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Global trends in risk management support of agriculture

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Abstract

The aim of this paper is to make an international comparison of risk management policies in OECD countries as well as in selected emerging economies. The results are based on the data from OECD Producer Support Estimates Database and General Services Support Estimates Database, a study of agricultural insurance schemes carried out by the European Commission and an overview of risk-related policy measures formulated by the OECD. The results indicate that all OECD countries have the price stabilizing support for at least some commodities. Although the share of market price support in the producer support estimates has been decreasing for a long time, it still remains an important component in most countries around the world. The analysis also revealed the pilot experiences with index based insurance in developing countries whose economy is considerably dependent on agriculture.

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Key words

Agriculture, agricultural policy, risk management, market price support, income stabilization.

Anotace

Cílem příspěvku je provést mezinárodní komparaci politik zaměřených na řízení rizik v zemích OECD a v prahových ekonomikách. Výsledky jsou založeny na databázi odhadu produkčních podpor (OECD), databázi odhadu podpory obecných služeb (OECD), studii o systémech zemědělského pojištění, zpracovanou výzkumným centrem Evropské komise, a na přehledu OECD o politikách zaměřených na řízení rizik. Výsledky ukazují, že všechny země OECD aplikují v určité míře systém stabilizace cen. Ačkoliv podíl podpory tržních cen na odhadu produkčních podpor dlouhodobě klesá, zůstává podpora tržních cen stále důležitým nástrojem řízení rizik ve většině zemí světa. Analýza rovněž odhalila první zkušenosti s indexním pojištěním v rozvojových zemích, jejichž hospodářství je významně závislé na zemědělství.

Klíčová slova

Zemědělství, zemědělská politika, řízení rizik, podpora tržních cen, stabilizace příjmů.

Introduction

Agricultural production has always been exposed to many risks. The uncertainty of future incomes complicates both short-term production decisions and long-term planning which can adversely affect the provision of loans to farmers. The key drivers of farm profit or loss are production risks pertaining to the price and yield volatility of agricultural commodities. Because of the existence of heterogeneous agricultural policies over the world, which have recently changed due to the global economic crisis, it is highly topical to focus on the risk-related effects of the past and current public support of agriculture.

Omitting risk and uncertainty in decision has been criticized in the neoclassical theory of the firm since the 1960s. Over the last decades, better insight has been developed about risk assessment, risk preferences and value of information. Since the second half of the 90s of the 20th century, discussions on the topic of risk management in agriculture have been taking place at a global level. The literature on farmers' risk exposure usually covers price risk [5, 7, 14], yield risk [7, 13], both price and yield risk [3, 16] and the spectrum of the most frequently used risk management tools in agriculture [9, 10, 11, 12]. Most professional papers have been devoted to the issue of agricultural insurance as the most active and functional tool supporting stability in the field of agricultural business [1, 3, 11].

Many studies argued against the common definition of risk and uncertainty which considers risk as imperfect knowledge where the probabilities of the possible outcomes are known, whereas uncertainty exists when these probabilities are not known. Hardaker et al. [6] defined uncertainty as imperfect knowledge and risk as uncertain consequences, particularly exposure to unfavorable consequences. Risk is therefore not value-free, usually indicating an aversion for some of the possible consequences. Harwood et al. [7] offered more specific definition of risk. They defined risk as uncertainty that "matters" and may involve the probability of losing money, possible harm to human health, repercussions that affect resources (irrigation, credit), and other types of events that affect a person's welfare. Uncertainty (a situation in which a person does not know for sure what will happen) is necessary for risk to occur, but uncertainty need not lead to a risky situation. Chavas [2] argued that the debate about distinction between risk and uncertainty ultimately boils down to an argument about the existence and interpretation of probability. He did not draw a sharp distinction between risk and uncertainty and uses the terms interchangeably. There has not been a clear consensus on definition of risk yet. However, this paper concentrates on pure risk which is considered as downside risk only, although the business risk usually incorporates both downside and upside risk.

The main groups of risk in agriculture result from the specific features of the agricultural sector and from the trends in agrarian policy. The OECD publications [11, 12] may be considered as significant and relatively comprehensive studies of income risk management in agriculture. The overview of the European agricultural risk management schemes was introduced in the common research project EC-JRC-ISPRA Italy with data contributed from European countries [1]. This study constituted the basis for analyzing strategies to integrate risk management tools within the Common Agricultural Policy (CAP). The strategic objective of the parallel research projects was to analyze the potential of different risk management tools for stabilizing farm household incomes in the EU [9]. The results of these surveys were used within the impact assessment of the CAP Health Check [4].

