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**Book Part — Accepted Manuscript (Postprint)**

## Employment effects of CAP payments in the UK non-farm economy

*Suggested Citation:* Rizov, Marian; Davidova, Sophia; Bailey, Alastair (2019) : Employment effects of CAP payments in the UK non-farm economy, In: Davidova, Sophia M. Thompson, Kenneth J. Mishra, Ashok K. (Ed.): Rural Policies and Employment: Transatlantic Experiences, ISBN 9781786347084, World Scientific, Singapore, pp. 147-161,  
[https://doi.org/10.1142/9781786347091\\_0009](https://doi.org/10.1142/9781786347091_0009)

This Version is available at:

<https://hdl.handle.net/10419/204516>

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## **Chapter 12: Employment Effects of CAP Payments in the UK Non-Farm Economy**

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The effects of the CAP payments on indirectly generated non-farm jobs in small and medium-sized enterprises (SMEs) are central to job creation. This chapter examines whether there are differences in these effects according to business location (rural or urban), the agricultural supply chain, and according to CAP Pillars, using both static and dynamic models of employment. The results suggest positive net spill-overs of CAP payments to non-farm employment. Although their magnitudes are small, they are economically significant. In general, Pillar 1 has a stronger positive employment effect than Pillar 2, but Pillar 2 payments have a stronger positive effect per € spent in rural areas and within the agricultural supply chain.

### **12.1 Introduction**

This chapter investigates the contribution of the EU's Common Agricultural Policy (CAP) payments to non-farm sector employment in both rural and urban areas in the United Kingdom (UK) through its direct and indirect effects on agriculture's upstream and downstream industries, and the economic diversification of rural areas. In recent years, given the difficult recovery from the 2008 financial crisis, the provision of employment is of primary interest to policy makers and to millions of UK citizens. Additionally, whatever the UK Brexit package may be, it is almost certain that the ways in which agriculture is supported will change.

For decades, CAP payments have implicitly maintained the level of agricultural employment, or at least slowed down its decline under the pressures of technical and structural change. In the face of these forces, the CAP could hardly have further substantial impact in the direction of

job creation or even job maintenance in primary agriculture, although the need to increase the CAP's contribution to employment has been emphasized on many occasions by the European Commission and European Parliament, and was included as one of the three objectives of rural development support for 2014-2020 (art 4, Regulation (EU) No. 1305/2013). However, in reality the CAP contributions to employment may have been more important than they appear at first glance, due to possible inter-industry spill-overs on non-farm employment which are often not accounted for.

Against this backdrop, the objective of this chapter is to estimate the effect of CAP payments on indirectly generated non-farm jobs. In particular, the study focuses on three key questions: (i) whether CAP payments are positively associated with non-farm employment; (ii) whether there are differences in the effect according to business location (rural or urban), and within agricultural supply chain; and (iii) whether Pillar 1 direct payments and Pillar 2 rural development payments have different employment effects.

A report [EP, 2016] for the European Parliament Committee on Agriculture and Rural Development (COMAGRI) reviewed 53 studies concerning the role of CAP in the creation of rural jobs. The structured literature review is discussed in detail in Chapter 10 of this book 'CAP and Rural Jobs: Analysis of Studies'. Of these studies, 16 reported a negative effect on employment in agriculture, 9 a positive one, 8 a mixed effect, depending on farm structure and rural economy, and 6 found no effect. However, all these studies either focused on agriculture and rural jobs, or on labor migration out of agriculture. More recently, Blomquist and Nordin [2017] examined the CAP's impact on regional employment beyond agriculture in Sweden, and estimated the cost per job as equal to \$26,000. Earlier, Petrick and Zier [2012] found higher costs (€50,000 per job) in East Germany.

## **12.2 The Evolution of CAP Subsidies and the Implications for Employment**

The CAP Health Check of 2008 did not change the fundamental decisions taken in the 2003 reforms, i.e. the introduction of a decoupled (from production) Single Farm Payment (SFP) to farmers, conditional on environmental and other cross-compliance requirements, and keeping the land in Good Agricultural and Environmental Conditions (GAEC), as the main feature of Pillar 1, but it decreased the remaining coupled payments, increased modulation of funds from Pillar 1 to Pillar 2, and removed arable land set-aside. It also provided the EU Member States (MSs) with flexible possibilities (the so-called Article 68 measures) to assist sub-sectors of agriculture with special problems.

