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# INTERNATIONAL COMMODITY BENCHMARKS AND PRODUCER PRICES

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**AMIS**



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## 1. Preface

At the fourth Session of the AMIS Global Food Market Information Group, which was held in Rome in October 2013, the Group requested the Secretariat to undertake a closer examination of agricultural price transmission from futures benchmarks to farm-gate. That request provided the genesis for this paper. Although price transmission is the subject of much academic research in the United States, elsewhere it is little studied. In fact, the basic questions about how prices diffuse from global markets to the farm among the major agricultural producers have gone largely unasked. Such questions include: How do prices get relayed from the CME benchmarks to the farming oblasts in Ukraine or to the Brazilian producers of Mato Grosso? Which components along the supply chain facilitate price transmission and which impede them? How relevant are futures market prices – whether global or regional - to producer price realization? And finally, given that commodity prices are so globalized, why do producers in some farming regions thrive and enjoy high price realization whereas others seem bound to a persistent low level of income? Using a qualitative approach, the paper attempts to answer these questions. Hopefully, it will show that price transmission involves a complex set of factors that have evolved from varying paths and rates of agricultural sector development and are inextricably tied to government policy.

## 2. Acknowledgments

*International commodity benchmarks and producer prices* was prepared by Ann Berg, who also coordinated the contributions of Estefania Puricelli, Rod Gravelet Blondin, Sun Chao and Holly Wang. The report benefited from inputs provided by economists at United States Department of Agriculture, traders from international grain houses and CME staff as well as from trade experts in the six countries reviewed.

## 3. Executive Summary

This study examines the level of price transmission from global or regional benchmarks to farm-gate - for wheat, maize and soybeans - in six countries: United States, Argentina, Brazil, Ukraine, South Africa and China. The first five countries are major exporters while the sixth – China – is the world's largest importer. It finds that price transmission varies considerably from country to country and is dependent upon an interlinking set of variables. Each country, in fact, has a unique set of variables that determines the diffusion of price from the global level to the point of production. The study groups these variables into three broad descriptive categories: *Background*, *Agricultural policy measures* and *Marketing tools*. These provide the basis for determining the level of *Price transmission* in each. The section on *Background* includes geographic factors, such as landmass, coastal access, proximity to importing regions, level of arable land, as well as demographic factors. It also describes the developmental path of the agricultural sector, including infrastructure and financial sector development. The section on *Agricultural policy measures* includes export taxes, export intervention (bans and quotas) and import restrictions. It also examines multiple subsidies – some direct - such as commodity specific price supports and others more indirect, such as credit and input subsidies and safety net insurance programs. The section on *Marketing tools* comprises exchange traded futures and cash market pricing agreements. In addition, this

TABLE 1:

	Wheat		Maize		Soybean	
	% of World Production	% of World Trade	% of World Production	% of World Trade	% of World Production	% of World Trade
United States	9	22	35	37	33	40
Argentina	2	6	3	17	18	9
Brazil	1	5	7	15	29	38
Ukraine	3	4	2	11	1	1
South Africa			1	3		
China*	18	2	22	3	6	60

\*China's trade figures refer to imports by Mainland China.

Source: FAO. 2011-2013 average.

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AMIS participating countries and those included in the study



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section describes technological, logistical and managerial advancements that are facilitating producer income realization. Finally, this section examines the level of credit access, institutional support and markets integration. The concluding section on *Price transmission* forms a synthesis of the first three.

The study finds that in some countries, farm gate prices are easily quantifiable through futures prices and transport costs (US, South Africa). In others, intermediary mark-ups (Argentina, Ukraine) or a series of logistical constraints (Brazil) impede price formation; while in others, various government policies play a significant role in domestic price determination (Argentina, Ukraine, China). Outside the US – where producer pricing power is uniformly high - pricing power tends to be variable within each country depending upon farm size, vertical integration, access to credit, on-farm storage, managerial skills and risk management tools.

For the six countries included here, the study identifies several key variables, many of which are interconnected, that determine both farm income and level of price transmission along the supply chain to point of production:

- Farm size
- Access to credit
- Infrastructure development
- Intermediary margins
- Managerial skills
- Government intervention
- Futures markets development

Although the issue of farm size warrants further research, especially in such countries where cereal farms are on average less than 50 hectares, such as India, Turkey, and much of the European Union, in the six countries reviewed here, farm size plays an important role in the level of price transmission. Large farms are found to have several advantages over their small and subsistence farm counterparts. For example, in Brazil and Ukraine, large farms (10,000 – 500,000 hectares) are frequently organized as corporations or holding companies, giving them access to international financing (including US futures markets) which aids in their vertical expansion along the supply chain, from farm to export. Ownership of storage facilities, export terminals, transportation lines, as well as processing plants, allows corporate farms to enjoy high levels of price transmission from global benchmarks. Conversely, small producers often endure steep sales discounts and double digit loan rates, which keep them bound to sub-optimal farm practices and low levels of production. They tend to operate within a fragmented price environment and have few marketing tools or choices at their disposal. In China – where grain and oilseed farm size is on average less than one hectare – the government compensates many of these marketing system asymmetries by providing hefty subsidies for inputs, machinery, storage and minimum price supports.

Access to credit varies across countries and is another key to price transmission. Highly developed farm credit sectors in South Africa and the US – where farm sizes are medium (2000 and 445 hectares respectively) have aided producers with risk management needs, including marketing tools and the use of futures. In addition, cheap credit for US producers has been instrumental in their building a massive amount of on-farm storage (330 million tonnes) giving them extraordinary pricing power in the market. Elsewhere, such as in Brazil and to a lesser extent Ukraine, the government subsidizes credit by offering low interest rate loans. Barter contracts, i.e. a pledge of harvest quantities in exchange for loans, are common arrangements in Brazil and Argentina where access to farm credit is suboptimal.

Infrastructure development has a profound impact on producer price realization. As demand for grain has steadily increased, infrastructure in some countries, most notably Brazil, and to some extent China, Ukraine and Argentina has not kept pace. Brazil, a vast country with a system of mainly unpaved roads, suffers from long transit times and extreme bottlenecks at export points. These inefficiencies add layers of costs that are passed along the supply chain. As these can total over USD150 per tonne, they are driving some farm gate prices - depending upon the commodity - to levels significantly below production costs. In China, insufficient storage is leading to crop waste, whereas in Ukraine, a country projected to double production by 2020, a rail car shortage is impeding quick transit from interior to export. Harvest time bottlenecks are frequent in Argentina, especially with regard to soybeans. Similar to Brazil, the costs incurred from infrastructure deficits in China, Ukraine and Argentina are passed on to the producer.

Intermediary margins are difficult to assess as they are often opaque and embedded along the supply chain. In general, countries with well-functioning futures markets, such as US and South Africa operate with minimal intermediary margins, since futures markets tend to draw ancillary services that bring transparency and integration to the entire market. However, in China, where futures markets exhibit high levels of trade volumes, domestic markets fragmentation combined with minimum price support levels (now above market clearing levels) are causing<sup>1</sup> door-to-door crop collector-merchants to take wide margins at farm-gate. In Ukraine, which has no domestic futures market and a weak ancillary farm service sector, producers are subject to steep intermediary margins and often sell their production at harvest at distressed prices.

Managerial skills, including technological adaptations are increasingly aiding producer price realization. Argentina offers the strongest example of this trend. It features the highest percentage level of “no till” farming in the world and has embraced silo bag storage. The latter allows producers to reduce layers of costs associated with short haul trucking and traditional storage rents. Argentina also employs several managerial models to increase the cost effectiveness of farming. Elsewhere, the level of technological and managerial adaptations tends to split along the lines of large farms vs. small farms.

Government measures including export taxes, export restrictions, stocking policies, and farm subsidies varies significantly across the six countries reviewed. South Africa is the only one that allows its markets to operate in a free market environment and without producer assistance. Argentina taxes exports and these taxes tend to be passed along the supply chain to the producer. Steep discounts to global prices are lessening supply responsiveness by its producers, particularly for wheat. China, conversely, has implemented a price support program with yearly increases which has resulted in maize, rice and wheat to be purchased by the government and to be held in subsidized silos. This is distorting prices and creating artificial shortages across much of the country while creating transnational arbitrage opportunities for major grain and oilseed companies operating in China. In Ukraine, where the government has invoked export restrictions as recently as 2010, exporters tend to impose wide margins at point of vessel loading as a risk premium against potential government interference (as well as basis risk against CME prices). These margins are passed along the supply chain to the producer.

The study finds that the presence of well-functioning futures and options markets is an important determinant of producer income realization: Futures price transparency across a time and space continuum is a valuable tool for cropping decisions and sales timing as well as a means for pinpointing and correcting infrastructure deficiencies. Options contracts increasingly serve as important price tools for producers as they afford price protection and, beyond the initial premium expense, require no further margining. Where these markets are integrated with the financial sector (US, South Africa), producer hedging with the use of futures or options contracts - or forward contracting based on these markets - greatly improves access to credit, a significant

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1 In the literature on China they are called IGMs or “Individual Grain Merchants”.

factor in farm income. In countries where futures markets are illiquid or non-existent, intermediary mark-ups and logistics constraints depress farm income (Brazil, Ukraine). Finally, in countries where government role is more pronounced (Argentina, China), futures prices may differ from global markets and in some instances become vulnerable to excess speculation or volatile price behavior.

## 4. Introduction

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Although commodity benchmarks have engendered significant debate among academics, industry participants, inter-governmental organizations and supervisory authorities over the past decade, their relevance to those engaged in the production of the underlying goods on a global comparative basis has gone largely unexplored. This study examines agricultural markets in six countries, seeking to understand the process by which prices are transmitted from regional or global benchmarks to the farm-gate for wheat, maize and soybeans. A dual aim of the study is to determine levels of regional price transparency and producer price realization.

### 4.1. Methodology

This report is a qualitative analysis of the price transmission process for maize, wheat and soybeans within the agricultural marketing systems of six countries. Many of the topics examined, such as farm prices, infrastructure capacity, and intermediary margins are not easily quantifiable owing to the variability and availability of country by country statistics. Therefore, the report relies heavily on a broad base of literature to ensure as much accuracy as possible in its findings and observations. Further, it complements the literature with information gathered from interviews with cash grain traders, academics, public officials and exchange operators. Hopefully, the report will lead to efforts to increase the data collection (see Appendix) via surveys and other methods so that market discontinuities and asymmetries can be more accurately identified and supply chains viewed with greater transparency - a key goal of AMIS. It should be noted that the paper's findings, conclusions and opinions expressed without citation are the authors' own and are based on extensive experience in grain export, futures trading and country field work.

### 4.2. Background

The current global agricultural pricing system cannot be fully appreciated without reference to the commodities markets operating throughout the second half of the 20<sup>th</sup> C. During or following World War II (WWII), commodity exchanges in India, Argentina, Egypt, were either nationalized or shuttered in the name of food security. The majority of governments fixed producer prices, particularly for wheat. Commodity futures trading was simply irrelevant in the absence of price discovery. Much trade took place under international agreements, such as the Wheat Trade Convention, although the maize trade was unrestricted. The US was the largest exporter and European countries, significant importers for 2 ½ decades after WWII, became exporters as the Common Agricultural Policy encouraged massive productivity gains. Grain trading houses were all privately held multi-generation companies known for their secrecy. Only the United States featured commodity futures markets, operated at the Chicago Board of Trade, which were recognized as international pricing mechanisms, or benchmarks. Elsewhere, in the UK, the London Commodity Exchange had developed futures in softs such as coffee and sugar and later cocoa which were seen as professionals' markets; Canada maintained small markets in grain and Japan, which had developed the first futures market in rice in 1730, opened the Tokyo Grain Exchange in 1952. Malaysia, the heart of the palm oil industry for centuries, began trading in crude palm oil futures in Kuala Lumpur in 1980.

Enormous change swept over markets beginning with the late 1980's. Markets liberalization allowed trade to grow, boosting GDP in a number of countries, newly labeled "emerging markets." The European Union along with other countries changed their commodity specific price support systems to income supports, allowing markets to fluctuate. From the late 1980's through the 2000's, commodity futures exchanges began to mushroom, appearing in India, China, South Africa and France. In Argentina and Brazil, futures markets which had been eclipsed by state grain boards – were reopened as price discovery centers.

During the 2000s, a constellation of factors emerged setting in motion a boom in commodity and commodity futures trading. Extensive de-regulation in the US, emerging markets growth including China's entry into the WTO, promotion by the brokerage and banking industry of commodities as an alternative "investment class" and the expansion of markets via electronic trading caused CME agricultural trade volumes to grow at annual



double digit rates. When the food crisis struck in 2007, a fierce debate began over the rise of speculative trading and its effect on prices and volatility. Following the 2008 financial crisis, a reformist movement developed in the US and Europe, which resulted in several legislative, regulatory and exchange initiatives, bringing greater markets transparency, higher levels of supervision and increased enforcement activity.

Parallel to US and European development, emerging markets governments welcomed commodity futures markets: electronic marketplaces allowed supervisors to monitor and audit all trading activity while price discovery gave producers important signals about cropping, storing and selling. Futures markets did not rise without incident, however. In China, the government ordered 2 separate *rectifications* on the multiple and often redundant exchange system over a 15-year period, finally reducing the forty-plus entities down to only three located in Dalian, Zhengzhou and Shanghai, each with a separate product base. In India, the government halted trading in wheat, rice, tur and potatoes when commodity prices began to rise in 2007; referring the matter to a formal commission before allowing trade resumption in 2010. In Turkey, the fledgling Izmir exchange launched contracts in wheat and cotton, alongside currency and equity index contracts, to find that, unlike financial futures which in 2005 met with quick success, the commodity sector was not sufficiently liberalized to support futures trading. Overall, commodity futures trading in emerging markets is more regulated than in its US and European counterparts, often restricting foreign participation and stipulating smaller price and position limits to curb speculation.

### 4.3. Existing literature

Much of the literature that exists on the efficacy of futures markets is empirically based and focused on markets in the US, where futures have enjoyed a long existence. Not surprisingly, the 2007/08 food crisis motivated several studies examining the role of speculation, much of it based on the phenomenon of index investing (Irwin & D, 2010) (Tang & Xiong, 2012) (Irwin & Sanders, *The impact of index funds in Commodity Futures Markets: a System Approach*, 2011) (UNCTAD, 2011). During the last decade, several scholarly studies focused on futures pricing in China and India studies have appeared in publication. Most recently, cross exchange comparative studies have emerged. For example, “Cross-market Soybean Futures Price Discovery: Does the Dalian Commodity Exchange Affect the Chicago Board of Trade?” (Han, Liang, & Tang, 2013) provides an analysis of the co-integration between soybean futures prices at the Dalian Commodity Exchange (DCE) and the CBOT, or “How far do shocks move across borders? Examining volatility transmission in major agricultural futures markets” (Hernandez, Ibarra, & Trupkin, 2013). Further, “Price transmission from international to domestic markets” provides a quantitative analysis of international cereal price transmission in emerging regions to retail and wholesale markets (but not to farm-gate) (Greb, Jamora, & Mengel, 2012). Most recently, “Price Formation in Commodities Markets: Financialisation and Beyond” (Valiente, 2013) is a comprehensive examination of major commodity groups including agriculture and assesses the drivers of the growth of derivatives markets and their impact on price formation.

*Case studies: US, Argentina, Brazil, Ukraine, South Africa, and China:* The six countries are selected for their diversity of domestic price models – particularly regarding producer price realization - and their significance as exporters or importers. A brief matrix below explains the selection of the 5 countries.

TABLE 2: CASE STUDIES

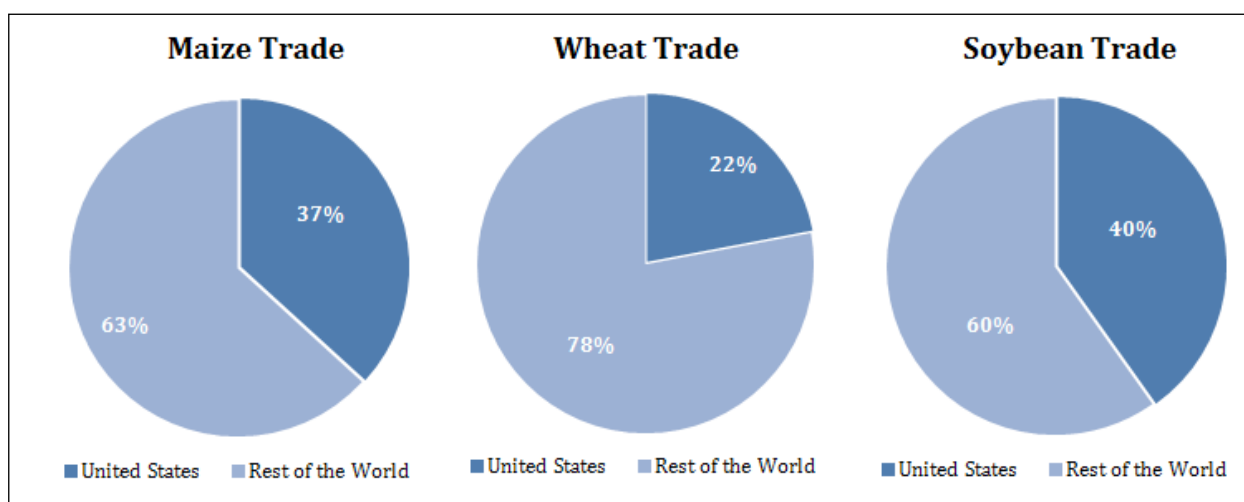
US	Major maize, wheat, soybean exporter - global benchmarks and high level of price transmission to domestic producers.
Argentina	Large wheat/maize/soybean exporter - export tax regime and future markets.
Brazil	Large maize/soybeans exporter; wheat importer - significant farm to port transport costs and illiquid agricultural futures trading.
Ukraine	Major grain exporter with projected significant export growth - rudimentary exchange development.
South Africa	Maize exporter - producer-oriented commodity futures exchange system.
China	World’s largest soybean importer - robust commodity futures exchanges with high level of speculative trade.

## 5. United States

### 5.1. Summary

The US has the most extended history of agricultural risk management of the six countries studied here. The agricultural supply chain is highly integrated and transparent, with sizable levels of infrastructure development, including efficient barge and rail transportation networks and significant amounts of on and off-farm storage. The ancillary service sector – farm credit, farm advisory, brokering – is a mature and competitive industry, characterized by low margins. Producers, mostly family enterprises operating medium sized farms (average 445 hectares), have a wide array of marketing and pricing tools, including cash forwards, futures and increasingly more common – put and call options. The government (USDA) is a significant collector of farm gate and terminal market prices which it publishes along with other relevant information such as quarterly supply and demand estimates and weekly exports. The level of government intervention is low although generous safety net programs, particularly ones involving crop insurance, have helped supplement US producer income. US futures markets are the most heavily traded in the world and are considered global “benchmarks.” Altogether, the system exhibits a high level of price transmission from benchmark to farm-gate and demonstrates considerable pricing power by the producer.

FIGURE 1



Source: 2011-2013 average. FAO.

### 5.2. Background

The US is an agricultural power achieving self-sufficiency in tobacco, grains, and meats before its founding in 1776. It possesses vast tracts of open flat land – ideal for large scale production - and a navigable river system that winds through the center of country's growing region. It features the oldest continuous commodity futures exchanges, which became established in Chicago and New York around the grains and dairy markets. Founded in 1848 by a group of businessmen as a members' organization, the Chicago Board of Trade (CBOT) became the first exchange to provide a structure to the chaotic grain markets of the mid-19th C. Wheat and rye prices tended to dip so steeply at harvest that, according to historians, producers would sometimes dump their grain into neighboring Lake Michigan as protest. Conversely, as the old crop ran out during April and May, prices would often soar. A centralized trading hub, it was reasoned, would allow prices to smooth out along the crop year. Trade first began in forward cash contracts and later evolved into both futures and option contracts - called privileges. Despite ongoing scandals of price manipulations such as corners,<sup>2</sup> Chicago grew rapidly as the world price hub for grain, particularly from 1870 –1913, a period called the Great European Grain Invasion. Exchange-created quality and weight standards, mechanized harvesting and the completion of the Erie Canal, which cheapened grain transport between Chicago and eastern seaboard from USD 100 to USD 10 per tonne, gave Chicago the global advantage.

<sup>2</sup> A corner is an attempt to increase the commodity futures price by owning or controlling large quantities of the underlying supplies, particularly in the delivery warehouses.

