SUM INSURED DETERMINATION FOR CEREAL, CITRUS AND VINEYARDS IN THE SPANISH AGRICULTURAL INSURANCE SYSTEM

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INTRODUCTION

In general, insurance is a form of risk management used to hedge against a contingent loss. The conventional definition is the equitable transfer of a risk of loss from one entity to another in exchange for a premium or a guaranteed and quantifiable small loss to prevent a large and possibly devastating loss being agricultural insurance a special line of property insurance.

Agriculture insurance, as actually are designed in the Spanish scenario, were established in 1978. At the macroeconomic insurance studies scale, it is necessary to know a basic element for the insurance actuarial components: sum insured. When a new risk assessment has to be evaluated in the insurance framework, it is essential to determinate venture capital in the total Spanish agriculture. In this study, three different crops (cereal, citrus and vineyards) cases are showed to determinate sum insured as they are representative of the cases found in the Spanish agriculture.

Crop sum insured is calculated by the product of crop surface, unit surface production and crop price insured. In the cereal case, winter as spring cereal sowing, represents the highest Spanish crop surface, above to 6 millions of hectares (ha). Meanwhile, the four citrus species (oranges, mandarins, lemons and grapefruits) occupied an extension just over 315,000 ha. On the other hand, vineyard target to wine process shows almost one million of ha in Spain.

A new method has been applied to estimate crop sum insured in these three cases. Under the maximum economic impact assumption, the maximum market price has been used to insurance each species. Depending on crop and reliability of the data base available, the insured area or insured production has been used in this estimation. When for a certain crop varieties or type of varieties show different insurance prices a geometric average was used as average insurance price for that particular crop. One extreme difficult case was vineyards, where differentiate prices based on Denomination of Origin (DO), varieties and autonomous communities made this estimation more complex.

RESULTS

The macroeconomic results obtained based on MAGRAMA (Ministerio de Agricultura, Alimentación y Medio Ambiente) prices and crop data in 2009 are showed and discussed.

METHODOLY TO CALCULATE CAPITAL INSURED

Risk capital is defined by the following relation:

Risk Capital (€) = Production (Kg) x Price of insurance (€/Kg)

Production is determinate by Agricultural Statistics Yearbook of 2010 edited by MAGRAMA for all the respectively crops corresponding to 2009 data. In some cases we had to search for this information in other sources. The **insurance price** for a particular crop was determined as the weight average price of the maximum insurance prices of its varieties based on area/production ratio respective implantation.

Maximum prices for each crop were obtained from several ministerial publications of Agricultural Insurance for each insurance line belonging to Agricultural Insurance Strategy (*Plan de Seguros Agrarios*) for 2010.

To determinate varieties implantations of a particular crop the 2009 campaign data base of *Entidad Estatal de Seguros Agrarios* (ENESA) was used.

CEREALS

Cereals have only one price per crop in the Spanish Agriculture Insurance System, therefore it is necessary to weight the average of maximum price except the rice case.

In this study four basic crops are included: wheat, barley, rye, oats and triticale. In this group we separate their value as grain production and as certified seed production, including the straw value as there is possible to insure this sub-product. We have included also the summer traditional cereals such as rice, maize and sorghum beside millet and canary seed.

Rice is the only cereal that shows different prices depending on varieties. In this case the weighted average price has been based on insured area determining the insurance implementation.

Price (€/100 kg), area (ha), production (t) and sum insured are showed in table 1.

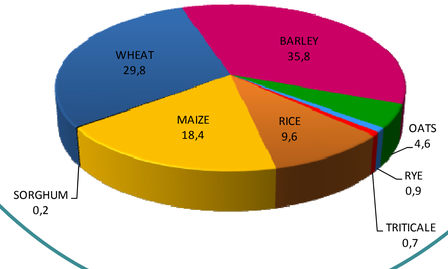
Figure 1 represents the venture capital distribution in cereals.

Table 1. Price (€/100 kg), area (ha), production (t) and sum insured (thousands of €) of cereals.