SFPs may affect non-agricultural employment through two main channels, both of which would lead to expansion in the demand faced by non-farm sector firms: its ‘coupled’ effect on farm investments and output levels, and its ‘decoupled’ effect on household consumption. In the first, SFPs may be invested in farm production and thus increase or maintain employment in agriculture and in up- and downstream industries. They may also have wealth and insurance effects that may increase the input use and output levels, and affect investment decisions as farmers save and invest more, as well as increase the liquidity of credit-constrained households. Decoupled income support to farmers can also affect income-leisure and labor allocation decisions as well as the consumption of the farm household. Farm household income/expenditure effects are generated mainly in rural areas but may or may not correlate with increased employment in those areas, taking into account purchases at a distance and services provided from urban areas. Moreover, direct payments are well known to ‘leak’ out in higher land rents (the price of the land input), paid to landowners who may not live in the locality. A consequence of the appropriation of a high share of payments by landowners means that the local multiplier effect of CAP Pillar 1 payments is likely to be lower in those areas where there is a high proportion of rented land, as higher rents go to landowners who do not always live in the same locality. However, while the presence of leakages is an important consideration, which generally applies to farmers’ purchasing power and

expenditure, the analytical framework used in this chapter is built on the idea of economy-wide spillovers and the data employed capture economy-wide effects.

Rural development measures in Pillar 2 can affect non-farm employment through a wide range of channels. Rizov [2004; 2005] studied the CAP's effect on the organization and performance of rural communities since the introduction of Pillar 2 in 1999, e.g. through diversification of economic activities. However, such measures may create employment both within the local rural community and beyond, in the urban areas, thus emphasizing the general interdependency of rural and urban areas. Similarly to Pillar 1, first-order effects are due to the flow of funds into some rural households which increases their purchasing power. Additionally, measures for investments in physical assets – farm modernization, infrastructure, energy-saving technologies – may influence employment in research and development, construction, technical services, etc. Business start-up aid for young farmers and for non-farm enterprises, as well as village renewal support, can have a direct effect on employment in rural and surrounding urban areas. Support to enhance biodiversity and the provision of higher-value ecosystem services may help to create non-farm jobs in rural tourism and associated services. Policy developments within the food system, e.g. short food chains, organic box trade, and traceability, can produce employment growth along the entire agri-food supply chain.

However, the form and the level of CAP payments vary across the UK. Table 12.1 presents some indicators that exemplify the striking differences in agricultural sectors across its four constituent countries (England, Northern Ireland, Scotland and Wales).

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Table 12.1. Indicators of UK farming by constituent country, 2013

Indicators	England	Northern Ireland	Scotland	Wales
Total agricultural area (million ha)	9.5	1.0	6.2	1.7
Number of farms (‘000)	101	24.5	52.7	42.3
Average farm size (ha)	90	41	106	37
Crops/grass/ rough grazing (% of total agric. area)	40	5	10	5
Grass (% of total agric. area)	44	78	24	68
Rough grazing (% of total agric. area)	10	17	66	27
Designated less favoured area (%)	17	70	85	81
Gross output per farm (£’000)	189.3	78.4	59.6	26.1
Gross output per ha (£)	2016	1925	507	879
Net Farm Income (£’000)	34	13	21	17

Source: Allen *et al.* (2014).

Table 12.2 presents the CAP payments by Pillar in the UK and the constituent countries since 2010 – the first year available which falls within the period of analysis in this paper. The constituent countries implemented SFPs differently: Scotland and Wales introduced the SFP on a historical basis, England opted for a dynamic hybrid version, and Northern Ireland for a static hybrid one.

