Agricultural Finance Review

Prospects for agricultural insurance in Europe

Miranda P.M. Meuwissen, Yann de Mey, Marcel van Asseldonk,

Prospects for agricultural insurance in Europe

1. Introduction

The agricultural insurance landscape in the European Union (EU) is diverse. Member states are facing different types of risks, and also the cultural and political environment varies between member states. In addition, the so-called risk management toolbox of the common agricultural policy (CAP) authorises public support for different tools including insurance, mutual funds and income stabilisation tools (European Commission, 2016a). Governments' attitudes towards disaster payments also differ between member states, thereby likely influencing the farmers' willingness to pay for insurance and consequently the development of (private) insurance schemes. For instance, while France and Romania provided substantial amounts of disaster payments to farmers after major floods (European Commission, 2017a), the Dutch Government withdrew from such payments in 2017 for any losses which could be insured on public-private insurance markets (Van Asseldonk *et al.*, 2018).

In 2018, the risk management toolbox of the CAP was further extended. It now authorises member states to increase support rates for crop and livestock insurance to 70 per cent of premiums and to annually inject payments into mutual funds (European Commission, 2017b). Such extensions seem to indicate that the EU has chosen for a public-private partnership approach for agricultural insurance comparable to e.g. the US crop insurance programme. Such public-private partnerships have been advocated to extract at least some of the insured's willingness to pay to co-finance protection, which would otherwise fall within the sole responsibility of the public sector in case of disaster payments (Van Asseldonk *et al.*, 2018). Moreover, public-private partnerships for insurance could provide for a fairer way of allocating public funds to agriculture compared to the current system in which most of the budget is used for direct payments, unequally distributed among members states and sectors (European Commission, 2017c).

Yet, despite the fact that the public-private partnership approach for agricultural insurance is currently being explored in the risk management toolbox of the CAP, member states have much flexibility with regard to its utilisation. For instance, they can decide not to utilise the instruments because they prioritise other rural development goals, such as greening, or because conditions of the risk management toolbox are perceived as too stringent (Meuwissen *et al.*, 2013). Also, concerns with regard to market distortions can play a role. Buckwell *et al.* (2017, p. 9) argued that risk mitigation should be mainly based on private risk management measures. They state that public support to such measures would have to be only on a temporary basis, "e.g. to help meet the costs of producer organisations or the set-up of private insurance markets where these are underdeveloped".

Within this heterogeneous landscape, the aim of this paper is to provide an overview of the state of play of agricultural insurance in the EU[1] and to prioritise the research agenda with regard to European agricultural insurance. The state of play builds on literature and eight case studies (papers in this issue). For the research agenda, we elaborate on the case studies and use insights obtained from a group discussion with six key stakeholders equally representing public and private parties, all with EU-wide experience on commercial and supported agricultural insurance schemes.

2. A brief introduction of the EU case studies

The case studies in this special issue represent different geographical regions in the EU, i.e. two case studies are from the north-western region (the Netherlands; Van Asseldonk *et al.*, 2018;

Agricultural Finance Review
Vol. 78 No. 2, 2018
pp. 174-182

0002-1466
DOI 10.1108/AFR-04-2018-093

and Germany; Schulte and Musshof, 2018), two from the eastern region, i.e. Poland (Wąs and Kobus, 2018) and Hungary (Zubor-Nemes *et al.*, 2018), and three are from the mid- and southern part of the EU, including Austria (Url *et al.*, 2018) and Italy (Santeramo *et al.*, 2018; Trestini *et al.*, 2018).

