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Mutual insurance companies as a tool for farmer income stabilization: performance and prospects in the CAP

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Abstract

The European Commission is currently considering the introduction of income stabilisation tools as a means of stabilising farmers' incomes throughout the European Union. One of the options is to use mutual insurance schemes. The objectives of this paper are to analyse the performance of mutual insurance companies currently operating in The Netherlands and to discuss the pros and cons of mutual insurance schemes as tools for farmer income stabilization. Data was collected through interviews with the companies' experts and from the companies' websites. We conclude that, even though provision of net income and revenue insurance goes beyond their expertise, mutual insurance companies are effective in insuring farmers against income fluctuations arising from specific agricultural production risks. In order to encourage solidarity among farmers, policy support that stimulates the development of local mutual insurance companies can be more beneficial than support aimed at companies operating in more than one European country.

Key words: Mutual insurance companies, farmer income stabilization, agricultural production risks, European Union

JEL classification: Q1

1. INTRODUCTION

For many years, a number of reasons have contributed to the income variability of European farmers. Some of the reasons include yield variability due to weather fluctuations, price variability because of trade liberalization, the move from price support to decoupled payments, and outbreaks of epidemic animal diseases (European comission, 2005; Cafiero et al., 2007; European commission, 2011; Meuwissen et al., 2011). Measures to stabilize farmers' income have been and are being taken at farmer, member state and European Union (EU) levels. Support funds in case of natural disaster and subsidies to crop insurance can be mentioned at State level. At an EU-wide level, one can mention price supports, income transfers (such as the Single Payment Scheme) and European solidarity funds in case of disasters (European commission, 2005; Cafiero et al., 2007). However, such income stabilization supports at State and EU levels and particularly the ad hoc measures provided during catastrophic events are not without cost. They impose a large burden on taxpayers and government budgets. In March 9, 2005, one of the options advanced by the European commission to completely and partially

replace the community and member states' ad hoc measures was the supporting of mutual funds (Cafiero, 2007). Further exploration of mutual insurance companies was also one of the options suggested in the ideas for an EU-wide income stabilization tool for farmers in the summer of 2010 (Meuwissen et al., 2011).

According to Cafiero (2007, p.433), 'Traditional mutual funds as insurance tools are based on the establishment of financial reserves, built through participants' contributions, which can be called upon by members in the event of severe income losses, according to predefined rules'. Mutual insurance funds, which are regionally based, can enlarge and evolve in time to become mutual insurance companies similar to large insurance companies (Bielza et al., 2007). Mutual insurance companies have, however, no profit objectives and are owned by the policy holder farmers (Bielza et al., 2007). The EU's interest on mutual funds as insurance tools or on mutual insurance companies emanates from the fact that the mutual structure of these organizations increases the insurability of losses due to weather fluctuations, and animal and plant diseases. That is, the mutual nature of the agreements among farmers reduces the level of morale hazard and the shared knowledge of individual exposure to risk of participating farmers reduces the probability of adverse selection (Cafiero, 2007). In addition, the fact that farmers finance their own losses resulting from natural disasters and diseases strongly reduces the burden of taxpayers and governments. Therefore, mutual insurance companies, owned and managed by few farmers insuring against specific agricultural risks can be used as a tool to reduce farmers' income fluctuations emanating from such specific risks. However, financial capability of mutual insurance schemes to stabilize farmers' income can be threatened by the systemic nature of catastrophic events such as widespread flood and drought (Meuwissen et al., 1999; Cafiero, 2007).

Mutual insurance arrangements are widely used in developing countries. The study by Platteau (1997) for instance has shown that traditional rural communities tend to engage in informal mutual insurance arrangements where social control plays the role of contract enforcement due to the absence of formal legal contracts. Mutual insurance is particularly common in the health sector among rural communities in developing countries. This is evidenced by studies such as the one by Chankova et al (2008) on community based health insurance and Dror and Jacquier (1999) on micro insurances. In Europe, the study by Cabrales et al (2003) provides the case of a fire mutual insurance organization called La Crema found in the principality of Andorra founded by 102 farmers in 1882. As shown in this paper, the fact that members get compensation based on self-reported value of their properties (instead of an independently assessed value) is a strong evidence of the solidarity and trust that exists in mutual insurance organizations. Even though the concept of mutuality is widely discussed in the insurance literature, it is mostly in relation to risks besides agricultural production risks (due to weather fluctuations, animal and plant diseases). To the author's knowledge, literature on the pros and cons of mutual insurance companies in reducing farmers' income fluctuation due to

agricultural risks is missing. This paper will fill this literature gap as it aims to discuss the pros and cons of agricultural mutual insurance companies as tools to stabilize farmers' income.