The 20th C. saw the first legislative efforts to oversee the nation's grain markets. The Grain Futures Act became law in 1922, followed by the Commodity Exchange Act (CEA) in 1936. The latter was significant because it introduced the concept of speculative position limits and included an aim of countering "excessive speculation."<sup>3</sup> The CEA, amended multiple times, still provides the legislative framework for all futures trading and allowed for the creation of the Commodity Futures Trading Commission (CFTC) in 1974. Other significant regulatory events include the Commodity Futures Modernization Act (CFMA) in 2000, which famously gave energy futures contracts and all Over-the-Counter (OTC) bi-lateral contracts exemption from oversight, and the Dodd Frank Act of 2010, which more or less reversed the exemptions of the CFMA. The D-F Act also introduced a standard of "recklessness," which lowered the bar when charging traders with disorderly trading or market manipulation<sup>4</sup>. Similarly, other acts and rulings of the early 2000s that were part of the deregulatory trend in the US are being revisited, particularly with regard to the banking sector which created a heavy footprint in the whole commodity sector over the last 10 years.

Although sometimes dominated by the government's various price support systems during times of surplus, the US grain market has experienced greater fluctuation than others. Legal certainty over producer cooperatives together with the establishment of trade associations and standardized trade practices during the early 1900s created fairly efficient markets in marketing and credit. In 1916, the Federal Farm Loan Act established the Farm Credit System as a borrower-owned organization which still provides working loans today. The efficiency of the futures markets was described in 1933 by the economist Holbrook Working who examined the wheat futures spread differential between the May and July contracts - the transition period from old crop to new crop - going back almost fifty years to 1885 (Working, March 1933). Working also published many other papers on futures trading, in one - rejecting John Maynard Keynes theory of *natural backwardation*<sup>5</sup>, and in another - arguing that grain firms tended to speculate on the basis<sup>6</sup> because it was more predictable than futures speculation, underscoring the level of trade sophistication that existed by the mid-20th C. Significantly, Working was the first economist to theorize on the level of speculation necessary for smoothly functioning futures markets. Commissioned in 1960 by the US government (then worried about the insufficiency of speculative activity in the Chicago grain markets), Working established a minimum ratio of 115 speculators for every 100 hedgers<sup>7</sup>.

Market efficiency was further enhanced by steady infrastructure improvements, including the Great Lakes lock and dam system, networks of barge waterways, rural roads, railways, warehouses and on-farm storage. As rail transport deregulated during the 1970's, some producers added rail sidings to their farms enabling them to load unit trains of 60 or more cars for US Gulf export at advantageous freight rates.

The advent of options at the CBOT revolutionized producer pricing. After the government lifted a 46 year ban on options<sup>8</sup> in 1982, options became a regular feature of producer marketing. Options trading received a considerable boost in 1993 when the USDA devised its Options Pilot Program (OPP) that subsidized the purchase of CBOT put<sup>9</sup> options in lieu of deficiency payments<sup>10</sup>. Today, producers purchase put or call options through a futures broker or devise a cash contract with the local warehouse that includes an embedded call option. For example, producers often enter a cash forward called a minimum price contract (MPC). This allows the sales price to be upwardly adjusted if the futures price of maize, for example, rises sharply between the forward sale date and harvest delivery. Besides call options, put options, which insure against a price decline, allow producers an

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3 Excessive speculation has never been defined.

4 Previously, the CFTC would have to prove that a trader had "intent" to manipulate prices.

5 Keynes (1883-1946) - a renowned British economist - theorized that the speculators - in order to accommodate short hedgers - would only be induced into long market positions if the spot cash price was a premium to the spot futures price. Today "backwardation" refers to a market structure in which each deferred contract month is trading at a successively lower price than the front month.

6 Arithmetic difference between the cash and futures price, e.g. + 50 July Wheat futures, in which the cash price is \$6.50 per bushel and the July futures is \$6.00 per bushel Most commercial trade in US is conducted using basis contracts.

7 This ratio is called the T-ratio and is expressed as 1.15.

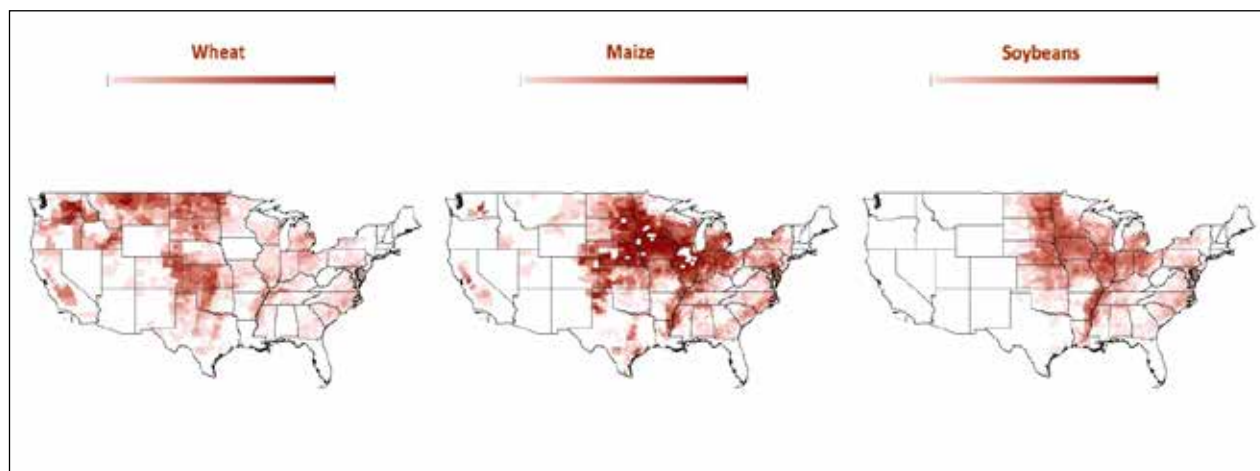
8 Options are the rights to buy and sell commodities at a particular price, called the strike price. The buyer pays a premium to the seller, or grantor, for this right.

9 A put option is the right, but not the obligation to sell a futures contract at a particular price. The put option buyer pays a premium for this right.

10 This program was not renewed in the subsequent Farm Bill.

alternative to selling a futures contract and avoid potentially account-breaking margin calls in the event of an upward price spike. When prices surged in 2007, some banks refused to lend to farmers to cover margin calls for short futures hedges because of severe market volatility.

**FIGURE 2: MAIN PRODUCTIVE REGIONS FOR WHEAT, MAIZE AND SOYBEANS**



Source: GEOGLAM, based on 5 years (2009-2013) average of production.

### 5.3. Agricultural Policy Measures

Notwithstanding the relatively free market environment in the US, producers have benefited enormously from the various safety net programs and indirect subsidies many of which began in the Depression Era. In addition to direct subsidies that provide income support, the US farm bill<sup>11</sup> provides measures for countercyclical (deficiency) and conservation payments, as well as subsidized credit and marketing loans which establish a minimum price per bushel sale price. Finally, producers can obtain crop insurance offered by private insurers underwritten by the federal government. For crop year 2011/12 - the year of extreme Midwest drought - producers received a record USD 16 bn in insurance payments, USD 11 bn of which was paid by the taxpayer. Some experts have argued that the structure of the insurance program, which bases payments on the highest price for year, allowed the payouts to balloon to twice the actual losses incurred for 2012. According to the OECD, between the years 2007 and 2012, US producers received subsidies of approximately 7 percent of total crop value, which ranked relatively low among OECD countries<sup>12</sup>. Nonetheless, subsidy payments are highly skewed to large farms: the largest 10 percent received over 70 percent of the subsidies in recent years.

In addition to farm legacy programs, the biofuels mandates established in 2007, created indirect price subsidies to grain and oilseed producers by exerting a large demand pull on the maize market. US ethanol plants received subsidies, tariff protection, loans, grants, tax credits and other concessions to start ethanol manufacture, all enabling an industry to ramp up usage from 10 percent to 40 percent of the maize crop in 5 years, (blending subsidies and import tariffs for ethanol were eliminated as of 2011). Although promoted as a national security issue, as a means to achieve energy independence, ethanol consumption since 2010 has remained static at around 10 percent [13 bn gallons] of gasoline consumption, meeting resistance among blenders. The mandates, which were based on an assumption of annual increases in gasoline usage, have been recently relaxed by the Environmental Protection Agency, the body responsible for overseeing the biofuel program. The influence of biofuel mandates on price levels for maize and alternative crops continues to be debated.

### 5.4. Marketing Tools

A survey of marketing choices reveals that producers have an array of products and marketing tools from which to choose. Agricultural advising has become a fully developed industry, helping producers, via computerized spread sheets to make cropping and marketing decisions. Multiple private and government sources, particularly

<sup>11</sup> Direct payments and countercyclical payments were eliminated in the 2014 US Farm Bill.

<sup>12</sup> Crop insurance payments for 2012 were mostly paid in 2013 and not included in the OECD 2007 – 2012 time frame.

the USDA, make available agricultural news, such as export sales, domestic and export basis levels, futures price commentary and supply and demand estimates. Universities also devote extensive research to agriculture, commonly funded by public grants. The CBOT - now part of Chicago Mercantile Exchange (CME) group - makes available weekly information on receipts, shipments and stocks in the delivery areas and daily information on makers and takers of deliveries.

Choice among marketing tools is the most salient feature of producer pricing in the US. Producers can use exchange traded futures and options to manage price risk or can choose among a variety of cash contracts. These include traditional cash forward agreements, deferred pricing, storage agreements and basis contracts. In addition, producers can negotiate other more sophisticated arrangements such as a minimum price contract (MPC) that includes and embedded call option. An MPC can be upwardly adjusted if the futures price rises between the contract agreement and harvest period. OTC swaps agreements, which offer price protection but do not involve transfer of ownership of the physical commodity, are finding some traction among larger producers<sup>13</sup>. Intense competition among warehouses and large grain buyers, cheap credit, multiple agricultural advisors, transparent futures and cash markets have allowed producers to become very savvy about cropping, growing and marketing. In addition, their ownership of significant on-farm storage, estimated by the USDA at approximately 330 million tonnes<sup>14</sup> has given them the greatest pricing power among the global farm community. Finally, US producers are relatively wealthy: the USDA has projected farm income for 2013 at a record high of USD 121 bn, while estimating farm debt to asset ratio at about 10 per cent, the lowest since 1960, owing in part to increasing land values. Producer wealth means that producers have considerable holding power in times of low prices, often forcing buyers to pay nearby premiums for spot purchases. Part of the farm success can be attributed to ever growing farm sizes – today averaging over 1,100 acres [445 hectares], double the size in the 1980s. Despite this consolidation, the most recent census data reveals that 87 percent of all farms are family owned or controlled vs. 8 percent incorporated.

## 5.5. Price Transmission

Commodity pricing across the US tends to be very efficient with each commodity forming a constantly evolving matrix. The price matrix is known to all traders involved in grain merchandising since profitable trading depends on capturing small arbitrage opportunities between demand points such as the US Gulf export terminals and the domestic supply regions, such as central Iowa, the state with the highest maize and soybean production. Margins along the supply chain are extremely lean with warehouses and transporters depending upon large volumes to generate revenues. Commodity future brokerage fees are negligible at less than 0.1 percent of commodity value.

Determinants of commodity price for any location including farm gate are largely:

- Futures price
- Transportation costs
- Storage availability and Regional supply and demand

### 5.5.1 Futures price

Although deemed global benchmarks, US grain futures traded at the CME specify physical delivery in areas located in the Midwest growing regions, quite distanced from the export markets. The maize and soybean delivery areas include a relatively narrow band of barge loading stations along the Illinois River, including Chicago which also has rail and Great Lakes shipping capacity. The Illinois River is a major tributary to the Mississippi River, the central artery to the largest export point (US Gulf) for grains and oilseeds. The soft red wheat delivery area is considerably larger and includes another Mississippi tributary - the Ohio River - and non-contiguous interior points such as Toledo, Ohio<sup>15</sup>. Hence, the futures prices of these contracts – commonly viewed as barometers of global supply and demand, are designed to converge to their specified interior pricing points during the delivery month. Figure 3 shows how cash prices (and to a lesser extent farm prices) are tightly correlated with futures market prices in the maize market.

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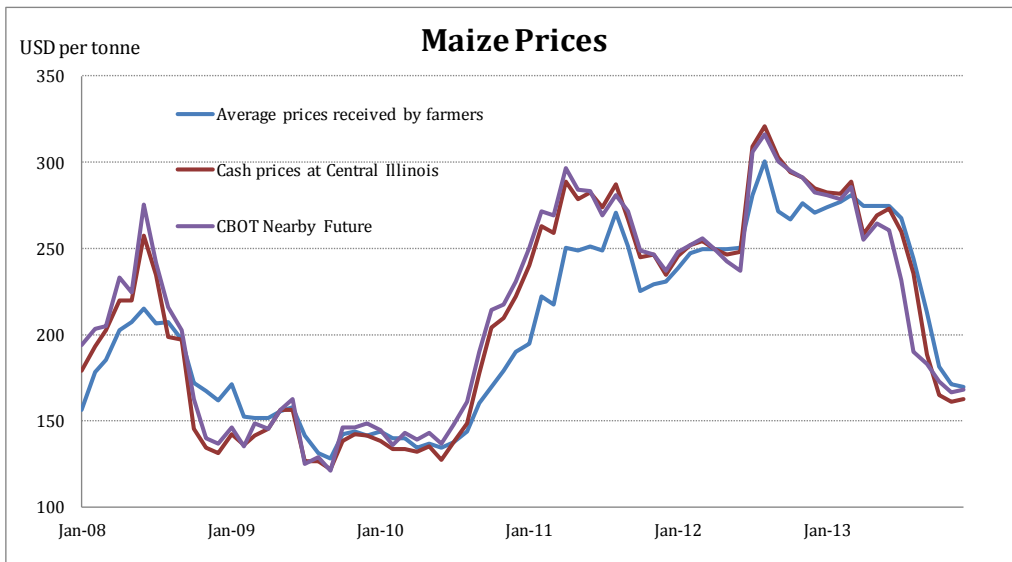
13 See Appendix for list of marketing tools.

14 On-farm storage is greater than off-farm commercial storage, which is estimated at about 257 million MT.

15 The largest wheat class, Hard red winter wheat, known as Kansas City HRWW, features delivery in the environs of Kansas City, Missouri.



**FIGURE 3: US FARM-GATE PRICES ARE HIGHLY CORRELATED WITH FUTURES PRICES**



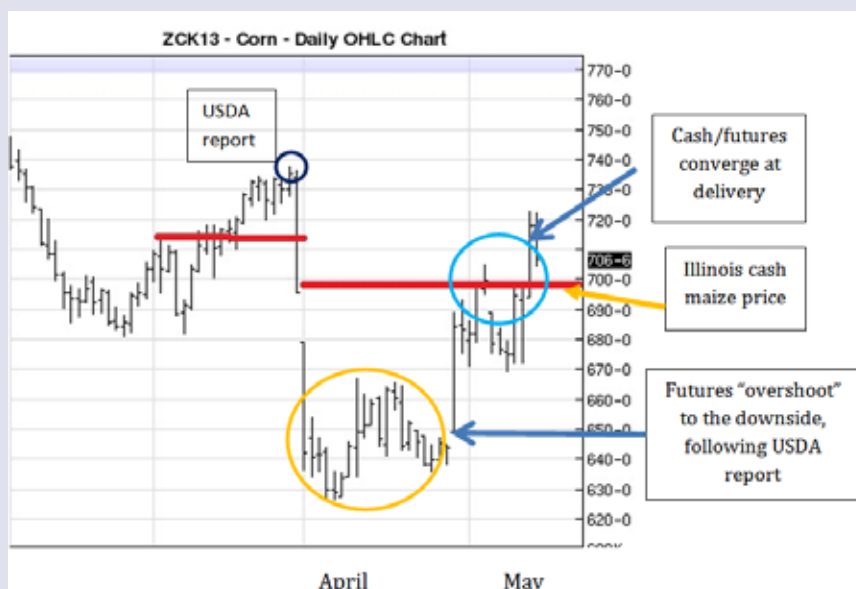
Source: USDA – ERS, CBOT.

Farm prices are based on a survey of grain procurers (local elevators). The survey includes both spot sales and deliveries on forward sales, resulting in a “smoothing” of prices.

**Box: Interplay between global and local dynamics in futures pricing**

A stark example of the interplay between global and local dynamics in futures pricing is observable in the events following the USDA March 2013 planting intentions report, which projected historically high US maize acreage: while the maize futures price plummeted a record USD 35 per tonne amid massive hedge fund liquidation, the farm price in Illinois barely moved, averaging a lofty USD 16 per tonne higher than the May futures for all of April. The dramatic futures move and lack of follow-through by the farm price, underscores the occasional tendency for futures prices to “overshoot” (Nissanke 2010) on the up or down side. Predictably, within a month and throughout the delivery period, May futures price experienced a sharp upward adjustment and converged with the cash values at around USD 275 per tonne (see chart).

**FIGURE 4: CHART CASH MAIZE PRICE IL VS MAY FUTURES [AVERAGE MONTHLY CASH PRICE REPRESENTED BY RED LINE]**



Source: Author’s own derived from CBOT, USDA-ERS, Illinois Farm Bureau

### 5.5.2. Transportation

The cost of transport to and from the delivery area largely determines the components of the cash price matrix - both domestic or export. The US Gulf export market is the most watched market, its price largely determined by the futures price plus handling costs and Mississippi River barge freight, which is highly variable. A typical export price for maize during harvest might be quoted at USD .70 per bushel [USD 27.5 per tonne] plus Chicago December futures, when the cost of shipping from the interior via the Mississippi River is approximately USD 25 per tonne and other charges such as barge loading, insurance and export elevation could total an extra USD 3- USD 5 per tonne. All other domestic prices typically price off the export price minus freight and handling. As the map indicates, basis levels decline according to distance from export points, although strong demand by ethanol refiners and soybean crushers will often improve these interior basis levels considerably. Unlike exports, which are increasingly sourced from other regions, demand by domestic milling, refining, distilling and crushing plants is fairly inelastic.

Although theoretically the price at the Gulf cannot exceed the futures price plus full costings, the Gulf export market does fluctuate, spiking higher as it did for soybeans in mid-2013, when significant levels of demand switched from South America to the US, or sliding lower as it did for wheat during the summer of 2010. The historically low wheat basis and lack of convergence to either the soft red wheat (SRW) Chicago based futures or the hard red wheat (HRW) Kansas City based futures in 2010 engendered industry-wide debate. In addition to the deliberations among academics, farm advisors, end-users and exchanges, the CFTC hosted roundtable discussions, noting that the entire premise of hedging depends upon a predictable correlation between the cash and futures market. In 2010, after the CME allowed the fixed storage rates specified in the SRW contract to become "variable," cash/futures convergence improved considerably<sup>16</sup>, although this change resulted in greater fluctuation of spreads (the price difference between two calendar months)<sup>17</sup>.

### 5.5.3. Storage availability and Regional supply/demand

The linked factors of storage and regional supply/demand are the other important components in determining interior prices, including producer prices. Normally, during years of adequate supplies, producer cash prices trade at discounts to futures. Even though producers have significant on-farm storage (330 million tonnes vs. 270 off-farm), it is not sufficient to hold the massive maize, soybean and wheat crops at harvest. As commercial warehouses fill, the price levels to producers may sink to minus USD .30 per bushel – USD .50 per bushel (USD12 – USD 20 per tonne) the nearby futures, forcing steep carrying charges in the market and sometimes encouraging producers to store crops temporarily on the ground<sup>18</sup>.

As supplies become consumed during the year, the producer basis will tend to increase. Farmers keep several years' history of their individual seasonal basis levels to optimize their timing of sales. For the majority of producers, once the glut of harvest ends, on-farm storage permits them great flexibility in sales timing while futures/options positions and cash forward sales protect them against an overall price decline.

The drought stricken 2012/13 maize market provides a look at how the producer price configuration can depart significantly from the norm. Early in the year, ethanol refiners surpassed exporters as the strongest demand pull – indeed maize demand for ethanol<sup>19</sup> was so strong it drew supplies away from the river system, pricing the US out of its long held position as the number one maize exporter. The interior cash basis levels, particularly along the deficit Illinois River delivery region, remained at abnormally high levels for most of the year, at premiums rather than discounts to futures, causing large inversions between the spot and forward month futures to occur at the March, May and July expirations.

Although the effects of large speculative inflows into grain markets are still being debated, most experts would agree that futures markets during 2013 have behaved rationally and with subdued levels of volatility. The large rebound in production for 2013/14 has dissuaded some speculative activity as lower prices and lower price variability translate into lower profitability, particularly for hedge fund managers who tend to trade aggressively

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16 For an analysis of this topic, see: (Scott Irwin, 2009); or (Daniel O'Brien, 2010).

17 The July/September 2010 wheat spread traded in a \$18/MT range, while normal range was previously static, around \$1/MT.