EU regions differ with regard to multiple issues, including agricultural risks, farm structure and historical context. For instance, in the north-western region the Netherlands and Germany have a relatively long history in the EU, face fairly high rain and storm intensities (Le Den *et al.*, 2017), and the liberal character of governments induces reluctance to support agricultural insurance (at least before introduction of the risk management toolbox). Poland and Hungary are members only since 2004 (compared to 1952 for the Netherlands and Germany), and, prior to joining the EU, provided compulsory insurance under government control. Also, they face higher animal disease risks due to proximity of areas in which a number of notifiable diseases are endemic, such as African swine fever (Bosch *et al.*, 2017). Italy is one of the six founding fathers of the EU which started as the European Coal and Steel Community in 1952 while Austria is member since 1995. With regard to climatic risks, southern member states are relatively more prone to droughts and heat waves (Le Den *et al.*, 2017; European Commission, 2017a), likely explaining their long history of compensating farmers against losses due to natural disasters (European Commission, 2017a). More recently, southern member states are also facing outbreaks of plant diseases, such as the olive tree disease (Abbott, 2017) and brown bug pest in Italy (Haye and Weber, 2017).

Case studies mostly deal with crop insurance for arable crops. They elaborate on the effect of previous loss experience on adoption of insurance (Wąs and Kobus, 2018; Santeramo *et al.*, 2018), implications of insurance for technical efficiency (Zubor-Nemes *et al.*, 2018), and crowding out of private market insurance by supported insurance schemes (Van Asseldonk *et al.*, 2018). Url *et al.* (2018) and von Negenborn *et al.* (2018) explore margin insurance and weather index insurance, respectively. The paper by von Negenborn *et al.* (2018) is on weather index insurance in Madagascar (Africa). It serves as an illustration on index insurance, for which only few examples exist in Europe so far. Two papers are on livestock insurance. They cover feasibility of price insurance (Schulte and Musshof, 2018) and the potential of an income stabilisation tool (Trestini *et al.*, 2018).

3. European farming at a glance

Agricultural insurance in the EU can only be discussed against an appropriate backdrop of the European agricultural sector and policy sphere. Table I summarises some key structural statistics on European agriculture based on the most recent farm structure survey (European Commission, 2014) and Farm Accountancy Data Network data (European Commission, 2016b) for the year 2013.

The EU-28 has roughly 11 million farms, covers almost 175 million hectares (about 40 per cent of total land area) with an average farm size of only 16 hectares. However, these numbers vary greatly between member states. In terms of number of farms, Romania (33.5 per cent), Poland (13.2 per cent) and Italy (9.3 per cent) have the most registered farms, whereas France and Spain have the largest share of the EU-28's agricultural land, with 15.9 and 13.3 per cent, respectively[2]. The largest farms are mostly located in the Czech Republic and the UK with average farm sizes of 133 and 94 hectares, respectively; the smallest average farm sizes are recorded in Romania (3.6 hectares), Cyprus (3.1 hectares) and Malta (1.2 hectares). Across the EU-28, the number of farms has consistently decreased over time, utilised agricultural area has condensed slightly whereas average farm size has increased steadily (European Commission, 2014).

In terms of employment opportunities, the total EU-28 farm labour force was the equivalent of 9.5 million annual working units in 2013. The farm labour force fell in nearly

Table I. Key structural statistics on European agriculture in 2013

Variable	Unit	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU
		Member states													
Number of farms[a]	103 #	140.4	37.8	254.4	35.4	26.3	285.0	38.8	19.2	709.5	965.0	54.4	472.2	157.5	491.3
	%	1.3	0.3	2.3	0.3	0.2	2.6	0.4	0.2	6.5	8.9	0.5	4.4	1.5	4.5
Utilised agricultural area (UAA)[a]	10^6 Ha	2.7	1.3	4.7	0.1	3.5	16.7	2.6	1.0	4.9	23.3	2.3	27.7	1.6	4.7
	%	1.6	0.7	2.7	0.1	2.0	9.6	1.5	0.5	2.8	13.3	1.3	15.9	0.9	2.7
UAA per farm[a]	Ha	19.4	34.6	18.3	3.1	133.0	58.6	67.5	49.9	6.8	24.1	42.0	58.7	10.0	9.5
Standard output[a]	10^6 EUR	5.7	8.4	3.3	0.5	4.4	46.3	9.6	0.7	8.1	36.0	3.4	56.9	2.0	5.6
	%	1.7	2.5	1.0	0.1	1.3	14.0	2.9	0.2	2.4	10.9	1.0	17.2	0.6	1.7
Labour force in annual working units (AWU)[a]	1,000 AWU	111.2	56.7	320.2	16.6	105.1	522.7	54.5	22.1	463.9	813.6	57.6	724.7	175.1	433.7
	%	1.2	0.6	3.4	0.2	1.1	5.5	0.6	0.2	4.9	8.6	0.6	7.6	1.8	4.6
Farm net value added (FNVA)[b]	1,000 EUR	30.0	86.6	19.5	15.9	138.6	95.8	162.0	32.2	12.8	28.6	31.4	62.7	7.2	28.8
FNA/AWU[b]	1,000 EUR/AWU	20.9	41.0	7.9	11.3	20.8	42.8	89.3	16.2	11.8	21.2	24.0	30.7	3.9	18.5

