the authorities invoke the precautionary principle as it places a heavy, if not impossible, burden of proof on innovators and researchers (Hathcock 2000). The use of the precautionary principle as a basis for regulation has given rise to a wide range of criticisms founded on a normative rather than a 'sound scientific' approach to the governance of risk with the benefit of the doubt trumping expert-based risk-assessment techniques involving scientific experimentation and modelling (see, for example, Peterson 2006). When it comes to EU agriculture there are two reasons why this concern is heightened. Firstly, examples where precautionary regulation, or where the regulation includes - explicitly or implicitly - some elements of precaution, are very widespread including biotechnology, plant protection, water management, protected areas, and food safety.[2] Secondly, as argued in the previous section, the extensive use of the precautionary principle is in part the outcome of the involvement of non-farming interest groups in policy making.

2 See Codex Alimentarius (1999) for a summary of definitions relating to microbiological precaution and risk assessment.

Pesticides

We can demonstrate the potential, long term impact of this concern with two areas where the precautionary principle has had a significant influence on the nature of regulations: synthetic plant protection products and genetically modified (GM) crops. In both cases consumer concerns, which owe much to the activities of non-farming interest groups, have encouraged policy-makers to resist these technologies by the imposition of precautionary based regulations (see, for example, McGrath (2014) and Tait (2001)). Despite the existence of nine Directives - and a significant number of Regulations - relating to pesticides, the Commission would appear to be of the view that that the current regulatory framework does not sufficiently address the actual farm-level use of pesticides. Consequently, the EU is reviewing its pesticide legislation with the objective of achieving a significant reduction in pesticide use (Skevas et al. 2013). Notwithstanding the fact that the effect of existing Directives and Regulations has been the loss for EU farmers of some important crop protection products, the review process could result in the removal from sale of many more pesticides commonly used in the UK (Hillocks 2012). The effect would be significant yield losses and reductions in economic margins (Webster et al. 1999). Researchers estimate that overall crop yields would be around half their current levels without the use of crop protection products (see for example Higginbotham et al. 2000, Oerke 2006 and ADAS 2008). The extent of the potential reduction in pesticide usage is not clear - the more so as the policy is now being reviewed - but the overall effect of a reduction in crop yields across the EU would be a substantial rise in the price of agricultural products and therefore a reduction in the affordability of food.

It is not the purpose here to attempt to quantify the impact on retail food prices of actual and potential reductions in crop protection products. The data set out in Table 2 show comparative yields for three representative crops grown conventionally and organically in the UK and has the limited

aim of illustrating the potential costs in terms of food affordability. If synthetic crop protection products were completely banned farms would be forced to adopt organic farming systems and consequently average yields would decline as shown - in practice they would probably decline by a greater percentage given that organic crops are largely grown on productive land and by specialist farmers. Currently 58,600 hectares of arable land in the UK are devoted to growing organic crops which amounts to 1.3 per cent of the total arable area (Defra 2016). As the scope to increase the area of arable land both in the UK and across the EU is severely limited so the fall in yields implied by the data set out in Table 2 would result in a large fall in the production of arable crops and consequently higher prices for not only arable crops but also meat and dairy products according to the proportion of feedstuffs accounted by grains. Cheaper imports from third countries would increase but as they would be subject to tariffs their ability to mitigate rising prices would be constrained. For example, the current tariff for soft wheat is about £75 per tonne, an increase of 58 per cent on the price shown for conventionally grown wheat in Table 2.

Table 2: Illustrative Impact on Yields and Prices (2014 prices)

		Conventional	Organic	Percentage Change
Winter wheat:				
	Yield (tonnes per hectare)	8.95	4.5	−49.0
	Prices (£ per tonne)	130.0	220.0	69.0
Winter beans:				
	Yield (tonnes per hectare)	4.05	3.0	−25.9

	Prices (£ per tonne)	180.0	275.0	52.7
Ware potatoes:				
	Yield (tonnes per hectare)	45.0	25.0	−44.4
	Prices (£ per tonne)	119.7	350.0	192.3

Source: ABC (2015)

