Department for Environment Food & Rural Affairs

EVIDENCE AND ANALYSIS

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Agriculture Bill: Analysis and Economic Rationales for Government Intervention

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This document sets out the evidence and analysis underpinning the Agriculture Bill and accompanies Health and Harmony: the future for food, farming and the environment in a Green Brexit - Policy Statement. In addition, Defra has published a slide-pack that sets out the evidence and analysis for phasing out Direct Payments in England in a visual format.

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Executive summary

The agriculture sector makes a small but significant contribution to the UK economy. Its impact on the environment and society (through the provision of public goods and environmental outcomes, as well as some environmental costs it imposes) is extensive.

- Agriculture contributes around £10bn (less than 1%) to the UK economy, employing 1.5% of the workforce in 2017. Within England, the agriculture sector in 2016 contributed 2% to predominantly rural areas.
- UK agriculture accounts for nearly half of the food consumed in the UK. Food production also provides an important basis for food and drink sector industries, and it benefits other industries, including fibre production where wool and biomass crops provide additional products.
- In England in 2017, approximately 70% of land was managed through farming and 10% through forestry. Land management activities can secure and increase the provision of public goods and other environmental outcomes with social and economic benefits. These include thriving plants and wildlife; clean air; clean and plentiful water; protection from, and mitigation of, hazards; a habitable climate; and beauty, heritage and engagement with the natural environment. For example, in 2015, it was estimated that UK woodland provided £301m in recreation benefits while farmland provided £205m.
- Land management can also impose costs on society. It is estimated that agriculture produced 10% of UK greenhouse gas emissions in 2015, with costs equivalent to £3bn. While total UK greenhouse gas emissions fell by 41% between 1990 and 2016, emissions from agriculture fell by only 16%.
- There has also been a sustained decline in diversity across plant, animal and insect species, attributable to changing land use and intensive agricultural production.

The EU Common Agricultural Policy has shaped the agricultural policy framework. Leaving the EU allows us the opportunity to move away from some of its weaknesses.

- The UK currently receives around €4 billion in CAP funds each year. Around 80% is spent on Direct Payments to farmers under Pillar 1 (which also includes single Common Market Organisation (sCMO) interventions to support agricultural commodity prices). The remaining 20% is spent under Pillar 2 on programmes intended to support environmental outcomes, farming productivity, socio-economic outcomes and rural growth.
- Direct Payments are not distributed evenly across farm businesses and not all sectors benefit from Direct Payments to the same extent. Since Direct Payments are based on land area, recipients of the largest amounts are typically farmers with large land holdings. Of the total payments under the CAP, most is received by a relatively small proportion of farmers.
- In general Pillar 1 funding represents poor value for money where the benefits of spending do not justify the costs.

- The funding that goes to Pillar 2 has been found to have good value for money. Despite this, Pillar 2 receives a relatively small proportion of overall CAP funding.

Government wants to transform agriculture policy through the Agriculture Bill by paying farmers and land managers to deliver environmental public goods.

- The 25 Year Environment Plan sets out our goals for improving the environment and leaving it in a better state than we found it[1]. As we leave the EU, we have an opportunity to deliver environmental benefits and contribute to the achievement of the goals in the Plan, including clean air, clean and plentiful water, thriving plants and wildlife, reducing risks of harm from environment hazards, enhancing beauty, heritage and engagement with the natural environment, and mitigating and adapting to climate change.
- A new Environmental Land Management (ELM) system will be the cornerstone of agriculture policy in England, and a key mechanism for achieving the outcomes of the 25 Year Environment Plan. ELM will provide public money to pay farmers and other land managers for environmental benefits and services which society values - this includes public goods and other environmental outcomes that deliver public value where the market may not provide them and the public would benefit.

In order to transform agricultural policy and move to a better value for money state, Direct Payments need to be reformed. There is a strong, evidence-based case for change.

- While the stated EU rationale for Direct Payments is linked to income support, the payment is not targeted towards farm businesses with low incomes and involves no kind of means testing. As a result, the system necessitates that significant amounts of public money are used to provide income support to high income households and households of high net wealth. However, this is not to say there are no farming households who have low incomes that are supported by the existing system.
- They undermine efficiency and productivity growth. While formally decoupled from production, there is evidence that the indirect effects of Direct Payments distort the economics of agriculture and constrain incentives for productivity-enhancing activities. They impede beneficial structural change, particularly through their inflationary effect on farm rents and land prices.
- They do little to deliver against the environmental outcomes of modern agricultural policy. 30% of a farmer's Direct Payment is dependent on carrying out certain agricultural practices, nominally of benefit to the environment, known as "Greening". However, a report from the European Court of Auditors concluded that Greening is 'unlikely to provide significant benefits for the environment and climate'[2].

The agricultural transition will allow farm businesses to adjust to the new, more environmentally-focused policy framework. Removing Direct Payments is not

[1] HM Government (2018), A Green Future: Our 25 Year Plan to Improve the Environment
[2] European Court of Auditors (2017), Greening: a more complex income support scheme, not yet environmentally effective.

expected to have substantial impacts on overall English agricultural production or prices.

- While Direct Payments make up significant proportions of some current farm revenues, and substantial proportions of some current farm business incomes, the effective size of this contribution is expected to be smaller in reality, given the effect of Direct Payments on input costs, such as rents, and their impingement of incentives to improve farm efficiency and productivity.
- Setting Direct Payments in a broader context, particularly relative to the net worth of farm businesses, and the range in productivity performance across the sector, suggests they are much less relevant to the question of farm business viability than might first appear. Most farm businesses will be able to make modest cost reductions in order to improve efficiency, which will be required when Direct Payments come to an end.
- On average, farm business which appear to make a loss without Direct Payments get £89 in outputs for every £100 they spend on inputs. In order for them to break even without Direct Payments they would need to become 10% more efficient on average, by reducing their costs to £89 to match their output or raising the value of their output to £100 to match their input, or a combination of both.
- With reasonable notice and time for adjustment, farm businesses can thrive in a future without Direct Payments. These adjustments may occur via a variety of mechanisms such as a fall in rents, more efficient use of inputs, optimising investment, diversifying the farm businesses for additional income, improved animal and plant health or greater integration in the supply chain.
- Since Direct Payments in England are formally decoupled from production, they are only indirectly linked to the level of domestic agricultural production. While any forecast or projection of the impact of their removal is inherently challenging, a wide range of evidence, including Defra modelling (discussed in Chapter 5), suggests any indirect production-stimulating effect from Direct Payments is likely to be small, and limited to particular sub-sectors.
- An agricultural transition period will help enable a smooth adjustment to the new policy framework.

Chapter 1: Agriculture and its contribution to the economy, environment and society

This chapter looks at the position of the agriculture sector in the economy. It describes how the sector contributes to the economy, environment and society and recent productivity performance.

1.1 Economic and environmental outcomes

The agriculture sector makes a small but significant contribution to the UK economy.

Agriculture contributes around £10bn of Gross Value Added (GVA) to the UK economy (less than 1%), employing 1.5% of the workforce in 2017. Within England, the agriculture sector in 2016 contributed 2% to GVA in predominantly rural areas[3].

Agriculture consists of a number of broad subsectors: cereals, dairy, general cropping, poultry, mixed farming, horticulture, lowland grazing livestock, pigs, and Less Favoured Area (LFA) grazing livestock. Primary agricultural products are exported as well as consumed domestically. Key inputs in the sector are land costs such as rent and labour, energy, fertilisers, pesticides, seeds, veterinary care and advice and depreciation, fuel and repairs relating to machinery.

The contribution of the agriculture sector to the environment and society is more wide ranging.

In England in 2017, approximately 70% of land was managed through farming and 10% through forestry, reflecting the importance of the agriculture sector in land management[4].

The UK agriculture sector accounted for nearly a half of the food consumed in the UK in 2017[5]. The UK's favourable food security is built on access to a diverse range of sources, including domestic production from agriculture (Box 1). The UK has a production to supply ratio (which provides a broad indicator of the ability of UK agriculture to meet consumer demand) of 76% in indigenous food and 60% in all food[6]. Food production also provides an important basis for food and drink sector industries, and it benefits further industries, including fibre production where wool and biomass crops provide additional products.

[3] Defra (2017), Rural productivity and gross value added (GVA) statistics.
[4] Defra (2018), Agriculture in the United Kingdom 2017, p10, Forestry Commission (2018) Forestry Statistics 2017, page 4.
[5] Defra (2018), Food statistics in your pocket 2017 – Global and UK supply.
[6] Ibid.

Box 1: UK Food Security

Food security is a complex, multifaceted issue, which cannot be reduced to a single factor. Defra's UK Food Security Assessment (2009, 2010)[7] defined food security in terms of: (i) Global Availability, (ii) Global Resource sustainability, (iii) UK availability and access, (iv) UK food chain resilience, (v) Household-level food security and (vi) Safety and confidence.

It is not a public good by any economic definition (see page 16), but it is of clear public concern. There is a case for government intervention to ensure the UK's food security. As examples of these interventions: the UK participates in the Agricultural Markets Information System (AMIS) to encourage better functioning international markets; there are regulatory interventions to ensure food safety; agricultural-environmental policy seeks to increase productivity and reduce environmental impacts at home and abroad via UK aid; and the government works closely with the UK food chain to ensure resilience.

The Assessment concluded that *'By any objective measure, we enjoy a high degree of food security in the UK today*[8]*'*. The key area of future concern related to indicator (ii) on global resource sustainability where the current situation (classed as uncertain/somewhat unfavourable) was expected to deteriorate over the next 5-10 years.

A wide range of factors impact on food security – including UK food and economic policy, but also broader policy and non-policy factors across energy, transport, trade and environment. Importantly it is not just UK-specific factors which matter but also global ones. For example, the price of oil is a key input to food prices, and features in the Assessment through many indicators (such as commodity prices or energy dependence).

A critical conclusion from the Assessment is that the key to positive UK food supply is the diversity of supply. Self-sufficiency does not ensure food supply, and would not insulate the UK from global markets. The UK's production-to-supply ratios for all food and indigenous-type food has remained broadly similar for 15 years, and is high in a historical context (pre-1970s) when the UK imported far more of its food. Markets distorted by earlier versions of the Common Agricultural Policy inflated self-sufficiency up to the early 2000s.

The themes outline the multi-dimensional nature of food security across issues and time. The everyday resilience of the UK food supply chain to ongoing threats and hazard is such an example. Food is one of the UK's 13 Critical National Infrastructure sectors, although it has no individually critical assets. There are interdependencies with transport, energy and communications networks, and there is a key focus on protection of physical, personnel and cyber security from malicious threats.

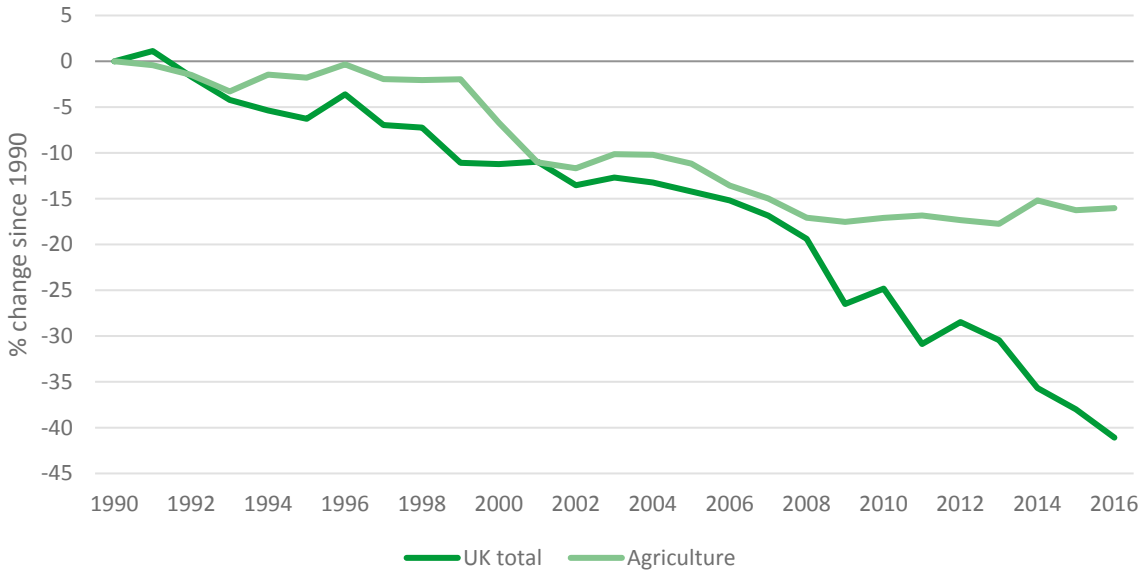
[7] Defra (2009), UK Food Security Assessment: Our Approach. Defra (2010), UK Food Security Assessment: Detailed Analysis.

[8] A high-level re-assessment in 2012 (unpublished), reiterated the results of the original assessment. Defra is currently updating the UK Food Security Assessment.

But the agriculture sector also imposes costs on the environment.

In 2015, it is estimated that agriculture produced 10% of UK greenhouse gas emissions, with a cost equivalent to £3bn[9]. While total UK greenhouse gas emissions fell by 41% between 1990 and 2016, emissions from agriculture fell by only 16%. This is shown in Figure 1. In 2015, 81% of ammonia emissions were attributable to farming, which was estimated to cost £456m in human health and environmental impacts[10]. The annual external cost to farmers from soil erosion and compaction from agriculture was estimated at £305m in 2010 for England and Wales[11].

Figure 1: Greenhouse gas emissions, total UK and agriculture (by source)



Source: BEIS (2018)

There has also been a sustained decline in diversity across plant, animal and insect species, attributable to changing land use and intensive agricultural production. Since 1970, the Farmland Bird index has halved, woodland birds have declined by 18% and the countryside species index for butterfly populations has fallen by 57%[12]. This decline limits the range and scale of the private and public benefits that can be derived from the environment.

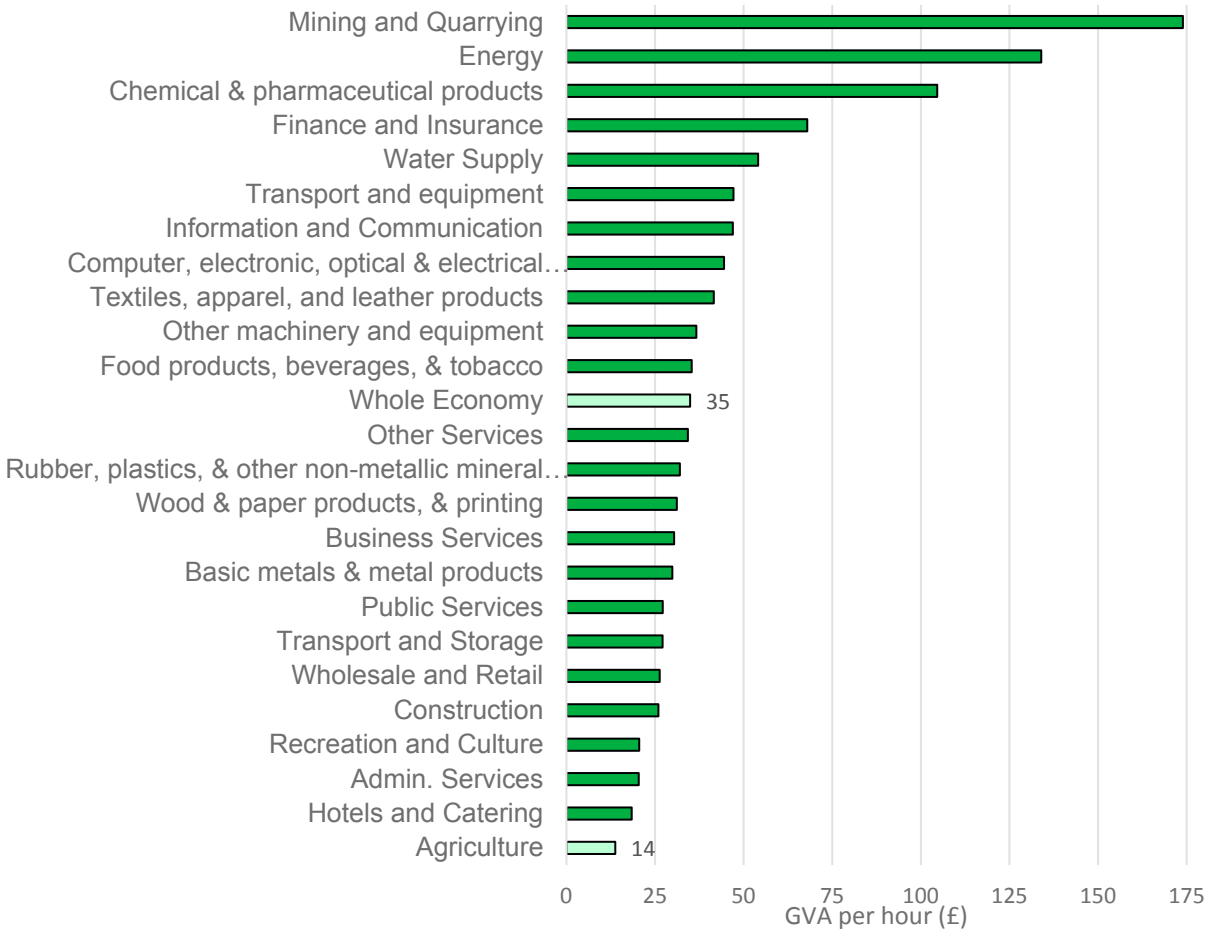
[9] Defra estimate based on BEIS non-traded carbon prices.
[10] Defra calculation using updated interim damage costs. These damage costs are not finalised and may be subject to change; in 2017 prices.
[11] Defra analysis in 2017 prices using figures from Defra Science Project. Defra (2018), The total costs of soil degradation in England and Wales (SP1606).
[12] Defra (2018), The Future Farming and Environment Evidence Compendium, pages 61-64.

1.2 Productivity

Average labour productivity in the UK agriculture sector is low compared to other sectors.