Variable	Unit	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK	EU-28
		Member states														
Number of farms[a]	103 #	139.6	1,010.3	171.8	2.1	81.8	9.4	67.5	1,429.0	264.4	3,629.7	67.2	72.4	23.6	185.2	10,841.0
	%	1.3	9.3	1.6	0.0	0.8	0.1	0.6	13.2	2.4	33.5	0.6	0.7	0.2	1.7	100.0
Utilised agricultural area (UAA)[a]	106 Ha	5.0	12.1	2.9	0.1	1.9	0.0	1.8	14.4	3.6	13.1	3.0	0.5	1.9	17.3	174.6
	%	2.8	6.9	1.6	0.1	1.1	0.0	1.1	8.3	2.1	7.5	1.7	0.3	1.1	9.9	100.0
UAA per farm[a]	Ha	35.5	12.0	16.7	63.0	23.0	1.2	27.4	10.1	13.8	3.6	45.2	6.7	80.7	93.6	16.1
Standard output[a]	106 EUR	5.0	43.8	1.9	0.3	1.0	0.1	20.5	21.8	4.5	12.0	4.7	1.0	1.8	21.8	331.0
	%	1.5	13.2	0.6	0.1	0.3	0.0	6.2	6.6	1.4	3.6	1.4	0.3	0.5	6.6	100.0
Labour force in annual working units (AWU)[a]	1,000 AWU	163.7	816.9	144.8	3.5	82.1	4.5	153.3	1,918.6	323.5	1,552.6	59.3	82.5	50.6	275.4	9,508.6
	%	1.7	8.6	1.5	0.0	0.9	0.0	1.6	20.2	3.4	16.3	0.6	0.9	0.5	2.9	100.0
Farm net value added (FNVA)[b]	1,000 EUR	28.3	26.7	16.4	65.3	16.7	12.9	147.9	12.0	15.8	7.3	52.6	5.9	176.1	83.8	27.9
FNA/AWU[b]	1,000 EUR/AWU	23.5	21.5	9.0	37.0	8.2	9.1	54.8	6.9	10.0	5.9	36.6	4.2	11.4	38.2	18.1

Source: [a]Eurostat, online data code: ef_kvaareg, http://ec.europa.eu/eurostat; [b]DG AGRI EU-FADN, http://ec.europa.eu/agriculture/rica/database/database_en.cfm

all EU-28 member states over 2007-2013, with the notable exceptions of Ireland, Hungary and Malta (European Commission, 2014). The largest employment in the agricultural sector is recorded in Poland and Romania, with both member states combined providing more than one-third of total EU-28 annual working units.

Income also developed in a downward fashion as average farm net value added per annual working unit (FNVA/AWU[3]) decreased by 4.6 per cent to €18,100 in 2013. Underlying this overall drop in income are substantial differences across member states, regions and farm typologies. Farms in Denmark, North-Western Germany and Northern France generated the highest FNVA/AWU, whereas the lowest FNVA/AWU are recorded in the ten member states that joined the EU after 2004. Typology-wise, EU farms specialising in intensive livestock production (e.g. pigs and poultry), field crops, wine, milk and horticulture obtained the highest FNVA/AWU, while farms specialising in other permanent crops, grazing livestock and mixed activities generated below-average incomes.