In Europe, The Netherlands is among the nations where mutual insurance companies were developed to deal with agricultural production risks. Discussion on mutual insurance schemes were initiated among farmers, the government and insurance companies after the disaster reliefs in 1999 for crop losses due to extreme weather events such as floods and droughts (Meuwissen et al., 2008). Outbreaks of epidemic diseases such as classical swine fever (1997/1998) and foot and mouth disease (2001) also contributed to the development of mutual insurance companies (Meuwissen et al., 2008) Since the private insurance market for risks such as specific animal and plant diseases and adverse weather events were not available, farmers in different sectors took the initiative to start non-profit mutual insurance companies to protect themselves against financial losses arising from these risks. The objectives of this paper are therefore to i) analyse the financial and organizational performances of agricultural mutual insurance companies currently operating in The Netherlands and ii) to discuss the pros and cons of these companies in stabilizing farmers' incomes based on results of the companies' performances.

The second section of the paper describes the materials and methods used to achieve the research objectives. Section 3 provides the main results of the study and section 4 discusses the key findings. Section 5 concludes the study and briefly provides the policy implications.

2. MATERIALS AND METHODS

The case of five mutual insurance companies, namely Agriver, OFH, Avipol, Potatopol and Porcopol are studied in this paper. Interviews were conducted with the experts of the companies, and where the experts could not be contacted, use was made of information available on the companies' websites. The gathered data focused on two key issues: the organisational performance of the companies and their financial performances. In this study, organizational performance refers to i) the companies' main features expected to affect their attractiveness to the farmers in relation to premium assessment, use of deductibles and losses covered and ii) the strategies used by the companies to deal with morale hazard, adverse selection and systemic risk. However, the latter aspect could adequately be assessed for only two of the companies. Financial performance of the companies is assessed in terms of i) the penetration rate of the companies (indicating the abilities of the companies to pool capital in order to adequately provide coverage) and ii) the annual loss ratios of the companies given by (indemnities paid per year + annual reinsurance premium) / (total collected premium per year). The discussion of the pros and cons of these companies in stabilizing farmers' incomes (section 4) is based on results on the companies' performances.

2. RESULTS

2.1. Background information of the companies

Agriver is a mutual insurance company for greenhouse and open air crops founded in 1892. It derives its present form from the merger of eight mutual hail insurance companies in the early nineties of the last century. It covers all open air arable crops against hailstorm, storm, fire, rain flooding, drought, (night) frost, snow, ice, and erosion. The policies can be bought either for a single peril (for instance, hail only, rain flood only or against snow only) or for multiple perils all at once (the government initiated multi-peril insurance or the Agri (ver) climate policy). Agri (ver) climate policy differs from the government initiated multi-peril insurance policy in that the former has a more extended coverage with much less deductibles. In addition, Agriver also provides greenhouse insurance for horticulture crops. The coverage includes against storms, hail, hurricane, lightning, fire, explosion, frost and even against theft. Compensation is provided for the lost crops as well as for the buildings and equipments. One requirement that farmer had to fulfil to participate in Agriver's rainfall insurance was that they had to participate for at least five years to get compensations for rainfall losses of 2002. Just like other mutual insurance companies, policy holders in Agriver are owners of the company.

OFH is a mutual insurance company for fruit growers (all fruits) which specializes in insuring weather damage risks for apples, pears, stone fruit, woody berries, strawberries and grapes. It traditionally insures the risk of hail damage to crops. Since 2007, coverage is additionally offered against the risk of frost damage to plant stands and harvests and since 2010, coverage was extended to damages to plant stands and harvest by nine weather risks (multi-peril insurance). These nine weather risks are hail, frost, sleet, snow pressure, storms, extreme rainfall, drought, erosion and fire caused by lightning. OFH does not have a profit objective and part of annual premium surpluses is allocated back to farmers.