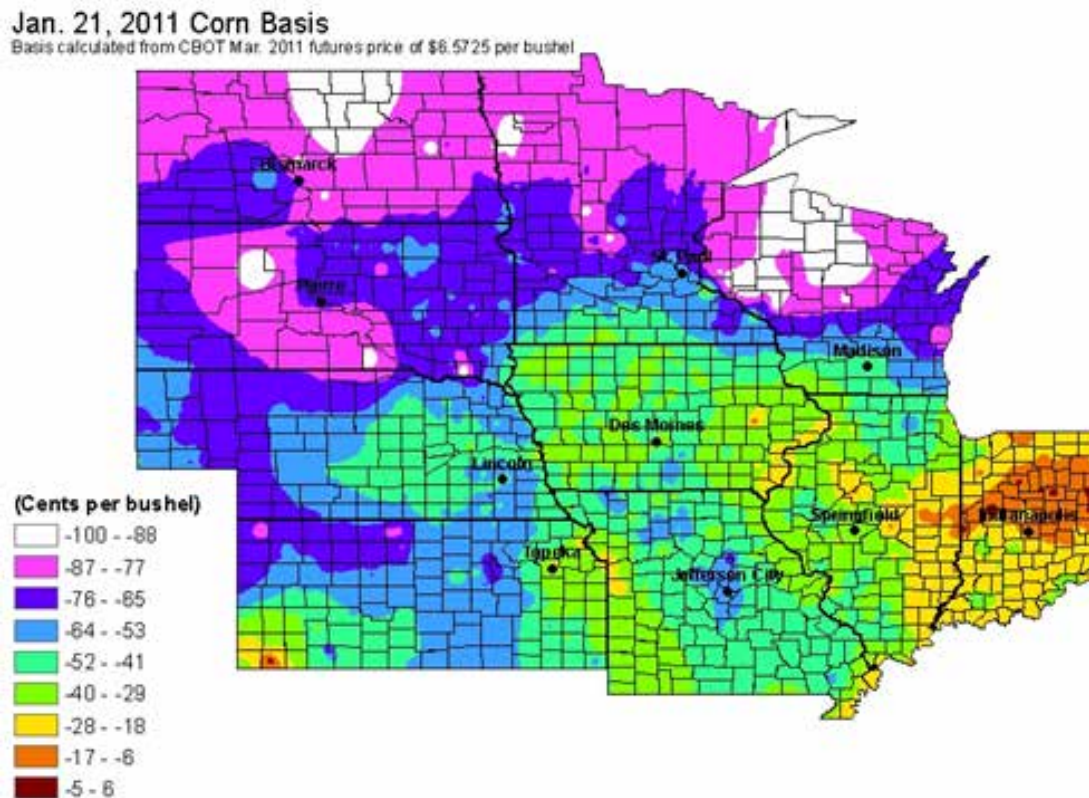
18 Similar to the other futures pricing systems, the CME contracts do not allow a producer, who has sold futures, to satisfy the contract by making delivery. Only warehouses registered with the CME can make delivery against short futures contracts. Consequently, the warehouse will normally discount the producer's price to the futures.

19 Ethanol consumption for 2012/13 marketing year was estimated at 127 m MT vs. exports of 29 m MT.

without long or short bias. Passively managed Index funds, which track a basket of commodity prices, are also reducing their market presence.

Producers in the US have proved to be highly responsive to market signals, notably in the spring of 2013, by expanding planting and changing their crop mix to a higher proportion of maize acreage.

**FIGURE 4: US MAIZE (CORN) BASIS**



Source: [card.iastate.edu](http://card.iastate.edu)

In all, owing to the prominence of US cash and futures markets, extended history of risk management, the sophistication of price tools and high level of market related information available, US producers enjoy the highest level of price transmission and price transparency among global producers. However, because of increasing supply price responsiveness by other countries, US producers are losing their price setting dominance. Declining global influence together with high production costs, mostly attributable to lofty land prices, may result in a more challenging environment for US producers for the foreseeable future.

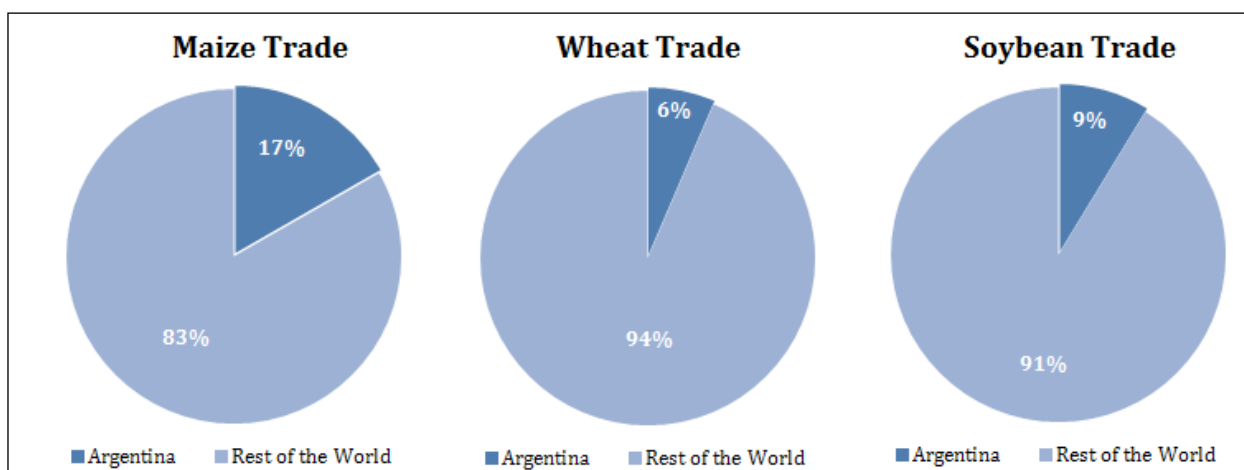


## 6. Argentina

### 6.1 Summary

Argentina has an extended history as a major producer and exporter of agricultural products, including wheat, maize and soybeans. Fertile land, a temperate climate and the proximity of the main productive areas to ports, give it a competitive advantage in the agricultural export sector. Aided by agricultural promotion measures and possessing entrepreneurial skills, Argentinean producers have developed a distinct set of market-related efficiencies. Cost-saving farm practices and technologies, flexible managerial models and infrastructure advancements have enabled producers to maximize income and increase market pricing power. Two commodities future markets operate in Argentina, offering a variety of markets tools.

FIGURE 5:

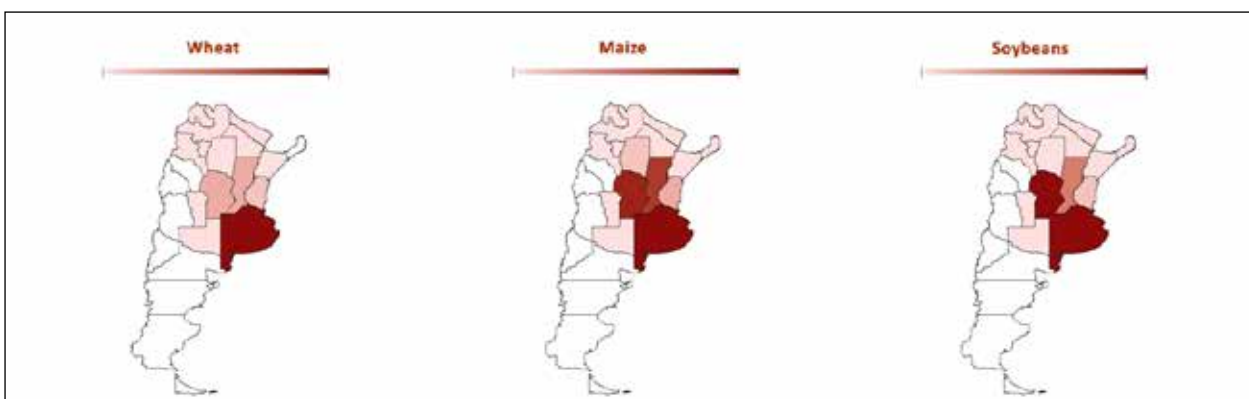


Source: 2011-2013 average. FAO.

### 6.2. Background

Argentina is a major producer and exporter of agricultural products with a history that extends back 150 years, when the country achieved statehood. Thanks to its fertile land, temperate climate and resourceful producers, it has developed a distinct set of market-related features. Historically known as the "Pampas", Argentina is the largest exporter of soybean meal and soybean oil and is among the top 10 exporters of soybeans, maize and wheat among other products. Situated in the Southern Hemisphere, it supplies the international market in contra-season.

FIGURE 6: MAIN PRODUCTIVE REGIONS FOR WHEAT, MAIZE AND SOYBEANS



Source: GEOGLAM, based on 5 years (2008-2012) average of production.

Geographically, the main productive regions of maize, soybeans and wheat are near the most important port areas of the country, namely Paraná River (which includes the port of Rosario), Quequén Port and Bahía Blanca Port. In the case of soybeans, the main crushing complex is along the Paraná River. Because the domestic market is relatively small, the international market is the main destination of soybean production, both soybeans and its byproducts, i.e. soybean oil, soybean meal, and biodiesel. Argentina has one of the world largest soybean crushing industries. As for maize and wheat, although the domestic market is proportionally larger than that for soybeans, the export market is also the most significant determinant of prices. Most of the production is transported by truck to the ports (85 percent), resulting in significant bottle necks during harvest season, mainly in Rosario area. Besides truck, 13 percent is transported by train and 2 percent is transported through the Paraná Hidroway (López, 2012).

Similar to the US, agricultural sector development in Argentina began in the middle of the 19th Century. Shortly after statehood, the Buenos Aires Grain Exchange was founded in 1854 becoming the oldest institution in the country. As a domestic exchange, it initially received grain shipments from rural merchants and country elevators, and sold them to the mills and seed buyers of the province of Buenos Aires and the National Territory of La Pampa. The Buenos Aires Stock Exchange, however, served as the trading center for conducting transactions in the export market. Since May 1905, the Arbitration Chamber has mediated disputes between exporters, country elevators, consignees, traders, and millers - all active participants in an increasingly sophisticated trading chain. In the early twentieth century, Argentina consolidated its position in the world commodity market - exporting millions of tonnes per year of grains and oilseeds grown in the Pampas (Costa, Massó, & Puricelli, 2004).

Despite Argentina's longstanding success as an agricultural supplier, political and economic crises during the 20th century have impeded the smooth development of the cash and futures trading. Frequently, State trading companies managed the operations of the grain trade. These include the "Junta Reguladora de Granos" established in 1933, the Argentine Institute for the Promotion of Trade (IAPI) (1946), and the "Junta Nacional de Granos" (1963), which dissolved in 1991. Two commodities future markets operate in Argentina: Mercado a Término de Buenos Aires<sup>20</sup> (MATba) and the Rosario Futures Exchange<sup>21</sup> (ROFEX).

MATba, founded in 1907, lists commodities futures and options on barley, sunflower seed, maize, soybean seed, soybean oil, sorghum, wheat and ICA Index. In the 1990's, MATba received authorization to settle all transactions in US dollars, as well as pesos, and introduced options on futures contracts. In 1998, MATba launched its electronic trading system, which has been upgraded several times. After signing an agreement with the CME Group in 2012, MATba listed CME's soybean, maize and wheat contracts alongside its domestic agricultural contracts.

ROFEX, founded in 1909, lists commodity contracts on soybeans, wheat, maize and financial futures and options contracts (currencies, gold, oil, among others). ROFEX's overall trade volume is larger than MATba's volume, but registers less volume for commodities contracts. During 2013, ROFEX registered a trade volume in commodity contracts of 10 million tons, compared to MATba's trade volume of 34 million tonnes<sup>22</sup>, 75 percent of which was concentrated in the Rosario Soybean contract.

In 2012, Argentina approved a new law (Law 26.831), modifying the regulatory framework of the markets. The implementing regulations of this law are still at the developmental stages, so the final implications for futures markets are unclear.

### 6.3. *Agricultural Policy Measures*

Historically, the Argentinean agricultural sector, particularly with regard to producers, has received relatively little direct government support. Unlike most countries with high agricultural productivity, producers are mostly self-reliant and farm without substantial input subsidies, direct payment support, minimum support prices or government subsidized loans. However, Argentina's economy relies strongly on agricultural revenues. According to INDEC (National Institute of Census and Statistics), during 2013 calendar year, Argentinean exports totaled USD 83 billion. Soybean complex exports (soybean, soybean meal and soybean oil) represented 25 percent of this total, while maize exports accounted for 7 percent and wheat and flour 1 per cent.

20 <http://www.matba.com.ar>

21 <http://www.rofex.com.ar>

22 <http://www.matba.com.ar/Reportes%20MATba/2013/Reporte%20MATba%2049.pdf>

### 6.3.1. Export Taxes and export restrictions

During the 1990s, Argentina enjoyed a period of relative economic stability. Grain production, greatly aided by significant investment in technology and infrastructure, expanded considerably throughout the decade: maize and soybean production increased by 100 per cent while wheat grew by 75 percent (Schnepf, R.; Dohlman, E.; Bolling C., 2001). However in 2001, Argentina experienced a major economic crisis, causing trading to halt on futures markets for several months. Shortly after, the Government began taxing some exports. Following the 2007/08 international price spike, it implemented more trade measures including restrictions on some agricultural exports, as a way to protect domestic food security<sup>23</sup>.

The *export tax* levels have changed over time. In 2013/14 season, they stood at 20% for maize, 23% for wheat and 35% for soybeans. These taxes tend to be passed down along the supply chain to varying degrees, depending upon the domestic supply and demand situation<sup>24</sup>.

The export restrictions were widened following the 2007/08 international price spike, with the implementation of several new requirements on grain exportation. After halting the export sales registry<sup>25</sup> several times, the government issued a new Resolution (543) in May 2008, detailing the rules and reporting requirements to be followed by grain exporters. The new Resolution fixed export authorizations in 45 running days, changing the previous scheme which allowed sales 9-12 months in advance of shipping (Costa, R.; Puricelli E., 2009)<sup>26</sup>. From 2008 to 2009, Resolution 543 was modified multiple times, specifically regarding the dates between the sale's authorization and the execution of the shipment. More recently, exporters are able to apply for longer dated terms if several conditions are fulfilled, such as advance payment of export taxes. The National Bureau of Farm Control (UCESCI)<sup>27</sup> publishes daily the amount of grain authorized to be exported, divided in the terms of the authorizations (45 days, 180 days, 365 days, etc.). Also, the government announces the amount of grain tonnage to be approved for each season, mostly for maize and wheat. These announcements, however, are sometimes prone to adjustments.

### 6.3.2. Other Agricultural measures

Several governmental measures aim at providing incentives to grains and oilseed producers. Some measures, for example, seek to provide income support by the transfer of export tax revenues to producers<sup>28</sup> (especially for wheat and maize). Also, Argentina has implemented programs that encourage value added creation (for example bio-fuel law, 2006; temporary import regime for soybeans, 2012) and aim to improve agricultural practices (Intelligent Agriculture Program, 2011; Best Agricultural Practices manuals, Biotechnology workshops and programs, pest and disease control measures, among others). Argentina also actively promotes agricultural development, by supporting research, infrastructure, and capacity building. Moreover, Argentina has approved measures to provide government assistance in the event of a natural disaster<sup>29</sup>.

In 2009, in recognition of the importance of agriculture to the country, the government transformed the National Agricultural Secretariat into a National Ministry, enabling it to utilize more tools and resources to foster sector growth. As a Ministerial body, the National Ministry deals with agricultural issues at the highest political level. Together with several decentralized agencies such as INTA (National Institute of Agricultural Technology), SENASA (National Health Service and Food Quality), INASE (National Seed Institute), the government has provided a longstanding platform for the development of different technologies.

In 2010, within this public policy framework the Strategic Agri-Food and Agro-Industrial Plan 2010-2020 (PEA) was launched. This plan aims to achieve sustainable growth in agri-food and agro-industrial production for the

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23 Argentina is one of six countries in the region to have succeeded in meeting the World Food Summit Goal of halving the number of inhabitants suffering from hunger.

24 The export taxes are paid by the exporters based on FOB prices, which are published every day by the government. See Price transmission section.

25 Affidavit of sales to foreign Country.

26 Through this resolution, the former ONCCA was vested with the power of approving or rejecting exports licenses.

27 [http://www.ucesci.gob.ar/rverde\\_quees.htm](http://www.ucesci.gob.ar/rverde_quees.htm)

28 Other examples: Compensation Regime (valid from 2007 to 2011 for different agricultural products), resolution 112/09 ONCCA, Decree 516/2013, Decree N 1/2014.

29 Such as Agricultural Emergency Law, 2009; or specific agricultural insurance programs.

purpose of generating greater wealth with value added at origin and benefits for the entire population in the form of development, regional equity, land tenure, and food and nutrition security.

## 6.4 Marketing Tools

Decision-making in the agricultural sector has developed as a response to an evolving macroeconomic environment, government policies and the cyclical nature of agricultural markets. Several kinds of marketing and risk management tools have emerged over time and include those related to grain marketing, and those related to cost saving technologies.

### 6.4.1. Grains marketing

#### 6.4.1.1 Futures/options markets

The Argentinean futures markets address risk management needs in commodities by providing market operators with transparent prices - both spot and forward - and a safeguard against price volatility. Both ROFEX and MATba offer futures contracts and options on futures. Producers, depending on their individual transaction volume, are able to participate in the market directly or through brokers. Other market actors using future markets include warehouses, cooperatives, exporters, and processors. Exporters' previous practice of using the more liquid CME contracts to hedge Argentine purchases and sales has declined due to several country specific risks, including currency fluctuations, export licenses, among others. Domestic maize, soybean and wheat contracts are settled by physical delivery - in the port of Rosario or in Buenos Aires. Rofex and MATba domestic contracts are settled free alongside vessel (FAS), meaning that the short making delivery does not incur the cost or obligation of loading the vessel (fobbing<sup>30</sup>) or pay export taxes. Also, FAS delivery means that exchange rate risk is borne by the exporter making a FOB or CIF (cost insurance freight to final destination) sale. Therefore, the FAS price normally exhibits a significant discount to global prices except in times of domestic shortages as seen recently. There is a market scale of discounts/premiums for other delivery points outside these two primary delivery ports.

Futures contracts in the MATba can be settled either by making or taking delivery of the grain or by arranging a physical transaction with a party with an opposite futures position. The CME contracts listed on MATba are always cash settled against the CME settlement price. Indices, such as the ICA Index (MATba product) are also cash settled.

#### 6.4.1.2 Cash Marketing tools

The most common cash market contracts in Argentina are cash forwards, storage, barter and "to fix<sup>31</sup>." Cash forwards and storage agreements are structured similarly to US cash contracts. Barter arrangements (which are also common in Brazil) involve the pledge of a specific quantity to be delivered at harvest in exchange for credit, underscoring the insufficiency of commercial farm credit for small holders. "To fix" contracts are a version of deferred price contracts.

### 6.4.2. Other marketing tools

Besides futures and options markets and physical contracts, new tools have been developed to address the costs related to production and storage. Some of the adaptations are related to management and others to input use technologies (mostly cost saving technologies) (Buenos Aires Grains Exchange, 2011). Examples include agricultural services, adoption of genetically modified seeds, direct seeding, precision agriculture and the use of silos bags. These technologies have reported a high rate of adoption in a few years.

#### 6.4.2.1. Agricultural Management

The agricultural trusts, which are commonly known as 'pools', are groups that organize their production by gathering individuals or businesses which contribute resources (land, machinery, supplies, capital) and capacities (technical and administrative management). Their main competitive advantage is their ability to seek partners,

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30 Fobbing costs are about \$5 to \$10 per tonne or 2 to 4 per cent of cargo value.

31 See Appendix for a complete description.

establish relationships, negotiate, and manage agreements and contracts. Their greater efficiency related to specialization and capital goods usage contributed to the changes in agricultural management in Argentina (Bisang & Kosacoff, 2006). The agricultural contractors – which provide agricultural services- own the equipment (combines, trucks, etc.) and operate throughout the agricultural regions. Besides lowering capital expenses, they provide an alternative occupation for farmers unable to expand into larger scale operations. They also fulfill a need for specialization and for greater efficiency in a context of scarce market credit and capital. Because of the cost constraints of owning a full complement of farm machinery, most small-and some medium and large-sized- farming operations in Argentina contract machinery operators for much of the tilling activity. As creators of economies of knowledge and management specialization, contractors have contributed to the rapid diffusion of agriculture and the new technologies during the 1990s and 2000s (Lódola, 2008), sometimes independently and otherwise as a 'pool'.

The flexibility of land rental and the use of services instead of fixed capital expenditures, gives rise to a large variation in the average "farm" size (maize, soybean and wheat) in Argentina. Argentina's farms stand in sharp contrast to traditional US farms, which are predominantly owner-operated family farms. According to the last Argentinean Agricultural Census, the size of the average farm varies depending on location and productivity. Around the most productive area (the maize and soybean belt) the average size is between 200 and 500 hectares<sup>32</sup>. The traditional Census and producer surveys are unable to capture the whole dimension of new actors and scale of production (Lódola, 2008).