On the basis of the data shown in Table 2 - supported by similar calculations for other crops - it would not be unreasonable to conclude that in the absence of synthetic crop protection products farm-gate prices for arable crops, fruit and vegetables would be at least 50 per cent higher and consequently - allowing for the increased costs of feedstuffs - farm-gate prices for meat and dairy products would average out around 25 per cent higher. In 2015 the farm-gate value of crops, livestock and livestock products produced in the UK was some £21.5 billion i.e., £8.5bn for crops and £13bn for total livestock output (Defra 2016). Thus, on the basis of the forgoing, admittedly crude, calculations, and ignoring any mark-up on the increased prices between the farm-gate and first hand processors, the UK food chain would be faced with additional raw material costs of some £7.5 billion per year. This is an extreme position as it assumes that all synthetic plant protection products are banned and it ignores the likelihood that some of the increase would be absorbed by higher productivity in the food chain. That said, the Commission has yet to determine the nature and scope of any new regulations concerning pesticide usage. It is not suggested that all synthetic plant protection products are likely to banned. However, as current EU policy is directed towards significant reductions in synthetic crop protection products, the foregoing serves to indicate that Defra's current estimate of £590 million for the total annual cost of complying with existing regulations is a significant underestimate of the potential costs. Defra's study makes no claim to go beyond the farm level financial cost of compliance but a balanced assessment should also take in the longer term costs in terms of the impact of lower productivity on the prices of agricultural products and hence household food expenditure (see, for example, Rickard 2012).

Innovation and GM crops

One response - frequently associated with non-farming interest groups - to the potential adverse effects on the affordability of food arising from a ban or severe restriction on the use of a particular pesticide is to argue that robust regulations motivate innovation and research into alternative technologies. There are however two caveats when it comes to EU pesticide regulations. The first was identified in a study by Ollinger and Fernandez-Cornejo (1998) of the effect of environmental regulation on the innovation of pesticides. They found that increasing regulatory costs not only decreased the number of pesticides brought to the market but also the overall innovation of pesticides was reduced; a situation that can only be worsened by the regulatory uncertainty arising from the Commission's current review. Research is expensive, and so organisations - be they public or private - involved in the discovery of new knowledge are rationally going to focus their efforts on products and/or processes that are less likely to fall foul of the precautionary principle. The requirement to establish safety with no uncertainty necessarily increases the costs of innovation and hence discourages the deployment of resources to technologies where there is even a low, theoretical probability of harm.

The second concerns alternative technologies, the most promising of which is the cultivation of genetically modified crops; yet, on the basis of the precautionary principle there is a *de facto* moratorium on the cultivation (though not the import) of GM crops in the EU despite the 2006 World Trade Organisation (WTO) dispute panel ruling that the moratorium was illegal (Smith 2012). To date only one GM crop has been licensed for cultivation in the EU - a type of maize - while 18 applications, more than half of which were submitted at least five years ago, languish in the regulatory pipeline (ACRE 2016). This contrasts markedly to conventional crops where applications for new varieties can expect decisions to be made within 2.5 years of submission. Moreover, the compliance costs for

conventional varieties are a fraction of those that apply to GM crops. These vary depending on the crop, but administration and testing fees amount to less than £5,000 for conventional crops (ibid.) compared to £5-10 million for a GM crop (Kalaitzandonakes et al. 2007).

The *de facto* moratorium on cultivating GM crops can be traced back to the 1990 Directive 90/220/EEC. Although replaced in 2001 by Directive 2001/18/EC legislation still follows the principles laid down in the 1990 Directive and a proposed amendment put forward by the Commission in 2010 would allow Member States to restrict or prohibit the cultivation of GM crops within their territories. Of significance is the reason for the proposed Regulation; namely, pressures from within member states from consumers driven by 'subnational entities' e.g., non-farming interest groups, who were relying on the precautionary principle (Randour 2014). The proposed regulation can be traced back to Austria's unilateral decision in 2003 to ban the cultivation of GM crops within its territory (Fleurke 2008). The European Court of Justice (ECJ) took the view that Austria had failed to provide new scientific evidence or to demonstrate that a specific problem had arisen within their territory. The ECJ ruling would logically suggest a relaxation of the regulatory corset allowing for the co-existence of GM and conventional crops within the EU. However, both the Council and the European Parliament - conscious of national consumer pressures? - have been unable to agree a way forward and consequently the Commission has sought to resolve the deadlock with its proposal despite the threat to the internal market for arable crops (Randour, op. cit).