Direct payments play an important role in the overall income development, i.e. they accounted for roughly one-third of the FNVA in the EU-28 on average, with the highest proportions in Finland (79 per cent) and Slovakia (77 per cent) and the lowest in the Netherlands (below 10 per cent). Farmers have to apply for aid every year in order to receive direct payments, declaring every parcel of their farm holding. The average amount of direct payments received in 2013 was €8,360 per farm. Large discrepancies exist between farm typologies once again due to the historical focus of the CAP. Direct payments are also frequently cited as having helped to even out the variability in farm income (European Commission, 2016b). This effect is achieved by acting as a cushion against volatility, i.e. direct payments are not linked to specific risks nor did they have risk reduction as their primary stated objective (European Commission, 2017d).

Comprehensive and recent estimates of EU farm income volatility – farm-level income variability over time – are difficult to obtain, as most studies focus on the level of income or on selected EU member states. The ample available evidence, however, points out that similar to the divergence in farm income levels, farm income volatility is heterogeneous across farm typologies, EU member states and farm sizes: Meuwissen *et al.* (2008) report average EU-15 coefficients of variation (CV) of family farm income over the period 1996-2004 of about 35 per cent, ranging from 28 per cent for the dairy sector to 53 per cent for intensive livestock; de Mey *et al.* (2014) similarly list an overall CV of net operating income of 33 per cent for the EU-15 over the period 1995-2008 with variation across member states from 26 per cent in Belgium to 38 per cent in Spain, Portugal and Italy; Hill and Bradley (2015) report that the CV of FNVA/AWU of the EU-27 is much greater in the smallest size class of farms (23 per cent for farms with €2,000 $\leqslant$ FNVA/AWU $<$ €8,000) compared to 7 per cent for farms with €8,000 $\leqslant$ FNVA/AWU $<$ €25,000 and 14 per cent for farms with FNVA/AWU $\geqslant$ €500,000)[4].

Over the past 30 years, the CAP has decreased from covering around 75 per cent of the overall EU budget to about 40 per cent; also reducing spending per farmer. Yet still, EU expenditures for the CAP amount to about €59 billion per year.

4. The role of agricultural insurance in the CAP

In some countries around the world (e.g. USA and Canada), crop insurance and to a smaller extent livestock insurance is the primary public policy mechanism for reducing farmers' exposure to yield and/or revenue risk (Mahul and Stutley, 2010). Globally, the USA has the largest market for multiple-peril crop insurance (MPCI) followed by China (Barnett, 2014). In Europe, the policy importance of agricultural insurance is different for several reasons. First, the risk management toolbox is part of the "second pillar" of the CAP, which has substantially less budget than the "first pillar". The latter focusses on direct payments and

market measures. Direct payments currently account for over 70 per cent of CAP expenditures (Buckwell *et al.*, 2017). Moreover, in the "second pillar" the risk management toolbox competes with other rural development objectives, i.e. "promoting food chain organisation, animal welfare and risk management in agriculture" is among policy goals such as the greening of agricultural and forestry sectors. Based on the principle of subsidiarity, member states have room to manoeuvre on how to allocate CAP funds, which enables them to tune the EU budget to local context and risks (European Commission, 2017c). Budget allocated towards risk management therefore differs across member states depending on e.g. local lobbying for direct payments, (political) room for *ex post* disaster payments, and perceived urgency of the other rural development issues.

Second, risk management has only been explicitly included in the CAP fairly recently, i.e. for the first time in 2009 (European Commission, 2017a). In the period 2009/2013, member states were allowed to support insurance premiums via the direct payments "envelopes" up to 10 per cent. With the 2013 CAP reform, the risk management toolbox has become a part of the "second pillar" for the period 2014/2020 with support being allowed for animal and plant insurance (Article 37), mutual funds (Article 38) and income stabilisation tools (article 39) in the form of mutual funds (European Commission, 2016a). Insurance and mutual funds under Articles 37 and 38, respectively may cover for loss caused by an adverse climatic event, or by an animal or plant disease, or a pest infestation, or an environmental incident. Mutual funds are based on the establishment of financial reserves, built up through participants' contributions (often sector-specific), which can be withdrawn by the members when losses occur, according to predefined rules (Meuwissen *et al.*, 2013).