#### 6.4.2.2. Cost saving technologies

*No-till farming* - which involves planting without plowing up the soil, is an example of a cost-saving technology that promotes land sustainability by reducing soil erosion, gas expenses and also allows double-cropping (i.e. wheat followed by soybeans). The wide diffusion of no-till is closely related to weather and genomics technology, especially with the advent of glyphosate-tolerant soybean in 1997. Since then, similar biotechnologies were adapted for crops such as maize and cotton. According to the "Applied Agricultural Technology Survey" (AATS) (Brihet, Costa, Sammarro, & Puricelli, 2012), during 2010/11 season, 96 percent of the soybean, 95 percent of the maize and 89 percent of the wheat area were sown with no-till technology, making Argentina the global leader in this field.

*Precision agriculture* – by applying specific location management, it helps allocate inputs according to environments, minimizing the quantity used.

*Dry grain silo bag* - Owing to the seasonality of agricultural production, the ability to store the harvested crop is a primary determinant of the rural economic performance; without storage, producers are forced into distressed sales. Recently, a new temporary storage option called the dry grain silo bag has been rapidly adopted to complement the traditional fixed storage. The silo bag allows producers to store crops in the field until the grains are transported to the elevators or other destinations, circumventing the high cost of trucking at harvest. It also gives them the flexibility to sell their crops in different periods during the year. Because the high cost of capital makes the addition of fixed on-farm storage prohibitively expensive for many producers, silo bags provide a cheap and convenient alternative to on-farm storage. There are several estimates of storage in Argentina (López, 2012) identifying fixed storage capacity at around 71 million tonnes, of which 16 million tonnes are on farm. The estimates of silo bag use range between 30 millions tonnes an 50 million tonnes (Bossio, 2013<sup>33</sup>). The use of silo bags represents a cheaper alternative to traditional grain marketing. By reducing freight and some warehousing expenses and by providing more marketing flexibility, the silo bag is revolutionizing producer price transmission and income levels<sup>34</sup>.

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32 The last information available is 2002, from INDEC (National Institute of Statistics and Census). Last Agricultural Census took place in 2008, but the total information is not available yet. According to the last Agricultural Census of 2002, the most common average size for a farm is between 200 and 500 hectares.

33 To avoid damaging the product, producers must take precautions such as monitoring the bag filling and controlling the bag after harvest. There are also some costs associated with the bag filling and discharge. Since this technology is relatively cheap, many producers consider that this cost is worthwhile.

34 For example, according to Márgenes Agropecuarios Magazine, November 2013 issue, for a maize producer around main productive area (South of Santa Fe province, north of Buenos Aires Province) the short freight to the nearest warehouse of 30 kilometers plus the long freight to Rosario Port area of about 200 kilometers has a combined cost of USD 35 per tonne. Using the silo bag on farm, a farmer could reduce the short freight by USD 5 per tonne and save on various warehouse costs, including storage and eventually drying costs. Soybean and wheat producers are similarly

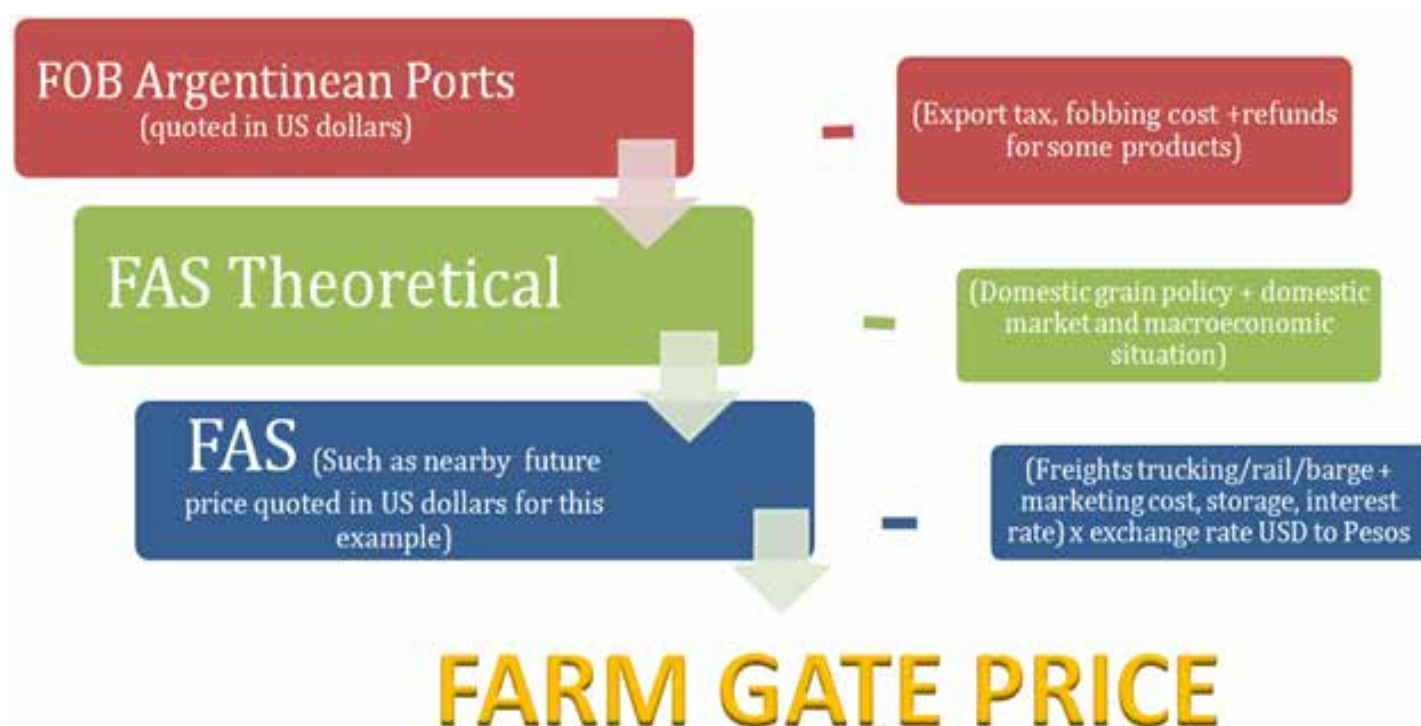


## 6.2. Price Transmission

Unlike the United States and Brazil, where the main productive areas are distanced (often 1000-2000 km) from the port areas, Argentina's main productive area is close, averaging around 300 km. Although the agricultural frontier has enlarged in the last decade - to inland provinces such as Salta (about 1000 km from Rosario Port) - prices in the port areas, rather than the inland growing regions, remain the price reference points. Similar to Ukraine, Argentina possesses a geographic advantage regarding its export activity because of the proximity of production to the export facilities (Ordonez & Lalor, 2001). Of the countries studied here, Argentina has the second cheapest transport costs from farm to port.

Between the farm-gate and port, the grains and oilseeds in Argentina undergo several price discounts. Producers are quoted in a delivered export price in a port rather than a local country elevator price<sup>35</sup>, thus producers must identify their own marketing, handling and transportation charges for purposes of estimating a net price (Ordonez & Lalor, 2001). Hence, the "farm gate price" is not homogeneous, but varies greatly across regions and depends on strategies used by individual producers (such as silo bag use or country elevator services, hedging in future markets, etc.).

**FIGURE 7: EXAMPLE OF FOB/FAS RELATION**



Source: Adapted from Agricultural Ministry, Argentina.

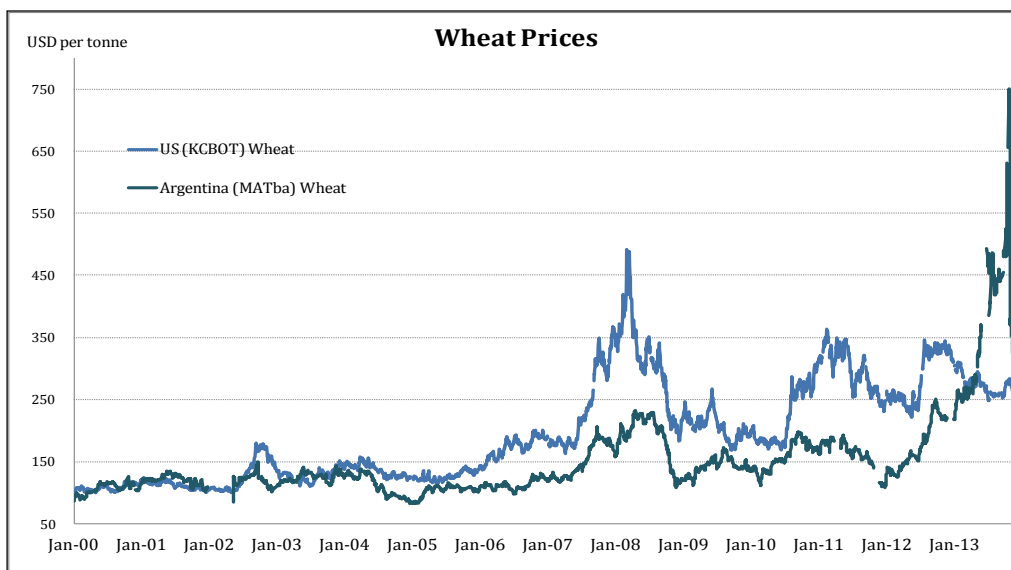
Price transmission is further prone to asymmetries and discontinuities as a result of market sensitivity to changes in the domestic grain policy, internal supply and demand, and macroeconomic situation. Domestic spot and agricultural futures are quoted as FAS prices and therefore reflect the "discount" applied as a result of the export taxes, export cost, domestic grain policy, macroeconomic situation, and internal supply and demand. As a consequence of the several changes of the market framework, FAS theoretical (FOB minus export tax, and fobbing)<sup>36</sup>, and the actual FAS (future market or spot price) are sometimes different.

advantaged by using silo bag storage. These marketing costs are as a percentage of the output, hence variable, being 22.3% of the price of a tonne of soybean (294 USD/tonne harvest price MATba), 35.2% of a tonne of maize (161 USD/tonne harvest price MATba), and 15.7% of wheat (250 USD/tonne harvest price MATba), November 2013.

35 Some contracts include basis levels to different destinations but port prices remain the determinant.

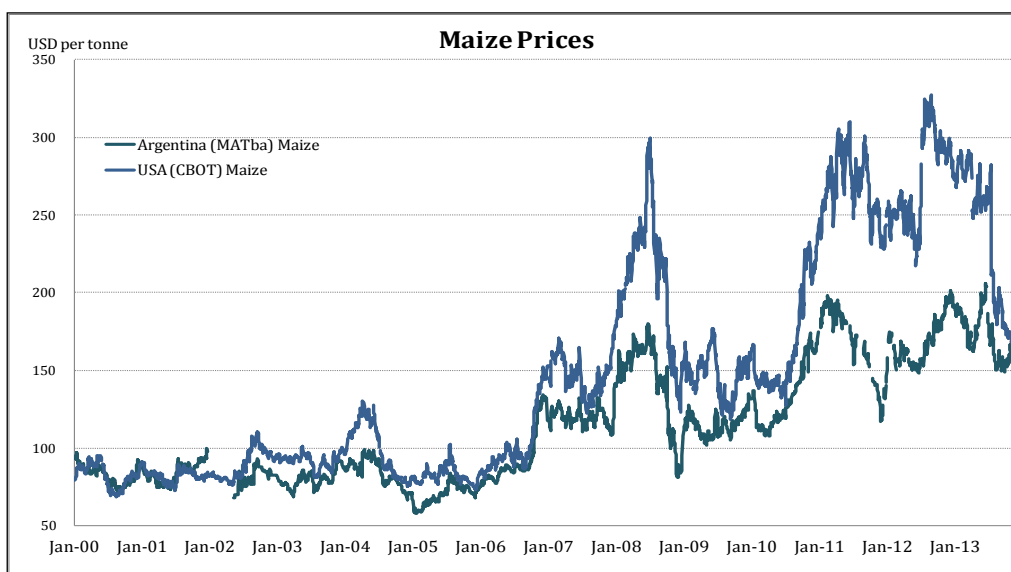
36 The government, publishes on a daily basis, the "Valor de Mercado" (Market Value), that is meant to reflect the FOB prices - export taxes - fobbing expenses, using a specific methodology, quoted in pesos.

**FIGURE 8: SINCE 2007, ARGENTINEAN PRICES FOR WHEAT HAVE BEEN VOLATILE AND NON-CORRELATED WITH KCBT**



Source: MATba, KCBT

**FIGURE 9**



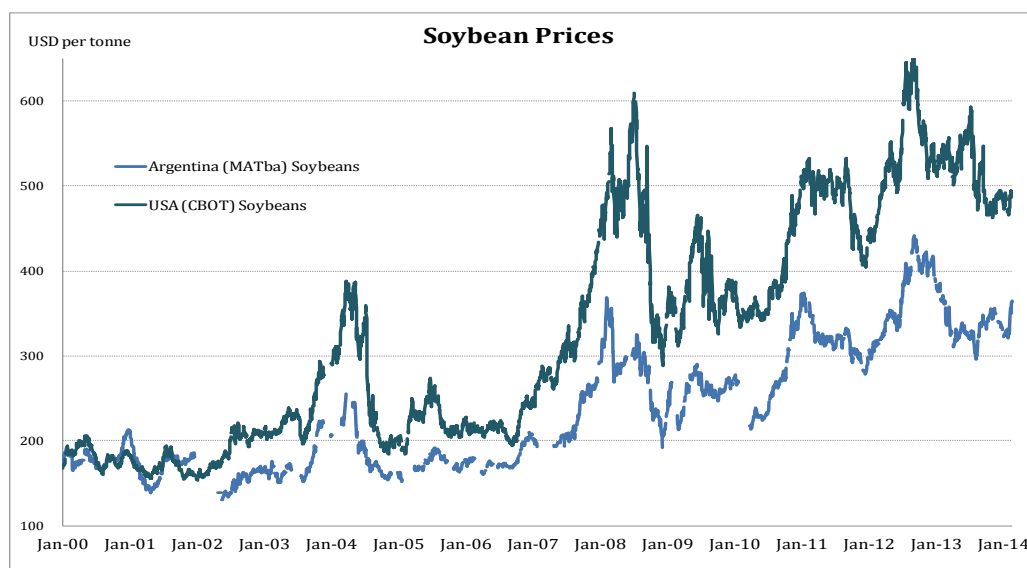
Source: MATba, CBOT

For example during 2008 for wheat, this difference between FAS theoretical and spot FAS futures reached almost 100 US dollars per tonne (red circle, Figure 9) when many export restrictions and changes in the domestic grain policy were occurring (Costa, R.; Puricelli E., 2009), and while prices soared in different international markets such as CBOT or KCBT<sup>37</sup>.

On the other hand, in 2013 (yellow circle), due to a constellation of factors, such as insufficient soil moisture, higher profitability of other crops and recent opening of the Chinese market to Argentinean barley, the 2012/13 season ended with the lowest wheat production for the past 33 years (8.2 million tonnes), and the lowest sown area in the Argentinean history (3.16 million hectares), with an estimated ending stocks of only 500 000 tonnes. During October 2013, low production and tight domestic stocks at the end of the crop year caused a price spike on the nearby MATba wheat futures contract. The contract, which reflects the free alongside (FAS) vessel price, rose to USD 750 per tonne - three times the global wheat price and higher than the fob export prices.

<sup>37</sup> Due to wheat quality characteristics, Argentinean wheat is comparable to KCBT traded wheat.

FIGURE 10



Source: MATba, CBOT

Soybean exports are also subject to an export tax (35 percent) and export authorization scheme, similar to wheat and maize. Export quantities (including byproducts), however, are not restricted. This factor, together with other facts (such as relative prices, cost of production, weather patterns, etc), has encouraged an increase in Argentinean soybean production relative to other crops such as maize<sup>38</sup>. According to the Ministry of Agriculture of Argentina, the soybean planted area was about 20.3 million hectares during 2013/14 season compared to 14.5 million hectares ten years ago.

In sum, Argentinean producers have vigorously adopted cost-cutting managerial practices (such as using barter, agricultural contractors, silo bag storage, etc.) and modern technologies (such as no-till, precision agriculture, etc.) over the past two decades. Their flexibility and competitive-seeking strategies have enabled them to thrive in international markets under evolving, and sometimes difficult, economic conditions.

<sup>38</sup> A similar situation is given for crops such as barley and sorghum, which started to be incorporated in rotations more often, replacing wheat and maize. There are export taxes and same export scheme for these crops, but their exports are not restricted.

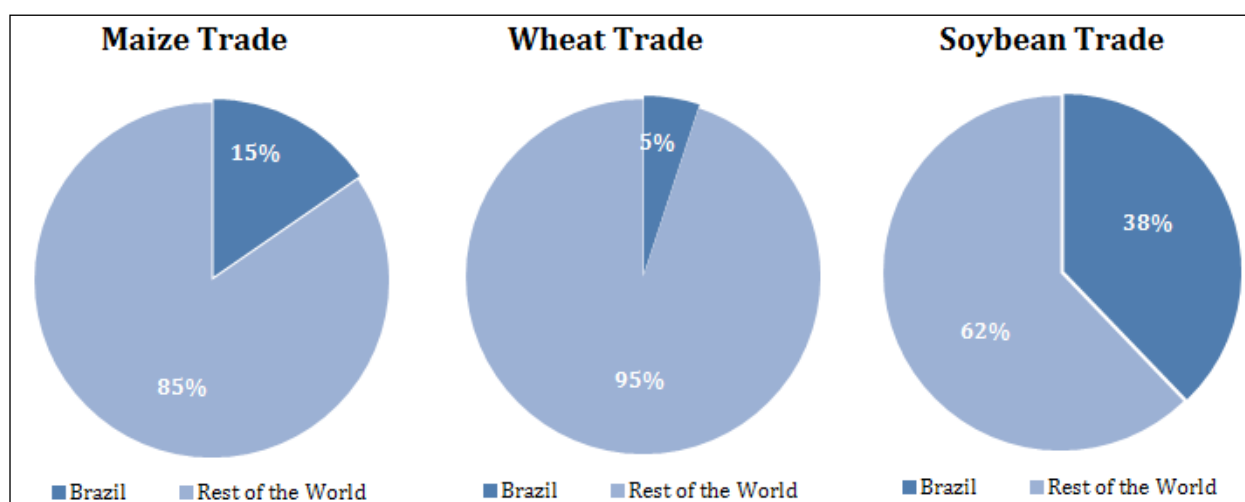


## 7. Brazil

### 7.1. Summary

Brazil has earned the title “agricultural superpower” by its matchless productivity and export growth over the past 30 years. As a vast country, Brazil’s infrastructure has not kept pace with its productivity - the resulting bottlenecks and long transit times impose a serious impediment to its competitiveness while severely depressing farm income, particularly for producing areas distanced from the coastal export points. Brazil is characterized by a dual farming system: very large corporate farms (above 10,000 hectares) that are export oriented and small farms that tend to supply the domestic market. This system (also existing in Ukraine and Argentina) confers multiple benefits to economies of scale, particularly access to international financing, while imposing layers of costs and discounts on smallholders. The Brazilian government ranks low on its level of subsidies, with most of its support involving farm credit, which remains commercially underdeveloped. Brazil features agricultural futures contracts, but unlike coffee and cattle that enjoy large futures volumes, its grain and oilseed contracts are illiquid. Price transmission from benchmarks (CME prices) to farm-gate is poor owing to the significant costs of vessel loading and trucking, making domestic demand or, in some cases, government support prices more determinate of prices.

FIGURE 11



Source: 2011-2013 average. FAO.