A starting point for most comparisons of performance across sectors is to look at their relative productivity. The two main measures commonly used are: average labour productivity (ALP, which measures how much output is produced for a given level of labour inputs); and total factor productivity (TFP, which measures how effectively inputs are combined to produce output)[13]. Figure 2 shows that agriculture has low labour productivity compared to other sectors in the UK.

Figure 2: Labour Productivity by sector (Gross Value Added per hour), Q1 2018



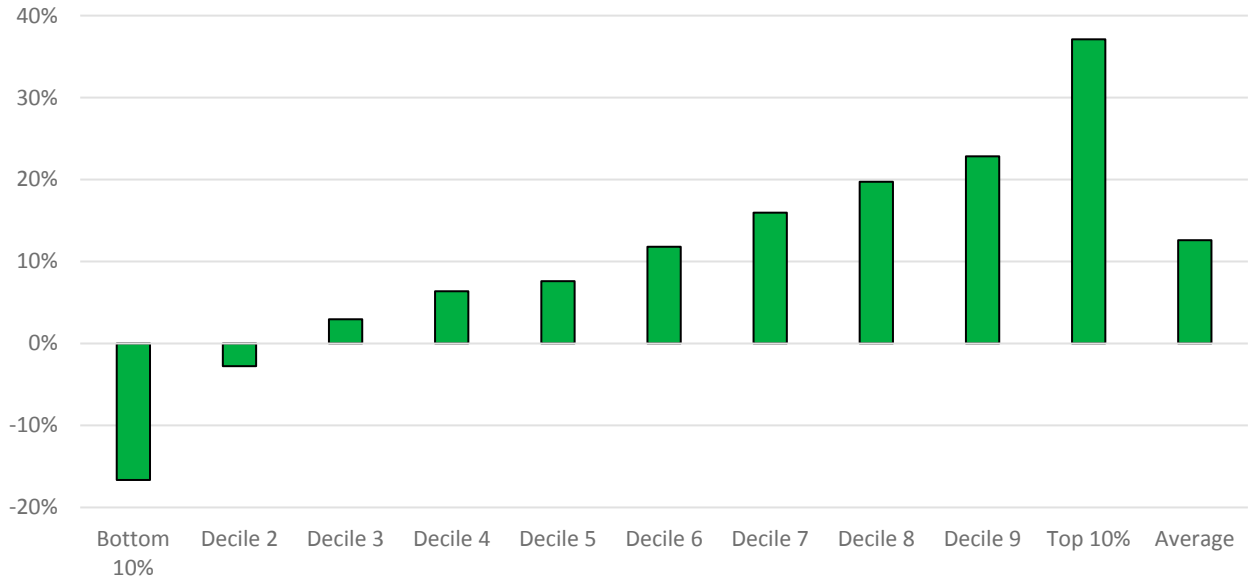
Source: Office for National Statistics

[13] Total factor productivity is harder to measure so labour productivity tends to be used more often.

Poor average productivity masks a diverse sector, with farms that are highly productive and profitable combined with others that do not perform as well.

Individual farm productivity (and its direct consequence: profitability) varies substantially across the sector[14]. As Figure 3 suggests, the top performing farms often make healthy returns (gross profits exceed 20% in the top two deciles) whereas farms in the bottom two deciles (bottom 20%) have a negative gross profit margin on average.

Figure 3: Average profit margin of farm businesses (Farm Business Income as a proportion of turnover) across farms in England by profitability decile



Source: Farm Business Survey data, three year matched dataset 2014/15-2016/17. While profit margin includes Direct Payments, to calculate a more market-focused measure, profitability deciles are calculated on the ratio of outputs to inputs excluding Direct Payments.

On average between 2014/15 and 2016/17, the top 10% of farm businesses (ranked by their profitability index without Direct Payments) in England produced on average around £150 of output for every £100 input, whilst the bottom 10% produced around £69 for every £100 input[15]. At its core, increasing productivity and profitability for individual farms is about managing costs and monitoring outputs to ensure high-quality and affordable goods are produced competitively. A comparison of agricultural productivity in the UK to major international competitors is set out in Box 2.

[14] A farm's profitability is the difference between receipts and costs. This can change when receipts and/or costs are affected by changes in production (or sales) prices and quantities. Hence, productivity is obviously not the same as profitability. Two businesses may even be equally productive but have different profitability; for example when they pay their workers differently, or one business may be less productive than another, yet have higher profits if it pays its workers less.

[15] Defra (2018), Farm Business Survey.

Box 2: International comparisons of agricultural productivity

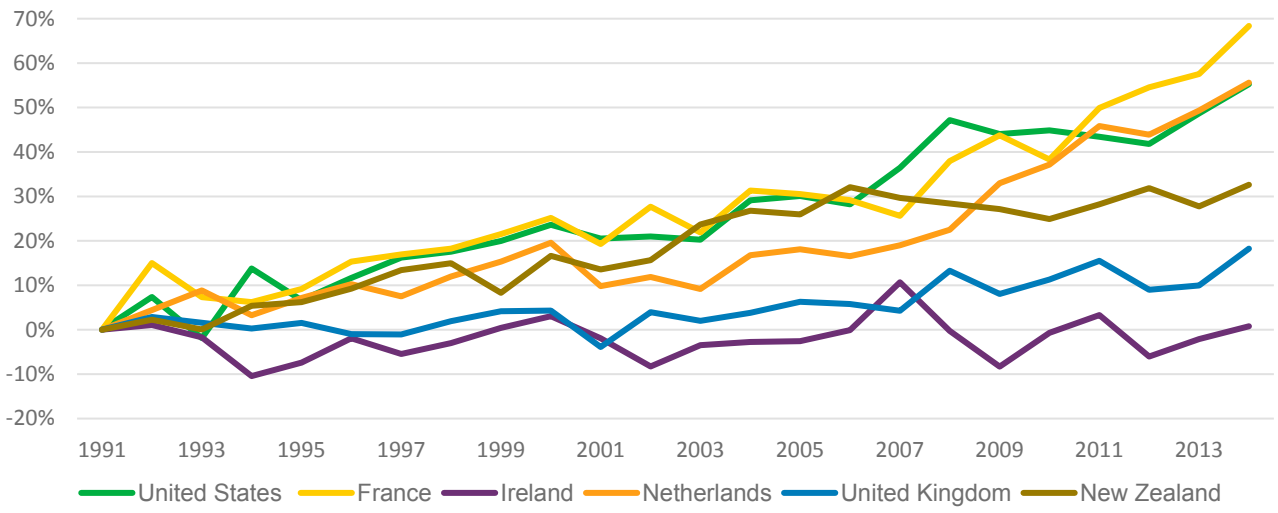
Productivity comparisons across different sectors can provide a useful picture of differences within the economy, and how agriculture can serve as an income source domestically. However, since the majority of agricultural products are heavily traded commodities, what ultimately matters for the viability of the sector is how the productivity of UK farm businesses compares to competitors in other countries.

Much of the data suggests that UK agricultural productivity growth rates have fallen behind major international competitors. However, there are significant data limitations and methodological issues in this area.

In terms of the absolute level of productivity, some sectors perform well in international comparisons of costs of production (dairy and cereals), while others perform poorly (sheep, beef)[16].

Many commentators frequently refer to international comparisons of total factor productivity (generally to statistics collected by the United States Department of Agriculture), which suggest that the UK agriculture sector has been lagging behind the same sector in other developed economies[17]. However, issues concerning data quality and comparability mean that existing international TFP measures should be interpreted with caution[18].

Figure 4: International comparisons of TFP growth, percentage change since 1991.



Source: United States Department of Agriculture (USDA), Economic Research Service

[16] AHDB (2015), Stocktake report.
[17] AHDB (2018), Driving Productivity Growth Together. NFU (2017), Domestic Agricultural Policy.
[18] In principle, TFP is a comprehensive measure of 'true' productivity performance as it controls for a number of factors which influence sector output, such as capital intensity. The advantage with USDA estimates is that they provide TFP figures for every country which can be aggregated to produce a global figure. However to do so, they have to use the 'lowest common denominator' of data available to construct their methodology. Fertiliser and animal feed are used as a proxy for all inputs. Whether this over or underestimates TFP depends on the relative prices and consumption of these inputs compared to those that are omitted (such as energy and pesticides).

Chapter 2: The Current Agriculture Policy Framework

This chapter reviews the structure and composition of the existing policy framework that governs the agriculture sector in England.

2.1 Objectives and Activities

The Common Agricultural Policy has shaped agricultural policy since the UK joined the EU.

The Common Agricultural Policy (CAP) is the EU's agricultural policy framework that sets the funding and conditions for member states. EU intervention in agriculture is justified through the CAP objectives set out in the Treaty of Rome (1957) (Box 3).

Box 3: Agriculture and Article 39(1) Treaty of Rome

(a) To increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilisation of the factors of production, in particular labour;

(b) Thus to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture;

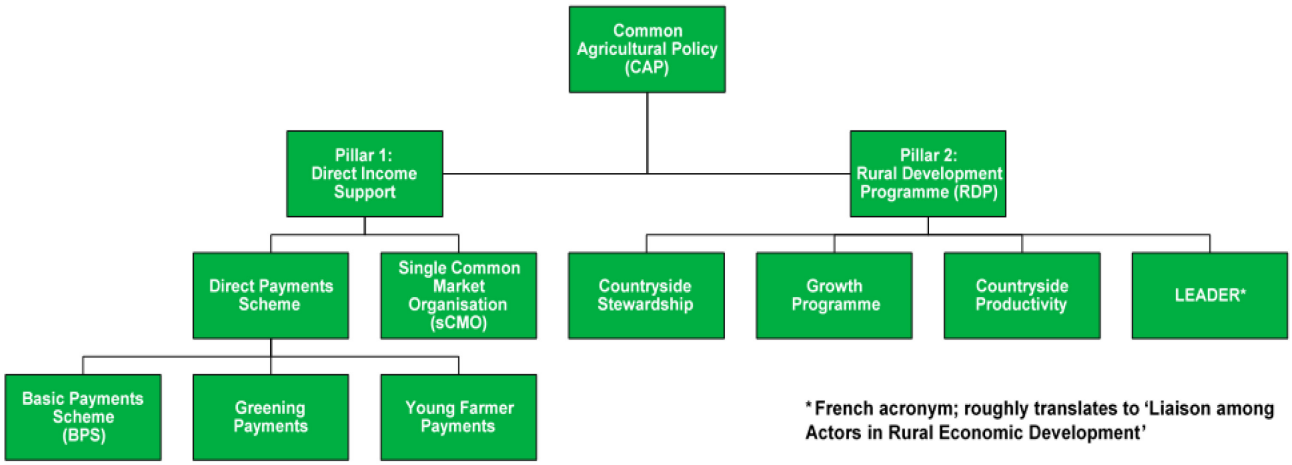
(c) To stabilise markets;

(d) To assure the availability of supplies;

(e) To ensure that supplies reach consumers at reasonable prices.

The CAP is a broad policy framework covering income support for farmers, market intervention measures and trade, and funding for rural growth under two pillars (see Figure 5).

Figure 5: The Common Agricultural Policy Framework



Source: Defra

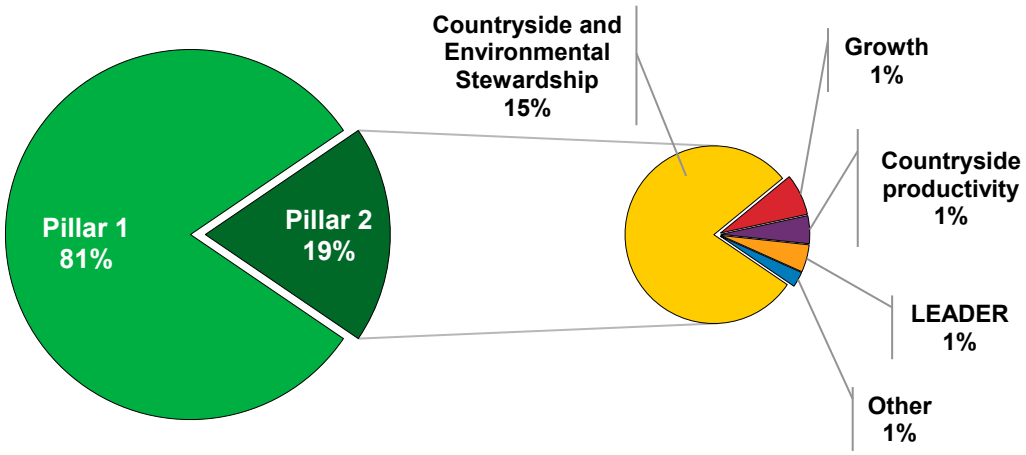
2.2 Allocation of Funding under the CAP

Most of the expenditure underpinning the CAP goes on Direct Payments within Pillar 1.

The UK currently receives around €4 billion in CAP funds each year. In England, nearly 80% of CAP funds is spent on Direct Payments to farmers under Pillar 1 (which also include single Common Market Organisation (sCMO) interventions to support agricultural commodity prices). The remaining 20% is spent on supporting environmental outcomes, farming and forestry productivity and rural growth outcomes under Pillar 2 (see Figure 6).

In England, about 80% of total CAP Pillar 2 spend is on environmental outcomes.

Figure 6: Allocations of CAP funding between Pillar 1 (Direct Payments) and Pillar 2, Annual average funding over the 2014-20 period.



Source: Defra

Direct Payments are the main system for providing income support to farm households within the CAP, with total payments to recipients in England of £1.65bn in the 2016 scheme year.

In England, there are three Direct Payment schemes: the Basic Payment Scheme, Greening and the Young Farmer Scheme:

- The **Basic Payment Scheme** (BPS) is an area-based annual payment, made to active farmers. Farmers in England need at least five hectares of eligible land and five entitlements to qualify for BPS. A farmer needs one hectare of eligible land to claim payment against each 'entitlement' they hold. It is possible to transfer entitlements to another farmer on the open market.
- **Greening** aims to support action to adopt and maintain farming practices that help meet environment and climate goals. There are three greening components: crop diversification, maintenance of permanent grassland and the need to establish Ecological Focus Areas. Greening makes up 30% of the budget for Direct Payments.
- The **Young Farmers Scheme** provides a top-up payment to qualifying farmers not above the age of 40.

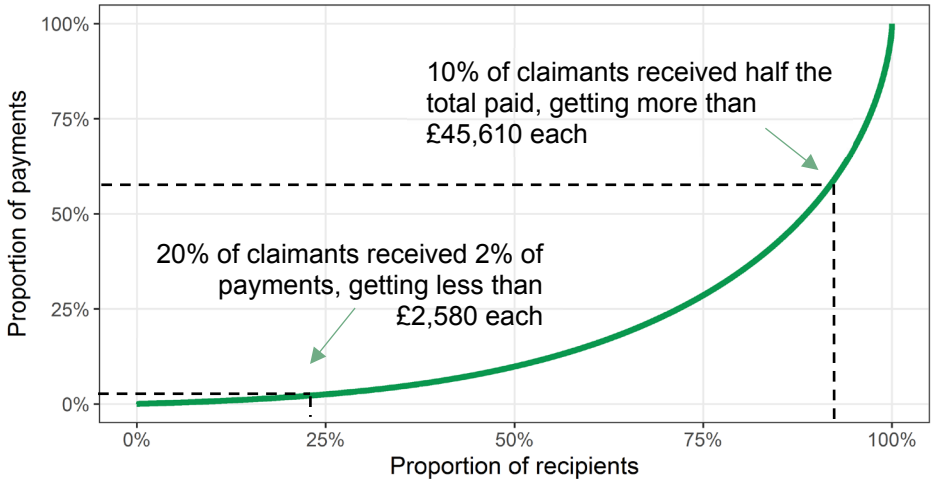
Minimum standards on the environment, animal and plant health and animal welfare are enforced in part through 'cross compliance'. Under this system, it is possible for breaches of the minimum standards to result in reductions to a farmer's Direct Payment.

In addition to the payments to farmers, there are also costs of administering Direct Payments. Indicative estimates using data from the Rural Payments Agency suggest that the administrative costs of Direct Payments are around £70m per year in England.

Direct Payments are not distributed evenly across farm businesses and not all sectors rely on Direct Payments to the same extent.

As Direct Payments are based on land area, recipients of the largest amounts are typically farmers with large land holdings (see Figure 7). Of total payments under the CAP, most is received by a relatively small proportion of farmers. In England, the top 10% of recipients of Direct Payments receive almost 50% of total payments while the bottom 20% of recipients receive just 2%. In 2016, the mean payment was £19,342 and the median payment was £8,939.

Figure 7: Basic Payments Scheme 2016 (England): cumulative payments



Source: Rural Payments Agency, scheme data for 2016, snapshot as at 30 November 2017

Estimates from the Farm Business Survey, which samples farms with at least €25,000 of output, show that over the period 2014/15 to 2016/17 Direct Payments were equivalent to, on average, 61% of the Farm business output (a measure of revenue) of farms in England (see Figure 10 below). These numbers vary across farm types, from 1% for specialist poultry and horticulture farms (which tend to be smaller, and are more likely to have land that is ineligible for Direct Payments) to 21% for LFA grazing livestock farms.

Direct Payments represent poor value for money for the average household. This is discussed in Chapter 4.

Pillar 1 also encompasses market intervention schemes under the single Common Market Organisation (sCMO) regulations, where action is taken to restrict domestic supply in attempts to raise prices during periods where they are relatively low. Pillar 1 overall represents poor value for money.

These sCMO policies also represent poor value for public money. They can undermine the proper functioning of markets, discourage the uptake of natural hedging strategies and

private sector risk management mechanisms, are costly to consumers and may add further uncertainty to market conditions where stocks are held over longer periods of time[19].

The OECD has presented evidence that there are likely to be substantial leakages from these policies to both input suppliers and inflated land values and rents, which further reduce their efficiency in providing income support to farm businesses[20]. In addition, they can only have their desired effect in highly specific circumstances but can be costly to the public purse even when they do not.