Initially, the CAP 2014/2020 stated that eligible insurance products must be constructed so as to only compensate losses exceeding 30 per cent (i.e. threshold level) where the expected yield or revenue is calculated as the average over the previous three-year period or an Olympic average (excluding the high and low year) over the previous five-year period. Also support to premium rates was set at a maximum level of 65 per cent. However, as of 2018, loss thresholds are reduced to 20 per cent and the allowed support rate increased to 70 per cent (European Commission, 2017b). In addition, annual payments into mutual funds and their initial capital stock became eligible, as well as extended possibilities to use indexes.

5. State of play of agricultural insurance in Europe

In the EU, crop insurance is much more widely available than the livestock insurance. Regarding crop insurance covering climatic risks, the largest MPCI programs are in France, Spain and Italy (Bardaji *et al.*, 2016; Santeramo *et al.*, 2018), while Germany has a mature single-peril hail insurance market for crops (Reyes *et al.*, 2017). Variation in the adoption of crop insurance across EU member states can be partly explained by cultural and historic differences. For instance, in Hungary and Poland, crop insurance is partly obligatory, as described by Zubor-Nemes *et al.* (2018) and Wąs and Kobus (2018), respectively. Hungarian farmers are obliged to buy insurance if their farm is larger than 10 ha (arable farms) or 5 ha (vegetable farms). In Poland, farmers have to buy insurance at least for half of their utilised agricultural area if they are to receive direct payments. In the Netherlands, commercial hail insurance is marketed next to supported MPCI (Van Asseldonk *et al.*, 2018), whereby MPCI schemes are offered mostly through mutual funds (Meuwissen *et al.*, 2013). With regard to index-based insurance, only a few products exist. One prominent example of index-based insurance is marketed in Austria, in the form of a drought index targeted to some specific crops and grassland (Url *et al.*, 2018). Crop insurance covering notifiable phytosanitary risks (i.e. pests and diseases) is not widely available in the EU. Some member states implemented phytosanitary insurance that is offered as complement to climatic coverage, i.e. in Denmark, Germany, Hungary, Italy, the Netherlands and Spain (European Commission, 2017a).

With regard to livestock insurance covering diseases, coverage is available in most EU member states, yet availability and adoption rates differ across member states and sectors. Germany has high adoption rates for the main livestock sectors with the insurance being entirely private-based, i.e. without public support. Spain is another example of high uptake, with public support provided within a voluntary setting (Bardaji *et al.*, 2016). In the Netherlands, breeding and rearing farms of the broiler chain can insure poultry diseases through a private-based mutual fund (Meuwissen *et al.*, 2013).

With regard to price risk, insurance plays a limited role in Europe. A private company in the UK launched a revenue insurance scheme for cereals in 1998, based upon yield statistics from the Home-Grown Cereals Authority and prices of LIFFE commodity futures (Meuwissen *et al.*, 2003). However, since the uptake was minimal, the scheme was cancelled in the subsequent season (Bielza Diaz-Caneja *et al.*, 2008). Early in 2018, a UK-based company again launched a price insurance scheme (Stable, 2018). Market interest and uptake are not yet known.

Regarding margin risk, private-based pilots for fattening pigs were offered in the Netherlands and Belgium (based on combined hedging of wheat and pork on the French Matif and German Eurex futures markets, respectively), and for cereals in the Champagne region of France. The latter was based on revenues minus nitrogen cost, measured as cereal price at sowing and the annual regional average price for nitrogen respectively. The hedging pilot for the pig sector was discontinued after two years (2014/2015) due to low liquidity on the pork market. Also, Dutch and Belgium pig chain actors perceived the hedging instrument as rather complicated. The French margin insurance has not received much interest from the market as well. Yet, the paper by Url *et al.* (2018) shows that various types of margin insurance are being investigated.