### 7.2 Background

Brazil is the world’s 5th largest country and enjoys an advantageous geographic position coupled with a favorable growing climate. It also features a robust economy, attracting high inflows of foreign direct investment and maintains a stable public sector debt<sup>39</sup>. Its successful adaptation of plant varieties to tropical conditions and acidic soils combined with swift expansion of cultivated land into forests or inland savannah, called the *cerrado*, have caused it to achieve greater agricultural productivity growth than any other country over the last thirty years. Often referred to as an agricultural superpower, it ranks first in the export of coffee, processed beef, orange juice, sugar, chicken and tobacco. For the last two years, it has met or surpassed the US in soybean production and exports and ranks third in maize exports. Given its vast arable land base and its ability to double-crop maize in a single season, most experts predict that Brazilian production will continue to outpace all other countries<sup>40</sup>. Brazil’s infrastructure, however, has not kept pace with productivity surges and the country has the most expensive transport and fobbing costs among the major grains/oilseed exporters. Unlike Ukraine, which transports 80

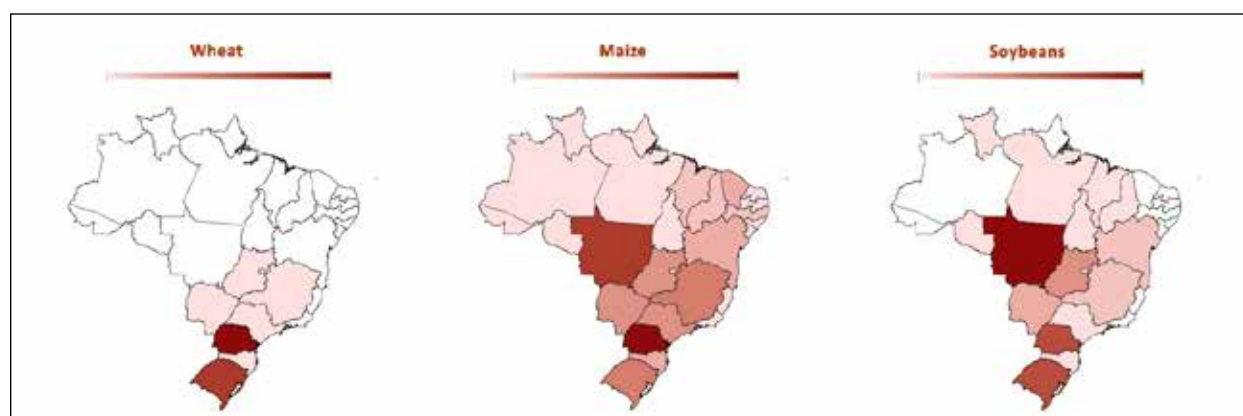
39 Brazil’s economic outlook and infrastructure investment opportunities, Ministry of Finance, 2013.

40 Brazil’s tropical climate is less conducive for winter grains, causing it to import wheat.

percent of its grain destined for export by rail, or the US which ships heavily by barge along the Mississippi River system, Brazil ships mostly by overland truck on a system of unpaved roads. The shipment of soybeans may entail several days' transit time as the average distance from Center-West to port is over 1000 km. Once at the port, the wait-time to unload may be several weeks or at harvest time, over a month. Port capacity is limited and bulk carriers chartered to sail from Brazilian ports also endure a long line-up - adding significant shipping costs to Brazilian maize and soy-complex exports. These costs tend to be passed along the supply chain to the producer.

Unlike Ukraine, the US and Argentina, which were major agricultural exporters during the late 19th C., Brazil's expansion began after WWII. The government undertook a policy plan, called import-substitution industrialization, to increase domestic productivity: while taxing exports, including a low level of agricultural exports, it encouraged a vast expansion of agricultural cropland through concessionary terms to large landowners. After this period of horizontal integration, in the 1970s it implemented a "conservative modernization strategy" which provided incentives for the formation of agribusiness complexes. With a view to whole sector development, the government invested in the adaptation and development of green-revolution technologies while providing inducements to the emerging agricultural processing and input industries. Agribusiness complexes received subsidized credit, guaranteed prices, and tax exemptions and subsidies for exported goods<sup>41</sup>.

**FIGURE 12: MAIN PRODUCTIVE REGIONS FOR WHEAT, MAIZE AND SOYBEANS**



Source: GEOGLAM, based on 5 years (2008-2012) average of production.

Following three decades of high inflation, in 1994, Brazil launched an economic stabilization program called the "Real Plan" named after the country's currency, the real, which it revalued at a level par with the USD. The plan stressed greater market orientation, privatization of government-owned industries, lower tariffs, tighter credit, "de-indexation" of prices, and currency stability. Stability and the easing of capital and border controls attracted a wave of foreign direct investment as well as infrastructure improvements<sup>42</sup>. The government, formerly a major buyer and distributor of agricultural commodities, removed itself from direct management of markets.

In 1996, the implementation of "Lei Complementar" (complementary law n° 87) caused a significant change in the taxation of exported goods by eliminating the sales tax on primary and semi-manufactured exports. Because these export taxes previously worked to the advantage of soybean oil and meal exporters, the change caused a steep increase in soybean exports, reaching a record 8.3 million tonnes in 1997 and today stands at over 40 million tonnes. Agricultural exports, along with oil and ore exports, have worked to maintain Brazil's trade surplus since 2001. The potential for expansion in the agricultural sector is immense, with the ERS/USDA estimating that Brazil could expand its land area in production by up to 170 million hectares without further deforestation of the Amazon. Brazil also has 12 percent of the world's fresh water supply<sup>43</sup>.

41 Stanford edu

42 Future of Brazil's Agricultural Sector, ERS USDA, 2001.

43 ibid

### 7.3. Agricultural Policy Measures

The level of support to producers, as measured by the producer support estimate (PSE) of the OECD, is low compared with other major agricultural producers and exporters, both in absolute terms and as a share of agricultural output. Between 2010 and 2012, Brazil's PSE represented about 5 percent of the value of agricultural production, compared with 8 percent in the United States, 19 percent in China (OECD, 2013). However, some farm subsidy watchdog organizations claim that the complexity and intertwining of programs causes these levels to be understated. The main area of support concerns credit; the government periodically arranges for rural debt restructuring for small producers and subsistence/small family operations. The 2012/2013 Agriculture and Livestock Plan (PAP) finances production costs, marketing and investment and maintains subsidized interest rates of 5.5 per cent on average and at 5.0 per cent for middle-class producers, while offering a line of credit for middle-class farmers whose annual gross income is over R\$ 360,000 (USD 163,000) and under R\$ 1,600,000 (USD 727,000)<sup>44</sup>. The government has also recently offered agricultural debt renegotiation to producers on investment loans held by public or private institutions.

Some policies, including intrastate taxes, environmental regulations, and restrictions on foreign investment in farmland, impose costs on Brazilian agricultural producers. The land ownership policy, changing in 2010 by judiciary ruling on a 1971 law, is somewhat controversial as it restricts foreign purchase to 250 – 5000 hectares, depending upon the state, and prohibits ownership greater than 25 per cent in any single municipality (United States International Trade Commission). Following the ruling, the government has encouraged investors to enter production agreements or long term leases with Brazilian agribusiness. According to INCRA (the Brazilian agency for land issues), in 2011 foreign corporations owned 827,000 hectares and foreigner individuals owned 3,229,136 hectares in Brazil. Unofficial estimates are considerably higher.

A marginal producer of winter grains, Brazil is one of the world's leading importers of wheat, with over 95 percent of imports coming from Argentina. Minimum support prices range from R\$330.88 per tonne to R\$426 per tonne (USD 147 per tonne to USD 189 per tonne<sup>45</sup>). WTO bound import tariff for wheat is 55 percent and the applied rate is 10 percent for wheat imported from non-MERCOSUR countries. However, in 2013, Brazil allowed duty free imports from the US, owing to the limited Argentinian export supply. Wheat is traded duty free within MERCOSUR.

### 7.4. Marketing Tools

Similar to Ukraine, the level of marketing sophistication varies in proportion to the enterprise size. The large multi-national grain companies, including Cargill, Bunge, ADM and Louis Dreyfus Corporation as well as other conglomerates such as Glencore and Marubeni have a significant presence in Brazil and these firms enjoy the benefits of scale, vertical integration, and access to international finance and futures markets. Besides majors, large scale domestic enterprises are common, which are similarly positioned for the global market. In 2010, there were more than 20 of these firms with over USD 1bn of sales per year<sup>46</sup>. Large commercial farms generate about two-thirds of Brazil's agricultural output. These farms can be upwards of 10,000 hectares with some as large as 50,000 hectares. Brazilian agribusinesses are run by educated operators with extensive business and investment acumen using modern technology and production practices (USITC). Their size affords them lower production and finance costs, allowing them to expand into the Cerrado, where significant investment is needed to clear the land and apply nutrients to the acidic soil.

Of the approximate 6 million farm enterprises, 4.3 million are family farms, controlling about 80 million hectares or 24 percent of total farmland<sup>47</sup>. These farms are the main suppliers of domestic needs, but may contribute to the export market as well<sup>48</sup>. Since on-farm storage is about 12 percent of total of total storage (estimated at 130 million tonnes), the producer has very little holding power at harvest, particularly with commercial loan rates

44 Middle class income in Brazil is defined as earning between USD 600 to USD 2600 per month.

45 R\$/USD rate of 2.25 as of April 2014.

46 The Power of Brazilian Agribusiness, The Economist Intelligence Unit, 2010.

47 Statistics on the type of farming e.g. grain vs. livestock or coffee, are not available.

48 Small scale agriculture and agribusiness: The eyewitness account of a Brazilian NGO, <http://www.alimenterre.org/en/ressource/small-scale-agriculture-and-agribusiness-the-eyewitness-account-of-a-brazilian-ngo>

varying between 15 percent and 20 per cent. Various marketing arrangements have evolved to counteract these market constraints. Barter has enjoyed a long history as a means of exchange in Brazil, and producers use it by pledging a quantity of 60 KG sacks of soybeans or maize in exchange for fertilizers, seeds and rents. Producers belonging to cooperative associations have access to marketing services such as input supplies and storage. In addition, the producer can take advantage of cheap, easily transportable silo bag storage, each holding 200 tonnes. This mode of storage has also expanded in Argentina.

As the most advanced marketing arrangement, the Cedula de Produto Rural (CPR) allows the producer to enter into agreements whereby credit is granted in exchange for compulsory delivery of crop to a designated location. Upon delivery, the producer can either sell the goods or receive warehouse receipts, which can be traded in a secondary market and are listed on the BM&F. As a legal instrument, CPR provides a swift dispute mechanism for resolving any breach of contractual obligations. The commodity will be eventually priced according to the market. If the crop price drops between the point of loan issuance and delivery, however, the producer will be obligated to pay off the loan balance in cash. Similarly if producers suffer a shortfall, they will have to deliver more crop the following year. Because the maize and soybean contracts listed on the BM&F are illiquid and CME contracts have a poor correlation with domestic Brazilian prices, small producers reportedly do not use futures contracts as risk management tools.

## 7.5. Price Transmission

Similar to most markets examined in this study – Brazil derives its price signals from the CME benchmarks. Of all six countries, it has the highest logistical costs from interior to FOB export points. These costs pose a severe impediment on price transmission from global markets to farm gate. The government is taking several steps to remedy the situation, but because of Brazil's immense size and soaring productivity levels, experts estimate that the necessary large scale logistics improvements will likely take several years if not decades to materialize.

Brazil has over two dozen ports spaced along its coastline, but two southeastern ports – Santos and Paranaguá account for the majority of maize and soybean exports. These ports have been stretched to capacity in recent years. According to Brazil's Ministry of Development of Development, Industry and Foreign Trade, vessels in Brazil's ports spend 90 percent of port time either waiting for a loading berth or waiting for supplies to arrive. Long recognizing the infrastructure insufficiency, in 2007, the government initiated the Growth Acceleration Plan - PAC1 and in 2010, PAC 2. Most recently, it has announced plans to conduct a series of auctions called Bidding Blocks, to tackle the various components of road, rail and barge transport and export execution.

The 2013 soybean harvest offered a telling example of the storage and logistical restraints as the country enjoyed a record soybean crop. The cost of trucking, normally about a USD 100 per tonne to USD 110 per tonne from parts of Mato Grosso, the largest producing soybean state, to the ports of Santos or Paranaguá, increased to USD 140 per tonne. A new law limiting the hours of drive time for truckers, higher diesel prices<sup>49</sup> and a depreciating currency accounted for much of this increase. For small producers, the farm-gate price was further discounted by as much as USD 40 per tonne due to lack of storage and distressed sales (USITC). Additional expense was incurred by the wait time of 1 -2 months or more for ships in the vessel line-up. Because daily charter rates range around USD 10,000<sup>50</sup>, these costs, along with significant switching of origins from Brazil to US, forced the fob Brazil soybean market to about USD 40 per tonne discount to fob US Gulf. In all, costs incurred along the supply chain reduced the Brazilian farm-gate prices to 60 or 70 percent of the CME soybean benchmark, in many cases below production costs. In the US during 2013, producers, aided by high domestic demand received over 90 percent of the benchmark and in many areas obtained a premium to it.

As for maize, Brazil enjoys two harvests, one planted in September and harvested in March and the other, called the safrinha – little crop - planted in January and harvested in September. The first harvest occurs in Minas Gerais and Paraná and largely supplies the domestic market; the second occurs in Mato Grosso and serves the export market. Because transport costs are similar to soybeans and the benchmark maize price has dropped 40 per cent from last year, domestic prices have now dipped below the support price of R\$13.00 per 60 kilogram bag (about

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49 Fuel prices are subject to government control.

50 Daily charter rates are highly variable – in 2010 they were around \$25,000.

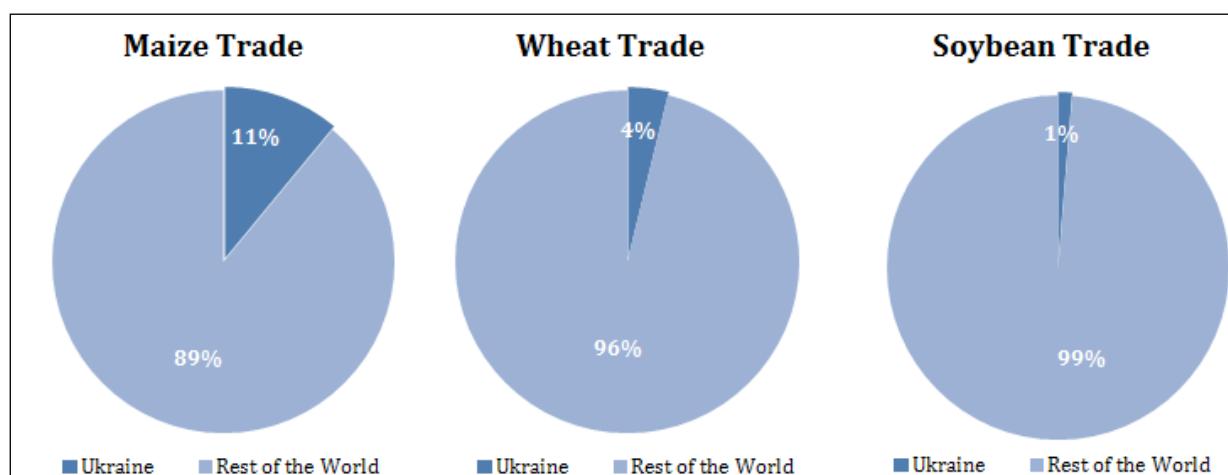
USD 100 per tonne). In some areas, because of the high transport costs to export points, the maize price dropped below R\$10.00 per bag (\$73 per tonne). As of November 2013, the state had supported about half the maize crop in Mato Grosso, by means of farm support programs. Effectively the state purchased 1,64 million tonnes - 0,34 million tonnes via direct purchases – AGF (Federal Government's Acquisitions) and 1,3 million tons via purchase options contracts. The government will ship the intervention stocks south or northeast where it will auction them to livestock or poultry operations. Although maize exports have surged in recent years (about 80 percent of the crop is consumed domestically), prices are now significantly below the cost of production, reportedly USD 200-260 per tonne. This and continued government intervention will likely decrease the percentage of export availability in the near future. Brazil is one of the few countries capable of significant expansion of its arable land base. However, because of its relatively recent entry into large scale soybean and maize farming, infrastructure capacity lags behind productive capacity, causing producer prices to drop below production costs in many areas of country. Brazil will require sustained upgrading of its roads, rail lines, waterways and ports in order to maintain its momentum as an agricultural superpower.

## 8. Ukraine<sup>51</sup>

### 8.1 Summary

Ukraine is a compact country with a large percentage of arable land and some of the most fertile soil in the world. After a period of stagnation, Ukraine is swiftly restoring its global position as a major exporter and is poised to double its production by 2020. Similar to Brazil, Ukraine features a dual farm system comprising some of the largest farms or agro holdings in the world (400,000 hectares) and a large population of small and subsistence farms. Farm to export point transport costs on Ukraine's subsidized rail system are the least expensive among the 6 countries studied here. Although Ukraine has significant infrastructure, current productivity projections suggest that rail cars, storage and export terminals will be strained to capacity in the near future. While providing some producer subsidies for inputs, Ukraine's overall producer support levels rank among the lowest of countries evaluated by OECD<sup>52</sup>. Ukraine does not have a commodity derivatives market although the government is taking steps to pass the necessary enabling legislation for that endeavor. A wide basis risk to CME prices together with recent government intervention (2010) in wheat exports compel exporters to take wide margins at point of export, which are then passed on along the supply chain to producers. In general, small Ukrainian producers form a fragmented market - void of institutional support and are captive to a series of price discounts along the supply chain.

FIGURE 13



Source: 2011-2013 average. FAO

### 8.2. Background

Ukraine, formerly extolled as the breadbasket to the world, is swiftly reclaiming its mantle among major grain exporters. It is the largest global exporter of sun seed oil, and ranks fourth and fifth in maize and wheat. Endowed with multiple natural advantages, Ukraine possesses the most fertile black soil in the world, a longer coastline than the US state of California, a wide navigable central river and a large arable land mass. The port of Odessa, located on the southwestern Black Sea Coast, has been renowned as a grain export center for two centuries. It is also well situated within the current global trade map with passage through the Bosphorus to the Mediterranean buyers of southern Europe, North African and Mid-East and further transit via the Suez Canal to Asian destinations including India, Indonesia, Malaysia, China, South Korea and Japan.

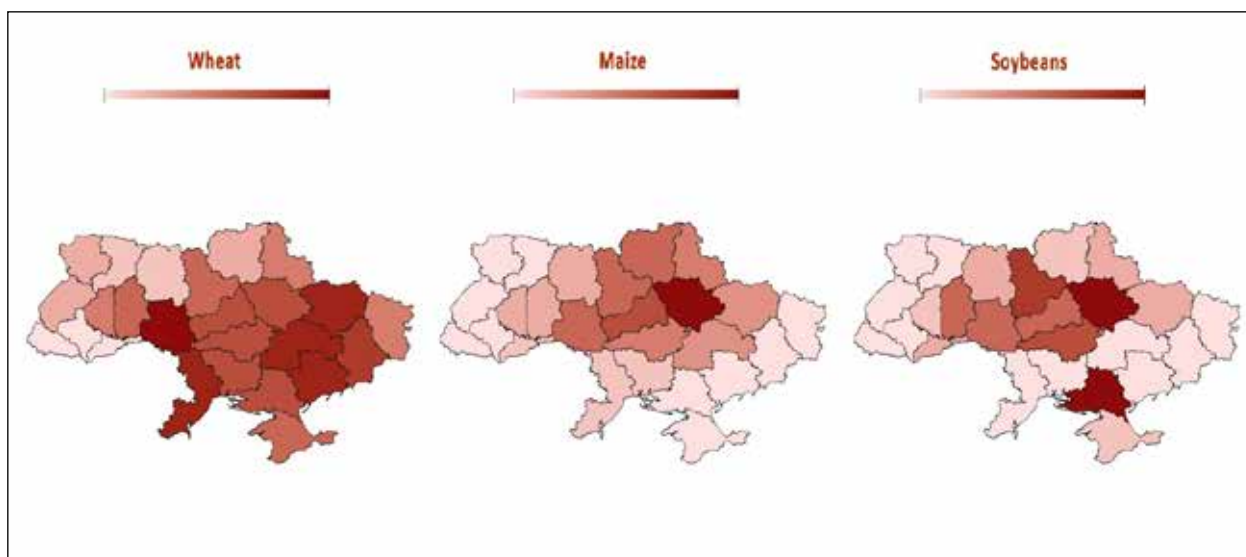
In addition to geographical advantages, Ukraine has significant infrastructure development including one of the largest rail systems in Europe, 35m tonnes of storage and an estimated 30m tonnes of annual export capacity.

51 At the time of this report's circulation, political tensions between the Russian Federation and Ukraine have heightened, particularly with regard to Crimea. Trading houses report exports are being executed normally, although there is a lack of new export activity due to uncertainty. It should be noted that the southwestern Ukrainian ports of Odessa, Illichivsk, Yuzhny and Nikolayev are the predominant suppliers of cereals to the export markets.

52 Agricultural Policy Monitoring and Evaluation in 2013, OECD, 2013.



**FIGURE 14: MAIN PRODUCTIVE REGIONS FOR WHEAT, MAIZE AND SOYBEANS**



Source: GEOGLAM, based on 5 years (2008-2012) average of production.