Pillar 2 is structured around socio-economic schemes to support productivity in farming and forestry and rural development, and the Countryside Stewardship scheme which supports environmental outcomes. It provides better value for money than Pillar 1.

Pillar 2 of the CAP aims to achieve a range of outcomes beyond income support. It includes three socio-economic schemes that are aimed at improving farmers' competitiveness and supporting business growth in the rural economy, and the Countryside Stewardship scheme which incentivises farmers to improve the environment.

In terms of the impact of the CAP on agricultural productivity, Pillar 2 of the CAP may have a positive effect[21]. The socio-economic schemes are expected to boost farming and forestry productivity, and benefit the rural economy through creating jobs and helping businesses grow.

The majority of Pillar 2 expenditure is on environmental measures which bring public benefits, and for which the market will not pay. The current agri-environment scheme in England is called Countryside Stewardship. It rewards actions that provide a range of environmental benefits, including: slowing the decline in wildlife populations, tree planting, improving water quality and providing more high-quality recreation opportunities. Applicants for these schemes can choose and be paid for specific land use and land management changes they wish to deliver. Under Countryside Stewardship, these changes are called 'options' and each option is defined in terms of prescriptions. These prescriptions must be followed to comply with the scheme rules. This can contribute to limiting the ability of farmers and land managers to try out new techniques for environmental land management.

There are three socio-economic schemes:

- Countryside Productivity Scheme[22] is expected to boost farming and forestry productivity through the provision of funding to farmers for the purchase of equipment, the delivery of animal health programmes, and grants for research projects targeted at improving productivity and sustainability.
- LEADER funding supports jobs and growth in rural areas, mainly through small grants. Funding includes help for farming and forestry businesses as well as other

[19] ICTSD (2011), Policy Solutions to Agricultural Market Volatility.
[20] OECD (2003), Farm household income: issues and policy responses, Paris.
[21] Defra (2014), The Rural Development Programme for England 2014 to 2020: Final Impact Assessment.
[22] Defra (2018), Countryside Productivity Scheme.

types of business and communities in rural areas. LEADER Local Action Groups (LAGs) deliver the funding to meet locally identified priorities.

- Growth Programme helps new rural businesses to get off the ground and existing businesses to develop new products and facilities, investing in broadband, business development, food processing and rural tourism. Local Enterprise Partnerships (LEPs) and local partners help decide how to spend funds in their area.

Chapter 3: The case for a new Environmental Land Management system

This chapter focuses on the rationale for moving away from the CAP to a new system focused primarily on the delivery of public goods. It reviews the evidence for moving to a new environmental land management system.

3.1 Rationale for intervention

Land management drives environmental outcomes.

As outlined in Chapter 1, agriculture has a significant impact on England's natural environment, both positive and negative, through land management decisions. Land managers, such as farmers and foresters, therefore play an important role in managing the land. Land management activities can secure and increase the provision of environmental public goods and other environmental outcomes with social and economic benefits, such as: thriving plants and wildlife; clean air; clean and plentiful water; protection from, and mitigation of, hazards; a habitable climate; and, beauty, heritage and engagement with the natural environment. Land management can, however, also have significant negative impacts on the environment (for example through water pollution and greenhouse gas emissions) so land has to be effectively managed to mitigate these.

Market failures adversely affect environmental outcomes, which warrants government intervention.

Environmental outcomes are affected by market failures caused by positive and negative externalities, and the nature of many environmental assets as public goods. These market failures provide a strong rationale for government intervention.

Land managers produce benefits that are not rewarded by the market, and there is under-provision of public goods

Positive externalities and public goods arising from land management represent market failures where the lack of reward leads to an under provision of environmental outcomes that benefit society.

Positive externalities occur when the activities of land managers produce benefits for others. These beneficial environmental spill-over effects are not rewarded fully by the market.

Many aspects of the environment, for example the benefits of clean air, can be described as public goods. We can all enjoy clean air. It is difficult to actively exclude anyone from enjoying it (known in economics as 'non-excludable' in supply), and one person's enjoyment of it does not reduce the amount available for others to enjoy (known in economics as 'non-rival' in demand). These features mean it is difficult for land managers and related businesses to provide public goods and they need to be provided through government policies. Public goods are both non-rival and non-excludable, which means there are not incentives to provide these through markets.

Ecosystem services represent the flow of benefits from the natural environment and can be grouped into four categories: regulating, cultural, provisioning and supporting services.

Each is explained below. Though some of these benefits can be monetised, they are not fully rewarded in the market, and so are underprovided.

Regulating Services: The benefits obtained from the regulation of ecosystem processes.

Carbon storage and sequestration play a large part in improving climate regulation. Trees, soils and peatlands are important carbon stores and so effective creation and management of these assets will enable this to be maximised. In 2015 it was estimated that UK woodland provided over £1bn of carbon sequestration benefits annually[23]. In addition, regulation of air quality (alongside that of water and soil quality) provides benefits to society where vegetation on land, for example, can help to reduce impacts of air pollution. It has been estimated that vegetated farmland and woodland provided £182 million and £794 million of health benefits respectively in 2015 in the UK, largely through reduction in concentrations of particulates ($PM_{2.5}$)[24].

Hazard regulation and protection provide societal benefits also, as land use change and management can mitigate the risk of flooding, and reduce the impact of floods when they do occur. Examples of water retention measures include ponds and earth banks and management measures such as buffer strips and runoff management.

Cultural Services: The non-material benefits people obtain from ecosystems.

The natural environment provides recreation value to society, with access to this land having direct positive effects on physical and mental health[25]. In 2015, it was estimated that UK woodland provided £301m in recreation benefits while farmland provided £205m[26]. These figures only count the benefits of those who have travelled to reach the land for recreation and exclude those who incur no costs to travel to the land, such as those on short walks, therefore, these figures are likely to be underestimates. The overall benefits to society are increased where the network of paths is optimised across a given area to meet visitor needs. In the absence of government intervention, landowners have little incentive to improve access across their land, as it imposes costs on them with no direct benefits to compensate for this. By extension, coordination activity between landowners is likely to be limited. The level of biodiversity in a given area will also positively impact the recreational benefit to society.

The accessibility of the land and level of biodiversity directly influence both the aesthetic values and cultural heritage benefits to society. For example, Sites of Special Scientific Interest (SSSI's) provide the best examples of the UK's flora, fauna, geological and physiographical features. The protection and management of our habitats and species in these areas and more widely across farmland and woodland, is therefore important because of the value society derives from these.

The maintenance of heritage assets, such as dry stone walls, further contributes to the landscape, benefitting both the owners of heritage assets as well as wider society, particularly visitors to the heritage sites. Cultural heritage also provides non-use benefits to

[23] ONS (2017), 'UK natural capital: ecosystem accounts for freshwater, farmland and woodland', in 2017 prices.
[24] Ibid, in 2017 prices.
[25] Natural England (2015), Summary of evidence: Access and engagement (EIN003).
[26] ONS (2017), in 2017 prices.

society as people value the knowledge that a heritage asset exists, even if it is not directly visited. Because of the public good characteristics of rural heritage, heritage is undervalued and under-invested in through free markets. Within the current system there are few incentives, which encourage efficient market outcomes for heritage, with neither existing commodity markets nor CAP Direct Payments rewarding land managers for maintaining cultural heritage assets on their holdings.

Provisioning Services: The products obtained from ecosystems.

The protection and management of our habitats allows for a more natural ecosystem that provides a variety of plants and mushrooms which offer effective cures for many kinds of health problems, for use in popular and traditional medicine and for developing pharmaceuticals[27]. In addition, ecosystems play a role in providing the flow and storage of freshwater, with forests filtering and cleaning the water[28].

Supporting Services: Those services which are necessary for the production of all other ecosystem services.

These services are more long-term and the benefits to society are indirect. Providing habitats for species and maintaining a diversity of plants and animals, alongside soil formation and retention would fall under this category.

Negative externalities

Economic activity by farmers and other land managers can have wider negative impacts on society, typically through some form of pollution or land use change that affects natural capital and the provision of ecosystem services. Examples are greenhouse gas emissions, water pollution, air pollution, habitat destruction, soil erosion and flooding. There are currently few mechanisms to address sufficiently these societal costs. Examples include:

- *Greenhouse gas emissions:* Farming is responsible for 10% of the UK's greenhouse gas emissions, equivalent to an annual cost of £3bn[29]. The main sources of emissions are livestock production and fertiliser application.
- *Water pollution:* Water pollution caused by agricultural fertiliser run-off into water bodies degrades habitats and can increase household and business water bills through higher water treatment costs. In 2013 the Environment Agency estimated that diffuse pollution from agriculture is the likely cause of 31% of failures of water bodies to meet "good" status. A recent report estimated that 50% of nitrate pollution, 25% of phosphate in the water environment and 75% of sediment pollution still comes from farming[30].
- *Air pollution:* Farming is a large source of air quality pollutants, especially ammonia, with 81% of total ammonia emissions originating from agriculture in 2015[31]. In the

[27] FAO (2018), Ecosystem Services & Biodiversity (ESB).
[28] Ibid.
[29] Defra estimate based on BEIS non-traded carbon prices.
[30] Defra (2018), The Future Farming and Environment Evidence Compendium, p60
[31] National Atmospheric Emissions Inventory (2018), Pollutant Information: Ammonia.

same year, it was estimated that ammonia emissions from UK agriculture resulted in £456m in costs to human health and the environment[32].

- *Soil erosion and compaction:* The success of agriculture in the UK depends upon healthy soils – while healthy soils have both private and public benefits, poor soil management can increase soil erosion and compaction. Soil erosion puts pressure on rivers through increased sediment runoff and nitrate and phosphate pollution. Compacted soils have a reduced rate of water infiltration causing a higher flood risk. Soil erosion and compaction from agriculture was estimated to impose an external cost in Wales and England of £305m in 2010[33]. In addition, over 70% of the UK's peatland is in poor condition, affecting its ability to sequester carbon, support biodiversity and mitigate the impact of flooding.
- *Loss of biodiversity:* Biodiversity is defined as the variability among living organisms[34], reflected in the variety, extent, condition, range and abundance of species and habitats. Costs from loss of biodiversity can be significant because ecosystem processes underpin many of the valuable services provided by the natural environment. An important part of our biodiversity resource is found on Sites of Special Scientific Interest (SSSI). 38% of SSSI land is in unfavourable condition owing to agricultural production[35]. Over time, gains in agricultural productivity have largely been at the expense of wildlife and pollinators, because they do not have a direct market value. For example, since 1970 the Farmland Bird index has halved[36], woodland birds have declined by 18% and the countryside species index for butterfly populations has fallen by 57%.

3.2 Role of the Common Agricultural Policy

The Common Agricultural Policy has insufficiently addressed the market failures.

Under the CAP system, the market failures which arise from agriculture have not been sufficiently addressed, with the contribution of farming practices to greenhouse gas and ammonia emissions, and soil erosion, among others, remaining significant.

The CAP introduced some of the world's first agri-environment schemes, making progress towards improving our environment. In 1973, the UK joined the European Economic Community and the CAP. The first major agri-environment scheme began in 1987 with Environmentally Sensitive Areas. Since then, there have been several agri-environment schemes which have made progress towards improving our environment. Although agri-environment schemes have demonstrated good value for money, only a small proportion of overall funding from the CAP is currently spent on environmental outcomes. The majority of funding is still delivered through Direct Payments that do not relate to

[32] Defra calculation.
[33] Defra analysis in £2017 prices using figures from Defra Science Project. Defra (2018), The total costs of soil degradation in England and Wales (SP1606).
[34] Convention on Biological Diversity (1992).
[35] Natural England statistics (2017).
[36] Defra (2017), Wild Bird Populations in the UK, 1970 to 2016.

environmental improvements. In 2017, the CAP ceiling in England for Direct Payment funding was €2,057 million[37], while in that same year approximately €365 million was paid to England's land managers through agri-environment and woodland schemes[38]. Underinvestment in activities which produce positive externalities has contributed to worsening environmental outcomes, with biodiversity indicators such as the Farmland Bird Index declining.

Agri-environment schemes have demonstrated good value for money.

Whilst Direct Payments have provided poor value for money, as set out in Chapter 4, existing agri-environment schemes have demonstrated good value for money and addressed some of the market failures detailed above, delivering environmental benefits which are three to five times greater than the scheme payment. Based on evaluation evidence from previous schemes, the Rural Development Programme for England (RDPE) 2014-2020 Impact Assessment estimates a benefit-cost ratio (BCR) of 3.7:1 for the higher-tier Countryside Stewardship scheme and 3.5:1 for the mid-tier scheme[39]. BCRs for forestry creation and management were 3.2:1 and 5.6:1, respectively[40]. In addition, the Natural Capital Committee's review of potential investments in natural capital found that BCRs of 4:1 are typical[41]. These are likely to be underestimates as the analysis covers only those aspects of environmental improvements that can be valued in economic terms[42]. Annex 1 provides further evidence on benefit-cost ratios of agri-environment measures.

3.3 The need for change

Existing legislative powers are not enough to address the current environmental issues.

The retained EU regulations allow for new agri-environment agreements to be commenced up to the end of the 2020 scheme year and payments made to farmers and land managers until the funds allocated to the Rural Development Programme for England are exhausted, which is likely to be in 2021 or 2022. Therefore the last year of Countryside Stewardship agreements will be for those agreements starting on 1 January 2020 and Defra will only be able to make any RDPE payments using retained EU law until funds are exhausted. The existing legislative powers to give financial assistance are set out in Annex 2.

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[37] Official Journal of the European Union (2015), Amendment of Regulation (EU) No 1305/2013. The England figure has been taken from the wider, UK figure presented in the document; these figures do not include spend on CMO, which also falls under Pillar 1, but which is very small in comparison (c. €86m across the UK in 2016).
[38] Defra figures.
[39] These estimates were based on a valuation of the outcomes of Environmental Stewardship – the previous scheme. These covered the biodiversity, landscape and emissions abatement impacts of the scheme.
[40] Defra (2014), The Rural Development Programme for England, 2014 to 2020: Final Impact Assessment
[41] Natural Capital Committee (2015), Natural Capital Committee's third state of natural capital report – The State of Natural Capital Protecting and Improving Natural Capital for Prosperity and Wellbeing.
[42] Some environmental impacts are difficult to value. This means that some environmental benefits estimates have uncertainty about their exact magnitude.

The termination of funding under the Rural Development Programme will start to reverse the environmental progress which has been made, but could lead to an acceleration in decline for some environmental indicators such as those highlighted above. Therefore, there is a substantial risk that the outcomes set out in the 25 Year Environment Plan will not be met.

A new Environmental Land Management policy is needed. This requires new powers.

As we leave the EU, we have an opportunity to deliver environmental benefits that contribute to achieving the 25 Year Environment Plan goals, including clean air, clean and plentiful water, thriving plants and wildlife, reducing risks of harm from environment hazards, enhancing beauty, heritage and engagement with the natural environment, and mitigating climate change[43].

Environmental Land Management (ELM) will be the cornerstone of agricultural policy in England, which the Agriculture Bill will take forward. ELM will provide public money to pay farmers and other land managers for environmental benefits which society values - this includes public goods and other environmental outcomes that deliver public value where the market may not provide them and the public would benefit. ELM will invest in sustained environmental benefits and services at a scale that will meaningfully contribute to achieving the goals in the 25 Year Environment Plan.

The Agriculture Bill will need to introduce new powers to set up and operate ELM as existing domestic powers to pay are not wide enough for achieving the desired policy outcomes. Powers are needed prior to EU Exit and the disapplication of CAP regulations. Without new powers, there will be no ability to pay out for new agri-environment schemes in 2021 or to continue to pay out for existing schemes after 2023.

The scheme will pay farmers and other land managers to provide environmental public goods and enhance the provision of positive environmental externalities. We will simultaneously move towards a more effective application of the 'polluter pays' principle to reduce the negative externalities of some farming practices.

The costs of ELM will principally consist of the payments to land managers and associated scheme delivery and administration costs. ELM is expected to deliver a wide range of environmental benefits and services covering: thriving plants and wildlife; clean air, clean and plentiful water; protection from, and mitigation of, hazards; a habitable climate; and beauty, heritage and engagement with the natural environment.

[43] HM Government (2018), A Green Future: Our 25 Year Plan to Improve the Environment.

Chapter 4: The case for moving away from Direct Payments

This chapter reviews the rationale and evidence base for moving away from Direct Payments in England. The evidence suggests that Direct Payments are poorly designed and offer poor value for public money. Direct Payments are essentially a legacy from previous CAP policies and as a result are not well designed to achieve any particular policy objective. They are a poor tool for income support and, in addition, they introduce distortionary incentives which inhibit productivity and frustrate many farmers.

Reform of Direct Payments policy, through a new agriculture and land management policy framework, provides the opportunity to correct historical agricultural policy failures. It will facilitate the delivery of a future agriculture policy that incentivises environmental outcomes and supports a self-reliant and productive sector. Policies can be tailored to address specific policy aims which will ensure efficient policies which provide better value for money for the average household.

4.1 History and aims of Direct Payments

Direct Payments are the result of a history of policy failures.

As discussed in Chapter 2, the Common Agricultural Policy was established through the Treaty of Rome (1957). It aimed to increase agricultural productivity, and in so doing ensure a fair standard of living for farmers, and reasonable prices for consumers. The primary mechanisms used were price support, guaranteeing certain prices for farmers and encouraging greater production, through the use of import duties, export refunds and public storage. The price support mechanisms were funded directly by public money and indirectly by consumers through higher prices.

By the 1980s, high levels of market price support (at very substantial cost to consumers) had resulted in such large increases in agricultural production that there was oversupply on EU markets (e.g. the widely publicised butter mountains) and the cost of CAP had escalated. There was growing international resentment of the placement of excess EU production on international markets at lower prices through export subsidies, particularly from developing countries who likely felt the worst effects of the policy. Policy reforms had to be introduced to limit production, including production quotas and set aside policy (paying farmers to leave some land out of production).