In total, 12 out of 28 member states have programmed instruments of the risk management toolbox for 2014/2020, with a total public expenditure of €2.7 billion targeting 636,667 farm holdings. A large part of this is programmed under the Italian, French and Romanian rural development programs, mostly allocated to the support of insurance premiums (€2.2 billion) (Bardaji *et al.*, 2016). With regard to the income stabilisation tools authorised under the risk management toolbox, little activity has taken place. Income stabilisation tools were programmed in a number of member states (Hungary, Italy and the region of Castilla y Leon in Spain), but they have not actually been implemented to date (European Commission, 2017a).

6. Prospects for agricultural insurance in Europe: a research agenda

This paper along with the papers in this special issue show that agricultural insurance has only recently been incorporated as a policy instrument in the CAP, with its role slightly increasing over the past nine years. We also illustrate the wide variety across member states with regard to types of insurance, uptake and degree of public support. Topics for further research emerging from this special issue include the following:

(1) improve understanding on the "overall risk management portfolio" at farm level, including farmers' switching behaviour between contracts (e.g. margin insurance and price contracts) and the role of advisory services (Santeramo *et al.*, 2018; Trestini *et al.*, 2018; Wąs and Kobus, 2018);

(2) assess "willingness to pay for price, revenue, margin and income insurance" (Schulte and Musshof, 2018; Url *et al.*, 2018);

(3) analyse the degree to which various (composite) "indices" are an accurate measure of farm or sector risk (von Negenborn *et al.*, 2018);

(4) improve knowledge on the "mechanisms affecting market distortions" with regard to agricultural insurance (Van Asseldonk *et al.*, 2018); and

(5) assess the "impact of insurance on farm efficiency" (Zubor-Nemes *et al.*, 2018).

Next to the papers in this special issue, a group discussion with six key stakeholders was organised to identify the topics for further research. More specifically, stakeholders were asked to articulate five research topics perceived as fundamentally contributing to the feasibility of agricultural insurance in Europe in the future. Interestingly, stakeholders did not prioritise the topics dealing with the fine-tuning of the existing insurance schemes or instruments of the CAP. Instead, public and private stakeholders agreed on the importance to consider the role of other chain actors beyond the farm, to understand much better the opportunities of risk prevention and to design insurance concepts for agricultural sectors currently underrepresented in the insurance market, such as the livestock sector. These issues are captured by the following research topics:

(1) Analyse degree to which various "incentive mechanisms enable improved risk prevention". Mechanisms should address the farm level and the chain level as a whole, thereby considering a variety of chain configurations (e.g. short supply chains, and export-oriented chains) and farm structures (e.g. family farms and corporate farms with hired labour force).

(2) Improve knowledge on the exploitation of "smart farming technology and data" to reduce transaction costs of underwriting and loss adjustment, including an assessment of the impact of smart technology on the risk level itself.

(3) Identify whether behavioural biases exist among farmers (and other chain actors) to engage in joint activities such as mutual funds, including analyses on reconnecting and feedback mechanisms affecting solidarity.

(4) Assess opportunities to improve the feasibility of "insurance or mutual funds for livestock farms". Currently, livestock insurance is under pressure due to recent feed and food safety crises and diminishing social acceptance of intensive livestock farms.

(5) Analyse the feasibility of a fundamentally new type of insurance, which is not based on indemnifying losses, but, instead, on "insuring the continuity of a farm".

This special issue illustrates that EU public and private sectors are eager to innovate on agricultural insurance, also beyond the risk management toolbox of the CAP; the ten research topics presented above underline that various challenges still need to be scrutinised in order to fulfil these prospects.

Notes

1. Throughout the paper we use the terms "Europe" and "EU" interchangeably, while the EU in practice does not include all European countries, i.e. the EU includes 28 member states: Austria (AT), Belgium (BE), Bulgaria (BG), Cyprus (CY), Czech Republic (CZ), Germany (DE), Denmark (DK), Estonia (EE), Greece (EL), Spain (ES), Finland (FI), France (FR), Croatia (HR), Hungary (HU), Ireland (IE), Italy (IT), Lithuania (LT), Luxembourg (LU), Latvia (LV), Malta (MT), the Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Sweden (SE), Slovenia (SI), Slovakia (SK), and UK. Candidate countries are Albania, Montenegro, the former Yugoslav Republic of Macedonia, Serbia, and Turkey. At the time of writing, the UK is scheduled to leave the EU.