**FIGURE 15: UKRAINE IS SLIGHTLY LARGER THAN FRANCE: TWO-THIRDS OF IT'S LAND IS ARABLE**

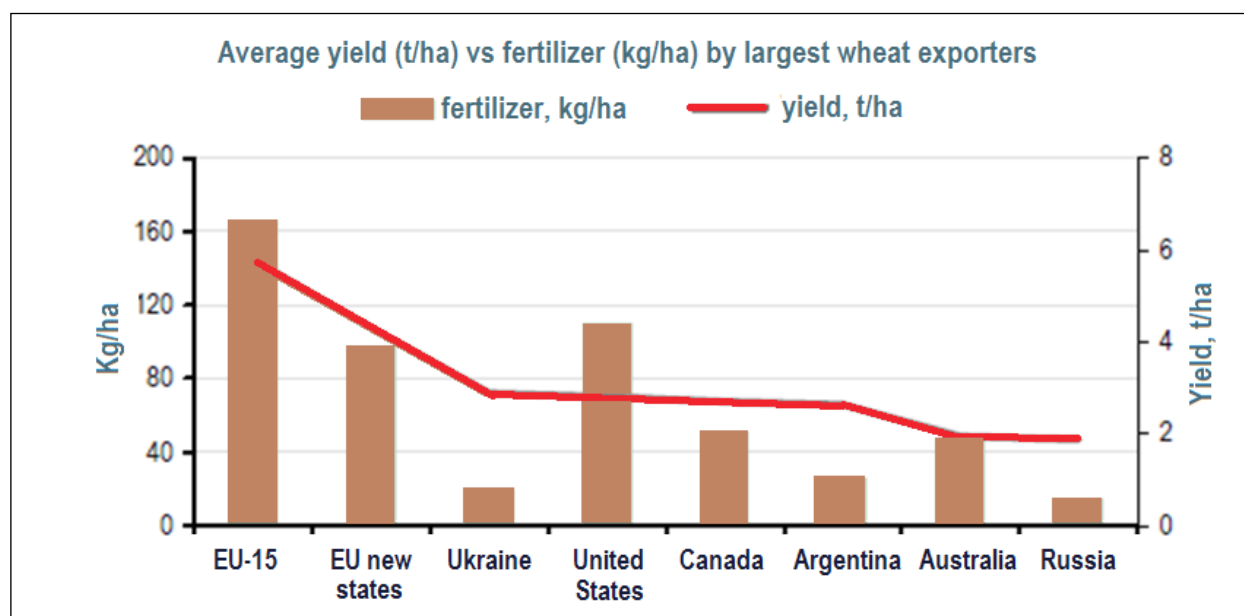


Source: Author

Nonetheless, Ukraine shippers complain of rail car shortages within the state-operated rail system. Shipping along the Dnieper River, which at one time carried millions of tonnes, is undergoing redevelopment by the private sector and holds great promise as a conduit for grain shipment to export. Because of Ukraine's compact landmass, it enjoys one of the cheapest transport costs from farm to export among the world's agricultural giants, averaging about USD 12 per tonne by rail and USD 6 per tonne by river. Most experts project Ukraine's production to double by 2020, requiring significant investment in transportation, storage and export infrastructure.

The agricultural system is only now recovering from the dislocations suffered throughout the 1990's after an end to the era of collectivized farms. In 1990, subsidies, particularly those promoting livestock expansion were eliminated, thus removing a prime demand for wheat and feed grains. A collapse of the livestock and grain sectors produced an inflationary impact on finished goods while depressing nominal wages. Consolidation of small leased land plots into large corporate farms, higher commodity prices and other structural changes have helped Ukraine to rebuild its agricultural base. Lack of land reform, however, tends to isolate the small producer from market signals; surveys find that most landowners deeply underestimate their land values considering the

**FIGURE 16: AVERAGE YIELD VS. FERTILIZER BY LARGEST WHEAT EXPORTERS**



Source: UkrRenaissance Capital.

land productivity and cheap transit to export terminals. The opaque land market prevents farm credit facilitation with producers having to borrow at double digit interest rates. This in turn inhibits optimal farming as Ukraine has one of the lowest use of fertilizer [see chart]. Also, some farm land simply sits idle, particularly as the farming population ages. After the Ukraine government recently liberalized its policy on foreign direct investment, China made a strategic venture into Ukraine, reportedly leasing 3 million hectares of farmland, an area the size of Belgium.

Although Ukraine passed a draft resolution on derivatives legislation in 2013, it remains the only major agricultural power without a liquid transparent commodities futures market. Initiatives in futures trading include the CME Black Sea Wheat Contract and the Agrarian Exchange. The CME lists a fob export contract which involves delivery of 3 different standards of wheat in Romania and Russia as well as Ukraine. It is denominated in USD, in trade units of 136 tonnes – equivalent to the 5000 bushel wheat contracts traded at the CME. The contract was launched in 2012, shortly after both Russia and Ukraine announced the lifting of export restrictions that were imposed in 2010. However, a lingering mistrust in the integrity of the Black Sea wheat market combined with what some traders describe as contract complexity have thwarted trade. As an external contract, which encounters currency convertibility issues<sup>53</sup> and requires the intermediation of a foreign broker, it is intended primarily as an export mechanism and does little for increasing price transmission to Ukrainian producers.

The Agrarian Exchange is an electronic matching system which received legal endorsement by way of a 2013 Cabinet of Ministers draft resolution, the stated objectives being:

- development of the agriproduce sales market;
- a more stringent competition per each of the commodities;
- mitigation of risks involved in commercial transactions;
- trades execution and settlements guarantee; and
- transparent price discovery.

In its infancy, the Agrarian Exchange is an electronic spot cash trade platform, traded in UAH (hryvnias), with plans to develop standardized futures contracts and thus far conducts low volumes of trade in grains. A draft resolution of an electronic warehouse receipt system has also recently passed which should aid the

<sup>53</sup> The GOU pegs its currency to the USD, at about 8 hryvnia to 1USD in 2013, and 9.75 in March 18, 2014



development of trade greatly. It is envisaged that negotiable warehouse receipts, identified by location and grade, will create a large geographical venue where traders – currently unable to conduct business together – could buy and sell grains and oilseeds. If successful, the Agrarian Exchange would greatly improve price transparency and price transmission throughout the growing regions. Although the Exchange is in the research stage regarding futures contracts, it has preliminarily identified transshipment hubs close to the coastal export markets as possible delivery points

### 8.3. Agricultural Policy Measures

According to OECD, which monitors subsidy levels in OECD countries and seven emerging countries (OECD, 2013), Ukraine is one of the least providers of subsidies to producers, ranking behind 19 other countries and the European Union (EU-27). Agricultural subsidies were cut as an outcome of the 2009 recession which severely restricted budget outlays. Grain is subsidized somewhat through the Agrarian Fund, which purchases small tonnages at intervention price levels<sup>54</sup> under concessionary loans, but predominantly through a range of input subsidies, based on a VAT accumulation mechanism (OECD, 2013). In 2013, the government announced plans to develop irrigation systems that would greatly help increase yields.

Other policy measures not targeted solely at the producing sector include subsidization of the railway system, VAT export refund<sup>55</sup> and – intermittently – export taxes, quotas and restrictions. The state operated railway has resulted in extremely low freight rates, attracting the bulk of shipments from interior to export. Experts note, however, that the low cost freight rates may be moot since recent surveys suggest that half of all railcar requests are unfulfilled<sup>56</sup>. In addition, the fleet is aging and industry experts claim that the government is slow in reacting to the swiftly growing production which is creating port delays. Because Ukraine joined the WTO in 2011, ad hoc export interventions will likely diminish or halt. The state also regulates the ports in Ukraine, charging about 4 percent of total commodity value for its services of ports maintenance.

### 8.4. Marketing tools

According to a World Bank initiative - the International Finance Corporation (IFC) – the rudimentary state of farm lending remains a serious obstacle to the development of marketing tool options, remarking, “There are no agronomy-based credit risk management tools; no lending policies and procedures specifically for agri-lending; and no loan officers trained on the specifics of agri-lending<sup>57</sup>”. Small holders (40 hectares or less), which contribute to roughly half of Ukraine’s production, are seriously disadvantaged by this lending vacuum, having no real marketing options other than making spot sales. Surveys in fact indicate that 90 percent of producer sales are spot<sup>58</sup>. Buyers are hesitant to make forward contracts with producers because of the potential for default. Recently, a draft law was passed, approving the Agrarian Receipt System to address the credit and forward contract issues. Modeled after Brazil’s Cedula de Produto Rural (CPR) system, the Agrarian Receipt System assures credit to the producer, but obligates delivery of entire crop to a designated warehouse under a strict 24 hour security watch. It does not, however, include a flexible pricing mechanism as in standard other country forward contracts between producers and warehouses. In short, small farmers in Ukraine are price-takers, receiving approximately two-thirds of the export price due to margins taken by exporters and intermediaries along the supply chain.

Most recently, a producer cooperative movement is appearing in some oblasts as a grassroots effort to scale-up productivity, but to date only involves dairy production. The recent past of collectivized farms is thought to be impeding this development in grains and oilseeds. Such an association, however, if properly organized, could offer several urgently needed solutions to credit and storage.

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54 1.2m MT of wheat for 2013 harvest.

55 Exporters are to receive a refund of the VAT tax upon export, but the system is backlogged

56 <http://www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELPRDC5105370>

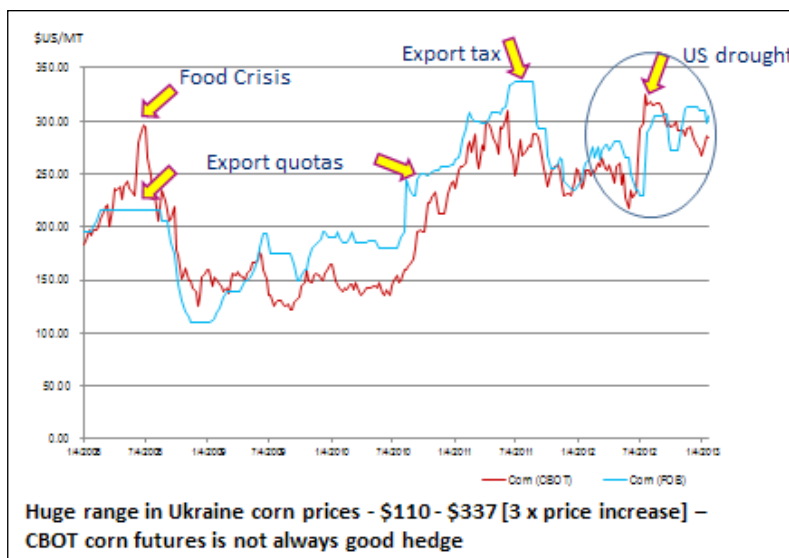
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58 Author’s field work

## 8.5. Price Transmission

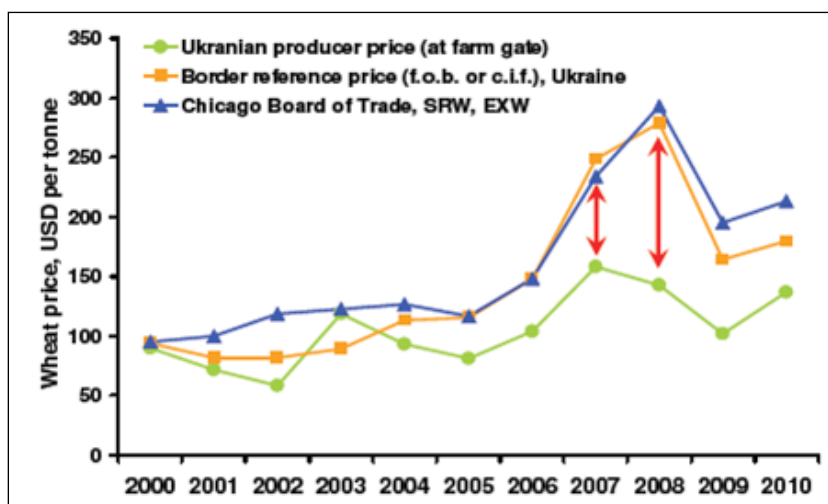
Global markets determine Ukraine export prices which then diffuse through the supply chain to farm gate. The export price is usually quoted as a flat price or more commonly –as in the case of maize- as a basis level to CME maize futures price. Wheat is increasingly quoted as a basis to the NYSE Euronext milling wheat futures which specifies delivery in-store silo Rouen, France. Indeed export sales are often transacted as basis contracts which are priced later when the buyer wishes to fix the actual contract price through an *exchange of futures*<sup>59</sup>. The variables that determine the Ukraine export price include:

**FIGURE 17: CHICAGO VS. UKRAINE MAIZE PRICES**



Source: UkrAgroConsult.

**FIGURE 18: COMPARISON OF UKRAINIAN WHEAT PRODUCER PRICE, BORDER PRICE AND PRICE ON CBOT**



Source: Kobuta, Sikachyna, & Zhygadlo, 2012

<sup>59</sup> A basis trade involves an “ex-pit” transaction, whereby the buyer “gives” futures to the seller - in equal amounts and at the identical price. The exchange clearinghouse then records a futures short for the buyer and a futures long for the seller. The buyers and sellers then have offsetting futures positions against their cash contract and the contract price is then fixed by adding the basis to the futures.

- CME (maize) or NYSE Euronext (wheat) futures price
- Ukraine exportable surplus
- Port logistics
- Cost of freight to various destinations
- Grain quality
- Risk of ad hoc export restrictions

Altogether these variables make risk management in Ukraine more challenging than in US and other countries which feature liquid futures markets. The Ukraine basis to CME or NYSE Euronext contracts fluctuates widely – sometimes at premiums and other times at discounts, as the graph below for maize illustrates. Basis risk, ad hoc intervention risk, quality uncertainty and low producer pricing power have created a market structure in which exporters take wide margins at point of export. According to some academics, during the export restrictions, Ukrainian farmers are among the major losers in the domestic market, since the high world wheat price is not fully transmitted to them (Goychuk, 2013).

Several corporate farms and agro holding companies operate in Ukraine that benefit from economies of scale, vertical integration and access to global capital markets. The Kernel Group, which is listed on the Warsaw Stock Exchange and reported \$2.7bn in revenues for 2012, for example, owns or controls 405,000 hectares of farm land along with shipping terminals. It was involved in the sale of 10 percent of Ukraine's agricultural exports for the year. Corporate farms contribute to roughly half of Ukraine's grain and oilseed production. They are very integrated into the global pricing system and enjoy a high level of global price transmission. Because these farms are diversified, with several owning oilseed crushing plants as well as livestock operations, they respond quickly to changing price signals. Corporate farms stand in stark contrast to small and subsistence farmers which form a fragmented market and are subject to local market conditions, high cost of credit and intermediary margins.

The government's goal of developing derivatives markets and various derivatives draft resolutions are important steps in helping empower the small farm sector. Price discovery along a forward curve would aid in promoting price transparency and supply responsiveness. Exporters, which face exposure to currency and basis risks by hedging with CME and NYSE Euronext contracts, would also benefit from a domestic hedging mechanism. When export restrictions were announced in 2010 for example, exporters that owned cash wheat in the Black Sea region and hedged this ownership by selling CME wheat futures, suffered a twin adverse price event: cash ownership sunk in value while CME futures soared. A domestic futures market would obviate this situation, since regional cash and futures prices tend to move together. Domestic derivatives would also introduce plentiful opportunities for Ukraine/US markets arbitrage - a proven strategy for promoting market efficiency. Besides marketing tools, silo bag storage, which has seen rapid expansion in Argentina and Brazil, would give producers improved pricing power.

Farming has only recently emerged from the breakup of collectivism and severe sector decline. Global demand remains strong and Ukraine is ideally positioned to respond. Agricultural policy direction, therefore, faces an important inflection point as grain and oilseed export promotion may be able to displace domestic food security concerns. Alongside the development of derivatives markets - extensive education and training would be needed to integrate more fully small farmers into the larger sphere of grain markets.

## 9. South Africa

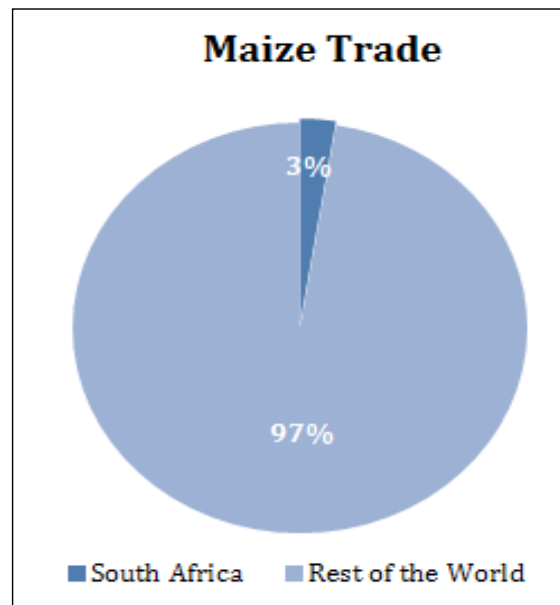
### 9.1. Summary

South Africa is a landmass of relatively small size and among the other countries studied, lacking in natural endowments, particularly water resources. Nonetheless its agricultural sector is growing and it is a net exporter of maize. It has well developed infrastructure including storage, roads and export terminals, although its railway system is suboptimal. It also features a financial service sector that is highly integrated into the farming community. The majority of producers in grains are engaged in commercial farming, operating farms of about 2000 hectares, although there is a small segment of subsistence farming. South Africa is the only country in this study in which producers and other supply chain actors operate without government support, either direct or indirect. It features a unique futures market which became established after the abolition of the Maize Board. Because of the numerous silos (over 200) registered to deliver maize and wheat, the futures markets are used both as a hedging mechanism and a marketing outlet for producers. Conducive government policy toward agricultural risk management combined with liquid, transparent cash and futures markets that are accessible to producers allow for a high level of price transmission within the system.

### 9.2. Background

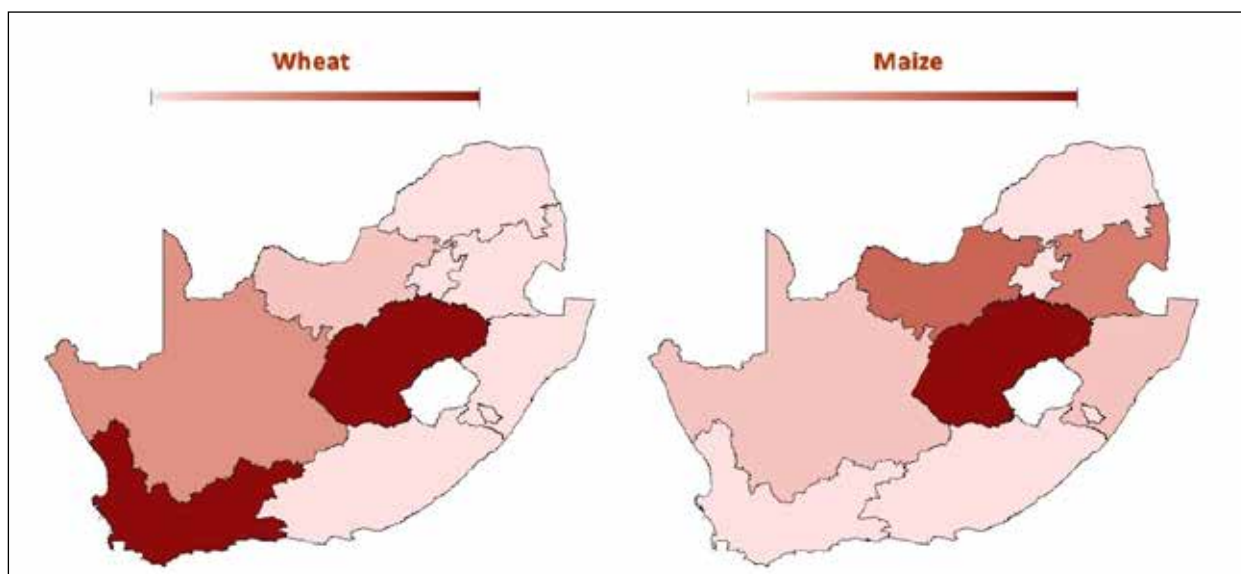
South Africa, covering 1.2 million square kilometers of land, is one-eighth the size of the United States and has seven climatic regions, encompassing Mediterranean, sub-tropical and semi-desert. Although South Africa is not well endowed with natural agricultural resources, suffering from limited water resources and good quality soil, agricultural activities range from highly intensive crop production and livestock farming, to the production of

FIGURE 19



Source: 2011-2013 average. FAO.

FIGURE 19: MAIN PRODUCTIVE REGIONS FOR WHEAT AND MAIZE



Source: GEOGLAM

sub-tropical fruits, deciduous fruits and wine. The agricultural sector can also be considered as a dual economy with large commercial farming existing alongside small scale subsistence farming. While 12 percent of South Africa's land can be used for crop production, only 22 percent of this is high potential arable land. With uneven and unreliable rainfall and a relatively low water table, water availability is the greatest inhibiting factor to increased agricultural production in South Africa. It is estimated that 50 percent of South Africa's water resources are presently used for agricultural production with about 1,3 million hectares (mainly crops) under irrigation. According to most experts, water availability and resources will be severely depleted in coming years.