Some papers also examined the relationship between the farmers' operating risk and current subsidies. Based on the simulation at the commodity level the results revealed that partially or fully decoupled payments extend the farmers' decision-making possibilities. The current subsidies are a suitable complement to other commonly used risk management tools primarily designed to reduce the farmers' and farm income variability [15].

Material and Methods

Risk management strategies can be grouped into three categories [8]: risk prevention, risk mitigation and risk coping strategies. Prevention and mitigation strategies focus on income smoothing, while coping strategies focus on consumption smoothing. Prevention strategies are intended for reducing the probability of a downside risk. They can also be called "risk reduction strategies". These are introduced before a risk occurs. Reducing the probability of an adverse event occurring increases the producers' expected income and reduces the income variance with a positive impact on wealth. These strategies primarily include [12] market price support measures (through price stabilization), market interventions such as private storage support (financing for producers to build or upgrade farm storage and handling facilities), non-marketing of agricultural products, support to production techniques such as water management (irrigation, drainage, flood control etc.), the purchase of certified seeds and animal breeds, pest and disease control, technical assistance and extension, and the inspection of agricultural products and food safety measures.

Whereas preventive strategies reduce the probability of the risk occurring, mitigation strategies reduce the potential impact if the risk were to occur. Risk mitigation strategies have an ex-ante effect. They can take several forms, for example, payments with a variable rate (or countercyclical payments) compensating for all or part of the income losses suffered according to a pre-established formula, subsidies for risk management tools (insurance systems, futures markets), income tax smoothing systems, income diversification support, support of vertical integration, contracting etc.

Coping strategies can relieve the impact of the risk once it has occurred. They include mainly ex-post

measures. The main forms of coping consist of disaster relief payments, ad hoc assistance, individual dis-saving/borrowing, migration, selling labour or the reliance on public or private transfers. In this case, the important role of the government lies in providing agricultural support programs such as calamity funds and other measures to manage sanitary or phytosanitary crises, safety nets, ad hoc state aid, social assistance etc.

The aim of this paper is to make an international comparison of risk management policies in OECD countries as well as in selected emerging economies. The analysis is based on the data from PSE database (Producer Support Estimates) and the GSSE database (General Services Support Estimate). A significant part of the PSE is market price support (MPS) which is defined as transfers from consumers and taxpayers to agricultural producers arising from policy measures that create a gap between domestic market prices and border prices of a specific agricultural commodity, measured at the farm gate level [12]. The individual measures have different labels describing their features. Any payment is defined as subject to a variable rate where the formula determining the level of payment is triggered by a change in price, yield, net revenue or income, or a change in production cost. If not, the payment has a fixed rate.

Because the European agriculture is very heterogeneous, the second part of the analysis is devoted to a closer view on a risk management schemes in the EU. There are various agricultural insurance systems in the EU which are defined as follows [1]. Single-risk insurance covers against one peril or risk, or even two but of a non-systemic nature (most often hail, or hail and fire). Combined (peril) insurance means a combination of several risks covered (two or more risks, mostly with hail as basic cover). In some countries (e.g. France) this type of insurance is also referred to as multi-risk insurance. Yield insurance guarantees the main risks affecting production. In the case of crops, the main risks affecting the yield (e.g. drought) are comprised. Premiums can be calculated from individual historic yield or from regional average yield. Losses (and premiums) can be calculated either by qualifying the losses due to each individual risk separately, either as the difference between the guaranteed yield and the insured yield. Whole-farm insurance consists of a combination of guarantees for the different agricultural products on a farm. Depending on the coverage of guarantees, it can be whole-farm yield insurance or whole-farm revenue insurance.

In some EU countries there are also the stabilization accounts, the individual bank accounts for self-insurance which are publicly regulated or promoted. The withdrawal can be based on yields, revenues or other indices.

Results and discussion

Assistive devices for visually handicapped people As shown in tables 1 and 2, the share of risk related measures in the PSE has been decreasing for a long time. In the OECD area, it dropped to 66 % in the 2000s compared to more than 75 % in the 1990s (in emerging economies, the share reached 50 % in recent years). MPS takes the most substantial part of the risk related measures in the majority of OECD countries and the emerging economies as well. Hence risk reduction can be considered as the most supported risk management strategy over the world. Nevertheless, the share of MPS in the PSE has decreased - from ca 30 % in 1986 to ca 10 % in 2008. On the other hand, the significance of the fixed rate payments has increased. Fixed rate payments based on output, area, animal numbers, receipts or income were slightly less than the variable payments at the end of the 1980s, while they were close to six times higher in the 2000s. In the emerging economies, the MPS was negative in the 1990s and domestic prices were isolated from world prices. This changed in the 2000s.