2. Instead of expressing the farm size based on agricultural area, economic size can be used alternatively by referencing to the standard output – the value of agricultural output at farm-gate prices. Using this measure paints a similar picture (Table I).

3. FNVA/AWU represents the return to the external/family-owned fixed factors of production (capital, labour and land) expressed per annual working unit in order to better represent the productivity of the agricultural workforce across diverse farm typologies.
4. The coefficient of variation (CV) is defined as the standard deviation divided by the mean. Meuwissen *et al.* (2008) report the average CV of farm-level family farm income over the period 1996-2004. Hill and Bradley (2015) analogously report the average CV of FNV/AWU calculated over the period 2004-2012. de Mey *et al.* (2014) take a slightly different approach by calculating the CV of net operating income over a 3-year rolling window and then reporting the averages over the period 1995-2008.

Miranda P.M. Meuwissen, Yann de Mey and Marcel van Asseldonk

References

Abbott, A. (2017), "Italy rebuked for failure to prevent olive-tree tragedy", *Nature*, Vol. 546 No. 7657, pp. 193-194.

Bardaji, I., Garrido, A., Blanco, I., Felis, A., Sumpsi, J.M., García-Azcárate, T., Enjolras, G. and Capitanio, F. (2016), "Research for agri committee; state of play of risk management tools implemented by member states during the period 2014-2020: national and European frameworks", available at: www.europarl.europa.eu/RegData/etudes/STUD/2016/573415/IPOL_STU(2016)573415_EN.pdf

Barnett, B. (2014), "Multiple-peril crop insurance: successes and challenges", *Agricultural Finance Review*, Vol. 74 No. 2, pp. 200-216.

Bielza Diaz-Caneja, M., Conte, C.G., Dittmann, C., Gallego Pinilla, F.J. and Stroblmair, J. (2008), *Agricultural Insurance Schemes*, Scientific and Technical Studies, European Commission, Joint Research Centre, available at: www.jrc.ec.europa.eu

Bosch, J., Rodríguez, A., Iglesias, I., Muñoz, M.J., Jurado, C., Sánchez-Vizcaíno, J.M. and de la Torre, A. (2017), "Update on the risk of introduction of African swine fever by wild boar into disease-free European Union countries", *Transboundary Emerging Diseases*, Vol. 64, pp. 1424-1432.

Buckwell, A., Matthews, A., Baldock, D. and Mathijs, E. (2017), "CAP: thinking out of the box. Further modernisation of the CAP – why, what and how?", RISE Foundation, Brussels.

de Mey, Y., Van Winsen, F., Wauters, E., Vancauteren, M., Lauwers, L. and Van Passel, S. (2014), "Farm-level evidence on risk balancing behavior in the EU-15", *Agricultural Finance Review*, Vol. 74 No. 1, pp. 17-37.

European Commission (2014), "Agriculture, forestry and fishery statistics", 2014 ed., Eurostat, Publications Office of the European Union, 249pp.

European Commission (2016a), "The common agricultural policy after 2013", available at: http://ec.europa.eu/agriculture/cap-post-2013/legislation/index_en.htm

European Commission (2016b), *EU Farm Economics Overview based on 2013 FADN Data*, Publications Office of the European Union, 82pp.

European Commission (2017a), "Risk management schemes in EU agriculture; dealing with risk and volatility", available at: https://ec.europa.eu/agriculture/sites/agriculture/files/markets-and-prices/market-briefs/pdf/12_en.pdf

European Commission (2017b), "Summary of main changes introduced to the four basic regulations of the CAP through the Omnibus regulation", available at: https://ec.europa.eu/agriculture/cap-overview/summary-changes-omnibus_en.pdf

European Commission (2017c), "Future of food and farming", Communication of European Commission, available at: https://ec.europa.eu/agriculture/sites/agriculture/files/future-of-cap/future_of_food_and_farming_communication_en.pdf

European Commission (2017d), "Modernising & simplifying the CAP. Economic challenges facing EU agriculture", available at: https://ec.europa.eu/agriculture/sites/-agriculture/files/consultations/cap-modernising/eco_background_final_en.pdf

Haye, T. and Weber, D.C. (2017), "Special issue on the brown marmorated stink bug, Halyomorpha halys: an emerging pest of global concern", *Journal Pest Science*, Vol. 90, p. 987.