Primary agriculture contributes about 3 percent to South Africa's gross domestic product (GDP) and about 7 percent to formal employment. There are, however, strong linkages between the agricultural sector and the general economy, with the agro-industrial sector comprising almost 12 percent of GDP. In recent years, South Africa has been a net food exporter, although the occurrence of drought has tended to impact this status. Sugar generally accounts for the largest export value (also drought affected) together with maize, wine and wool. South Africa has three deep water ports and a modern network of roads and railways, although the percentage of agricultural product, predominantly grains, transported by rail has declined considerably over the past twenty years as the rail system has aged. Significantly, it has a sophisticated financial sector that is well integrated with the agricultural sector. The counter-seasonality to Europe, the primary export market for agricultural product, is a major competitive advantage for South Africa.

Over the past twenty years, the gross income from agriculture has increased an average of 10 percent per year and the outlook is bullish in the near-term with a more moderate long-term growth. Gross farming income from field crops increases by 7.3 percent for the year ending Jun 2013.

The largest area of farmland planted to field crops in South Africa is maize, followed by wheat, sunflower seed and soya. The latest area planted to and production figures are detailed in Table 1.

### 9.3. Agricultural Policy Measures

Prior to 1996, South Africa's field crop marketing system was characterized by single-channel systems operated and administered by product Boards established in terms of the Marketing Control Act no. 26 of 1937. This Act was preceded by the Mielie (Maize) Control Act no. 39 of 1931. This legislation allowed for the government, through the relevant product board, to control the pricing of all the products produced in the country. Through the Maize Board, the government set maize and maize meal prices at each stage of the supply chain. All maize produced in a designated "maize marketing year" was required to be delivered to the maize board and was subject to a predetermined price. Despite the normal market premium extended to white maize over yellow, the Maize Board set the same price for both varieties. All maize "marketed" through the maize board was subject to a levy which was used to subsidize the required import of product when necessary (in times of shortage) and to export maize in times of surplus – thus allowing the stabilization of maize farmer income. Roughly 4000 large commercial farmers supplied the bulk of the market.

Rather than handling the maize directly, the Maize Board appointed agents, mainly farmer cooperatives, to buy from farmers, store the product, and sell to registered corporate millers on its behalf. The single channel system led to a concentration of all marketing services in the value chain. By the late 1980's, six cooperatives controlled virtually all of the bulk handling and storage facilities in the country and the maize milling and maize retailing sectors were also highly concentrated. Although the system of controlled pricing was intended to keep farm prices and marketing margins in line with costs and protect farmers against the exploitation of "unscrupulous traders", the pricing system generally followed a cost-plus approach. This approach was largely based on information provided by the farmers, processors and retailers themselves and resulted in a distortion of the economic value of the product and the related services. The pricing was also seen as a political tool by the ruling government. Attempts to modify the price setting process within the framework of the single channel system in the late 1980's and early 1990's often confused the issue and brought pressure for fundamental reform. Substantial reforms of the field crop marketing systems, including that of maize, were implemented in the late 1990's with the boards, including the Maize Board, totally deregulated in 1997. Table 3 details the history of the policy issues applied to the maize industry.

At present there is no intervention in the field crop marketing system and no policy measures to support grain farmers in South Africa. Price setting at every stage of the maize value chain is based entirely on supply and demand, through negotiations between market participants. Any participant is free to trade domestically, import or export maize in South Africa. However, despite the absence of support measures, the government is watchful

**TABLE 3: THE HISTORY OF POLICY ISSUES APPLICABLE IN THE MAIZE INDUSTRY IN SOUTH AFRICA**

Date	Policy Issue
1931	Mielie (maize) Control Act No 39 of 1931
1935	Regulation of Export of maize in terms of the legislation
1937	Marketing Control Act No 26 of 1937
1938	First mielie (maize) scheme established in terms of the Act
1944/5	Single channel marketing scheme for maize started
1953	Establishment of Maize Board Stabilisation Fund
1987	Summer Grain Scheme became a Single Channel Pool Scheme
1994/5	Deregulation started by freeing up domestic grain market by implementing a surplus removal scheme and export control
1995/6	Partial freeing of exports to trade (Board manages "export pool"
1997	Maize market totally deregulated and Maize Board abolished.

in ensuring that policy is conducive to supporting the efficient production and marketing of grains.

#### 9.4. Marketing Tools

The deregulation and abolition of the Maize Board system for field crops abruptly eliminated both the single buyer or seller of physical product and the price risk mitigator for sellers and/or buyers. This meant that all participants in the agricultural market suddenly needed to understand and utilize all marketing tools at their disposal to sell and buy physical product as well as manage the price volatility in the market. Since the removal of the Government from field crops management for almost two decades, there is no guaranteed minimum price, no target or reference price and no provision for a strategic reserve at a specified intervention price. Unlike the US, which provides heavily subsidized crop insurance to producers, South Africa provides none. In the absence of any Government support, all participants in the agricultural market place are therefore subject to volatility in prices, resulting from climatological forces, supply and demand balances and fluctuating exchange rates.

The market reacted quickly to the deregulatory change with the emergence of grain traders to trade physical product, the establishment of an agricultural derivatives market and the adaptation by the financial sector in structuring financial products for agricultural market participants. Most significant of all, and the confluence of all three developments, was the establishment of the Agricultural Markets Division of the South African Futures Exchange (SAFEX) in 1995.

Central to the price risk management process is the operation of the Commodity Derivatives Division (CDD) of the Johannesburg Stock Exchange (JSE). Formerly the Agricultural Markets Division of SAFEX, the CDD offers both long dated and short dated futures and options contracts on white maize and yellow maize, wheat, sunflower seeds and soya. Long dated futures contracts are traded for the months of March, May, July, September and December which are introduced 18 months out and short dated futures contracts for all other months. Agricultural derivatives provide the facility to manage price risk while also playing an active role in price determination and transparency in the local grain markets. The price discovered on the derivatives market serves as the market reference price for grains, particularly white and yellow maize, throughout the Southern African region. Production, financing, trading and usage decisions are based on the maize prices discovered on the derivatives market. Unlike other exchange-traded term contracts with discontinuous delivery months, e.g. January, March, May, etc., the combination of long and short dated futures contracts on the CDD provides market prices for every day of the year and enables delivery to take place on every day of the year.

Producers, users, domestic and foreign traders and financiers of maize hedge their price risk on the SAFEX Commodity Derivatives Division of the JSE, thereby effectively limiting their exposure to adverse price movements in the maize markets. This encourages increased productivity in the agricultural sector as farmers and users are able to concentrate their efforts on managing production risks. Financial institutions lending to the grains sector are also ensured of reduced risk profiles when dealing with clients who have hedged a portion of their price risk. Such clients could typically access funds at cheaper rates than would otherwise have been offered as lenders are confident of the operation of the derivatives market. Traders can also use the market to lock in prices without



counterparty risk, as well as source grains on a guaranteed basis of timeframe and quality assurance. Although, the primary aim of the derivatives market is to transfer risk, the guaranteed delivery mechanism of the market based on regulated warehouses and electronic warehouse receipts provides traders and users of South African grains a dependable source for grains<sup>60</sup>.

#### **9.4.1. Grains Delivery System**

Prior to deregulation, the various grains boards, including the Maize Board, required all product to be delivered to silos owned by the agricultural co-operatives situated throughout the grain producing areas. The co-operatives acted as collection and storage agents for the Boards and all associated fees were centrally determined and administered by the respective boards. The co-operatives were geographically positioned across the production areas to facilitate ease of access to a storage point. Users of product were required to submit their purchase requirements to the board that administered and coordinated the necessary transport logistics.

When the grains market deregulated, the co-operatives also went through a process of restructuring - some becoming companies. All started to adapt their business models to incorporate grains storage as a revenue line. This led to competitive storage rates and an expansion outside their traditional geographic boundaries. Logistics companies also emerged during this time as traders needed to arrange their own transport.

Although in its original plan to develop futures contracts, the Agricultural Markets Division of SAFEX proposed the designation of a limited number of delivery locations, producers advanced a more expansive system - one which would allow them to hedge anticipated harvest and subsequently make delivery at their "local" silos<sup>61</sup>. Recognizing the importance of transport costs in South African grain price determination, AMD then devised a system of multiple delivery locations (now almost 200 locations) with location (transport) differentials. These were calculated by the transport costs between the respective silos and the reference pricing point of Randfontein (just outside Johannesburg), the largest off-take point of grains in South Africa. SAFEX allows for any silo owner to become registered for futures deliveries, provided it meets the conditional requirements established and administered by the exchange. Unlike other delivery systems that tend to favor exporters (e.g. CME Black Sea wheat contract) the South African delivery system advantages producers by facilitating their access to delivery silos. The process of "convergence" between futures and cash prices at the contract expiration thus takes place at approximate farm-gate levels. It should be noted, however that many producers, unaccustomed to a system of market-based location differentials, initially felt penalized by the exchange for producing grains in areas distanced from the market<sup>62</sup>.

Locational discounts have been instrumental in the move away from the capital intensive concrete silo complexes to more flexible storage facilities such as bunker storage and silo bag storage. This development, now widespread in Argentina, takes storage closer to the producer and circumvents several intermediary mark-ups, thereby increasing producer price realization.

#### **9.4.2. The delivery process**

The delivery process is facilitated by the flow of electronic warehouse receipts issued by registered silo owners who are subject to financial criteria and operating conditions as established by the CDD. The silo owner storing the product guarantees its quality<sup>63</sup> and is required to out-load the product as per the details on the warehouse receipt. Delivery can take place at any SAFEX approved silo by the short position holder notifying his/her broker (who in turn notifies the clearinghouse) about his/her intention to make delivery to satisfy the obligations of a short futures sale. Deliveries on the exchange are made public. Any qualified market participant can bid (at a premium over delivery price) on particular locations during a specified time period. Otherwise, deliveries are randomly allocated by computer programme to existing long position holders. This system, then, is unlike any

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60 The CDD also offers Exchange for Risk (EFR's) and Exchange for Physicals (EFP's) to facilitate the price risk faced by participants in the maize market..

61 Normally, producers that sell futures contracts have to offset the sale with a repurchase of the same futures contract and then make a cash sale to the local warehouse.

62 For a discussion of this topic please see, THE FUNCTIONING OF THE AGRICULTURAL FUTURES MARKET FOR GRAINS AND OILSEEDS IN THE LIGHT OF CONCERNS EXPRESSED BY GRAINSA, National Agricultural Marketing Council, South Africa,2009..

63 As per detailed grading methodology specified by the South African National Department of Agriculture.

other futures system in this study as it combines futures trading with cash marketing over a broad domestic production area.

Spread contracts allowing participants to take positions in product spreads (the difference between products such as white and yellow maize) and calendar spreads (the difference between the prices in one month against the price in another month) are also available and add to the hedging and arbitrage opportunities available on the market.

Call and Put Option Contracts on products are listed to allow participants additional price risk management tools. To accommodate those participants who wish access to the international price of maize, the CDD of the JSE also trades cash settled contracts in South African Rand (ZAR) that are settled off of the closing prices on the CME. These ZAR settled CME products also serve those South African participants seeking to arbitrage between South African and US products (Kirsten, Geysler, Jooste, & Van Schalkwyk, 2009).

The Commodity Derivatives Division of the JSE is regulated by the Financial Services Board (FSB) of South Africa which approves the Rules of the exchange, oversees the operation and reporting of the exchange and acts as final authority in terms of the prevailing legislation. Daily price limits are in place and speculative position limits apply to the trading of white maize to curb excessive speculation in the market.

### 9.4.3. Cash market tools

As a result of the operation of the derivatives market, producers of grain in South Africa have various tools to choose from when marketing their grain. These consist *inter alia* of the following:

1. Short futures hedge - Producer sells short on the futures market to lock in a price by depositing initial margin and additional sums for daily variation margins. In many cases, financial institutions (banks) will assist in the provision of credit to cover margin calls for producers taking a short futures position as a hedge against anticipated production. The producer can offset the hedge (buy back the position) before delivery or decide to deliver in terms of the contract.
2. Cash forward -The producer makes a forward cash sale to a cooperative, final processor or trading firm at a price based off of the prevailing exchange price. The buyer would then hedge the purchase to manage its price risk. There are various structured agreements, similar to US minimum price contracts, whereby the producer can participate in any upside in the futures exchange price.
3. Spot/Storage -The producer can decide to remain unhedged or unpriced and sell to any buyer at the time of harvest – or at a later date after placing the grain in storage.

The CDD of the JSE is constantly looking at improving access to the exchange and providing more opportunities to both producers and buyers of grain. Recent developments have been the adoption on mini-contracts (based on a quantity of 10 tonnes instead of the standard 100 tonnes) and the ability for producers who own a negotiable warehouse receipt but do not hold a short position on the exchange, to sell their product by way of an auction on the exchange and benefit from the secure clearing and settlement system provided by the exchange.

The fundamental reasons for the derivatives market development in South Africa, providing grain producers with basic marketing tools, was the involvement of the banks in the market, sound infrastructure and a conducive policy environment.

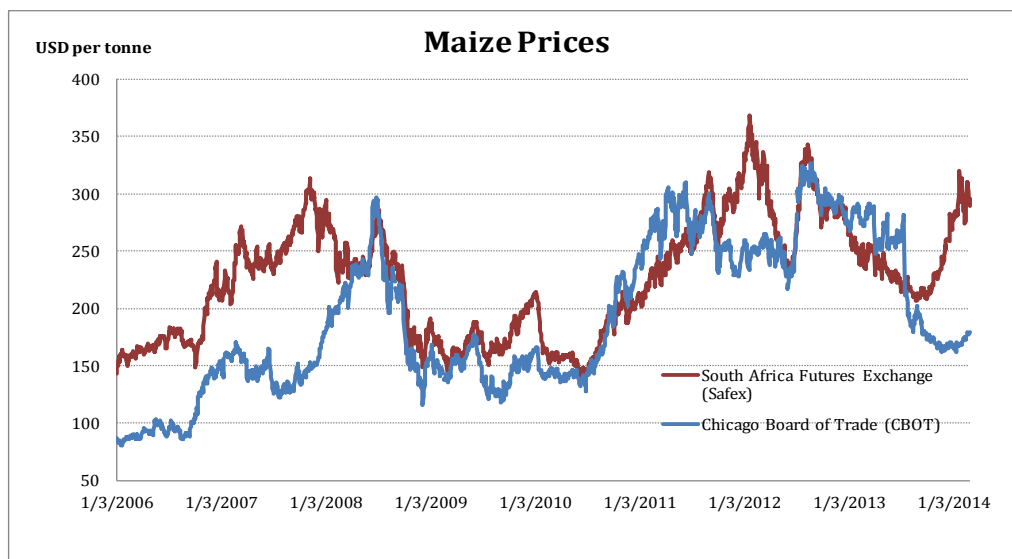
## 9.5. Price Transmission

### 9.5.1. Futures Prices and Farm gate Prices

Although futures prices converge closely with farm-gate prices, the correlation between futures prices and actual prices received by producers often varies in accordance with the producer's marketing skill, sales timing and point of production. In addition to these variables, there are other costs producers absorb, such as in and out handling charges and storage fees as well as fees related to the marketing option chosen. Similar to Argentina, there is no homogeneous "farm gate price". However, price transmission from futures to farm at any point in time as a result of the multiple point and continuous delivery system is very high.



**FIGURE 20: MAIZE PRICES BETWEEN CME (CBOT) AND SAFEX ARE OFTEN DIVERGENT**



Source: CBOT and Safex.

The overall price of grain, particularly maize, in South Africa is determined by buyers and sellers in a competitive and transparent manner with the following factors playing a dominant role:

- The supply and demand of internationally available product, as reflected on the predominant international markets.
- The supply and demand of maize in South Africa. This would include the breakdown between white maize and yellow maize and the demand and supply of substitutable products.
- The supply and demand of maize and other grains in the Southern African Region, including the policies of neighboring countries as regards the acceptability, or not, of GMO product and the availability of the non-economic provision of grains (Food Aid).
- The economic viability of exporting or importing maize that is largely determined by exchange rates.

The weighting of these determinants vary from season to season, but the graph below demonstrates that domestic and regional factors often play an important role in the price of maize in South Africa, particularly regional supply. The general trend in prices is largely influenced by the dominant international markets, and in the case of maize, by CME maize prices. However, there are times when the prices in South Africa, as determined on the SAFEX maize contracts, do not correlate with the international prices. The reasons for this include sudden changes in weather conditions (also noting the difference between the north and south hemispheric seasons), demand changes in neighbouring Southern African countries, time lags in importing product, changes in transport costs and policy differences specifically related to the approval of GMO events. The GMO issue has risen in importance recently as South Africa has restricted maize importation from certain countries due to the non-approval of certain GMO events. In addition to GMO issues, weather changes and increased regional demand have recently caused maize prices in South Africa to increase in opposition to the downward trend in international maize prices, particularly as quoted on the CME.

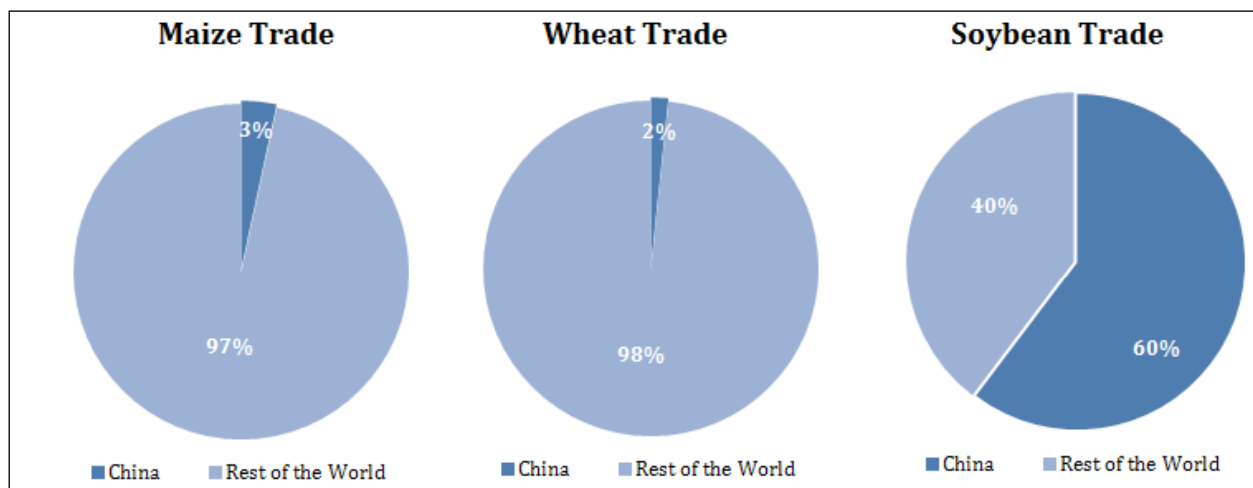
As the graphs indicate, domestic grain prices in South Africa are sometimes poorly correlated with international prices. As a rule in futures pricing, the further the market is from the dominant international grain suppliers and the greater the difference in the geography and climate, the lesser the price correlation. As this difference (known as the "basis") increases, the successful establishment of regional futures markets becomes more likely, which has been borne out by the proliferation of commodity futures exchange over the past two decades. Basis risk provides a rationale for domestic derivatives market as a valuable marketing tool for grain producers in South Africa, not only to manage domestic price risk, but also to facilitate accurate price discovery within the country and the entire southern African region.

## 10. China

### 10.1. Summary

China is the largest cereal grower in the world and also the largest soybean importer. China has a low level of arable land, making food security a primary policy concern, particularly as the economy grows at rapid rate. Infrastructure development varies – ports and much of the rail system are modern, while provincial storage and roads are underdeveloped. Farm size is very small (less than a hectare) as China tries to balance productivity with demographic stability. Among the 6 countries studied, China has the highest level of producer support and has increased these levels y/o/y since 2006. Its main areas of support concern inputs (China has the highest use of fertilizer in the world) and minimum price supports (MSP) which, as of 2013, are above market clearing levels for cereals. Although China features some of the highest volume global contracts for maize and soy complex, officials concede that most of the trade tends to be speculative. Producer prices are being largely determined by MSPs, but crop collector-merchants are reportedly able to buy on-farm goods at discounted prices, and then transport these goods to other demand points or into government intervention centers and sell at wide margins. As the system is exhibiting growing unmanageability, officials have indicated that China may reevaluate its price support program. Price transmission in China has become largely disassociated with global signals.