Risk reduction measures other than MPS have become a more important part of the risk management support in OECD countries. The USA and EU pay more attention to technical assistance/extension, pest and disease control. Water management support has slightly dropped, but it is expected to be more important in the future due to the greater weather volatility. Market risk management strategy - spreading sales - is a very widespread strategy in agriculture, but government assistance for private storage and non-marketing of agricultural products is rare.

Variable rate payments (VRP) and insurance subsidies are the essential components of the risk mitigation measures in PSE. VRP are implemented explicitly to stabilize farmers' receipts (ex ante).

They only generate transfers when receipts are below a target level and include loan deficiency payments, marketing loan gains (allow contract crop producers to repay price support loans at the lower of the announced loan rate or the prevailing world market price) and storage payments providing producers interim funds to help them store rather than sell their products when market prices are low. Canada and the USA are two countries where VRP are most significant, reflecting the traditional higher exposure to climatic risk and recourse to insurance and stabilization payments. These systems are operated by the federal and/or provincial governments with contributions from farmers. As a consequence of decreasing MPS, VRP have increased in the USA and Australia.

Subsidies to agricultural insurance systems are widespread. Insurance payments exist in most EU countries and 5 emerging economies (Brazil, Chile, Russia, Ukraine and Argentina). The USA has a long history of subsidized crop insurance systems. There is a special Federal Crop Insurance Program which offers more complex agricultural insurance aimed at covering losses in revenue, not only yields. As pointed out by JRC-ISPRA [1], the total support including funds for the administrative costs of the insurance companies and reinsurance amounts to 72 % of total premiums. The European subsidies to insurance premiums are around 32 %. On the other hand more complex insurance coverage is usually more expensive for farmers, so that the average premium rates in the USA (9 %) are much higher than in Europe (4 %). Agricultural insurance schemes in EU are heterogeneous (table 3). There are two extremes – countries with simple agricultural insurance schemes which have relatively low risk exposure to adverse weather fluctuations and where livestock production plays an important role (BE, DE, DK, UK, IE, NL), and countries with high weather risk exposure and sophisticated risk management systems (ES, FR, IT, GR, CY). In some south European countries there is also state supported reinsurance based on PPP (PT, ES and IT). Insurance payments can be put in all WTO boxes, depending on implementation criteria.

Income tax smoothing schemes has been of peripheral importance in PSE risk mitigation measures so far. According to the OECD definition, these consist of allowing taxable income to be spread over a multi-year period, thereby smoothing disposable income. But its low share in the PSE could be misleading. In most countries, transfers within income tax smoothing schemes are not included in the PSE, either because the system is not specific to farmers (Netherlands) or because, while the option is only available to farmers, the value of the tax concession is not estimated. This risk management tool is still underestimated.

The ex post risk coping measures have increased in most OECD regions. They are frequently used in Australia, Canada, EU, USA and many emerging economies. While disaster relief payments and ad hoc assistance are common in most OECD countries, support for social assistance and debt management measures have prevailed in emerging economies (China is the only one with a significant level of disaster relief payments). Social assistance which helps farmers to alleviate poverty and emergency situations has been of great importance for Chinese farm households.

Some risk reduction measures have been provided through general services to agriculture. This includes water management (infrastructure assistance for water management off the farm), collective pest and disease control measures and inspection services. Support for these general services has increased in most OECD countries as well as in most emerging economies.

Since the beginning of the 21st century new weather risk management tools have been developed – index insurance and weather derivatives. Concluding these contracts and their trading is called weather hedging (weather insurance or weather hedging). The aim of weather hedging is, above all, to decrease the volatility of profit or cash flow depending on weather fluctuations and thus to protect the company in cases of adverse weather development.