Table 12.2. CAP payments by funding stream and constituent country, € million \*

	2010	2011	2012	2013	2014
<i>UK Total</i>	<i>4337</i>	<i>4327</i>	<i>4433</i>	<i>4417</i>	<i>4299</i>
Pillar 1	3424	3309	3348	3326	3234
of which: DP	3325	3304	3290	3285	3195
CMO	99	5	58	41	39
Pillar 2 **	913	1018	1085	1091	1065
of which	512	653	742	752	798
EAFRD					
<i>England Total</i>	<i>2761</i>	<i>2696</i>	<i>2777</i>	<i>2792</i>	<i>2714</i>
Pillar 1	2199	2099	2146	2126	2048
of which DP	2100	2094	2088	2085	2009
CMO	99	5	58	41	39
Pillar 2 **	562	597	631	666	666
of which	348	448	470	532	563
EAFRD					
<i>Wales Total</i>	<i>413</i>	<i>417</i>	<i>426</i>	<i>406</i>	<i>413</i>
Pillar 1 DP	316	312	309	309	301
Pillar 2 **	97	105	117	97	112
of which	38	45	54	48	54
EAFRD					
<i>Scotland Total</i>	<i>779</i>	<i>826</i>	<i>840</i>	<i>819</i>	<i>757</i>
Pillar 1 DP	589	583	584	583	566
Pillar 2 **	190	243	256	236	191
of which	92	123	167	113	119
EAFRD					
<i>Northern Ireland Total</i>	<i>384</i>	<i>388</i>	<i>390</i>	<i>400</i>	<i>415</i>
Pillar 1 DP	320	315	309	308	319
Pillar 2 **	64	73	81	92	96
of which	34	37	51	59	62
EAFRD					

Source: *Agriculture in the United Kingdom* (2014).

Notes: DP – Direct Payments (aka SFP); CMO – Common Market

Organisation; EAFRD – European Agricultural Fund for Rural Development. \*

Annual data is for the EU financial year 16 October – 15 October. \*\* The difference between the total Pillar 2 and the amount received from EAFRD indicates the national co-financing.

### **12.3 Theoretical Framework: a Firm Employment Function**

The theoretical framework employed in the analysis includes the following:

- Smolny's [1998] monopolistic competition model with delays in adjustment in output price, employment, and capacity.
- As regards the timing of effects, only output is considered endogenous in the short run, while employment and prices adjust in the medium run, due to delays arising from contractual conditions, and various types of uncertainty. Production capacities and technologies react only in the long run.
- Demand for the firm's product is assumed dependent on prices and on other factors such as aggregate industry demand and its shifters induced by market factors or policies, as well as CAP expenditures (which may affect volatility as well as level).
- Short-run firm supply is determined by capital and labor as inputs, with output determined as the minimum of supply and demand.
- In the medium term, employment may be determined by capacity constraints, with price rather than employment adjusting. However, in the more likely case, employment and price are jointly determined.

Demand shifts due to the spill-overs and diversification effect of CAP payments lead to growth in employment. Uncertainty reduces optimal employment and increases the price through the costs of underutilization of employment. However, as argued earlier, if CAP payments reduce uncertainty, then there will be less underutilization of labor, and employment would rise in relative terms.



#### **12.4 Data and Estimation Strategy**

Firm (company) data for over 2 million firms over the period 2008–2014 was extracted from the Financial Analysis Made Easy (FAME) dataset of Bureau van Dijk, and combined with detailed subsidy data extracted from the CAP Payments database of the UK Department of Environment, Food, and Rural Affairs (DEFRA). Firm data coverage compared with national statistics is very good concerning sales (89%) and employment (90%). The analysis focusses on the effect on employment in small and medium-sized enterprises (SMEs), defined as businesses with fewer than 250 employees, and typical of most rural businesses. In 2013, SMEs represented over 99% of all private-sector businesses in the UK, and accounted for 59.3% of private-sector employment and for 48.1% of private-sector turnover [Department for Business Innovation and Skills, 2013]. The period covered ranges from 2008, the year of the European Commission's CAP Health Check, to 2014, the first transitional year of the 'new' CAP for the period 2014-2020. The geographic distribution of the firms is presented in Figure 12.1.