The behaviour of the EU towards GM crops undermines the claim by many advocates of precautionary regulation that it stimulates innovation and alternative technologies. Indeed, as with pesticides, studies show that costly and uncertain regulatory requirements inhibit research, causing programmes to be discontinued or slow to develop (see, for example, Wrubel et al. 1997). Although, by its nature impossible to quantify, the longer term economic cost of current and uncertain future regulation that deters or delays technological advances could be very large. But these potentially large costs for consumers and the food industry's international competitiveness are not even acknowledged in either Defra's or the EU's attempts to provide an estimate of the total annual cost of regulations. Indeed, on the basis of the foregoing, a proportion of these regulatory costs, particularly those based on the precautionary principle and affecting the growth of productivity, should properly be added to the total costs of agricultural exceptionalism in the EU.

Concluding Thoughts

Further doubts as to the whether the benefits of regulations outweigh the costs arise from the fact that EU wide command-and-control regulations cannot allow for specific contexts when it comes to the variability of the natural environment, business structures and farmer characteristics. Regulatory disconnect i.e., the difficulty for regulation to keep pace with technological change is a growing risk as the increasing complexity of agricultural systems puts them beyond the scope of what direct regulation can accomplish with any degree of efficiency.

Consider, for example, precision farming which in principle makes it possible through the fusion of information and engineering technologies to reduce pesticide application rates and limit spraying to areas of high infestation, thereby supporting productivity while reducing potential environmental harm. Precision farming requires monitoring of infestation levels, on-the-spot adaptation to local conditions, knowledge regarding potential yield damage and so on. In short, the use of advanced technologies requires more sophisticated human capital including the ability to adapt them to local conditions. This complexity favours greater resort to 'voluntary' policies; whereby, participation incentives rely largely on private benefits. The Commission justifies its mandatory approach by resort to 'public concern' (op. cit., 2011) but products which embody attributes that are valued by consumers potentially make their voluntary provision profitable e.g., improved nutrition, greater food safety, reduced pesticide residues, or enhanced animal welfare.

It would be churlish not to recognise that in some areas EU regulatory policy has been beneficial in helping to convince farmers of the importance of environmental protection and animal welfare. That said, many industry participants now believe productivity is being constrained by the sheer volume and intrusiveness of regulations, though in part the regulatory

burden is a consequence of farming's demand for exceptionalism. Decoupled support payments enable farms to adopt a less intensive search for productivity enhancing change and hence they impact negatively on efficiency (Rizov et al. 2013). Strong political support for 'family farms' together with powerful farmers' lobbies explain why it has proved impossible to undertake any reform of the CAP without the assurance that funding would continue at prevailing, nominal levels. But this exceptionalism has come at a further cost to efficiency as its preservation has necessitated an increasing role for non-farming interest groups whose *raison d'etre* is to seek ever more interventionist regulation. Thus regulation becomes a substitute for human skill and judgment which threatens a longer term opportunity cost.

This paper casts doubt on the frequent claims by both governments and non-farming interest groups that the benefits of the current regulatory burden outweigh the costs. Attempts by the authorities to demonstrate the positive net benefits of mandatory regulations are flawed because they do not take in the adverse effects for longer term technological advance and farm level operational efficiencies. Once allowance is made for the longer term opportunity costs of regulations and in particular those founded on the precautionary principle the balance of advantage becomes much more problematic. The uncertainty associated with the precautionary approach discourages the deployment of resources to researching technologies with even a low, theoretical probability of harm despite offering the likelihood of faster agricultural productivity growth. And productivity growth is further constrained by the existence of regulations that compromise, if not over-ride, the market advantages for the development of distinctive capabilities at the farm level. The difficulties of estimating these longer term, opportunity costs of regulation effectively mean that they are ignored in cost-benefit exercises. Yet, they are real and as indicated above the costs in terms of efficiency, competitiveness and living standards are likely to be large.

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