The index insurance and weather derivatives are based on an independent measurable quantity, the development of which correlates with the farm yields or revenues from agricultural production. This concept, as opposed to classical agricultural insurance (which uses loss adjusters for assessing damages on the farm), is based on an objective, transparent and easily measured specified external factor. Its correlation with the agricultural

production and the spatial correlation is, on the contrary, an essential condition of using these products. The measurement of meteorological phenomena is relatively easily attainable and objective. Moreover, modern satellite technologies providing highly reliable measurements and a relatively dense network of ground meteorological stations are available at present. The principle of weather hedging based on the objectivity of the measured factors, eliminates the risk of asymmetric information and at the same time involves low monitoring and loss assessment costs, which makes the parametric products more attainable generally. On the other hand, the most often quoted disadvantage of these products is the contract basis risk relating to the potential discordance between the real damage and the financial benefit from an index-based contract.

Basis risk and strong insurance support schemes are the main reasons why weather hedging is not widespread enough. Mainly the micro-finance institutions have been involved in pilot programs in lower income countries with agriculture as a significant and vital part of national economy (Argentina, Colombia, Ethiopia, India, Malawi, Morocco, Nicaragua, Peru, Thailand, and Ukraine). Some pilot studies have also taken place in Europe and the USA. Well developed index insurance schemes currently run in Canada and Mexico.

		USA		Canada		EU		Australia		Japan	
		92-97	02-07	92-97	02-07	92-97	02-07	92-97	02-07	92-97	02-07
Risk reduction measures in PSE, of which	€ M	14 109	13 352	1 876	2 513	58 005	51 308	772	298	44 592	32 484
- Market Price Support (MPS)	%	81.3	69.2	98.7	98.9	97.9	96.4	82.0	49.0	99.2	99.2
- Other risk reduction measures*)	%	18.7	30.8	1.3	1.1	2.1	3.6	18.0	51.0	0.8	0.8
Risk mitigation measures in PSE, of which	€ M	2 948	5 879	930	1 191	359	465	70	319	1 790	1 263
- Variable rate payments	%	86.0	77.9	100.0	100.0	58.5	33.8	0.0	43.3	65.7	61.4
- Insurance subsidies	%	14.0	22.1	0.0	0.0	41.5	66.2	0.0	0.0	34.3	38.6
- Futures markets subsidies	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
- Income tax smoothing schemes	%	0.0	0.0	0.0	0.0	0.0	0.0	100.0	56.7	0.0	0.0
Risk coping measures in PSE, of which	€ M	553	856	11	1 012	418	1 131	97	181	40	23
- Disaster relief/ad hoc assistance	%	100.0	100.0	100.0	100.0	80.6	83.1	100.0	100.0	100.0	100.0
- Social assistance/debt rescheduling	%	0.0	0.0	0.0	0.0	19.4	16.9	0.0	0.0	0.0	0.0
Total PSE	€ M	24 089	31 860	3 337	5 255	91 397	104 094	1 246	1 256	48 736	36 644
Total risk related measures in PSE	€ M	17 610	20 087	2 817	4 717	58 782	52 904	939	797	46 422	33 770
Share of risk-related measures in PSE	%	73.1	63.0	84.4	89.8	64.3	50.8	75.4	63.5	95.3	92.2
Share of MPS in PSE	%	47.6	29.0	55.5	47.3	62.1	47.5	50.8	11.5	90.8	87.9
Share of MPS in risk-related measures	%	65.2	46.0	65.7	52.7	96.6	93.5	67.4	18.2	95.3	95.4
Risk related measures in GSSE	%	2.9	3.0	18.8	27.2	1.9	5.3	12.1	14.8	28.3	30.1

Notes: *) Private storage/non marketing, water management, certified seeds/breeds, technical assistance/extension, pest and disease control
Source: Own calculations based on OECD (2009)

Table 1. Structure of transfers from risk management policies in selected OECD countries (average of the periods).