In 1992, the more fundamental MacSharry reforms were introduced and CAP began to move away from price support. As what was intended to be a temporary measure to compensate farmers for this loss, they received a payment dependent on how much they produced (coupled support). Farmers were still given public support for producing food, but prices were able to vary more according to supply and demand, providing some signals to farmers.

Further reforms, agreed in 2003, meant these coupled payments were replaced in England with decoupled Direct Payments which do not vary with a farmer's production. The level of Direct Payments were determined at farm level and were linked to how much coupled support each farmer received in the past, meaning they were based on historical levels of

production. Gradually over time, the decoupled Direct Payments moved from a historical-based approach to an area-based approach, where farmers receive a payment per hectare of eligible land. Decoupled Direct Payments do not pay farmers for any particular activity or for production.

The EU continued to maintain the Direct Payments system, seeking to justify them as "income support"[44]. However, they were never specifically designed as a progressive income support scheme and as a result they are a poor policy tool for achieving this. The next section assesses the evidence on the effectiveness of Direct Payments as a policy tool for providing income support.

4.2 Assessment of Direct Payments as a means of income support for farmers

Direct payments lack the characteristics of a well-designed income support policy.

While the stated EU rationale for Direct Payments is the provision of income support, no progressive element was ever intended, i.e. the payment is not targeted towards farm households with low incomes, and it involves no kind of means testing. As a result, fundamental elements of Direct Payments fail to meet their own rationale and do not meet the expectations of income support policies used in other parts of the economy.

Two factors combine to ensure that the current system of Direct Payments is in many respects an inefficient and ineffective means of income support for households with low incomes.

i. **Direct Payments lack any system of means testing / targeting**. As a result, substantial payments are made through farm businesses to some farm households with already high incomes relative to the average UK household. Payments through farm businesses to households with incomes only slightly lower than the average UK household can boost incomes to provide them with much higher than average incomes, while some of the farm businesses with lowest incomes receive smaller payments.

ii. **The ultimate beneficiaries of Direct Payments are seldom only the farm businesses who receive the payment**. Indeed the recipient may not even be the main beneficiary. In particular, the inflation of farm rents[45] as a result of Direct Payments (discussed in Box 4 below) means that a substantial element of the subsidy increases the income from landowning rather than active farming.

We consider the evidence on each in turn.

i) Lack of means testing / targeting of Direct Payments as income support

While Direct Payments are formally made to businesses, rather than households, benefits and income support schemes are generally assessed through an examination of their

[44] European Commission, Agriculture and Rural Development: Direct Support.
[45] Matthews, Salvatici, Scoppola (2017), Trade Impacts of Agricultural Support in the EU.

impact on households. Therefore, in this section we have looked at farm household income wherever possible[46].

In general, the economic rationale for income support schemes is based on equity arguments. Economic theory suggests that as a household's income rises, the value of an additional pound to them falls. This means that society as a whole can benefit by transferring some income from high income households to low income households.

The benefits of a transfer payment intended to support incomes are assessed on how effectively they target low income households[47]. All else equal, the better targeted a policy is at transferring income to those with the lowest incomes, the more distributional benefits it provides.

If an income scheme is to improve equity at all, the income of those who receive the payments must be lower than those funding them. You would also expect to see the largest payments being targeted on those with lowest incomes and it would be undesirable to see very large payments for any one individual recipient. However, Direct Payments are made on the basis of the total area of eligible land rather than income. There is also no cap of the maximum size of payment that can be claimed (although the most recent EU rules dictate that the largest payments must be slightly reduced and countries can choose to implement a cap)[48]. As a result, direct payments fail on this measure.

This is not to say that there are no farm-owning households who have low incomes that are supported by the existing system.

Income support policies are usually determined and assessed by looking at the total income and wealth of a household. To do this, we have examined farms in the Farm Business Survey within different income bands. Those farm households with incomes of less than £15,000 without Direct Payments, representing 38% of all farms, appear to have an average household income of -£1,200 if Direct Payments are removed from their accounts on a static basis (assuming no behavioural response to the removal of payments). They receive an average Direct Payment of £17,800, which pushes their average household income up to £16,600[49]. This suggests that there are likely to be some farms with household incomes low enough that Direct Payments provide income support.

Many of these households with low incomes are among the poorest performers when looking at the farm business. There should be substantial scope for them to improve their household income by achieving efficiency improvements in the farm business. This is discussed further in Chapter 5.

[46] It should be noted that there are caveats around this analysis as it is difficult to assess household incomes before Direct Payments based on past data as without them it is likely that different spending decisions would have been made.
[47] HM Treasury (2018), The Green Book: appraisal and evaluation in central government.
[48] England chose not to implement capping because of concerns that it would create perverse incentives for farmers to split large farms into smaller units, creating costs for both farmers, government and potentially reducing productivity.
[49] Source: Defra, Farm Business Survey, England. Based on 3 year matched dataset, 2012/13 to 2014/15.

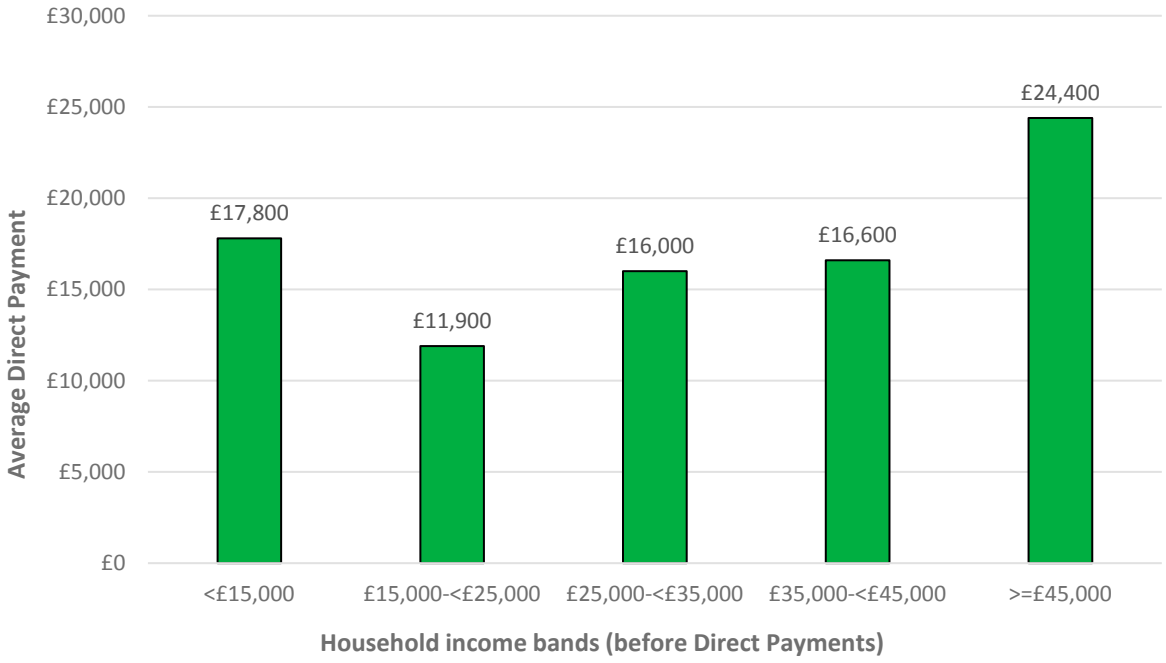
In addition, as discussed elsewhere in the chapter, there are additional costs associated with Direct Payments, and farm expenditure would be expected to fall with their removal, all other things being equal.

Those with the highest incomes receive more than those with the lowest incomes.

Direct Payments are paid to farmers based on the amount of agricultural land they hold and are not targeted in any conventional sense. Farm households with incomes over £45,000 received an average Direct Payment of £24,400, 37% higher than the average subsidy paid to farm households with household incomes of £15,000 or less (see Figure 8).

If an income support scheme is to improve equity, payments should go to farm households with an income lower than the average UK household income. However, a significant amount of Direct Payments go to households with incomes above average UK household incomes. Therefore, as a policy tool for income support, it is clear that Direct Payments are not focused on appropriate households.

Figure 8: Average Direct Payments for bands of household income.



Source: Defra, Farm Business Survey, England. Based on 3 year matched dataset, 2012/13 to 2014/15

The poor targeting of Direct Payments is further illustrated by analysis of farm wealth statistics.

For most benefits and income support policies in England, means testing also takes into account wealth or assets. For most working benefits, individuals' savings and ownership of property will be taken into account when assessing eligibility. However, Direct Payments do not take this into account.

Using the FBS three year matched data set 2014/15-2016/17, the average farm business held around £1.92 million in assets, and had a net worth of around £1.73 million. This statistic is not precisely comparable with statistics available for UK or Great Britain

households in general. It includes only business, not personally, held assets, and is defined at the business, rather than household level. As a result it is likely to be an underestimate of average farm household wealth. A useful comparator is that the median British household had a net worth of just £0.26 million, including pension wealth. Indeed, the net worth of the average farm business would comfortably put a farm household in the top 10% of UK households, before consideration of non-business wealth.

On average, the income and wealth of those who receive Direct Payments is higher than that of the average household. Of course there are some recipients who will be on lower incomes and have low wealth, but overall this comparison shows that the policy is not well targeted.

ii) **The ultimate beneficiaries of Direct Payments are seldom only the farm businesses who receive the payment**.

Despite the poor targeting of Direct Payments, a small percentage of the budget will reach some low income, low wealth, farming households. However, even for these farmers, the income support from Direct Payments can be eroded by their secondary consequences. Key to this is the inflation of farm rents (see Box 4).

Those farm businesses with lower wealth are more likely to be tenant farmers. Wholly tenanted farm businesses tend to have lower net wealth than other tenure types. For example, 58% had a net worth of under £250,000 compared to just 14% of all farms[50]. Furthermore, 34% of wholly tenanted farms had a negative farm business income before Direct Payments as well as a net worth of under £250,000.

For wholly tenanted farms, land rents will be a significant cost and Direct Payments will provide additional income but also, indirectly, lead to higher costs in rents. Land owners receive some of the benefit of the Direct Payments meaning that there is “leakage” in benefits of Direct Payments as a means of income support.

Box 4: Direct Payments, land values and rent

The provision of Direct Payments linked to the management of agricultural land increases demand for farmland, since farming it secures the benefit of subsidy, regardless of how efficiently it is farmed. The increased demand then drives up farm rents, which in turn increases the price of land itself.

A recent academic literature review of EU-wide empirical evidence on Direct Payments found a wide range of estimates for the scale of how much subsidy influences rents[51]. They ranged from as low as 6-7 cents going to landlords from each euro paid to tenants up to 80-90 cents, with a median estimate of around 20-25 cents per euro across the EU. These rates are known as “capitalisation rates”. The academic literature highlights than in some countries, regions and farm sectors the effect will be greater than in others. Particularly important is the ratio of basic payment entitlements to agricultural land. In

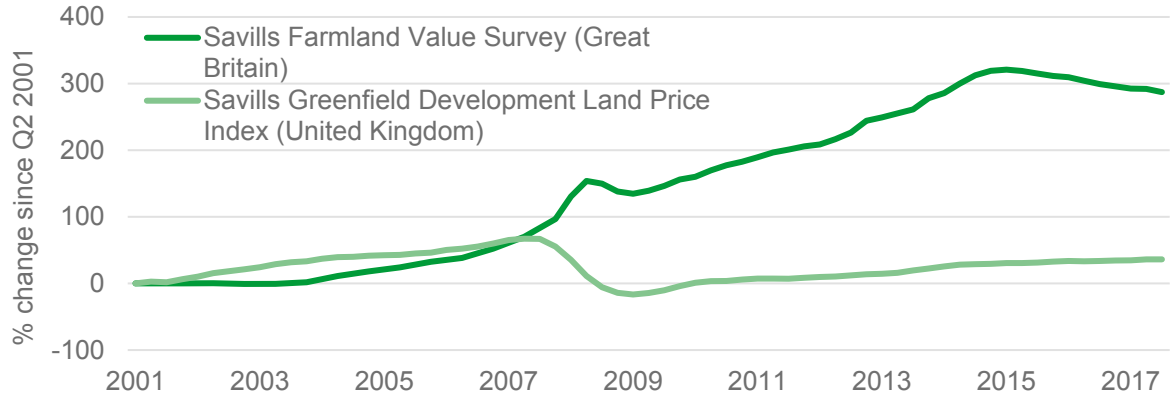
[50] Defra (2017), ‘Balance sheet analysis and farming performance, England 2015/2016’.

[51] European Parliament Directorate–General for Internal Policies (2013), Possible Effects on EU Land Prices of New CAP Direct Payments.

England, this ratio is high, suggesting that the capitalisation rate in England is likely to be higher than average.

Agricultural land prices have risen faster than other land prices over the last decade. The Savills Farmland Value survey showed an increase of more than 300% between 2001 and 2015, whereas the Savills Greenfield development Land price index rose by only 36% between 2001 and 2017 (see Figure 9). This suggests that someone who bought one hundred acres of farmland for £300,000 at the start of 2001 could have sold it for around £1.2million at the end of 2017[52].

Figure 9: UK agricultural land prices



Source: Savills Greenfield Development Land Price Index and Savills Farmland Value Survey.

Savills suggest that there are a number of factors that have influenced agricultural land prices since 2000[53]. They include:

- Interest from lifestyle buyers which peaked at around 45% of demand in 2003, a level not reached again until 2015.
- CAP reforms in 2005 with the introduction of the Single Farm Payment mechanism, which led to an increase in the extent to which subsidies would capitalise in to land rents.
- The global financial crisis of 2008 which led to increased demand for low risk assets including those related to agricultural land, which led to increased agricultural land price growth.
- Weakness in commodity prices in 2014 which led to lower earnings and led a downward trend in agricultural land prices.

Only a small area of agricultural land changes ownership each year. In England and Wales in 2016 only 0.25% of utilised agricultural area was sold. This tightness of supply, as well as Direct Payments, acts to maintain high prices of agricultural land, thus constraining productivity performance by inhibiting new entrants wanting to start a new

[52] Note these figures are purely illustrative, and the increase is a national average which masks a high degree of regional variation.
[53] Savills (2018), Spotlight: GB Agricultural Land.

farm businesses, increases the cost of expansion for productive businesses and poses barriers to exit for less productive farm businesses.

4.3 Unintended impacts of Direct Payments

The evidence in the previous section suggests that Direct Payments are not well designed as a form of income support scheme. However, in addition there are some further unintended impacts of the policy which are worthy of discussion.

Direct Payments and productivity impacts

Direct Payments can constrain productivity growth in the sector by dampening incentives to innovate and compete and holding back beneficial structural change.

Approaches to farming vary – some focus on the business, others on the lifestyle (individual and family heritage). In a survey conducted for Defra (in 2008) to understand different attitudes to farming, 93% agreed that the farming lifestyle is what they really enjoy and 91% agreed that maintaining environmental assets is a priority. Productivity may not be the sole focus of many farmers.

It is also likely that Direct Payments inhibit the overall productivity performance of agriculture by undermining incentives and structural change in the sector. This unintended consequence could prevent long term gains to farmers' incomes.

Direct Payments are equivalent to a significant proportion of farm income for many in the industry. While they are formally decoupled from production decisions, as a substantial subsidy to the sector, they likely create indirect channels through which they dampen the focus of some farms to seek out and adopt best-practice to optimise the profitability of their agricultural activity. In the long term, adopting best practice and embracing technological developments is key to improved productivity performance.

Direct Payments also hold back structural change and exert upward pressure on land prices and rents (see Box 4). They make it harder for some new entrants to join the sector and for more efficient farms to find land to expand. This process of some businesses entering or expanding, with others exiting, has long since been recognised as crucial to productivity growth across the economy[54]. To the extent that Direct Payments inhibit this dynamic, they likely hamper agricultural productivity growth and frustrate farmers who are keen to expand. On the other hand, there are farming sectors such as horticulture for example, that do not receive Direct Payments but have performed strongly.

This assessment that Direct Payments have an adverse impact on productivity growth is supported, while not uncontested, by wide range of economic studies and was highlighted

[54] OECD (2008), Agricultural Support, Farm Land Values and Sectoral Adjustment: the Implications for Policy reform.

in the Defra evidence paper accompanying the implementation of CAP reform in England in 2013[55].

Independent econometric analysis[56] provides further evidence that Direct Payments have a negative impact on UK agricultural productivity growth, supporting poorly productive and less innovative farmers to continue, although the UK's productivity performance is driven by many other factors beyond Direct Payments.

As a result, the OECD has long-recommended reducing agricultural subsidies to improve productivity and efficiency. In a world outside of CAP subsidies, increasing the productivity of farm businesses will be essential for their viability. In future, producers themselves should decide how to manage their land, determine what business strategy will work for them.

Without Direct Payments, increasing the productivity and environmental focus of many farm businesses will be essential for their viability. Such payments are likely to have hindered agricultural productivity growth in the UK by reducing the incentives to boost innovation and skills and enabling unproductive and inefficient farms to remain in business.

However, Direct Payments are not the only factor inhibiting agricultural productivity growth in the UK. Indeed, there are other countries inside the EU's CAP which also have Direct Payments, which have better agricultural productivity performance.

While some argue that Direct Payments increase farmers' cash flow and stimulate capital investment in the agricultural sector, improving productivity growth, the Direct Payments system is not targeted to tackle any market failure in capital markets, so any investment induced may not always be effective[57]. In 2016/17, after excluding land value, more than half of farms (56%) in the Farm Business survey (England) showed a negative overall return to capital. This suggests that Direct Payments could be one factor facilitating over-investment, which may not be improving farmers' returns to capital. A removal of Direct Payments and a reduction in capital expenditure may improve the return to farmers without having a detrimental impact on farm performance and may boost productivity.

Historical lending to UK agriculture has generally followed a positive trajectory[58]. While this may in part be due to Direct Payment providing a secure funding stream, it is likely more closely related to the security that land assets provide. Correspondingly, access to finance currently seems to be of low importance to agri-businesses themselves; with access to finance ranked low (7th out of 10) on the list of "major obstacles to business" in the BIS 2014 Small Business Survey[59]. Further, to the extent that Direct Payments reduce the market focus and efficiency of farm businesses by introducing other incentives, they reduce the ability of farm businesses to compete.