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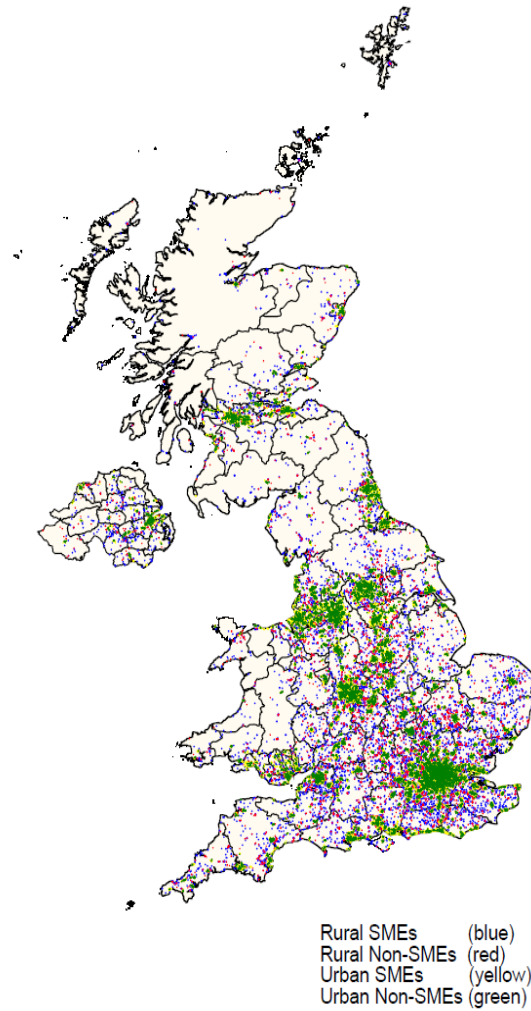


Figure 12.1. Geographic distribution of firms in the UK

The CAP payment information covers four years – 2008, 2010, 2012 and 2014 – and comprises the amount of total payments and its three components: common market organization (CMO) and direct payments (DP) made under CAP's Pillar 1, and rural development payments made

under Pillar 2. The geographic distribution of the average annual CAP payments in the dataset is presented in Figure 12.2.

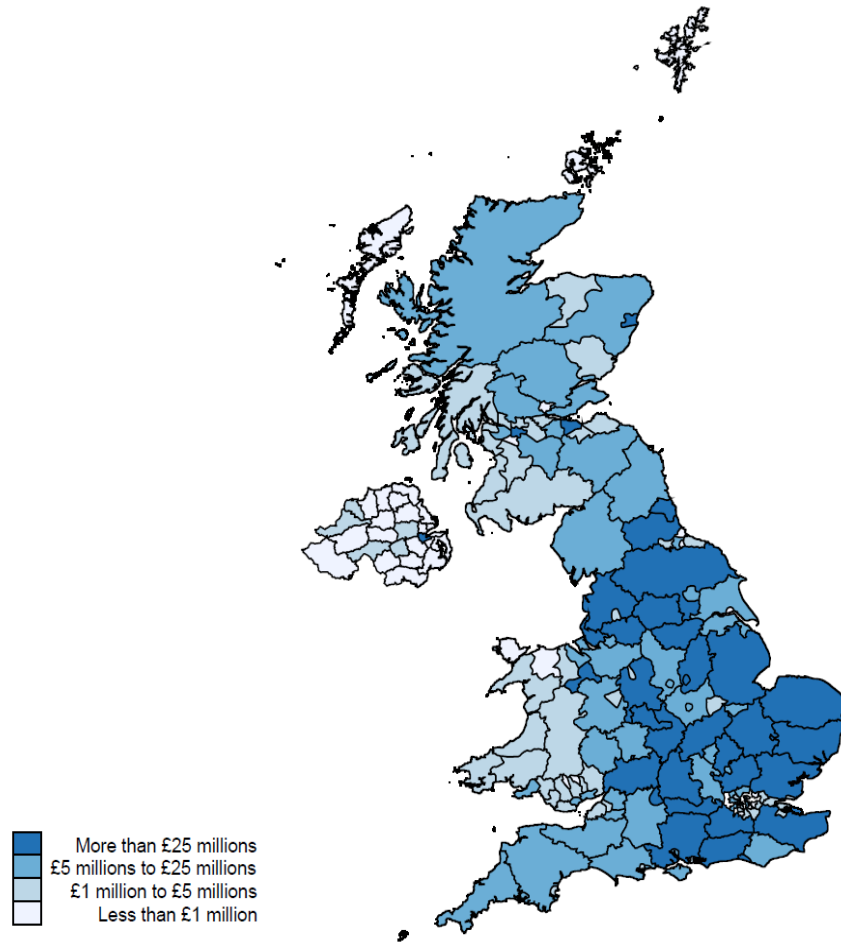


Figure 12.2. Geographic distribution of annual CAP payments

The industry sectors in the FAME dataset are identified on the basis of the 2007 UK Standard Industrial Classification (SIC) at the 2- or 4-digit level. All nominal monetary variables were deflated to real values using appropriate indices. The input-output (I-O) shares of the agriculture,

forestry and fishing sector in all other sectors were obtained from symmetric OECD I-O tables, averaged over the 2005-2010 period, and weights were used to represent inclusion or otherwise in the agricultural supply chain, including the manufacturing of inputs to agriculture (e.g. fertilizers, pesticides and other agrochemical products; machinery for agriculture, forestry and for food processing; renting or leasing of agricultural machinery and equipment) and industries downstream encompassing food processing and wholesale of agricultural raw materials and live animals.