Avipol is a mutual insurance company founded in 1996 on the initiative of broiler breeders to insure Dutch farmers against the risk of Salmonella (Avipol website). In the years after the start of the company, coverage was extended to damages caused by the diseases Mycoplasma gallisepticum (Mg) and the disease hysteria (Avipol website). A farmer is automatically insured against all three diseases when buying a policy from Avipol. The reason Avipol was first established is because there was no insurance company willing to insure against these diseases and also because public assistance was no longer available to compensate farmers for losses. The farmers covered by Avipol are breeders of the parent stock for broilers and broiler raising farms. A special requirement for farmers to become members in Avipol is that they should get an Integral Chain Control and Salmonella Control (ICCsc) certificate (also called IKB CHICKEN). This quality system requires them to get their farms regularly (every two weeks) examined by PPE (Product board for Poultry Meat and Eggs) for Salmonella and Mg. The company is characterized as 'mutual' because it is owned and managed by the

policyholders, it has no profit objectives and any annual financial surplus is given back to the farmers through a refund of a portion of the premium.

PotatoPol was founded in 1997 on the initiative of LTO Netherlands (Dutch Federation of Agriculture and Horticulture) in cooperation with the Dutch Trade Union Agriculture. A subsidy of start-up capital equal to 680,000 Euros was provided by the government (Bullens et al, 2002). Potatopol was established following the substantial damage caused by brown rot potato diseases in 1995 and 1996. The government covered part of the losses through disaster relief programs but stated it won't no longer do so, thereby giving way for the creation of Potatopol. The company covers the risk of financial damage to Dutch farmers caused by brown rot and ring rot during the potato growing season for seed, starch and ware potatoes. Since 2008, it also covers the risk of damage caused by PSTVd (potato spindle tuber viroid). Any potato grower in the Netherlands can join in Potatopol. The mutual does not have any profit target and surplus premiums are distributed back to farmers.

Porcopol is a mutual insurance company founded in late 2002 to insure Dutch sow farms against Aujesky's disease. The company started in response to an outbreak of Aujesky disease among farrowing farms who were exempted from vaccination (for the same disease) because they exported to countries that ban the vaccination (such as Germany). Since losses were high at the time the outbreak occurred, and there was no government support to cover the losses, the company was formed by the exporting farms. Coverage extended in 2008 to cover against Classical Swine Fever and Foot and Mouth diseases. Payment to farmers takes place when sows are infected with Aujeszky's disease and need to be vaccinated, when sows are infected with FMD or classical swine fever and need to be culled or when sows need to be preemptively culled because of an outbreak within a sphere of 1 kilometre. Similar to Avipol, Porcopol is owned and managed by the policy holders, has no profit objectives and annual financial surpluses are given back to farmers through a refund of a portion of the premium. Porcopol is being considered for liquidation at the end of 2012 due to the low probability of occurrence of the insured diseases (no claims since the start of the company). The liquidation will materialize contingent on the number of new farmers expected to join in until the end of the year. For the company to continue operating, the farmers' organizations are expected to bring in new members at least twice the number of existing members.

Table 1. Background information on mutual insurance companies in The Netherlands

Company name	Date of establishment	Type of farms covered	Animal/crop covered	Perils covered	Special requirement for membership
Agriver	1892	Open air arable crop farms and greenhouse horticultural farms	Arable crops and horticulture crops	Weather risks[1], theft and fire	At least 5 years membership for coverage of rainfall losses of 2002
OFH	n/a[3]	Fruit farms	All fruits	Weather risk[2]	None for multi-peril insurance
Avipol	1996	Parent stock broiler breeders and broiler raising farms	Parent hens, and broilers[4]	Salmonella, Mycoplasma gallisepticum and hysteria	Integral Chain Control and Salmonella Control (ICCsc) certificate
Potatopol	1997	Potato farms	Seed, ware, starch potatoes	Brownrot, ringrot, and PSTVd	none
Porcopol	2002	Sow farms (farrowing farms)	Sows	Aujesky's disease, foot and mouth, classical swine fever	none

[1]hailstorm, storm, frost, fire, rain flooding, drought, (night) frost, snow, ice, and erosion, lightning, hurricane, [2]hail, frost, sleet, snow pressure, storms, extreme rainfall, drought, erosion and fire caused by lightning, [3]data not available, [4]for breeding and raising farms respectively
Source: Interview with experts, companies' websites