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[55] Defra (2013), Implementation of CAP reform in England: Evidence Paper.
[56] Rizov, M., Pokrivcak, J. and Ciaian, P. (2013), CAP Subsidies and the Productivity of EU Farms, Centre for European Policy Studies, *Factor Markets Working Paper No. 37*.
[57] See Matthews, Salvatici and Scoppola (2017) for examples.
[58] Bank of England (2018), Bankstats Tables.
[59] BIS (2015), Longitudinal Small Business Survey 2014 - Businesses with Employees.

Direct Payments and environmental outcomes

Direct Payments do little to deliver against the environmental outcomes of modern agricultural policy.

Direct Payments have environmental implications, given the range of market failures in the intersection between agriculture and the environment. Since they are decoupled from production (meaning the payments a farmer receives are independent of how much they produce), the direct environmental impacts are primarily through the conditions attached to them – cross compliance and greening.

Beneficiaries of Direct Payments (and some Pillar 2 schemes) must comply with a series of 'cross compliance' rules, which are made up of requirements relating to the environment, animal and plant health and animal welfare. These are classified as either Good Agricultural and Environmental Conditions (GAECs) or Statutory Management Requirements (SMRs). There is evidence for some environmental value of these GAECs, this is discussed in further detail in Annex 3. However, they cover a relatively narrow range of very basic requirements and previous estimates of their overall value are extremely low (£24m-£40m per year) when compared to the overall value of the payments which, for context, is an annual average of £1.85bn[60].

The Greening payment makes up around 30% of the Direct Payments budget. However, a report into Greening from the European Court of Auditors concluded that the mechanism, 'as currently implemented, was unlikely to significantly enhance the CAP's environmental and climate performance'[61]. It estimated that Greening resulted in a change in farming practices of only around 5% of EU farmland. The fundamental weaknesses of the Greening measures were also exposed by a study funded by the European Commission[62].The limited scale of change in farming practices brought about by Greening was linked to a significant level of deadweight[63].

The majority of cross compliance requirements are already implemented within the UK's domestic regulatory baseline, and so are largely unaffected by changes to Direct Payment policy.

However, some (five of 24) cross compliance requirements and the three greening requirements are outside the scope of existing domestic regulation. While their effectiveness is highly variable, it is likely that at least some aspects deliver environmental benefits. Alternative mechanisms to achieve these benefits, such as implementing the effective and widely applicable aspects of cross compliance into the regulatory baseline,

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[60] ADAS (2009), Evaluation of cross compliance.
[61] European Court of Auditors (2017), Greening: a more complex income support scheme, not yet environmentally effective.
[62] European Commission (2017), Evaluation study of the payment for agricultural practices beneficial for the climate and the environment.
[63] Deadweight describes situations where public money (the Greening payment) is paid to a beneficiary (a farmer) for public goods (farming practices beneficial for the environment) that would have been provided anyway, even without public support, because they are either part of the beneficiary's normal activity or required by law (many elements of cross compliance).

are available, and would provide similar, or broader benefits if enforcement mechanisms were appropriately designed.

Using up-to-date analysis and evidence from Natural England and Defra, the core assessment of the monetised environmental benefits of the elements of cross compliance and greening not covered by the current regulatory baseline is around £50m per annum[64]. These benefits include increased biodiversity, and reduced greenhouse gas emissions and other pollution. While this figure is subject to a substantial degree of uncertainty and measuring outcomes is inherently challenging, it further illustrates how modest any positive environmental effects of policies linked to Direct Payments are relative to the cost of the scheme. However, as discussed in Chapter 3 agri-environment schemes under Pillar demonstrate good value for money.

Since the modest benefits of cross compliance and greening could be achieved, at least in the medium term, through alternative regulatory and environmental land management policies, they do not add substantially to the case for retaining Direct Payments as part of long-term agriculture and land management policy.

[64] A more detailed description and presentation of this up-to-date analysis can be found in Annex 3.

Chapter 5: Impacts on the agriculture sector of removing Direct Payments

This chapter focuses on the potential impacts of phasing out Direct Payments on the English agriculture sector. It presents and reviews evidence on production, sub-sectors and individual farm businesses. It outlines related policy considerations taken forward in the Agriculture Bill.

While Direct Payments are formally decoupled from production in England, evidence suggests there may be a small, stimulating effect on production in certain sub-sectors.

Defra has undertaken detailed analysis of the impact of moving away from Direct Payments. This is based on two complementary analytical approaches. The first is farm-level analysis using the Farm Business Survey. The second is sub-sector level analysis using Defra's internal partial equilibrium modelling.

5.1 The relationship between Direct Payments and production

Direct Payments are formally decoupled from production in England. However, evidence suggests they exert a small, stimulating effect on production.

Farmers can claim the same Direct Payment whatever their level of production. As a result, any effects of removing Direct Payments on production are indirect.

However, there is evidence from a range of sources[65] that Direct Payments exert a small, stimulating effect on production, through several unintended mechanisms:

- Cross-subsidisation: Farmers may use Direct Payments in ways that effectively cross-subsidise a particular activity, either by accident (e.g. if costs are not closely managed) or design (e.g. where business profitability is not the primary motivation)[66].
- Higher land rents: Direct Payments put upward pressure on the rental value of land for agricultural purposes, this may increase the amount of marginal, low-quality land used for agricultural rather than other purposes.
- Increased access to finance: The steady flow of income arising from Direct Payments can make it easier for farmers to access credit which in turn increases investment.
- Wealth effects: By increasing farmers' wealth, Direct Payments may reduce farmers' sensitivity to risks such as fluctuations in input and output prices.

[65] Matthews, Salvatici, and Scoppola (2017) includes a comprehensive literature review of the trade impacts of the Common Agricultural Policy, including the production effects of Direct Payments
[66] Defra (2013), Implementation of CAP reform in England: Evidence Paper.

These mechanisms contribute to the inefficiency of Direct Payments as a means of income support, by ensuring a proportion of the value of Direct Payments supports unproductive activity, or is lost in higher input costs, rather than supporting incomes.

Evidence suggests any production stimulation is largely limited to the ruminant livestock sectors (beef, sheep meat and milk), where the above mechanisms are more significant, not least because extensive grazing can form part of a low-cost strategy for continuing agriculture on marginal land in order to receive Direct Payments.

Any increase in aggregate production that results from these effects does not add economic value. Indeed, it represents an overall cost to society and a reduction in agricultural productivity as measured by Gross Value Added (GVA) per worker. This is because the resources employed in any excess production could be more productively employed in other activities. Indeed, the reduction in production that might be expected from the removal of Direct Payments would correspond to an increase in the earnings of the sector from agricultural activities, since it amounts to incentivising production even when additional production incurs financial losses.

Further to this, any stimulation of production leads also to the associated environmental harm in the form of greenhouse gases and other emissions, soil erosion and run-off, introducing additional costs.

This production stimulating effect may also feed into prices, by increasing domestic supply without affecting demand. The price effect is muted since prices are to a large extent determined by wider international supply and demand movements and the trade regime through import- and export-parity pricing. Any effect of Direct Payments on consumer prices is further limited since the farmgate price of an agricultural good is only one component of consumer food prices, combined with manufacturing, transportation and retailing costs and margins.

Agricultural production, in crops and extensive livestock in particular, has historically been relatively inelastic with respect to revenues. This fact feeds into partial equilibrium models of the agricultural sector such as the internal Defra modelling discussed in section 5.3. It means they do not tend to find substantial impacts on total production levels from removing these payments irrespective of the degree to which they retain a ‘coupled’ nature.

While the effects discussed above are likely to lead to small production increases in some sectors, some parallel consequences of Direct Payments are likely have the opposite effect.

There is both economic and social research evidence[67] that Direct Payments slow the rate of structural change (the entry, exit, contraction and expansion of businesses) in the agricultural sector. They may also reduce the incentives for farm businesses to deliver increased efficiency. Such effects share similar mechanisms to the effects referenced above, and combine to indicate that Direct Payments may enable and encourage the farming of more land by less efficient farm businesses than would otherwise be the case. This reduced reallocation of land towards more efficient businesses diminishes the overall

[67] Brady et al. (2009), Bartolini and Viaggi (2013). OECD (2008), Agricultural Support, Farm Land Values and Sectoral Adjustment: the Implications for Policy reform.

resource efficiency of agriculture. As a result, it further reduces any indirect production stimulation by Direct Payments.

5.2 Farm level modelling

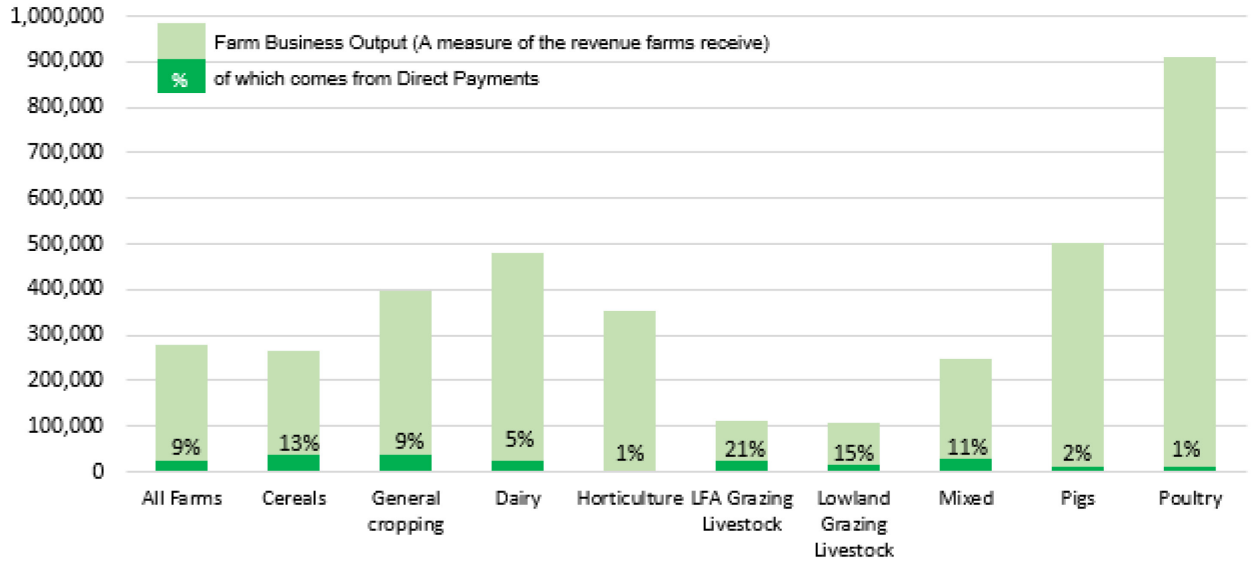
For individual farms, the removal of Direct Payments is primarily a loss of one source of income.

As discussed in Chapter 4, Direct Payments are primarily a transfer of income from the public purse to farm businesses who receive them. As a result, in the absence of any other government support, their removal will see a reduction in farm revenues. On average, over the period 2014/15 - 2016/17, Direct Payments made up 9% of revenue across all farm types, however by farm type Direct Payments contributed 21% to revenue for Less Favoured Area Grazing Livestock farms and 5% for Dairy farms. This is shown in Figure 10 below.

For Poultry, Horticulture and Pig farms, only a very small proportion of revenue comes from Direct Payments. Fewer of these farms claim Direct Payments than other farm types as they tend to be smaller, and are more likely to have land that is ineligible for Direct Payments.

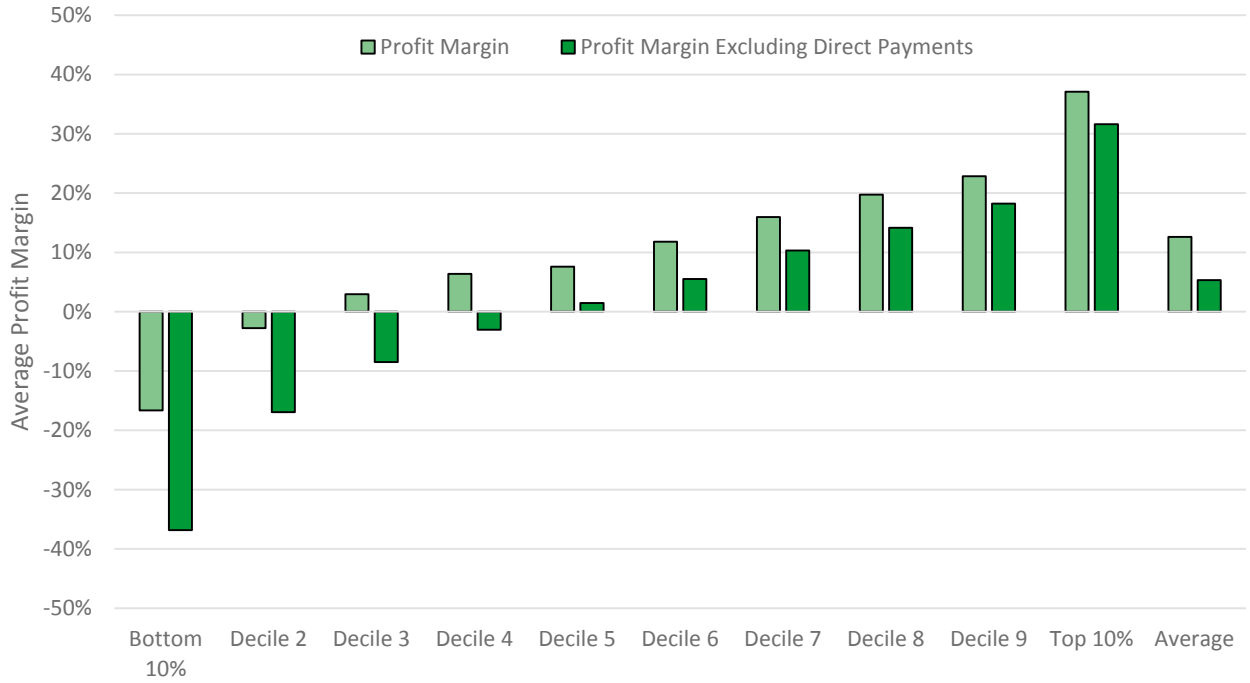
Using data from the Farm Business Survey, we have assessed the contribution Direct Payments make to farm revenues and Farm Business Income (FBI - a measure of farm profits). These are conducted on a 'static' basis, assuming nothing changes in response to the removal of Direct Payments, other than the payment itself.

Figure 10: Average Farm Business Output (revenues) and the proportion that comes from Direct Payments by 2016 farm type (based on 3 year matched dataset 2014/15 to 2016/17



The removal of Direct Payments from farm accounts on a static basis shows that the reduction in overall profit margin is likely to be non-negligible. The reduction looks to be much more significant for the lower performing farms. It is important to note that even with Direct Payments, a substantial proportion of farms continue to operate with low, or negative profit margins on this measure. This is shown in Figure 11 below.

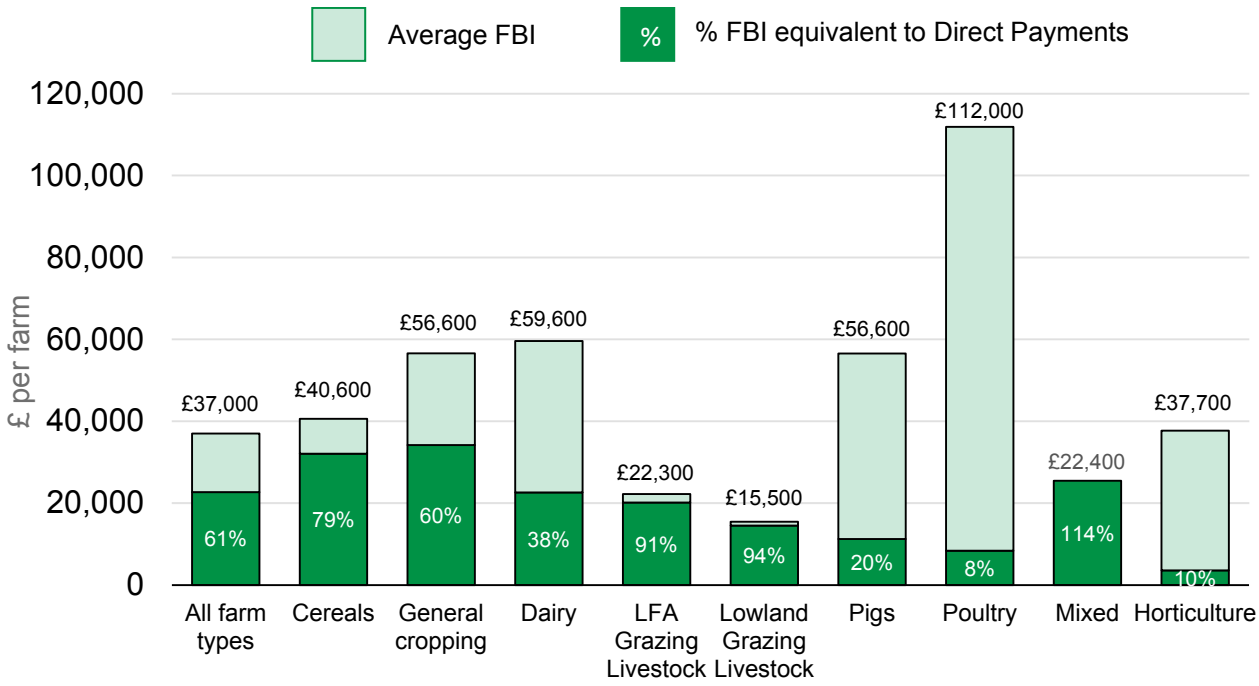
Figure 11: Change in average profit margin of farm businesses following static removal of Direct Payments from accounts: Farm Business Income as a proportion of turnover (revenue), across farms in England, by profitability decile



Source: Farm Business Survey, 3 year average 2014/15 to 2016/17

Farm Business Income (FBI) is a measure of the total net profit, calculated as Farm Business Outputs (revenue) minus Farm Business Inputs (costs). Over the period 2014-15 to 2016-17 the average profit for all farms was £37,000 and Direct Payments were equivalent to 61% of this. This varies greatly by sector, and is most significant for Grazing Livestock and Mixed farms as shown in Figure 12.