Definition of variables and descriptive statistics calculated from the estimated sample of SMEs are reported in Table 12.3, and average SME characteristics by rural and urban locations in Table 12.4. Generally, there are no important differences in summary statistics between rural and urban firms, but rural SMEs are slightly larger as measured by employment and smaller in assets, and they face smaller local market demand. The cost of employees (and their wages) also is lower in rural SMEs. In rural areas, more CAP payments are received than in the urban areas as exemplified by the total subsidy and the higher share of direct payments. The location-based (postal district) CAP payments measure confounds the amount of payments received by individual farms with the size of the farm sector at the location considered; nevertheless, such measure of intensity of the CAP payments suffices for our analytical purposes.

Table 12.3. Definition of variables and summary statistics

Variable	Definition	Mean (S.D.)
Employment	Number of full-time equivalent firm workers, log	3.07 (1.50)
Market demand	Annual 2-digit SIC by TTWA aggregated demand in £'000, log	13.83 (3.41)
Demand variance	Firm revenue deviation from 2-digit SIC geometric mean	0.99 (2.11)
Cost per employee	Annual firm wage bill per FTE worker in £'000, log	2.99 (1.24)
Firm size	Value of firm total assets in £'000, log	7.18 (2.60)
Firm age	Firm age in years	17.98 (17.93)
Total subsidy	Value of total CAP subsidies (Pillars 1 and 2) at 4-digit postcode district in £'000, log	8.78 (1.79)
CMO share	Share of common market organisation (CMO) subsidy, Pillar 1	0.04 (0.11)
DP share	Share of direct payments (DP) aka SFP, Pillar 1	0.67 (0.41)
Pillar 1 share	Share of Pillar 1 (CMO+DP)	0.71 (0.39)
Pillar 2 share	Share of rural development payments (RD)	0.29 (0.39)
Manufacturing	Dummy for aggregate manufacturing industries	0.12 (0.33)
Construction	Dummy for construction and utilities industries	0.09 (0.28)
Services	Dummy for aggregate service industries	0.79 (0.41)
Rural area	Dummy for rural areas according to the DEFRA (wider) definition of rurality	0.17 (0.38)
Ag. supply chain	Dummy for 4-digit SIC industries comprising the agricultural supply chain	0.02 (0.12)

Notes: Total number of observations: 190,348 for 2008, 2010, 2012 and 2014.

Table 12.4. Summary statistics for rural and urban samples of SMEs

Variable	Rural mean (S.D.)	Urban mean (S.D.)
Employment	3.09 (1.55)	3.06 (1.49)
Employment growth	0.01 (0.20)	0.01 (0.23)
Market demand	11.84 (3.40)	14.24 (3.26)
Demand variance	0.81 (2.06)	1.03 (2.12)
Cost per employee	2.82 (1.21)	3.03 (1.24)
Firm size	7.12 (2.61)	7.19 (2.59)
Firm age	18.65 (17.97)	17.85 (17.92)
Total subsidy	9.08 (1.79)	8.71 (1.78)
CMO share	0.02 (0.09)	0.04 (0.12)
DP share	0.76 (0.34)	0.66 (0.42)
Pillar 1 share	0.78 (0.33)	0.70 (0.40)
RD share	0.22 (0.33)	0.30 (0.40)
Manufacturing	0.16 (0.36)	0.12 (0.32)
Construction	0.10 (0.30)	0.08 (0.28)
Services	0.74 (0.44)	0.80 (0.40)
Ag. supply chain	0.03 (0.17)	0.01 (0.11)
Number of observations	32,788	157,560