2.2. Organizational performance of the companies

Features of the mutual companies' services

Agriver insures direct losses from damages to crops and equipment (in case of greenhouse insurance). Subsidies are provided for multi-peril insurance and Agri (ver) climate policy for up to 60% of the premiums. For rainfall insurance, any level of loss above the trigger of 25% of the insured amount is fully recovered by Agriver. For multi-peril insurance, the trigger loss level is 30% of the insured amount, and when damages exceed this threshold, Agriver pays only 25% of the sum insured regardless of the size of loss incurred. In the Agri(ver) climate policy, which provides a more extended coverage, no deductible apply for losses in excess of 30% damage of the sum insured. That is, up to 25% of loss, the risk remains with the farmer. Above 25%, for example for a 31% loss of the sum insured, all of the 31% loss is fully recovered. This therefore means that, at 100% loss of insured value, the applied deductible is 0%.

OFH compensates for direct losses from damaged crops and plant stands (this one, for all risks except extreme rainfall and drought). Collected premium ranges from 0.5 to 30% of insured value. Premium differentiation is based on the chosen trigger level of loss for indemnification (a lower trigger level of loss leading to a higher premium level, and vice versa). Premiums for hail insurance is also differentiated based on the claim a farmer has made in the previous period. The larger is the claim made by a farmer in the previous year, the lower will be his premium class implying a higher premium level. As of 2011, farmers receive a subsidy of 60% on their premium payments. In OFH, premium is paid as advance and additional assessment. The advance premium (made in June) consists of 30% of the maximal total payable premium and the remaining (70%) can be paid in November. OFH also makes deductible differentiation based on the type of risk insured. For hail for instance, the coverage reaches 100% for 100% loss of insured value (therefore, 0 deductible) and the coverage becomes smaller (the deductible become higher) when the level of loss is lower. Deductibles levels applied by OFH range from 0% (for example, for hail) up to 75% of the insured value (for example, for multi-peril insurance).

Avipol pays the farmers for both direct and indirect losses in case of notification of outbreaks of mycoplasma , salmonella and/or hysteria by the farmers and after approval by the PPE and the organization for animal health services (Gezondheidsdienst voor Dieren). Since contaminated animals and breeding eggs should be removed from the premises, the compensated direct losses are the value of the removed hens and breeding eggs. The PPE covers 25% of the value of the hens removed due to Salmonella gallinarum, Salmonella pullorum, hysteria and Mg and the remaining 75% is basically own risk of the farmers. Avipol then covers this 75% not covered by the PPE. However, it does not cover 100% of it. That is, 25% of this 75% (of the value of the hen) still remains as the risk of the farmer, or in other words, is the applied deductible. In addition, an amount equal to € 1.80 (direct loss) is paid to the farmers per kilo of eggs removed/destroyed during a maximum period of four weeks in case of a Salmonella gallinarum and Salmonella pullorum. In case of all salmonella diseases (pullorum, gallinarum, enteriditis, typhimurium, virchow, hadar, infantis and java), Mg and hysteria, Avipol provides compensation for losses of empty stable, also with a 25% deductible. This compensation is dependent on the age at which the animal was removed from the premises, and is paid on a weekly schedule for a given maximum time duration. For the rearing broilers, a fee of €0.045/animal/week is paid for broilers less than 19 weeks of age. For breeding broilers, a fee of €0.085/hen/week is paid for parents that were removed before the age of 51 weeks. In relation to premium assessment, Avipol charges farmers advance and additional premiums where the latter is contingent on the loss faced by the farmers. The advance premiums are a fixed amount and are equal to €0.09 /hen for breeding farms, and €0.03/animal (hens and roosters) in rearing farms. It can therefore be seen that the only base used for premium differentiation is the type of farm insured (breeding or raising). These premiums can go down during a particular year depending on the premium reserve held in the previous year from surplus premiums. The

maximum allowable additional premium is set at 4 times the advance premium payment. To date (2012), there have not been any additional premium assessments because the claims reported did not necessitate such assessments. In the past 10 years, the level of premium refunded back to farmers ranges from 65% to 75% of the collected annual premiums. In Avipol, farmers do not receive any subsidies on the premiums paid.