Hill, B. and Bradley, B.D. (2015), "Comparison of farmers' incomes in the EU member states", report for European Parliament, DG Internal Policies, available at: www.europarl.europa.eu/RegData/etudes/STUD/2015/540374/IPOL_STU%282015%29540374_EN.pdf

Le Den, X., Persson, M., Benoist, A., Hudson, P., De Ruiter, M., De Ruig, L. and Kuik, O. (2017), "Insurance of weather and climate-related disaster risk: inventory and analysis of mechanisms to support damage prevention in the EU", Directorate-General for Climate Action.

Mahul, O. and Stutley, C.J. (2010), *Government Support to Agricultural Insurance: Challenges and Options for Developing Countries*, World Bank, Washington, DC, available at: http://publications.worldbank.org

Meuwissen, M.P.M., Assefa, T. and Van Asseldonk, M.A.P.M. (2013), "Supporting insurance in European agriculture: experience of mutuals in the Netherlands", *EuroChoices*, Vol. 12 No. 3, pp. 10-16.

Meuwissen, M.P.M., Huirne, R.B.M. and Skees, J.R. (2003), "Income insurance in European agriculture", *EuroChoices*, Vol. 2 No. 1, pp. 12-17.

Meuwissen, M.P.M., van Asseldonk, M.A.P.M. and Huirne, R.B.M. (2008), *Income Stabilisation in European Agriculture*, Wageningen Academic Publishers, Wageningen, 224pp.

Reyes, C.M., Agbon, A.D., Mina, C.D. and Gloria, R.A.B. (2017), "Agricultural insurance program: lessons from different country experiences", Philippine Institute for Development Studies (PIDS) Discussion Paper Series No. 2017-02, available at: www.econstor.eu/bitstream/10419/173579/1/pidsdps1702.pdf

Santeramo, F.G. (2018), "Imperfect information and participation in insurance markets: evidence from Italy", *Agricultural Finance Review*, Vol. 78 No. 2, pp. 193-194.

Stable (2018), "Price insurance for family farms", available at: www.stableprice.com

Schulte, H. and Musshoff, O. (2018), "Insurance prospects after the European dairy quota abolition", *Agricultural Finance Review*, Vol. 78 No. 2, pp. 223-232.

Trestini, S., Szathvary, S., Pomarici, E. and Boatto, V. (2018), "Assessing the risk profile of dairy farms: application of the income stabilisation tool in Italy", *Agricultural Finance Review*, Vol. 78 No. 2, pp. 195-208.

Url, T., Sinabell, F. and Heinschink, K. (2018), "Addressing basis risk in agricultural margin insurances – the case of wheat production in Austria", *Agricultural Finance Review*, Vol. 78 No. 2, pp. 233-245.

van Asseldonk, M. (2018), "Does subsidized MPCI crowds out traditional market-based hail insurance in the Netherlands?", *Agricultural Finance Review*, Vol. 78 No. 2, pp. 262-274.

von Negenborn, F., Weber, R. and Musshoff, O. (2018), "Explaining weather related credit risk with evapotranspiration and precipitation indices", *Agricultural Finance Review*, Vol. 78 No. 2, pp. 246-261.

Wąs, A. and Kobus, P. (2018), "Factors differentiating the level of crop insurance at Polish farms", *Agricultural Finance Review*, Vol. 78 No. 2, pp. 209-222.

Zubor-Nemes, A., Fogarasi, J. and Kemény, G. (2018), "Farmers' responses to the changes in Hungarian agricultural insurance system", *Agricultural Finance Review*, Vol. 78 No. 2, pp. 275-288.

Further reading

European Commission (2017e), *Agriculture. A Partnership Between Europe and Farmers*, Publications Office of the European Union, 16pp.

OECD (2009), *Managing Risk in Agriculture: A Holistic Approach*, OECD, Paris.