		Brazil		China		Russia		South Africa		Ukraine	
		95-97	02-05	93-97	02-05	92-97	02-05	94-97	02-05	92-97	02-05
Risk reduction measures in PSE, of which	€ M	-3 911	603	-2 702	12 488	-4 652	4 433	892	577	-3 021	-667
- Market Price Support (MPS)	%	x	87.2	x	89.3	x	97.7	99.9	100.0	x	x
- Other risk reduction measures*)	%	x	12.8	x	10.7	x	2.3	0.1	0.0	x	x
Risk mitigation measures in PSE, of which	€ M	93	117	0	0	7	44	0	0	623	204
- Variable rate payments	%	65.6	35.9	x	x	0.0	0.0	x	x	100.0	100.0
- Insurance subsidies	%	34.4	64.1	x	x	100.0	100.0	x	x	0.0	0.0
- Futures markets subsidies	%	0.0	0.0	x	x	0.0	0.0	x	x	0.0	0.0
- Income tax smoothing schemes	%	0.0	0.0	x	x	0.0	0.0	x	x	0.0	0.0
Risk coping measures in PSE, of which	€ M	926	635	772	2 559	1 660	139	15	26	186	12
- Disaster relief and ad hoc assistance	%	0.0	0.0	42.6	34.0	0.7	2.9	100.0	100.0	0.0	0.0
- Social assistance/debt rescheduling	%	100.0	100.0	57.4	66.0	99.3	97.1	0.0	0.0	100.0	100.0
Total PSE	€ M	-2 284	2 377	311	25 535	235	5 759	924	687	-1 435	178
Total risk related measures in PSE	€ M	-2 892	1 355	-1 930	15 047	-2 984	4 617	907	603	-2 212	-452
Share of risk-related measures in PSE	%	x	57.0	x	58.9	x	80.2	98.2	87.8	x	x
Share of MPS in PSE	%	x	22.1	x	43.7	x	75.2	96.4	84.0	x	x
Share of MPS in risk-related measures	%	x	38.8	x	74.1	x	93.8	98.2	95.7	x	x
Risk related measures in GSSE	%	23.9	12.5	3.5	3.3	9.3	40.7	6.2	17.7	9.7	41.6

Notes: *) Private storage/non marketing, water management, certified seeds/breeds, technical assistance/extension, pest and disease control, "x" = not applicable

Source: Own calculations based on OECD (2009)

Table 2. Structure of transfers from risk management policies in selected emerging economies (average of the periods).

Public support/Insurance	Livestock insurance only	Single risk insurance	Combined insurance	Yield insurance
Non-subsidized private insurance	EE, FI[1)]	BE, BG, DK, FR, DE, GR, HU, IE, NL, SE, UK	BG, FR, HU, SL, SE	
Subsidized private insurance		AT, CZ, IT, LU, PT, RO, SK, SL, ES, LV, LT, PL	AT, CZ, IT, LU, PT, RO, SK, ES, PL	AT, FR[2)], IT, LU, ES
Insurance administered by public sector		CY	CY, GR	
Ad hoc aids	AT, BG, CY, CZ, DK, FI, DE, GR, HU, IE, LU, PL, RO, SK, SL, ES, SE, UK, LV, LT			
Calamity fund	AT, BE*, BG, DK*, FR*, DE*, IT, NL*, PL, PT*, LT			
State-run reinsurance	PT, ES, IT			
Stabilization accounts**)	FI, ES, SE			

Notes: 1) Single-risk insurance, combined insurance, 2) Whole-farm yield insurance, *) Public calamity funds, partially subsidized, **) Individual bank accounts for self-insurance which are publicly regulated or promoted.

Source: Bielza M. et al. (2008), own processing

Table 3. Public support of agricultural risk management systems in EU.

Conclusion

Market development, climate change, technological development, and company interests generate new kinds of risks and potential crises which it will be necessary to solve sensitively, efficiently and effectively.

The results indicate that the maximum tariffs were fixed after the WTO Uruguay Round Agreement on agriculture in 1995, which banned countercyclical border measures (variable levies), but countries could react to world price fluctuations by modifying the applied tariffs and applying special safeguard measures within the WTO rules. All OECD countries have the price stabilizing support

for at least some commodities. Although the share of market price support in the PSE has been decreasing for a long time, it still remains an important component in most countries around the world.

There are heterogeneous risk management support schemes in the world. While the emerging economies can be described as countries with a low level of risk management support, in the OECD area there are both countries with highly subsidized risk-related measures, which mainly rely on MPS (Japan), and countries with level of risk management support below OECD average, that rely heavily on VRP (USA, Canada). The share of MPS in the PSE has sharply decreased since the end of the 1980s, mainly as a consequence of the classification of the market distorting measures to the WTO Amber Box, such as MPS and most kinds of deficiency and stabilization payments based on current output or area. On the other hand, the WTO Green Box includes support for general services, water management, extension and advisory services, inspection services, training, and pest and disease control, the support of which will probably have higher priority.

The future development of governmental risk management support will depend on the frequency and consequences of the risks occurring as well as on the budgetary policy of countries and regions (the influence of the economic crisis will have an impact). Thanks to the progress in insurance and hedging and with the support of micro-finance institutions, the less developed countries that are considerably dependent on agriculture, can implement new risk management tools – index insurance and weather derivatives.

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