Potatopol compensates farmers only for direct costs which includes the cost of damaged crop and destructions costs. Consequential damages and / or additional charges such as the disinfection of equipment and storage areas are not reimbursed. A 10% deductible applies to all damages suffered by the farmers. However, if the number of seed suppliers is higher than 15, the deductible increases to 20%. Potatopol charges premiums on an advance and additional assessment basis. The advance premium is set as a percentage of the insured value of potato (0.3438% for seed, 0.0748% for ware, and 0.0600% for starch potatoes) or as a fixed lump sum expressed per hectare of land insured (27.50/ha for seed, 4.30/ha for ware and 1.65/ha for starch potatoes). It can be seen from here that the only base used for premium differentiation is the type of potato insured (seed, ware or starch).The additional premium assessments should not exceed 3 times the advance premium. During the period 1997-2000, Potatopol had to ask for additional premium for all of the 4 years. In the years 1998 and 1999, it asked additional premium of a maximum 3 times the advance. In 1997, it was able to make premium refunds of 34% of the total premium (advance plus additional) collected in that year. In the year 2000, it was able to refund 6.5% of the total premium (advance plus additional) collected in the years 1998 and 1999 (Bullens et al., 2002). Data on collected premiums is not available for recent years and annual percentages of refunded premium could not be computed.

Porcopol compensates farmers only for consequential losses resulting from Aujesky's disease, classical swine fever, and foot and mouth diseases. These consequential losses are losses of profits (from sales of piglets) because the animals had to be culled and the farms are empty. The compensation for consequential losses includes compensation for business interruption losses and losses from movement standstills and repopulation (Meuwissen et al, 2000). The direct losses such as the value of the animal, the cost to vaccinate and other veterinarian costs are not compensated by Porcopol because payments are made by the Animal Health Fund (Meuwissen et al., 2003). The compensation of loss of profits is a fixed amount equal to 225 € per sow and is considered as approximately 75% of the level of damage. This implies that the level of deductible is set at 25%. Porcopol also charges farmers an advance premium and an additional premium, where the latter depends on the costs incurred by Porcopol and the level of loss suffered by the farmers. The advance premium is a lump sum amount which is determined annually during a board meeting. For instance, in 2008, the advance premium was set at €5 per sow. Porcopol does not have any premium differentiation. If it is apparent that the advance premium is not sufficient, then the additional premium assessment can be up to 4 times the advance premium. Policy holders in Porcopol do not receive any

premium subsidies from the Dutch government. Porcopol has had a good claim history. No claim for losses has ever been made since the start of the company in 2002. Therefore, the major cost that it has been incurring were the reinsurance premiums. For the period 2007-2010, the refund percentage (out of total collected premium) ranges from 70-80%, with the loss ratio (here only reinsurance premium/total collected premium) ranging from 0.12-0.19. Any remaining premium is kept as a reserve in the company. Table 2 and 3 summarize the major features of the mutual insurance companies' services.

Table 2. Financial losses covered and deductibles

Company name	Financial losses covered		Deductibles (per event)
	Direct losses	Consequential losses	
Agriver	Damaged crops and equipment (for greenhouse)	n/a[1]	0%-75% of insured value
OFH	Damaged crops and plant stands	n/a	0% - 75% of insured value
Avipol	Value of hen and value of breeding eggs	€0.045 /broiler/week for age < 19 weeks, €0.085/hen/week for age <51 weeks	25% of loss
Potatopol	Damaged crops and destruction costs	0	Base of 10% of loss; increases to 20% if number of suppliers>15
Porcopol	0	€225/sow	25% of loss

[1]Data not available

Source: Interview with experts, companies' websites

Table 3. Premium assessment

Company name	Advance premium	Additional premium assessment relative to advance premium			Premium subsidy	Base of premium differentiation	% of premium refunded back annually
		Maximum allowed	Maximum in the past 15 years	Frequency of assessment in the past 15 years			
Agriver	n/a[1]	n/a	n/a	n/a	60%	n/a	n/a
OFH	30% of max. payable premium	70% of max. payable premium	n/a	n/a	60%	based on claim history, type of crop, trigger level of loss for indemnification and type of risk	n/a
Avipol	€0.09/hen and €0.03/broiler[2]	4 times	0	0	none	Type of farm	65-75% (past 10 years)
Potatopol	As % of sum insured or fixed sum/ha[3]	3 times	3 times (in 1998 and in 1999)	Every year during 1997-2000	n/a	Type of potato (seed, ware or starch)	In 1997-2000, max. refund of 34% and min.of 6.5%
Porcopol	Fixed sum/sow set annually[4]	4 times	0	0	none	none	70-80% (2007-2010)