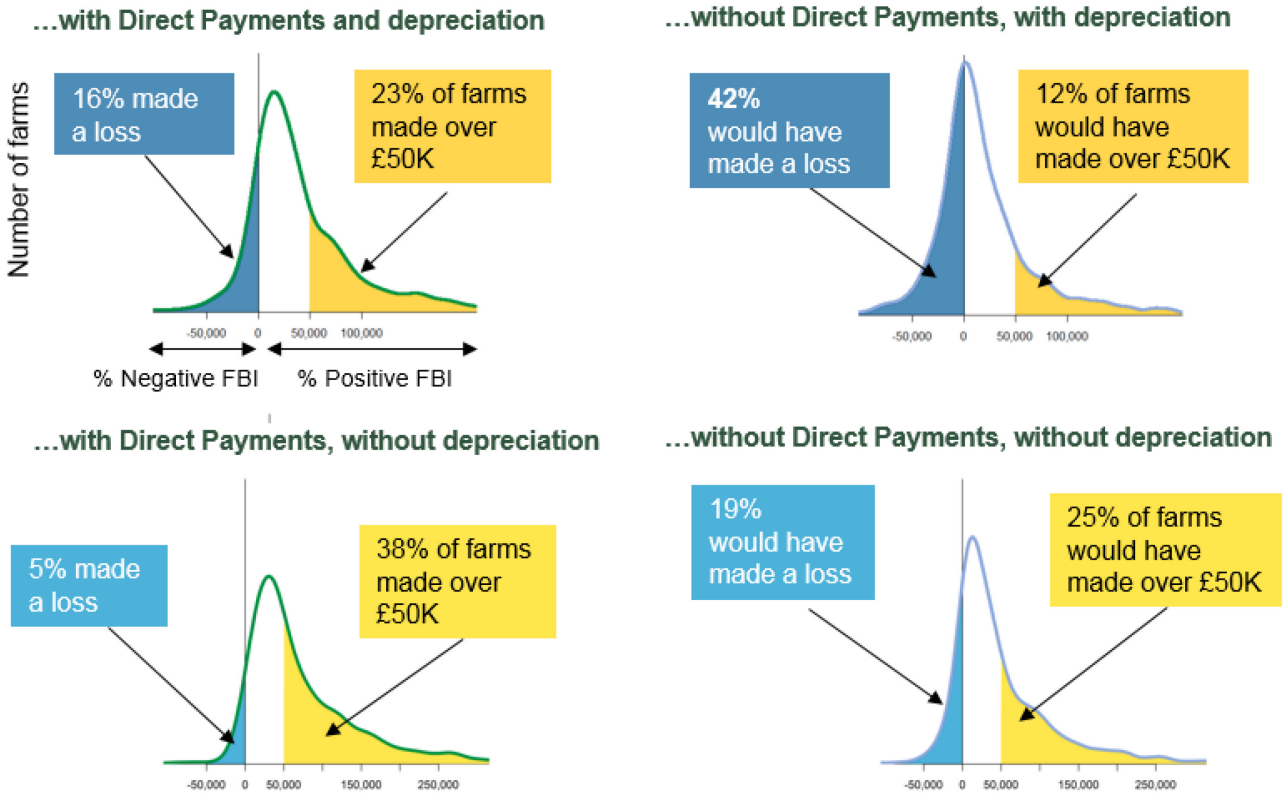
Figure 12: Average Farm Business Income (FBI) and the proportion that is equivalent to Direct Payments by 2016 farm type (based on 3 year matched dataset 2014/15 to 2016/17)



Source: Farm Business Survey, 3 year average 2014/15 to 2016/17

Over the period 2014/15 to 2016/17 16% of farms had costs exceeding their revenue including Direct Payments, and without them this rises to 42%. However, costs include the depreciation of assets. This is an adjustment to their accounts which is not physically paid out, so in the short term their cash income is higher than their actual Farm Business Income. Excluding depreciation, 19% of farms would not be have been able to cover their production costs in the absence of Direct Payments. This is illustrated in Figure 13.

Figure 13: Average Farm Business Income (FBI) and the proportion that is equivalent to Direct Payments by 2016 farm type (based on 3 year matched dataset 2014/15 to 2016/17)



This suggests that the immediate removal of Direct Payments could, at first sight, potentially result in adverse impacts for many farms, particular for businesses in more vulnerable sub-sectors. There may be businesses that would cease to operate if Direct Payments were immediately removed, depending on how much their depreciation costs have an immediate impact, but given reasonable notice and time for adjustment, would thrive in a future without Direct Payments.

A static analysis where Direct Payments are removed but the same spending and selling decisions and market conditions prevail presents an unrealistic scenario.

Two factors in particular highlight this:

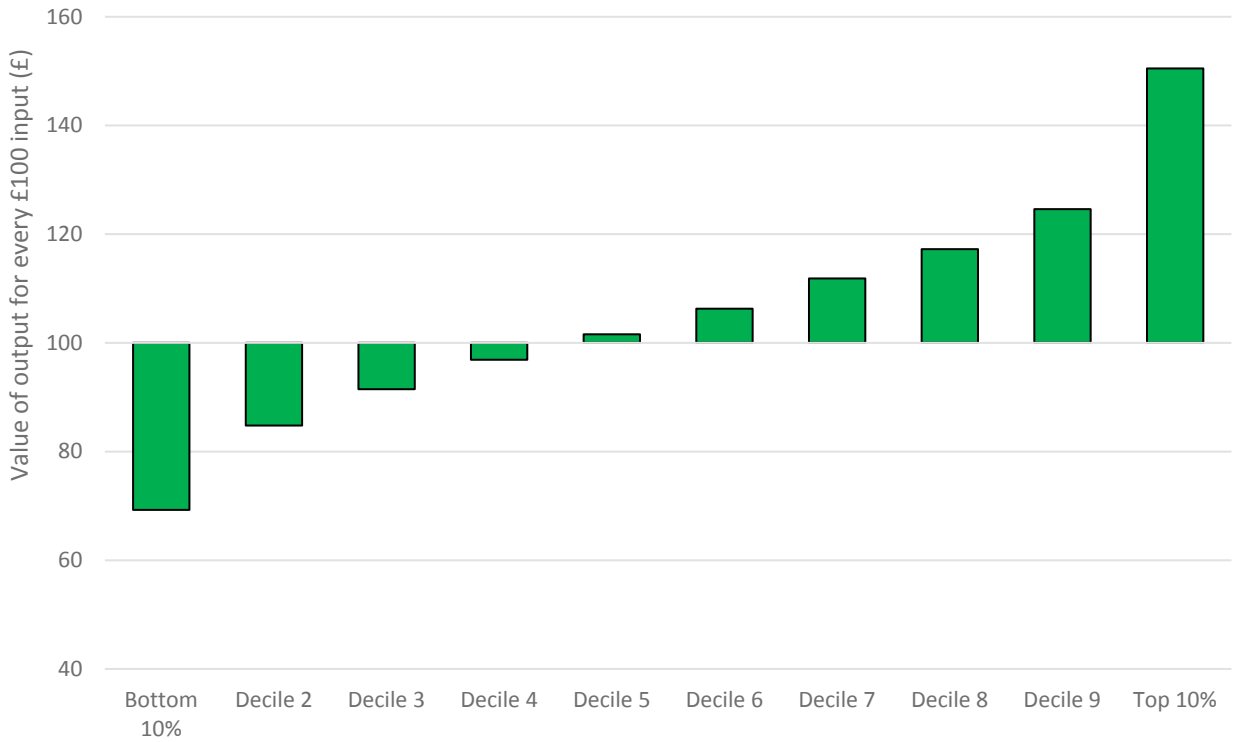
- Direct Payments affect the costs faced by farms, as well as their revenues. There is evidence they increase land rents, and as explained below, they can incentivise some additional loss-making production
- Direct Payments distort farm business incentives. They blunt beneficial market forces which create an imperative to increase efficiency and adjust business structures to avoid or minimise losses. They also keep some land under the curation of inefficient businesses, reducing the ability of the overall sector to generate income.

As a result, these statistics are likely to substantially overstate the impact of Direct Payment removal on farm incomes, particularly in the medium to long term. In the long term the farm business needs to consider the depreciation costs as they will need to replace and maintain machinery and buildings. Therefore we will consider the scale of adjustments required for the 42% of farms that made a loss on their accounts without Direct Payments[68]. To cushion changes in income from the withdrawal of Direct Payments, there is scope for farmers to increase productivity to offset reductions.

On average, farms who make losses without Direct Payments in their accounts have £90 in outputs for every £100 they spend on inputs. In order for them to break even without Direct Payments they would need to become 10% more efficient on average, by reducing their costs to £90 to match their output, or reduce costs in conjunction with increasing their output.

The bottom 10% of farms making the greatest losses received £69 on average for every £100 spent on inputs over the period 2014/15 to 2016/17 as shown in Figure 14. To break even they would need to reduce costs by 31% on average, or reduce costs in conjunction with increasing their output.

Figure 14: Value of output for every £100 spent on inputs by profitability group (2014-15 to 2016-17) excluding Direct Payments.



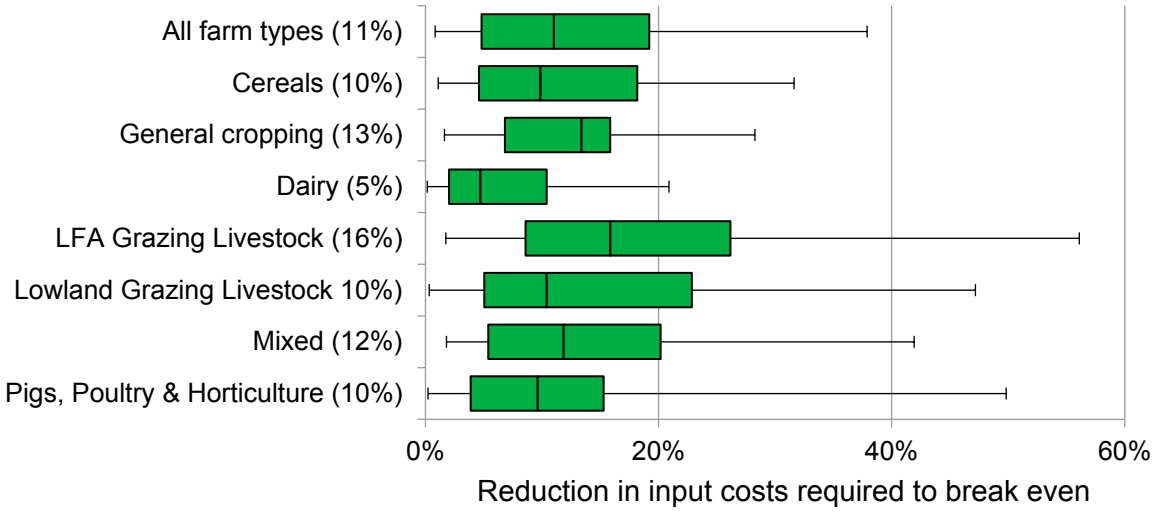
[68] See accompanying Direct Payments slide-pack for further detail. Profitability groups have been defined by calculating profit for all farms, before ranking these from worst to best and dividing the farms into 10% groups.

Farms in the second decile would require an average 15% reduction in costs to break even, those in the third decile (9%) and those in the fourth decile (3%).

Loss making Less Favoured Area Grazing Livestock farms have the biggest challenge in reducing costs to break even. Half of these farms require cost reductions of less than 16% and half require cost reductions of more than 16%, based on the period 2014/15 to 2016/17.

Figure 15 below shows the range of cost reductions those farms with negative FBI without Direct Payments would need to make in order to break even in different sectors.

Figure 15: Reduction in costs needed to break even for those farms making a loss without Direct Payments



Source: Farm Business Survey, 3 year average 2014/15 to 2016/17

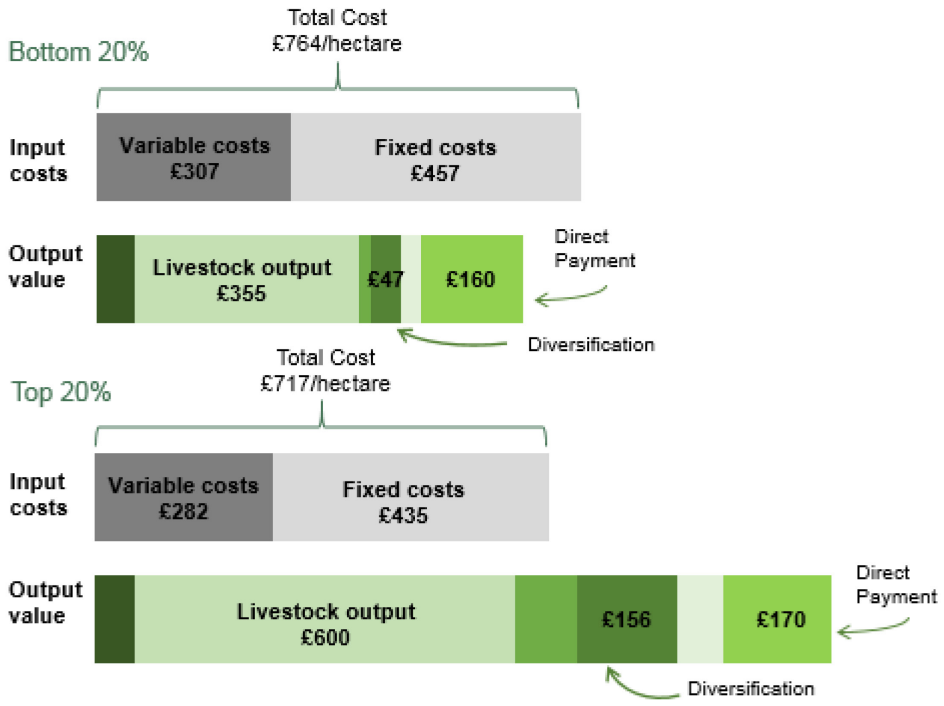
Differences in the performance within sectors highlight the potential for farm-level adjustments to prompt productivity increases and affect Farm Business Incomes in the absence of Direct Payments.

The Agriculture and Horticulture Development Board have conducted farm-level analysis of livestock farm performance[69]. This suggests that full economic costs of production of beef (store and finished) for the top 25% performing farm businesses were 47% lower than for the bottom 25% of farm businesses. For breeding sheep and suckler cows, the equivalent figures are 57% and 62% respectively.

Using data from the Farm Business Survey and comparing the top 20% and bottom 20% of Lowland Grazing Livestock farms, the top 20% of Lowland Grazing Livestock farms had marginally lower costs, and 70% more livestock output per hectare compared with the bottom 20%, as well as receiving three times as much from their diversified activities, as shown in Figure 16.

[69] AHDB (2018), unpublished study on the performance of farm businesses in the livestock sector.

Figure 16: Difference in inputs costs and output values by hectare for Lowland Grazing Livestock Farms between top and bottom 20% profitability groups



Source: Farm Business Survey, 3 year average 2014/15 to 2016/17

For some farm businesses, the scale of the efficiencies required will be challenging and take time, as illustrated by a 31% required cost reduction on average for the bottom 10% of farms. To provide sufficient scope for such businesses to adjust, there will be a transition period where Direct Payments are gradually phased out. This is discussed further in the section below.

The analysis shows the scale of adjustment needed and this may occur via a variety of mechanisms:

- **Rents** - Rent reductions would assist tenant farmers and in total 37% of agricultural land was rented in 2016. The extent to which rents have increased in relation to the subsidy will vary from farm to farm. It is widely accepted that Direct Payments have led to an increase in rents so their withdrawal will see the reversal of the previous impact. The capitalisation rate relates to how much a subsidy inflates farm rents. Estimates of the capitalisation rate range widely and will vary depending on farm type and region. The average income paid to wholly tenanted farmers from Direct Payments was £23,700 over the period 2014/15 to 2016/17 with an average rent in the same period of £31,400. At the extreme end, if all the subsidy was capitalised into the rental value, then the rent would fall to £7,700 (£31,400 minus £23,700). For illustration, if the capitalisation rate was 65% this would see the rent fall by £15,405 (£23,700 multiplied by 0.65), to an average of £15,995 (£31,400 minus £15,405).
- **Input costs** - There are often large variations in input costs for farmers. Removing Direct Payments may result in farmers becoming more efficient in order to minimise costs. Some farm businesses are more efficient than others in the use of inputs

such as fertilisers, and there is scope for improvement. Altering management practices, such as changing the timing or application of fertiliser or using soil testing, could reduce the total amount needed, lowering the cost to the farmer, and helping the environment.

- **Business management** - In 2016/17, only one third of farms undertook practices such as producing budgets, gross margins, cash flows or in depth profit and loss accounts. The top 25% of farm performers were 2.5 times more likely to engage in such management practices than the bottom 25%[70], suggesting this could be one way of improving the performance of many farm businesses.
- **Optimal investment** - As discussed in section 4.3, 56% of farms in England in 2016/17 showed a negative overall return on their capital excluding land. The total depreciation cost of assets for the UK was £4.1bn in 2016, greater than the amount farmers paid out in wages, rent and interest on loans. Without Direct Payments, many farm businesses may become more financially resilient by optimising investment decisions.
- **Diversification** - Around two-thirds of farm businesses carried out diversified activities in 2016/17 giving an alternative income stream to the farm business. Around a quarter of all farms make a greater income from diversified enterprises (e.g. such as running an on farm B&B) than from the rest of their business. The ability to diversify will depend on the characteristics and location of the farm. However, if more farms diversified into tourism this would increase the supply and thus in turn may lower the return to the farmer.
- **Output monitoring** – 25% of livestock farms do not currently have an animal health plan; and it is estimated that between 5 and 20% of cereal farm productivity is lost each year by pests and pathogens. This suggests some farms could make improvements which increase the value of their saleable produce.
- **Supply chain integration** – For some farm businesses, getting involved in processing or retailing of their own produce may provide another route to generate profit.