## 12.5 Results

The estimation results from the SME sample, for the static and dynamic models are presented in Tables 12.5 and 12.6. CAP payments have a statistically significant effect in both models. While the magnitudes of the coefficients appear small, they are of economic significance. The elasticity of employment with respect to total CAP payments is 0.014 (Table 12.5, column (1)), which means that completely removing the CAP payments in the UK would result in a 1.4% drop in employment in non-farm SMEs from the current level, *ceteris paribus*, equivalent to about 220,000 jobs lost. In Table 12.5, column (2) total CAP payments are decomposed into

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Pillar 1 and Pillar 2, which show different effect magnitudes. The contribution of Pillar 1 to non-farm employment is 1.0% or 150,000 jobs, and Pillar 2 contributes 0.5% or around 70,000 non-farm jobs. In column (3), where the CAP payments are treated as endogenous and instrumented with the share of arable land, the results remain similar to the ones discussed previously.

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Table 12.5. Regression results for the full SME sample, static specifications

Dependent variable	Log of employment, ln(empl)		
Explanatory variables	(1)	(2)	(3)
Total subsidy	0.014 ** (0.002)	-	-
Total subsidy (instrumented)	-	-	0.018 ** (0.004)
Pillar 1 share	0.023 ** (0.006)	-	0.024 ** (0.006)
Pillar 1 subsidy	-	0.010 ** (0.001)	-
Pillar 2 subsidy	-	0.005 ** (0.001)	-
Market demand	0.105 ** (0.007)	0.105 ** (0.007)	0.105 ** (0.007)
Demand variance	-0.183 ** (0.032)	-0.183 ** (0.033)	-0.184 ** (0.033)
Cost per employee	-0.226 ** (0.085)	-0.228 ** (0.088)	-0.221 ** (0.090)
Firm size	0.088 ** (0.014)	0.087 ** (0.014)	0.087 ** (0.015)
Firm age	0.017 ** (0.002)	0.017 ** (0.002)	0.017 ** (0.002)
Rural area	0.114 ** (0.014)	0.111 ** (0.013)	0.110 ** (0.014)
Ag. supply chain	0.248 ** (0.067)	0.248 ** (0.067)	0.248 ** (0.067)
2010	-0.111 ** (0.007)	-0.110 ** (0.008)	-0.110 ** (0.007)
2012	-0.151 ** (0.010)	-0.154 ** (0.009)	-0.164 ** (0.009)
2014	-0.171 ** (0.012)	-0.170 ** (0.012)	-0.169 ** (0.012)
Number of observations	190,348	190,348	190,348
Number of instruments	45	45	45
AR(1), p-value	0.01	0.01	0.02
AR(2), p-value	0.63	0.52	0.43
Hansen J, p-value	0.36	0.30	0.28

Notes: Robust standard errors are reported in parentheses; level of significance \*\* 1%, \* 5%. A set of 1-digit SIC industry dummies with reference category food processing is included in all regressions.



Table 12.6. Regression results for the full SME sample, dynamic specifications

Dependent variable	Log of employment, ln(empl)		
Explanatory variables	(1)	(2)	(3)
Lagged ln(empl)	0.350 ** (0.013)	0.351 ** (0.013)	0.350 ** (0.013)
Total subsidy	0.009 ** (0.001)	-	-
Total subsidy (instrumented)	-	-	0.012 ** (0.002)
Pillar 1 share	0.020 ** (0.003)	-	0.022 ** (0.003)
Pillar 1 subsidy	-	0.006 ** (0.000)	-
Pillar 2 subsidy	-	0.003 ** (0.000)	-
Market demand	0.084 ** (0.006)	0.085 ** (0.007)	0.085 ** (0.006)
Demand variance	-0.277 ** (0.017)	-0.281 ** (0.018)	-0.289 ** (0.017)
Cost per employee	-0.180 ** (0.051)	-0.180 ** (0.050)	-0.179 ** (0.050)
Firm size	0.216 ** (0.026)	0.215 ** (0.027)	0.217 ** (0.027)
Firm age	0.019 ** (0.005)	0.019 ** (0.005)	0.018 ** (0.005)
Rural area	0.051 ** (0.011)	0.050 ** (0.012)	0.048 ** (0.012)
Ag. supply chain	0.031 (0.017)	0.029 (0.017)	0.028 (0.016)
2010	-0.069 ** (0.006)	-0.068 ** (0.006)	-0.068 ** (0.006)
2012	-0.068 ** (0.012)	-0.074 ** (0.011)	-0.076 ** (0.012)
2014	-0.076 ** (0.013)	-0.074 ** (0.013)	-0.074 ** (0.013)
Number of observations	174,731	174,731	174,731
Number of instruments	48	48	48
AR(1), p-value	0.00	0.00	0.00
AR(2), p-value	0.15	0.14	0.13
Hansen J, p-value	0.45	0.46	0.45

Notes: Robust standard errors are reported in parentheses; level of significance \*\* 1%, \* 5%. A set of 1-digit SIC industry dummies with reference category food processing is included in all regressions.