[1]Data not available, [2]for breeding and rearing farms respectively, [3]0.3438% of sum insured for seed, 0.0748% for ware, and 0.0600% for starch or 27.50/ha for seed, 4.30/ha for ware and 1.65/ha for starch, [4]For example, € 5/sow in 2008

Source: Interview with experts, companies' websites

Morale hazard, adverse selection and systemic risk

Morale hazard can be defined as a situation where the policy holder changes his/her behaviour as a result of purchasing an insurance policy. Change of behaviour is here used in the sense of behaving in such a way that the probability and magnitude of loss are magnified. According to the experts, attempt to reduce the degree of morale hazard is made through the use of applied deductibles and the additional premium assessments. Expertise of the farmers' board on the insured diseases also reduced the incentive for morale hazard. This is because the board (quoting the expert at Avipol) 'knows what you can and cannot do in relation to poultry farming'. As a result, coverage is restricted to those diseases that are less affected by farmer behavior. But it was acknowledged by the expert at Avipol that it is too costly to check if the cause of damage is due to fraud and carelessness or due to the 'act of God'. Quoting the expert,

'the level of cost of damage [from careless behaviour] and controlling [farmers' behaviour] is assumed to be the same'.

Adverse selection has to do with 'risky' farmers buying an insurance coverage more than 'less risky' farmers. One way Avipol used to discriminate between 'risky' farmers from the 'less risky' ones is to oblige farmers to pay extra premium for animals that are insured at a relatively older age than what they pay for younger animals. This is because the chance of getting the covered diseases increases with the animal's age. The high cost of studying the risk profile of newly joining farmers was also acknowledged by the expert at Avipol.

Systemic risk occurs when the likelihood that all or a large number of policy holders make financial claims at once, thereby endangering the financial solvency of the insurance company. Mutual agricultural insurance is prone to systemic risks because an adverse event such as a widespread disease or rain flood is likely to affect a large portion of the policy holders as these are likely to be close geographically. Both the case of Avipol and Porcopol have not been subject to systemic risk so far as only a very tiny portion of the insureds (for Avipol) or none of the insureds (for Porcopol) have claimed for losses since the start of the companies. However, in the case of Porcopol, the concentration of 13% of insured sows (7,600 sows) within a radius of 3 km can result up to a loss of €2,100,000 if an outbreak is to take place in the area. Both companies make use of additional premium assessment and reinsurance to deal with systemic risks if these are likely to happen. Both companies have reinsurance with private companies on a stop loss basis. In the case of Porcopol, the company is required to handle all losses up to € 500,000 by itself. For larger losses, the reinsurance company covers from 165% of the total collected premium up to a maximum loss of €1,200,000. Table 4. summarizes the strategies used by the companies to deal with morale hazard, adverse selection and systemic risk. Data on OFH, Agriver and Potatopol were obtained from their websites.

Table 4. Morale hazard, adverse selection and systemic risk

Company name	Strategies to deal with morale hazard	Strategies to deal with adverse selection	Systemic risks		
			Largest geographical concentration of farmers	Strategies to deal with systemic risk	Reinsurance premium subsidy
OFH	Deductibles, additional premium	n/a[1]	n/a	Reinsurance (government), additional premium	Yes, for frost only (49% of reinsurance premium)
Agriver	Deductibles	n/a	n/a	Reinsurance (government)	yes
Avipol	Deductibles, additional premium	Higher premium for aged animals	40% of farms in 1 province	Reinsurance (private), additional premium	none
Potatopol	Deductibles, additional premium	Deductible differentiation	n/a	Reinsurance (private), additional premium	n/a
Porcopol	Deductibles, additional premium	none	13% of sows within 3 km radius	Reinsurance (private), additional premium, geographical dispersion	none

[1]Data not available
Source: Interview with experts, companies' websites

2.3. Financial performance of the companies

Avipol has seen its number of members decreasing when we compare the figures in 1997-2000 to those in 2000-2011. However, this was not translated in a decrease in the level of collected premium. This is because premium is based per animal insured and the number of animals per farm, according to the expert, have been improving along the years owing to increased productivity. The company's penetration rate in terms on insured animal can be considered as high given that it covers more than 50% of the parent stocks and broilers in The Netherlands. The company's claim history shows that it did not receive many loss claims from its policy holders. The average claim per year in the past 10 years were 2 or 3 claims per year. Table 7. Summarizes the major findings on Avipol's financial performances.