As well as these adjustments, farm businesses may apply for payments from the future Environmental Land Management schemes.

The viability of farm businesses depends on a wide range of factors. Projections of individual Farm Business income are only one way of looking at impact and represent a worst case scenario.

For many farms, Farm Business Income is not a good indicator of business viability. Even with Direct Payments, the performance of many farms is such that they consistently have a negative farm business income, but continue to operate. Indeed, 16% of farm businesses had a negative income in at least 2 of the last 3 years.

[70] Farm Business Survey, Farm business management practices in England 2016/17

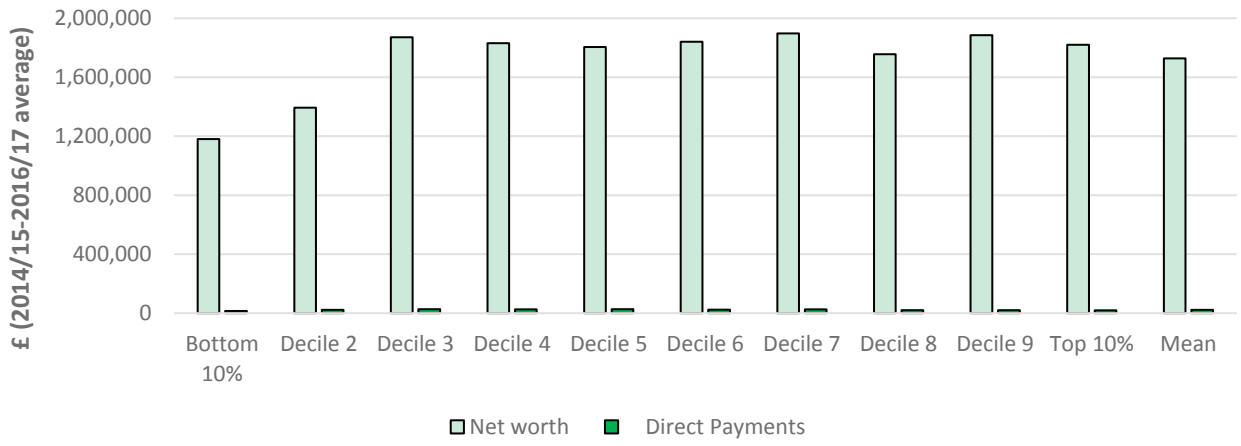
This can be for a variety of reasons: cash income may be considerably higher than Farm Business Income (which also includes depreciation of assets and other elements that do not directly affect the cash income of a farm business); farms may not be run solely as profit-making enterprises, but provide value to their manager through some other purpose, such as leisure; high land values can enable businesses to fund long-term borrowing and increasing land values in particular can encourage owner-occupiers to continue farming even where the activity is unprofitable.

When farm incomes fall, businesses may be able to borrow against, and/or liquidate, assets. As a result, their net asset position is likely to be a better measure of individual business viability, particularly in the short term. Indeed, since wealth (or net worth) is the result of income accumulation over time, for many businesses it provides a longer term, and more reliable, measure of the financial performance of the business.

For the average farm business, Direct Payments in any given year are equivalent to roughly 1% of their total net worth. As shown in Figure 17 below, even for the bottom performing 10% of farm businesses, which may on the surface appear most vulnerable to the removal of Direct Payments, this figure is also 1%. This suggests that farms may be substantially less vulnerable to the removal of Direct Payments than analysis based around FBI might suggest.

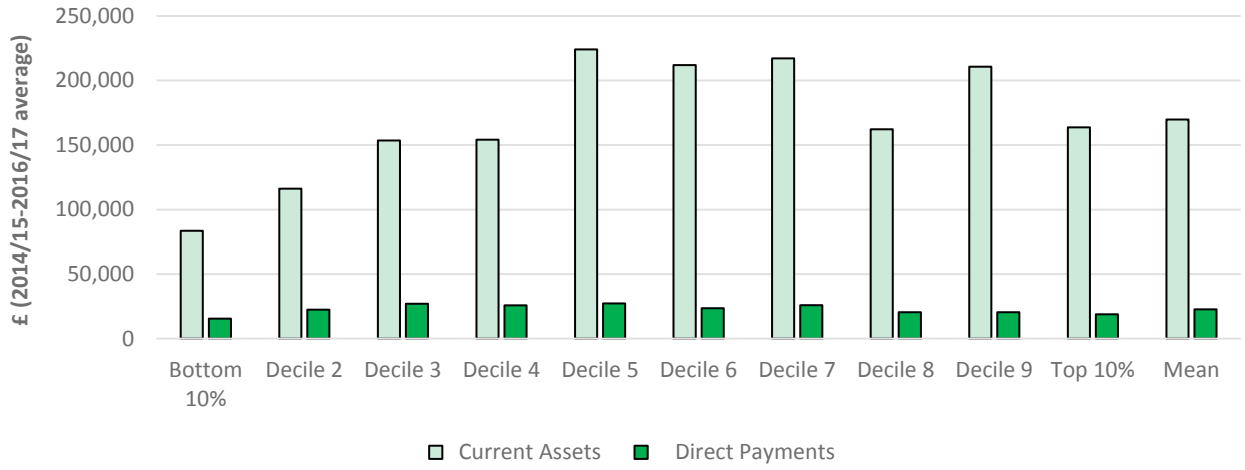
Figure 17: Net worth and annual Direct Payment receipt by profitability decile

Source: Farm Business Survey, 3 year average 2014/15 to 2016/17



Even as a proportion of current assets (i.e. those close to liquid, including cash, trading and store livestock and crops), annual Direct Payments are relatively small across the deciles (Figure 18), further suggesting that the vast majority of the sector is likely to be resilient.

Figure 18: Current Assets and annual Direct Payment receipt by profitability decile



Source: Farm Business Survey, 3 year average 2014/15 to 2016/17

5.3 Sector level modelling

Defra have modelled the removal of Direct Payments to provide an indication of the likely scale of any effects.

Modelling the production effects arising from Direct Payments using standard agricultural commodity models is inherently challenging and conceptually difficult given that payments are decoupled from agricultural production.

However, Defra has conducted internal modelling of a range of reasonable scenarios, following an approach similar to that taken by external organisations such as the Food and Agricultural Policy Research Institute (FAPRI), the OECD and the European Commission. The model we have used is a partial-equilibrium supply and demand model of the UK agricultural sector, calibrated to historical data.

Importantly, the modelling results are driven by assumptions around the degree to which Direct Payments retain a 'production-stimulating' impact and we have used a range of assumptions to capture the uncertainty around this effect. These are discussed in detail in Box 5 below.

Box 5: Modelling assumptions

The key assumptions are on the extent to which Direct Payments remain in effect 'coupled' to production, and in this we have taken a standard approach – 'coupling coefficients' – used by the OECD, the European Commission and FAPRI in their own modelling of Direct Payments.

In these models, all else equal, the elimination of Direct Payments reduces the returns to production in the model, as we assume Direct Payments retain a coupled element and are used to an extent to cross-subsidise agricultural activity. The overall impact on the production of agricultural commodities depends on the magnitude of the existing Direct Payment relative to producer returns from the market. For commodities where producer returns from the market are relatively low (e.g. beef), any cross-subsidisation from Direct Payments forms a more significant proportion of total returns. As a result, removing Direct Payments will have a larger projected effect on total returns and overall production levels for such commodities in the model.

A coupling coefficient of 0.3 for example means that Direct Payments are assumed to have a production-stimulating impact equivalent to 30% of a coupled payment i.e. a direct payment of £180/ha is assumed to be equivalent to a coupled payment of 0.3*180= £54/ha. Alternatively, the coupling assumption can also be interpreted as the degree to which Direct Payments are used to cross-subsidise agricultural output.

Our baseline assumption for the coupling coefficient is 0.3, which is based on the externally held FAPRI model. However, due to uncertainty we provide a standard range around this estimate of 0.1 to 0.5. Results are shown for the final modelled year – 10 years after Direct Payments are removed. This shows the dynamic response of the sector. Closer to the removal of Direct Payments, effects would be smaller, as production does not respond immediately.

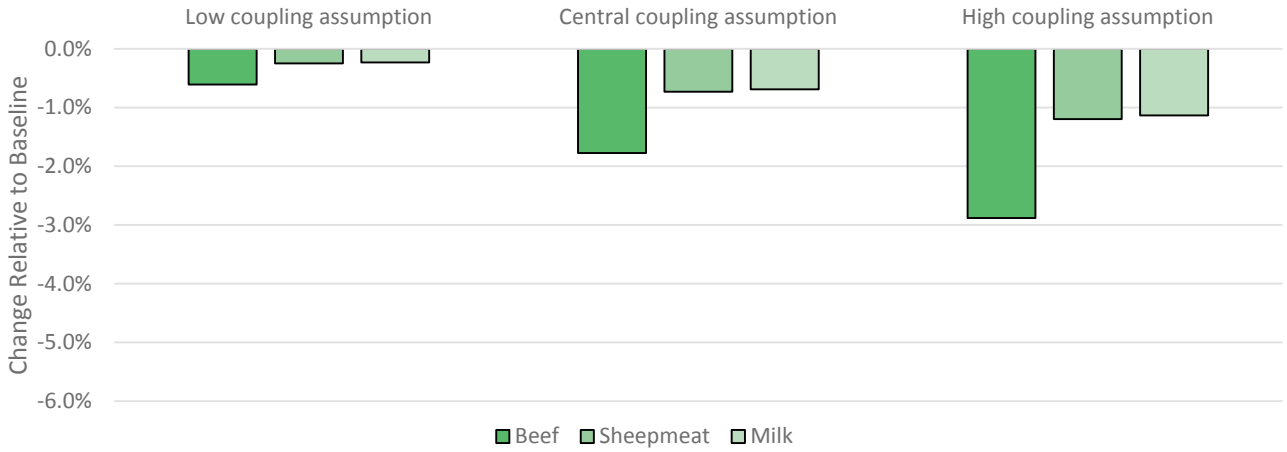
The scenarios in the model have been undertaken holding the trade regime unchanged with both the EU and the rest of the world in order to isolate the projected effects of Direct Payment removal alone. The modelling framework does not have the capacity to take account of any behavioural response of farmers to the removal of Direct Payments, structural changes in the sector, nor any change in factor markets, such as changes in rents. Modelling results should therefore be interpreted with caution and are indicative of only the direction and broad magnitude of change.

Our modelling indicates that small reductions in production in ruminant livestock sub-sectors may be expected.

Decoupled Direct Payments are notified by the EU in the WTO's 'green box' and are considered by the EU Commission to be non- or minimally trade-distorting. Modelling results tend to support the view that decoupled Direct Payments are 'non- or minimally trade-distorting' and find modest effects on total production levels, concentrated in the ruminant sector. The range of projected changes in production of beef, sheepmeat and milk is shown in Figure 19. Since Direct Payments are smaller in comparison to market

revenues in other sectors in the model production in these sectors is projected to be unaffected by Direct Payment removal and results are not presented. Pigmeat and poultrymeat production is not affected because these sectors are not in receipt of substantial Direct Payments.

Figure 19: Projected changes in UK production from the removal of Direct Payments



Source: Internal Defra Modelling

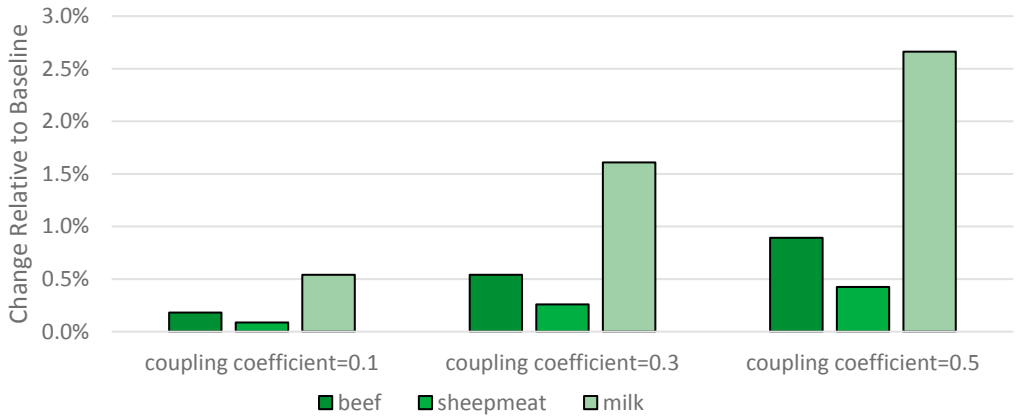
The magnitude of projected impacts on production from the internal modelling is small, but broadly commensurate with other external studies which have tended to find modest downward production effects from removing Direct Payments. External modelling results are discussed further in Box 6.

As a result of these expected reductions in production, our modelling indicates that small increases in farmgate prices in ruminant livestock sub-sectors may be expected.

Since domestic production can feed into farmgate prices to varying extents, these production projections allow us to also consider how the removal of Direct Payments is likely to affect agricultural commodity prices.

The price increases serve to substantially offset any loss in value from the corresponding reduction in production. Figure 20 shows the projected changes in prices that correspond to the production projections in Figure 19.

Figure 20: Projected changes in UK agricultural prices from the removal of Direct Payments



Source: Internal Defra Modelling

For beef and sheepmeat, modestly lower levels of domestic production lead to slight rises in UK agricultural prices relative to the baseline. Projected price effects are small because the trade regime essentially determines UK agricultural commodity prices, rather than the level of domestic agricultural production. The projected impacts on raw milk prices are slightly larger, as domestic production has a more significant effect on prices in this sector, given the perishability of the product and the lack of substantial trade in liquid milk. Price effects on milk are nevertheless constrained by the tradability of dairy commodities such as butter, cheese and skimmed milk powder because raw milk prices will also reflect the value of the returns from these commodity markets.

Box 6: Previous external modelling work on the impact on agricultural sector from reforming CAP

The European Commission funded Scenar 2020 study (December 2009) undertook some modelling of various CAP reform scenarios. A 'liberalisation' scenario was modelled to consider the impact of complete removal of Direct Payments combined with completely opening up the EU market to allow free trade on agri-food products with the rest of the world. Under this liberalisation scenario, the research estimated that agricultural land use in the EU would only reduce by 5%, relative to a reference scenario of continuing current CAP policies. The impact is small despite the research also suggesting that the number of farms in the EU could fall by 15%, because a large proportion of the land occupied by farmers exiting the sector would be transferred to the more competitive farms, rather than left abandoned. It should be noted that because the Scenar liberalisation scenario includes removal of all trade barriers we would expect the estimated impact to be greater than a scenario which just focused on removal of Direct Payments. Further, given general relative land quality in England, and the relatively advanced structure of the English agricultural sector, effects in any case are likely to be smaller in England.

Earlier work by FAPRI (2007) estimated the effects on agricultural production resulting from two scenarios: a unilateral 100% reduction in Direct Payments in the UK; and a 100% reduction in Direct Payments across the EU. The unilateral 100% reduction in Direct Payments in the UK was found to reduce sheep production by 8% and beef production by 4% in the UK. The 100% reduction in Direct Payments across the EU was

found to reduce sheep production by 7% and beef production by 4% in the UK. The changes in production were found to be negligible in other sectors.

However UK sheepmeat prices have been around 40-50% higher over recent years as compared to the prevailing prices at the time of the 2007 work and these higher prices have substantially improved market returns relative to the 2007 period. The latest modelling results therefore do not show as significant an impact on UK sheepmeat production. In addition, the sterling exchange rate used in the model run contained in this note is significantly lower than that used in the 2007 FAPRI analysis. The lower exchange rate makes the profitability of farming, without subsidies, higher (mostly due to higher UK agricultural prices).

5.4 Policy Considerations

An agricultural transition period could facilitate adjustments for those farm businesses that have the greatest challenges

Allowing Direct Payments to cease from the 2021 scheme year (which would be the outcome of not taking powers in relation to Direct Payments under the Agriculture Bill, as the European Union (Withdrawal) Act 2018 allows us to make Direct Payments only up to the 2020 scheme year) may encourage structural change and productivity gains if less efficient farmers change their practices or choose to leave the sector. For some farms who would make losses without Direct Payments, they would only require small adjustments to become profitable and the market may provide these without a need for significant change in the farmer's practices.

However, as discussed above, for some farms, in particular the bottom 10% of farmers (based on profitability) would have more significant challenges with instant removal as they require an average 31% reduction in costs (or improvement in output) which may be difficult overnight.

In particular, some of the poor performance of farms may be a result of historical policies introducing incentives which encourage dependence in some parts of the farming sector. While the opportunity to build a self-reliant sector bolsters the benefits of moving away from the existing system, it also follows that policy should be implemented in a way that supports those who can and wish to adapt to the new system.

A beneficial transition period should consider three key factors:

- Allowing farm businesses sufficient time to make necessary business adjustments to the removal of the distortionary incentives of Direct Payments;
- Sufficiently rapid transition away from direct support to incentivise farm businesses to make the necessary adjustments; and
- Reducing public expenditure on a system that does not deliver value for money as quickly as possible.

As set-out in the work of Swinbank and Tangermann (2004)[71] there is no straightforward solution to the length of a transition but in many cases, and across several sectors, agricultural business planning involves long timescales, and year-on-year business performance is subject to volatility in both markets and the weather. For instance, rent reviews on tenancies under the Agricultural Holdings Act (1986) may take place no less than three years apart and overall production cycles within the dairy sector can last between five and six years.

Additionally, Defra's farmer engagement research suggests that trade arrangements when leaving the EU is the biggest concern for farm businesses irrespective of sector. A transition period for the removal of Direct Payments would enable the sector to be better prepared for the future trading arrangements.

A transition period offers the opportunity for adjustment and will help the willingness and ability of farmers to undertake large changes early-on.