In the dynamic models, we can distinguish between short-run and long-run effects. The total short-run effect of CAP payments is 0.9% while the long-run effect is about 1.4%, similar to the static model estimate. The effects of Pillar 1 and Pillar 2 are estimated as 0.6% and 0.3% respectively, generally preserving the relative importance of the two Pillars from the static model analysis. Importantly, the static and dynamic analyses seem to produce comparable and consistent results. The finding that Pillar 1 has a stronger impact on employment than Pillar 2 suggests that, although in theory decoupled from farm output, Pillar 1 payments do in fact affect the supply and demand linkages between farms and firms. Furthermore, the Pillar 1 and Pillar 2 payments appear to have heterogeneous effects on non-farm employment; these deserve further investigation.

Estimation of interaction terms suggests that the long-run impact of CAP payments on employment is relatively concentrated in the rural SMEs and within the agricultural supply chain, with the CAP payments bringing extra employment mostly in rural areas relative to urban areas. Regarding the agricultural supply chain employment, the interaction term suggests that again CAP payments play a very important role for job creation in the industries up- and downstream of agriculture, with the effect of Pillar 1 remaining larger than Pillar 2.

Considering that rural SMEs employed over 2 million people in 2015 [ONS, 2015], completely removing the CAP payments *ceteris paribus* would lead to losing around 45,000 rural jobs as the negative impact on the rural labour market would be economically (and socially) significant. Interestingly, the contribution of Pillar 2 to rural employment is higher (1.2%) than that of Pillar 1 (1.0%). Considering that the Pillar 2 payments are just under a half of the Pillar 1 payments, the difference is even more pronounced per € spent.

The contribution to employment in the agricultural supply chain of Pillar 1 is about 17% and of Pillar 2 about 14%. Clearly, per € spent, the contribution of Pillar 2 is again higher than Pillar 1. The fact that CAP payments show higher overall employment maintenance in the agricultural supply chain compared to the rest of the economy suggests that farmers' spending on production and consumption activities, along the farm supply chain, generates spill-overs that are important for non-farm employment.

## **12.6 Conclusions**

The market-distorting effects of the CAP have been subject to many criticisms by economists. However, this study has found net positive effects of CAP payments on non-farm UK employment, with relatively stronger effects per € spent of Pillar 2 rural development payments than Pillar 1 direct payments, especially in rural areas and within the agricultural supply chain. The magnitude of the overall estimated effect (elasticity) is 1.4%, which is relatively small but of economic significance. The UK has one of the more flexible and efficient labour markets in Europe, and one characterised by relatively low unemployment during the period of analysis. Thus these results could be considered as towards the lower bound of CAP employment effects in the EU non-farm economy.

Under an extreme policy scenario in which the CAP payments were completely removed without compensating/countervailing measures (and neutral tax policy), the impact on UK employment would amount to about 220,000 jobs lost. Furthermore, the impact in rural areas would be more than two times stronger, in percentage terms, which equates to about 45,000 jobs lost. In the industries comprising the agricultural supply chain, the effect is also substantial, at about a 32% total reduction in employment.

The results suggest that the removal of CAP payments could have rural development implications beyond employment lost, e.g. higher rural unemployment and a possible outflow of population from rural areas. Furthermore, if the extra jobs at firm level supported by the CAP were removed, some firms might become unviable and exit in the long run.

These results should not be interpreted as an attempt to justify the role of CAP subsidies as a job creation policy across the EU because there might be other non-agricultural, labour market policies which could be more efficient in increasing or sustaining employment opportunities in non-farm enterprises. Nevertheless, a broad approach is necessary in analysing the implications of the CAP, as its impact is felt well beyond agriculture.

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