Potatopol, similar to Avipol, has seen its number of members decline over the years from nearly 5,300 to 3,500. But surprisingly, the size of land insured (in hectares) was relatively

stable. The coverage in terms of hectare can also be considered as significant given that it is more than 50% of the Dutch potato acreage. The claim history of Potatopol shows that it has been incurring relatively large losses prior to 2000 compared to post 2000. This high loss has resulted in a loss ratio of nearly 0.85 in the years 1997-2000. However, approximate figures of more recent loss ratios could not be established due to missing data on collected premiums (and paid reinsurance premiums).

The number of members in *Porcopol* has also a decreasing trend along the years. The penetration rate of the company in terms of number of sows insured can be considered as low given that, as of 2012, it is only 5.5% of total sows that are eligible for coverage (approximatly 1,000,000 farrowing sows in 2,500 farms in The Netherlands). The claim history of the company is excellent as there were no claims made since the start of the company. However, as learned from the interview, this is posing a major challenge to the company as it is the main reason why farmers are dropping out from the pool.

Table 7. Financial performance of Avipol

Year	Collected premium (advance plus additional) (a)	Indemnifications in euros (b)	Paid reinsurance premium (c)	Loss ratio (b+c)/a	Penetration rate	
					Broilers insured	Number of members/farms insured
1997-2000	€ 344,750 average per year	€ 68,987	n/a[1]	0.2	n/a	320 members in average
2000-2011 (average)	€ 325,000 average per year	€ 82,550	n/a	0.2	83% of parents and 64% of broilers(2011)[2]	75% of breeding farms and 71% of raising farms (2011)[3]

[1]Data not available, [2]In breeding and raising farms respectively, [3]In average, 180 members in 2000-2010
Source: interview with the expert, Bullens et al., 2002

Table 6. Financial performance of Potatopol

Year	Collected premium (advance plus additional) (a)	Indemnifications in euros (b)	Paid reinsurance premium (c)	Loss ratio (b+c)/a	Penetration rate	
					Hectare insured	Number of members insured
1997-2000 (average)	€ 3,111,012	€ 2,642,726	n/a[1]	0.85	n/a	5,304

2006/2007	n/a	€ 75,000	n/a	n/a	98,700 ha[2]	4,192
2007/2008	n/a	€ 249,000	n/a	n/a	98,300 ha[2]	3,996
2008/2009	n/a	€ 461,000	n/a	n/a	94,900 ha[2]	3,743
2009/2010	n/a	€ 636,575	n/a	n/a	94,700 ha[2]	3,552

[1]Data not available, [2]60-63% of total eligible land
Source: Company's website, Bullens et al., 2002

Table 5. Financial performance of Porcopol

Year	Collected premium (a)	Indemnifications (b)	Paid reinsurance premium (c)	Loss ratio (b+c)/a	Penetration rate	
					Number of sows insured	Number of members insured
2007	€ 768,813	0	118.020	0.15	73,430	119
2008	342,065	0	64,623	0.18	61,075	94
2009	314,655	0	40,089	0.12	60,550	84
2010	331,146	0	40,000	0.12	56,045	75
2012	n/a[1]	0	n/a	n/a	56,170 (approx. 5.5% of total sows eligible)	73

[1]data not available
Source: Interview with the expert, company's website, annual reports of Porcopol

3. DISCUSSIONS

For mutual insurance companies to effectively insure farmers against income fluctuations arising due to specific agricultural risks, they should be attractive enough for farmers to join in. It was shown in the results that mutual insurance companies have many attractive features. Among others, the flexibility they offer in terms of insurance coverage and premium assessments can be found. The flexibility in insurance coverage gives the farmers the opportunity to get coverage against additional risks without having to look for a new insurance company that can cover the same risk. On the other hand, the opportunity to pay premiums as

advance and additional allows the farmers to pay low level of advance premiums. A possible drawback of additional premium assessments is, however, the fact that farmers may frustrate in situations where such assessments are made frequently. But the experience of the studied mutuals has indicated that such situations might not always happen. Premium subsidy offered by the government provided farmers an additional opportunity to lower paid premiums. However, such subsidy was not available to all companies and tended to focus on the companies that provided coverage against weather risks. Though it can be debated, this might be associated with the high probability and high losses related to weather risks as compared to animal diseases. In addition, the refund of surplus annual premiums back to the farmers and the compensation of farmers for consequential losses are features which can hardly be found in profit oriented large insurance companies.