However, others argue that an extended transition period could encourage farm business to adapt too slowly, or to make the wrong adaptations[72]. Instead, they argue that a sudden, reliable reform is more likely to induce rapid and viable business responses.

Delinking offers an opportunity to provide a clear signal that Direct Payments are to cease and encourage more rapid structural change, while at the same time simplifying the payment process for recipients.

Delinking means that the link between the land and Direct Payment is broken: the payments will be made regardless of whether the recipient continues to farm to the same extent, or indeed, at all. Instead, how much a business receives would depend on a reference period.

Under this option, farmers receive their payments completely delinked from production, land or the requirement to remain in farming. The payments would taper to zero at a fixed end point.

As argued by Swinbank and Tangermann (2004)[73], the link between land area and Direct Payments in the current system constrains farmers' options. Removing these constraints is particularly important during a transition phase, where flexibility should help people adjust to the removal of Direct Payments. The link maintains the incentive for each farm business to continue farming the same land as under the current system.

Delinking could deliver the following:

- **Simplify the payment process for recipients of the Basic Payments scheme (BPS)**: delinking Direct Payments would mean that all those who qualify based on a

[71] Swinbank and Tangermann, "A Bond Scheme to Facilitate CAP Reform", in Swinbank and Tranter (eds.) (2004).
[72] This argument has been made strongly by Professor David Harvey. One example of his argument can be found in Harvey and Jambor (2010), On the Future of Direct Payments: CAP Bond Revisited.
[73] Swinbank and Tangermann, "A Bond Scheme to Facilitate CAP Reform", in Swinbank and Tranter (eds.) (2004)

reference period, would receive an annual payment that would no longer be linked to the land or farming. These payments would be made for each year of the agricultural transition. The government will look to give farmers the option of taking a one-off lump sum payment in place of all their annual Direct Payments.

- **Demonstrate a signal to the sector that Direct Payments are to cease**: delinking payments would represent a marked change in the policy framework governing the agriculture sector and influence future decision making by farm businesses, as the sector adjust towards a new policy framework. At the extreme, delinking would allow an individual to leave farming and treat the payments as an exit grant. For others, it would allow them to take fully business-focussed decisions under the new environmentally-focussed policy framework about how much land to farm each year, how much to rent, and how much to rent out, without the incentives being skewed by a solely area-based payment.
- **Facilitate more rapid restructuring of the agricultural sector and to offer choice to farmers:** As discussed in Chapter 4, Direct Payments based on land area are at least partially capitalised into land values and rents. Removing the link between Direct Payments and land during a transition may encourage a more rapid adjustment in distorted land markets and increase the ease with which farms could transition away from the business structures Direct Payments have incentivised. This may be more apparent for rents as there are many other factors that influence the demand for purchasing land. Additionally delinking removes the need to farm the land so it may encourage those who choose to leave to accelerate this decision. This could increase the ease with which new entrants and expansionary farms could acquire land area for farming.
- **Delinking also has potential environmental implications.** As discussed in Chapter 4, Direct Payments have environmental consequences, both directly through cross compliance and greening conditions, and indirectly through their marginal effects on production and the structure of the industry. Delinking payments from land would remove greening conditions. It would also involve moving from cross compliance to alternative enforcement mechanisms so that we can maintain agricultural and environmental best practice. In isolation, this would have modest negative environmental consequences, the mirror of the benefits discussed in Chapter 4 and Annex 3. However, an updated regulatory baseline and updated Environmental Land Management policies provide a mechanism through which these benefits could be maintained and most likely improved upon.

Annex 1: Environmental benefits and cost-benefit ratios of previous agri-environment and forestry schemes

Previous agri-environment and forestry schemes have encouraged positive farming practices which have provided the following benefits[74]:

- 23,000 ha of food sources for farmland birds;
- 189,000 hedgerow trees and in-field trees protected;
- 19,000 ha of planted areas providing pollen and nectar sources for pollinators;
- Significant, positive effects at the farm scale for 6 out of 15 farmland bird species on Higher Level Stewardship agreements in three years (2008-2011);
- 820 designated scheduled monuments removed from the Heritage at Risk Register;
- Maintenance, management and restoration of 280,000 km hedgerows, ditches and stonewalls;
- A positive/strongly positive effect on the landscape in 77% of National Character Areas in England;
- £29 million of farm improvements coordinated through Catchment Sensitive Farming (CSF);
- 1.2 million ha of land and 14,000 farmers actively engaged in CSF;
- 47,000 ha of buffer strips protecting water courses and features from agricultural impacts.

Benefit-cost ratios (BCRs) are a metric used to provide an assessment of value for money, taking into consideration the costs and benefits which can be monetised. Monetising environmental outcomes is particularly challenging and not possible in certain circumstances. Therefore, BCRs can only provide an approximation and slightly narrow view of the value for money. Indicative BCRs include:

- Across all Biodiversity Action Plan (BAP) habitats, the spend in 2011 on the UK BAP habitats was estimated to deliver £1,366m per annum in benefits from ecosystem services with an average BCR of 2.9:1 [75].

[74] Defra (2018), The Future Farming and Environment Evidence Compendium.
[75] Christie, M. et al. (2011), Economic valuation of the benefits of ecosystem services delivered by the UK Biodiversity Action Plan: Final Report to Defra.

- Evidence of BCRs of around 4:1 for investment in woodland planting, wetland creation, upland peatland restoration and intertidal habitat creation[76].
- The BCR for restoring upland peat has been estimated at between 0.5:1 and 7:1 depending on the state of the peatland. This does not capture biodiversity benefits which would increase this further.
- The expected BCR for natural flood management and flood resilience has been estimated at up to 4:1[77].
- Woodland planting around the periphery of major towns and cities across the country away from peatlands in England yields estimated BCRs of 5:1 using lower bound carbon values and nearly 6:1 using higher values[78]. This includes high recreation benefits and reductions in emissions of greenhouse gases. There are also water quality improvements and wildlife impacts that were not valued in economic terms, which would increase the BCRs further. Investment in expansion of England's woodlands could generate substantial benefits, particularly recreation opportunities and carbon sequestration and storage, and also wildlife gains and improvements in water quality.
- The benefits of expanding the extent of wetland areas can exceed costs significantly under certain scenarios with estimated BCRs of 9:1 for some wetland sites of 100ha[79].
- Investments in activities aimed at re-wetting areas of peatland would lead to significant benefits, including carbon storage, water quality and wildlife gains.
- Grassland and heathland management and restoration offer substantial value through contributions to public access and pollination services[80].

[76] HM Government (2018), A Green Future: Our 25 Year Plan to Improve the Environment. Annex 1: Supplementary evidence report, page 120.
[77] Eftec (2017), Flood Risk Reduction Benefit Valuation for Natural Flood Management. Environment Agency.
[78] Bateman & Day (2014).
[79] Natural Capital Committee (2015), The State of Natural Capital Protecting and Improving Natural Capital for Prosperity and Wellbeing.
[80] HM Government (2018), A Green Future: Our 25 Year Plan to Improve the Environment. Annex 1: Supplementary evidence report, page 123.

Annex 2: Existing legislative powers for domestic provision for financial support for farmers and other land managers

Domestic provision for financial support for farmers and other land managers largely pre-date the CAP and are focused on agricultural productivity rather than providing environmental benefits, and are therefore considered insufficient to deliver ELM.

These powers include:

1. Agriculture Act 1970 (section 29). This is a power to make farm capital grants towards capital expenditure incurred or to be incurred for the purposes of the carrying on or establishment of an agricultural business.
2. Farm Land and Rural Development Act 1988:
    a. Section 1 contains a power to make grants for expenditure incurred for the purposes of the establishment or expansion of farm businesses or agricultural businesses;
    b. Section 2 contains a power to make grants for expenditure incurred or to be incurred for the purposes of conversion of land from agricultural use to forestry or for the maintenance of land that has been converted. Schemes may be statutory instrument-making power under the affirmative procedure.
3. Forestry Act 1979 (s.1) contains a power for the Forestry Commission to make grants and loans to owners and lessees of land for use and management of the land for forestry purposes. Approval from the Treasury is required (and the power is devolved to Scottish Ministers). The grant payments and loans must be made in accordance with s41 of the Forestry Act 1967, which regulates the Forestry Fund.

The exception to the focus in existing powers on productivity is section 98 of the Natural Environment and Rural Communities Act 2006 ("the NERC Act"), which allows the Secretary of State to provide financial assistance for expenditure incurred or to be incurred for any matter that is related to or connected with a Defra function. Section 104 provides a power to make supplementary provision as the Secretary of State considers necessary or expedient for the purposes of giving full effect to any provision of this Act. Section 98 is not sufficiently broad to provide for the extensive schemes that would be necessary to meet the policy objectives in this case.

Other provisions in the NERC Act provide powers only to Natural England, for example, section 6 (Financial assistance to facilitate Natural England's general purpose) and section 7 (Management agreements).

Section 153 of the Environmental Protection Act provides a list of programmes to which the Secretary of State may give financial assistance. The department considers that it is not appropriate to add the new schemes to that list because it wishes to limit eligibility to provide the Secretary of State with the ability to target funding on the department's priorities as set out in the 25 Year Plan or decided on by the Secretary of State from time to time.

Annex 3: Environmental impacts of Direct Payments

Direct Payments are likely to have direct environmental impacts through cross-compliance and greening conditions.

This annex provides a brief overview of Natural England and Defra's assessment of these impacts.

It considers the effects relative to a counterfactual or baseline of no Direct Payments being made following the 2020 scheme year (in the absence of an Agriculture Bill), which is equivalent to a 'do nothing' scenario.

The analysis does not consider:

- Any balancing environmental policy measures introduced that offset these impacts;
- Trade agreement specific scenarios that may see restructuring in favour of specific enterprises at the expense of others with differential environmental impacts;
- Any leverage effect of BPS on compliance with the existing domestic legislative baseline, since it is assumed that there is 100% compliance with regulation;
- Potential delivery impacts of changes to BPS that affect existing agri-environment agreements that are designed to sit above e.g. cross-compliance or greening.

Cross-compliance

The majority of cross-compliance requirements, including all those categorised as statutory management requirements (SMRs), are covered by domestic legislation. However, a number of elements of good agricultural and environmental condition (GAECs) requirements are not similarly covered and any protection they offer would be lost if BPS or the cross-compliance conditionality was withdrawn without replacement, with associated environmental impacts.

As a result, potential impacts can be identified against the following cross-compliance conditions:

- GAEC 1 – Buffer strips by watercourses;
- GAEC 4 – Minimum soil cover;
- GAEC 5 – Soil erosion;
- GAEC 6 – Soil organic matter; and
- GAEC 7A – Boundaries.

Buffer strips by watercourses

The UK Water Resources Act 1991 states that it is an offence to knowingly permit pollutants to enter into watercourses. Buffer strips are one mechanism by which such pollution can be avoided.

However, the only current legislation that specifically relates to buffer strips along watercourses and prevents cultivation within those strips is the cross-compliance SI (SI 2014 No.3263 as amended).

As a result, it is likely that the cross-compliance condition provides some additional protection for watercourses from pollution.

Using updated estimates for the length of watercourses in England along arable and improved grassland (where the condition applies), we have estimated the benefits of the condition, using the same approach taken by previous Defra impact assessments of buffer strips in Impact Assessments of Buffer Strips under the Ecological Focus Areas aspect of Greening policy[81].

This approach takes estimates of the mitigation by buffer strips of pollution from greenhouse gases, ammonia, nitrates, phosphorus, and sediment.

While it is challenging to calculate a full length of the watercourses affected by the condition (both physically, and in terms of how many buffer strips would remain in the absence of Direct Payment conditionality), our best estimate is that this could provide around £34.7m of annual benefits in 2018 prices.

Minimum soil cover

Maintaining soil cover can prevent diffuse pollution. While maintaining minimum soil cover is not explicitly referred to in domestic regulation (Farming Rules for Water, effective April 2018), existing regulation does require land managers to take all reasonable precautions to prevent diffuse pollution caused by land management and cultivation practices. Maintaining minimum soil cover could be considered such a precaution.

The cross-compliance condition also provides exceptions for numerous 'agronomic reasons', which in some cases are universally applicable.

As a result, we have not attempted to ascribe monetised environmental benefits to this cross-compliance condition.

Soil erosion

Similarly to minimum soil cover, the new basic rules on water quality contain some requirements for farmers to limit activities that could cause soil erosion.

However, the rules are more subtle than those under GAEC 5, as the requirements link soil erosion and muddy runoff to water quality, whereas cross compliance is concerned with activities that cause soil erosion purely in relation to damages to the soil itself, regardless of the external impact.

Therefore, the loss of cross compliance will not lead to a complete void in legislation on soil erosion, as the basic rules for water quality will require farmers to limit soil erosion that could damage watercourses.

[81] Defra (2013), Implementation of CAP reform in England: Evidence Paper. A cost-benefit analysis of Greening measures was included in this evidence paper.

Given this complexity, we have not attempted to provide monetised estimates of the benefits of this cross-compliance condition.

Soil organic matter

Without cross compliance, there are some regulations in place that set out required measures to protect soil organic matter. The *Heather and Grass etc. Burning (England) Regulations 2007* prohibit the burning of specified vegetation at night or outside the burning season and state that farmers can be prosecuted or fined up to £1000. However, these regulations do not cover the burning of crop residues, which are laid down in the *Crop Residues (Burning) Regulations 1993* and make it a criminal offence to burn cereal straw, stubble and certain crop residues. Impacts on soil organic matter are also contained within the *Environment Impact Assessment (Agriculture) (England No 2) Regulations 2006*, which are regulated by Natural England. These state that before carrying out proposed agricultural work, to avoid prosecution, a formal procedure to assess the work's environmental impacts must be carried out by farmers, including assessing activities that involve cultivation of soil or application of soil improvers.

Therefore, without cross compliance some requirements for farmers to maintain soil organic matter would still be laid out in existing legislation. Whilst environmental Impact Assessment regulations permit the imposition of civil sanctions, the legislation for heather/grass and crop burning does not allow for the use of these enforcement mechanisms. Hence an equally robust enforcement procedure could be required to ensure that compliance levels did not drop for all elements of this area of soil protection.

Given this complexity, we have not attempted to provide monetised estimates of the benefits of this cross-compliance condition.

Boundaries

Currently, cross compliance requires farmers to protect boundary features such as hedgerows, stone walls and earth banks. This includes a hedge cutting ban from 1st March to 31st August and a ban on removing existing stone walls.

The Hedgerows Regulations 1997 state that the removal of hedgerows is prohibited unless the local authority has provided the land owner with consent for their removal. Any person who removes a hedgerow without consent is guilty of an offence under this legislation. However, whilst the regulations prohibit removal of hedges, 2m protection buffers for all hedgerows, the cutting ban and protection for stone walls required by cross compliance are not included in these or other regulations.

Therefore, the removal of cross compliance for this area could leave a significant void in terms of legislation and the associated inspection process. Existing legislation on the protection of hedgerows is relatively weak and does not cover all the requirements laid out in cross compliance guidelines. Furthermore, there is no requirement to carry out routine inspections on this legislation and no civil sanction that can be applied.

This relevant cross-compliance standard provides very significant 2m protection buffers for all hedgerows (against damage to roots from ploughing and other cultivations and from spray drift and other agricultural operations). Hedgerows (including their buffers and hedgerow trees) are a very significant farmland habitat.

The Defra-funded 'Evaluation of Cross Compliance' (2009) incorporated a methodology which allows the benefits of this cross-compliance condition to be quantified, as follows:

Biodiversity (1.5% x £1.537m) + Rivers (0.5% x £0.446m) + Lakes (0.5 x £0.119m) + Estuaries (0.5% x £0.25m) + Drinking water (0.5% x £0.9m)

Total = £3.125m

Greening

Greening conditions cover:

- Permanent Grassland;
- Crop Diversification
- Environmental Focus Areas

The majority of these conditions have no effect on environmental outcomes, either because they are unrelated to beneficial outcomes, or because they do not differ from the standards land managers routinely meet.

Permanent Grassland

Permanent Grassland aspect of Greening enables the government to take action to encourage arable farm businesses to increase their proportion of Permanent Grassland in a case where the overall UK area of Permanent Grassland falls more than 5% below the baseline, set in 2015.

As such, it only provides a retrospective, and blunt protection. Since such a fall in Permanent Grassland has not been observed since its introduction[82], it has not been effective, and cannot be ascribed any positive environmental impact.

Despite the ineffectiveness of Greening in this regard, Permanent Grassland is an environmentally beneficial land use. Indeed, a 10% increase in the area of Permanent Grassland over standard arable land (equivalent to an increase of 375,000 hectares) would act as a sink for carbon emissions with an annual value of £569m in 2018 prices. Greening conditions have not though contributed to any such increase.

Crop Diversification

In line with Defra's original Impact Assessment, there is very limited evidence that monocultures have a detrimental impact on biodiversity. Furthermore, the vast majority of English farms are either exempt or would comply with this condition anyway.

For other farms, the costs of complying outweigh the potential Greening payment for complying, and therefore they choose not to comply.

As a result, we do not expect Crop Diversification to provide any environmental benefit, and have not attempted to monetise any impact.

[82] Defra (2018), Structure of the agricultural industry.

Ecological Focus Areas (EFA)

EFA likely increase the area of fallow land, hedges, buffer strips, catch cover crops and nitrogen fixing crops. Each of these can be associated with environmental benefits by reducing pollutants, including greenhouse gases, ammonia, nitrates, phosphorus and sediments.

There is a lack of readily available data on the impact of the Greening condition. However, looking at how the land areas of each of the features discussed above changed after its introduction can provide some indication of the potential scale of benefits.

FBS analysis[83] suggests that after the introduction of Greening in 2015/16, fallow land increased by 40,700 hectares, buffer strips by 1,100 hectares and catch crops by 17,200 hectares.

Using values for the mitigation of pollution these increases would provide suggests a total monetised benefit of around £11m per annum in 2018 prices.

[83]Defra (2017), Ecological Focus Areas: features on farms in England 2015/16.

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