CROP	PRICE (€/100kg)	AREA[(1)] (ha)	PRODUCTION[(1)] (t)	SUM INSURED (thousands of €)
WHEAT	19,00	1.772.752	4.804.772	1.069.456
BARLEY	15,50	3.024.726	7.295.934	1.285.063
OATS	15,50	561.238	923.946	165.030
RYE	15,50	132.161	180.666	31.997
TRITICALE	15,50	60.987	138.491	25.268
RICE	37,98	119.202	913.754	345.967
MAIZE	18,00	371.732	3.717.671	661.244
SORGHUM	18,00	7.541	32.782	5.901
MILLET	33,00	562	1.248	412
CANARY SEED	45,00	13	15	7
SUM		6.050.914	18.009.279	3.590.346

(1): Data from Agricultural Statistical Yearbook 2010.

Figure 1. Distribution of cereals venture capital.



CITRUS

Citrus include cultivation of orange, mandarin, lemon and grapefruit. These crops present more than one variety, therefore the insurance price was determinate as weight average price of maximum insurance price of each variety based on respective implantation productions. Production data of each insurance line that include a contract in citrus was used.

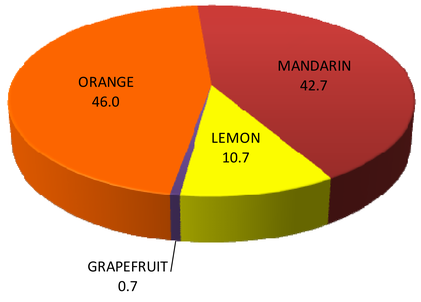
Price (€/100 kg), area (ha), production (t) and sum insured are showed in table 2.
Figure 2 represents the venture capital distribution in citrus.

Table 2. Price (€/100 kg), area (ha), production (t) and sum insured (thousands of €) of citrus.

CROP	PRICE (€/100kg)	AREA[(1)] (ha)	PRODUCTION[(1)] (t)	SUM INSURED (thousands of €)
ORANGE	22.70	153,415	2,675,900	607,384
MANDARIN	28.20	119,154	2,000,149	564,625
LEMON	20.50	40,689	687,936	140,940
GRAPEFRUIT	19.90	1,640	43,639	8,690
SUM		314,898	5,407,624	1,321,639

(1): Data from Agricultural Statistical Yearbook 2010.

Figure 2. Distribution of citrus venture capital.



VINEYARD

Vineyards for wine production can be established in a denomination of origin (DOP) or outside of this protected area. Each vineyards variety has different prices depending on the Autonomous Community (CA) in which the vineyard is established. In certain cases, one vineyard can be protected under one or various DOP and different white and red grape varieties used in wine production normally show several insurance price. The grower can register his vineyards in several DOPs and choose voluntary under which DOP subscribe his insurance.

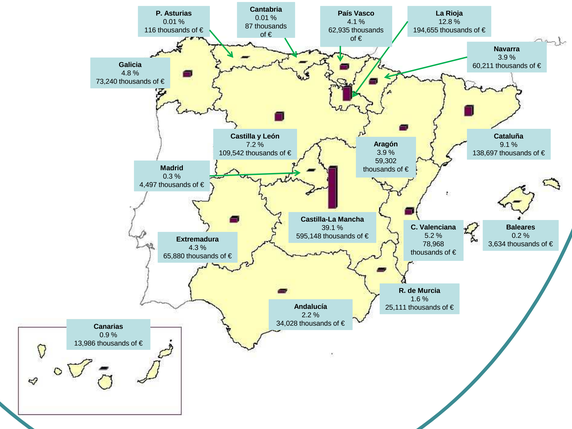
The insurance price in grape varieties for wine production was determinate as the weight average price of the maximum insurance prices of the varieties based on the production implantation, in the insurance, considering each Spanish CA and inside and outside of DOP. To determinate the contract production for each variety a study at CA, province, county, municipality and sub-municipality level was done as there are some DOP that require this spatial resolution.

Venture capital of a CA is estimated as the sum of the established vineyards capitals inside and outside the DOPs found in that CA.

The grapes for winemaking weight average price was 30.31 €/100 Kg.

In figure 3 the distribution of vineyards venture capital in each CA is represented and sum insured (thousands of €) of vineyards for each CA is showed too.

Figure 3. Distribution of vineyards venture capital in each Autonomous Community.



CONCLUSIONS

The determination of sum insured with this method offers the possibility to apply it to all the insurable productions by Spanish Agricultural Insurance System, livestock production and food industries chain. We obtain one insurance price by type of agricultural production. This developed method is better adjusted to the actual reality of the Spanish agricultural field than other macroeconomic models used earlier.