The degree to which an insurance company can insure risks also depends on the degree to which it can deal with adverse selection and morale hazard. The interviews revealed that social control is not necessarily used by the companies as tools to solve these two problems. Rather, other tools such as the use of deductibles and additional premium assessments play the role of reducing morale hazard by reducing the incentive for farmers to behave in a way that increases the probability and magnitude of risk. On the other hand, tools such as deductible differentiation (ex, Potatopol) and charging a higher premium for aged animals (Avipol) are used to deal with adverse selection. A major challenge the companies face in further dealing with morale hazard and adverse selection is the potential high cost that can be incurred if they had to monitor farmer behaviour (to reduce morale hazard) and study effectively the risk profile of farmers (to reduce adverse selection). Incurring these costs, however, does not go in line with the objective of keeping premiums as low as possible. Systemic risk is generally considered as another drawback of mutual insurance companies. But the experience of the studied companies show that they did not have to deal with such risks so far. In the likely event of a catastrophic loss, all of companies make use of reinsurance coverage. A finding worth noting, however, is that only companies which insure against weather risks are reinsured by the government and also receive reinsurance premium subsidies. Similar to the farmer premium subsidies, one can infer from this that weather risks might have a higher probability and magnitude of risks compared to animal diseases.

Last, but not least, mutual insurance companies need sufficient capital to effectively insure farmers. the penetration rate of the companies are above 50% except for Porcopol (only 5.5%). However, the results shows that there is decreasing trend of the number of members. This can be associated with the reduction in the number of damages occurred along the years. This can explain the low loss ratio of some of the companies (Porcopol and Avipol for instance). However, underestimation of the probability of risk and continuous reduction in the number of members will reduce the pooled capital and create an undiversified pool. This is turn can further reduce the companies' capacities to deal with catastrophic losses.

In line with the EU's proposal to further explore the potential of mutual insurance companies, it has been shown that these companies can be effective in insuring farmer income fluctuations arising due to specific agricultural risks. However, given the specific expertise of mutual companies, it can be difficult for these to provide net income insurance or gross revenue insurance. This is because these two types of incomes can be affected by a multitude of factors (such as health of farmers, management skills, price of the commodities...) which can be beyond the expertise of the mutual insurance companies. Besides, the farmers are not likely to be equally exposed to risks associated with these factors. Therefore, one would not expect solidarity among farmers to insure farmers' net income or revenue. In addition, determining losses and monitoring farmers with respect to the factors that can affect net income is even more problematic and costly for mutual insurance companies.

4. CONCLUSIONS

Agricultural production risks caused by extreme weather conditions and animal (and plant) diseases are among the reasons that cause fluctuation in farmers' income. When they occur, these risks can cause large financial losses that are difficult to bear by private insurance companies. This leaves a huge burden on taxpayers money and government budgets in the form of ad hoc compensations. In response to this, the European Union has called upon mutual insurance companies to step in and participate in the coverage of these agricultural risks. Among the reasons for calling upon these mutuals is the fact that their mutual structure increases the insurability of the risks in terms of adverse selection, morale hazard and their specialization on specific risks. This paper attempted to further explore the potential of mutual insurance companies in effectively insuring farmers against agricultural production risks and in thereby reducing the income fluctuations that result from these risks. This was done by analysing the financial and organizational performances of agricultural mutual insurance companies currently operating in The Netherlands. The results were used to discuss the pros and cons of mutual insurance companies as tools for farmers' income stabilization. The following conclusions can be made from this study: i) as pools of 'few' number of farmers, mutual insurance companies possess the required expertise to insure farmers against income fluctuations arising as a result of specific agricultural production risks that are common to all members of the pool. Insuring farmers' net income or revenue, however goes beyond the mutual companies' expertise, ii) the mutual arrangement allows mutual insurance companies to be flexible in the type of risk and loss covered, and in premium assessment. Similar to the case of The Netherlands, policy support of mutual insurance companies in terms of farmer training on the benefits of mutual insurance, provision of start-up capital, subsidies and reinsurance can encourage the development of mutual insurance companies in other European countries. Since mutuality/solidarity in insurance is likely to exist when coverage is for risks that are common to

all members of the pool, the policy targets should be those companies that are national based than those which provide coverage at an European Union level. This is because specific agricultural production risks are likely to be dependent on the conditions in a particular nation.

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