FIGURE 21



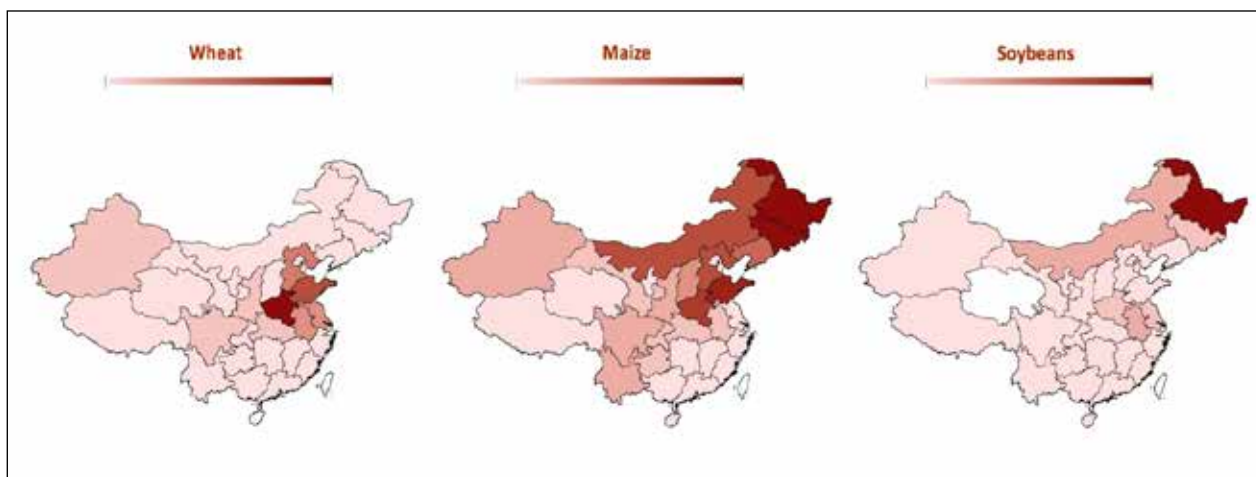
Source: 2011-2013 average. FAO.

### 10.2. Background

China is the world's most populous country and largest producer of cereals. Its agricultural history dates back an estimated 9 millennia when millet and rice cultivation first evolved. Entwined in a complex mythology, grains have long held a sacred status and became an accepted form of commodity money during the Chan Kuo period (approximately 5th -3rd C. BC). As a global manufacturing giant, China today is a leading economy and the largest importer of basic commodities such as oil, iron ore, tin, lead and soybeans.

Owing to China's limited arable land base (about 12 percent of total), food security has been a constant political concern during the modern era. Following The Chinese Revolution of 1949, the country undertook a land redistribution system in 1952 that transformed the feudal landowner arrangement into small peasant plots. Over the next four years, these farms were further restructured into large state-owned collective farms, involving hundreds or even thousands of households, organized as communes. These arrangements, combined with certain agrarian and industrial policy directives aimed at modernization, ultimately failed and by 1978, communes were transformed into the "household responsibility system" which survives today. The system comprises two essential components: first, is the distribution of land-use rights among households, meaning that land circulation in China is unlike most countries that allow for private ownership of property, and second is a strict household registration system which is a primary mechanism for population management, preventing free migration from rural to urban areas (Minghong, Guy, Xiubin, & Liangjie, 2013). The system, therefore, has made farm size more static than in other large agricultural countries, such as Ukraine and Brazil, which have witnessed a rapid growth in large scale

**FIGURE 22: CHINA MAIN PRODUCTIVE REGIONS FOR WHEAT, MAIZE AND SOYBEANS**



Source: 2011-2013 average. FAO.

farming over the past few decades. Since 2011, a gradualist approach has been taken to farm consolidation - in an attempt to balance productivity growth with demographic stability. While the livestock sector is undergoing relatively rapid consolidation, about 80 percent of grain farms remain small, consisting of 0.6 hectares or less.

China's main growing areas are in the eastern provinces, close to the coastal regions, although significant rice production takes place in the south central province of Sichuan. Maize production is fairly diffuse from north to south, with the north having the highest concentration of productivity. Wheat production is more concentrated in the middle provinces of Henan, Jiangsu, Shandong, Anhui and Hebei. Oilseed processors are situated mostly along the eastern coast, close to the ports which handle record amounts of soybean imports.

Statistics on infrastructure in China are not complete, but infrastructure in the rural areas in particular appears underdeveloped. According to head of the State Administration of Grain, inadequate on-farm storage causes 20million tonnes of cereals to be lost every year. Rural roads are also problematic in providing efficient transport. However, China has a relatively vast system of railways and paved roads allowing grain to be shipped eastward to processing centers at rates comparable to US shipping rates (Keats & Wiggins, 2012). It also features an advanced north-to-south coastal shipping corridor facilitating swift crop redistribution.

China features some of the most active commodity futures exchanges in the world. Beginning in the early 1990s, China experienced a proliferation of futures exchanges - at one time supporting over forty. However, the exchange growth surpassed the authorities' supervisory capabilities and so, abusive practices, including brokerage scams, fraud and manipulation grew rampant. In 1993, the authorities abruptly altered the trading landscape with the issuance of the *first rectification* – The Notice of Firmly Curbing the Blind Development of the Futures Market. Over a five year period, authorities slashed the number of exchanges to 14, delisted 20 futures contracts (leaving 35), began licensing of futures commission merchants while cutting their number by over 70 per cent, restricted trading on foreign futures exchanges, introduced new rules and regulations, and shifted the control of the exchanges from local governments to regulatory authorities (Xue & Ronalds, 2005).

Continued supervisory issues, however, led to the *second rectification* in 1998, further circumscribing trading. Eleven more exchanges were closed, bringing the number down to the three operating today: The Shanghai Futures Exchange (SHFE), the Dalian Commodity Exchange (DCE), and the China Zhengzhou Commodity Exchange (CZCE). The number of futures contracts was reduced to 12 from 35, and more brokers were closed, leaving just 175 standing from the early 1990s peak of 1,000. Margins were standardized and regulations further toughened. Trading on foreign futures exchanges was restricted to a small number of large, global entities<sup>64</sup>.

Today, in terms of agricultural contracts traded, China's exchanges rival those in the US. Volumes in 2012 for the soymeal, soyoil and soybean contracts on the DCE ranked 1st, 5th and 7th in the world, although DCE's soybean contract size of 10 tonnes is considerably smaller than the CME's soybean contract of 136 tonnes. The major companies

64 Ibid.

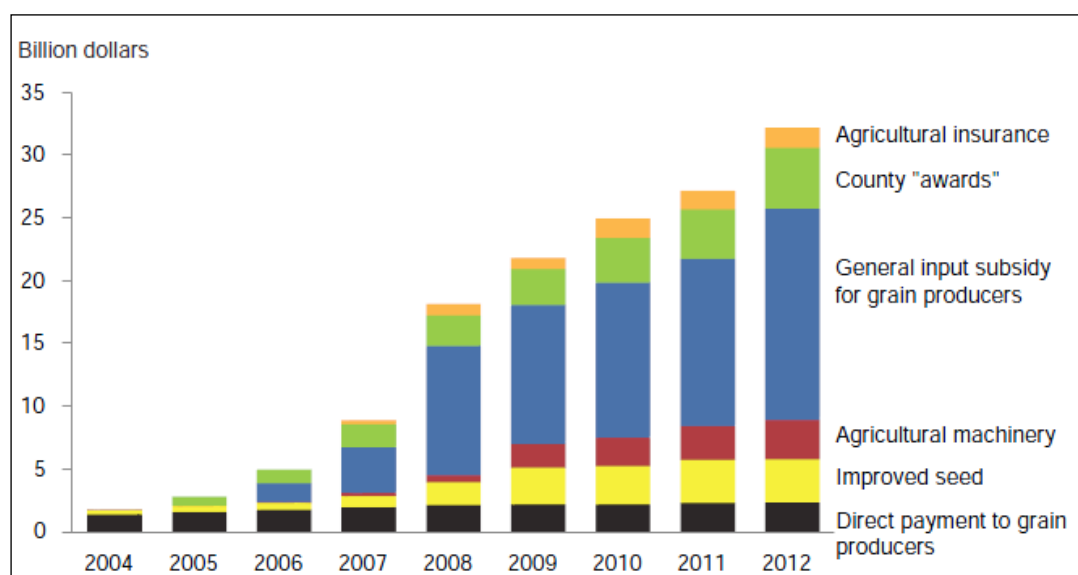
operating in China, such as Cargill and Bunge reportedly hedge their soybean crushing output using the DCE products, because they offer higher prices. The rules governing trading are comprehensive and include registration procedures for bona fide hedgers, clearing, margin levels, price limits, speculative position limits, procedures for taking delivery (or arranging an “exchange for physicals” at contract expiration) and dispute settlement. China’s government supports exchange trading for producers and since the last decade has promoted, together with the DCE, risk management through an educational program entitled a thousand villages, ten thousand farmers.

### 10.3. Agricultural Policy Measures

China maintains a principle objective of attaining 95 percent self-sufficiency in grains. According to the OECD’s Evaluation 2013 (OECD, 2013) China’s producer support levels are about 19 percent of total output, ranking near the middle among OECD countries and emerging economies. Following its entry into WTO (2003) and within its general plan of “coordinated urban-rural development,” China undertook a series of direct rural policies to implement one of its stated principles of “giving more to peasants, asking for less from peasants, more activating for peasants.” Specifically, to boost grain output and expand grain planting area, the government implemented a series of measures, including agricultural tax deduction, grain subsidies, seed subsidies, machinery purchase subsidies, etc. most of which have since risen every year since 2003. In 2005, it abolished the regulations on agricultural tax, which had been in existence for over 2 ½ millennia. After 2006, the central government began to adopt “the New Socialist Countryside Policy” and “Comprehensive Rural Reform” that involved the political, social and cultural aspects of rural life, stressing the importance of democratic elections, decision-making, and management in villages (Shui & Veeck, 2012). Altogether, such measures met with success, as grain production grew by almost 25 percent by 2008, although yields per hectare continue to lag behind Europe for wheat and the US for maize.

Inputs receive the most subsidies. According to the OECD, China has the highest use of fertilizers per hectare in the world. Input prices have reportedly doubled in some regions making grain growing at current global price levels unprofitable. In addition to input subsidies, which are not commodity specific, the government has also raised price support levels for wheat and rice, deemed strategic food items, every year since 2008. In 2012, China established the support price for wheat at USD 323 and for rice a range between USD 380 and USD 440. As these levels were above world clearing prices, two-thirds the wheat and rice grown ended up in intervention stocks by September of that year (OECD, 2013). Because the government holds the majority of wheat stocks, flourmills buy directly from central government auctions, which are held weekly by the State Administration for Grains (SAG) (Lagos & Junyang, 2013). For maize, China raised its support price to over USD 350 per tonne which is twice the CME maize futures price as of January 2014. The government also provides hog producers a subsidy when the

**FIGURE 23: CHINA EXPENDITURES ON MAJOR AGRICULTURAL SUBSIDY PROGRAMS, 2004-12**



Source: Gale, Growth and Evolution in China’s Agricultural Support Policies, 2013.

hog/maize ratio declines below a specific number, keeping feed demand strong in the livestock industry. With regard to soybeans, according to China's National Grain and Oils Information Center (CNGOIC) the government set a floor price of RMB 4200 per tonne to RMB 4500 per tonne (USD 682 -731 per tonne) during the 2012/13 marketing year, allowing it to accumulate about 6m tonnes over 3 marketing years . Some of these stocks were auctioned in August 2013(at sales prices averaging around RMB 3900 or USD 634 per tonne) (Meador & Xinping, 2013). As the MSPs have played an increasingly larger role, some experts believe that government support has become unmanageable owing to funding or elevator capacity issues (Lagos & Junyang, 2013). In addition to the state level subsidies are various provincial subsidies.

In addition to its producer subsidies, China exempts food transport from road tolls (Keats & Wiggins, 2012) and increasingly supports infrastructure development.

As part of its policy of self-sufficiency, China maintains tariff rate quotas on wheat (9.6m tonnes), maize (7.2m tonnes) and rice (5.3m tonnes) and a tariff rate of 1 per cent. Soybeans, however, have no quotas and China is the largest importer of the oilseed - importing 60m tonnes in MY 2012/13. This is consistent with its general policy of importing land and resource intensive products such as soybeans or cotton and exporting labor intensive finished products such as canned goods or manufactures.

In its quest for food security, China has embarked upon acquisition or leasing program of foreign land since about 2000, when the country first leased land in Mexico and Cuba (Von Braun & Meinzen-Dick, 2009). Today China owns or leases farmland in South America, Australia and parts of Africa. Most recently it acquired a tract of leased land in Ukraine, reportedly the size of Belgium.

#### 10.4. Marketing Tools

Despite China's vowed commitment to a liberalized marketing system<sup>65</sup>, falling global prices have produced a significant level of government intervention, particularly in the form of stockpiling. The high minimum support price of maize in particular has caused some trade analysts to describe it as an indirect subsidy to US maize producers, who during the 2013 harvest experienced a 40 percent y/o/y price decline, the largest in history. The levels of MSPs in China have been adjusted upward because of soaring production costs, primarily labor and inputs, transforming China from a low-cost to a medium-to-high-cost producer in less than a decade.

The ramifications of high MSPs on marketing and price formation are substantial. Since 1990, the government has maintained a policy of encouraging producers to form long term partnerships with Leading Entities (LEs), which provide loans or inputs to producers in exchange for crops. High prices have triggered the emergence individual crop collectors (called individual grain merchants or IGMs) which approach farms door to door. These IGMs offer better prices than the LEs and promise the additional service of transporting the commodity from the farm. This competition between the LEs and the IGMs has caused a rash of producer defaults to the LEs (Luo, F., & Wang, 2013). IGMs in turn deliver the grain to other demand centers or a registered government depot to take advantage of the MSPs, reportedly gaining a margin between farm-gate purchase and government sale (Gale, 2013). In addition, warehouses that store grain for the government receive generous subsidies for storage and interest and so are willing to store as much grain as possible (Gale, 2013). Because the stockpiles are insulated from market channels until prices rise, the bidding competition between IGMs and LEs combined with the warehouse demand for storage subsidies keep prices high.

#### 10.5. Price transmission

Whereas grain prices in most countries included in the report are fairly integrated with CME benchmark prices, in China they have become disassociated. Prices for maize and wheat are now largely determined by MSPs and stocking policies; as cereal prices (more so than oilseeds) have experienced a dramatic decline as a result of an unprecedented supply response, China's gradualist approach to farm support has suddenly left it in a position of price setting and stocks management. Exporters to China, particularly those with domestic operations, are reportedly enjoying high levels of profitability as they arbitrage the price differential between US and other origin grains against Chinese grain.

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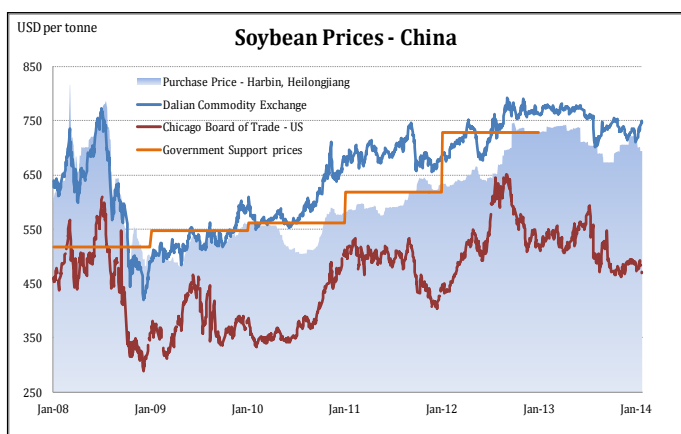
65 "Grain prices have come to the stage to be decided by the market," the China Economic Times cited Fang Yan, head of rural department of the National Development and Reform Commission (NDRC), as saying.' Economic Times of India, Nov 26, 2013.



With regard to futures prices at the DCE [maize and soybeans] and CZCE [wheat], trade analysts and commercials report that the soybean oil and soybean meal contracts are useful for placing short hedges while soybeans are normally priced against the CME contract. However, the DCE soybean futures price is far more market responsive than its maize and wheat prices. According to one study, CME and DCE prices have become co-integrated (Liyan, Rong, & Tang, 2012). Since CME and DCE represent the primary supply (North and South America) and demand (China) components for the soybean price equation, this should be expected. Prices on the maize contract are reportedly more speculative in nature. In fact, officials concede that about 95 percent of grain/oilseed futures trade is speculative. According to some officials and commodity futures experts, maize and wheat trading often consists of wagers on the upcoming policy adjustments in support prices and stocking.

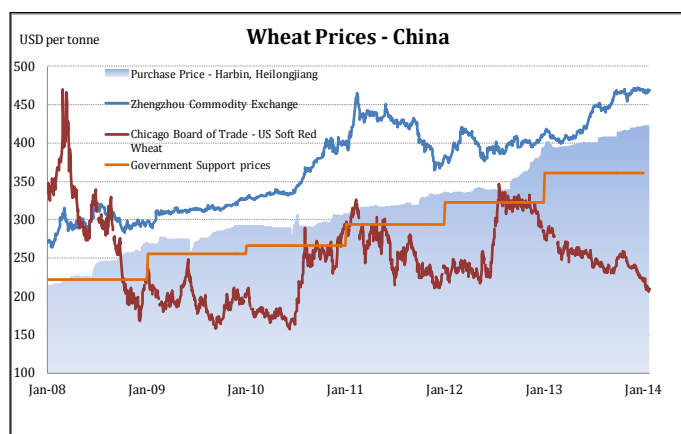
China's several long-term policy objectives, specifically self-sufficiency in cereals and encouragement of domestic markets development, are colliding in a year in which global supplies have experienced an upsurge. Officials from the National Development and Reform Commission (NDRC) recently acknowledged that high MSPs are against the "basic rule of value"<sup>66</sup> and that, "Grain prices have come to the stage to be decided by the market." However, downward price adjustments given China's increased labor and input costs are likely to cause rural dissatisfaction, underscoring the continuous tension most countries face between food security and market forces.

**FIGURE 24: SOYBEAN PRICES**



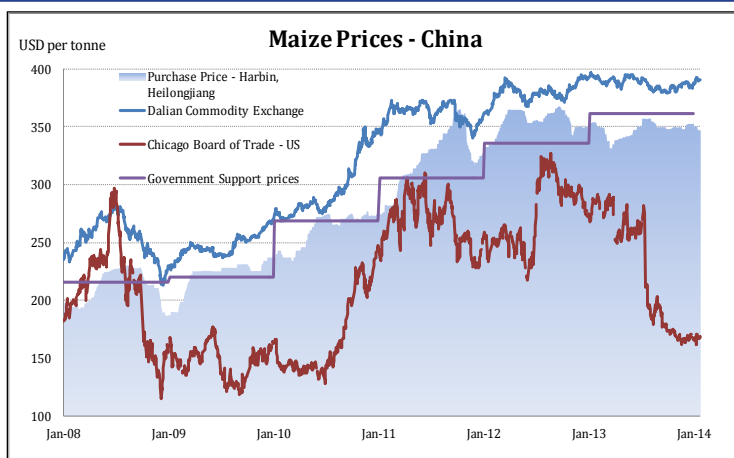
Source: Dalian Commodity Exchange, Chicago Board of Trade, CNGOIC-China National Grain and Oil Information Center. For 2013, government soybean support price was eliminated 2013.

**FIGURE 25: WHEAT PRICES**



Source: Zhengzhou Commodity Exchange, Chicago Board of Trade, CNGOIC-China National Grain and Oil Information Center.

**FIGURE 26: MAIZE PRICES**



Source: Dalian Commodity Exchange, Chicago Board of Trade, CNGOIC-China National Grain and Oil Information Center. Government Support prices, province average.

66 China will gradually let market decide grain prices: Report, Economic Times of India, November 26, 2013.



## 11. Final Remarks

A review of six major agricultural producing countries demonstrates that the marketing systems for wheat, maize and soybeans vary considerably from country to country. Price transmission is highly variable, but appears to be highest where futures markets are transparent and trusted as price signaling and risk management mechanisms at the producer level, such as in the US and South Africa. Multiple components along the supply chain, including government policies (Argentina, China), infrastructure deficiencies (Brazil), fragmented pricing (Ukraine) and high cost of capital (most countries) are imposing disproportional burdens on small producers, keeping them bound to sub-optimal levels of productivity and income realization. Perhaps surprisingly, government support levels show mixed results with regard to productivity or price transmission. Producers in some countries with negative or no price support (Argentina, South Africa) have developed competitive strategies in farming, storing and marketing to counterbalance this lack of support. However, low producer support in Brazil and Ukraine seems to have produced a dichotomy between large scale corporate and small scale subsistence farms. Conversely, where support is high (China), producers tend to rely on government signaling, which is generally dissuasive of marketing innovation. In the US, generous safety net programs are heightening land prices, potentially impeding US producer competitiveness. Hopefully the study will engender further research into the area of price transmission from regional and global benchmarks to producers, one which exhibits increasingly greater complexity and heterogeneity - even as commodities markets continue to globalize.

**FIGURE 27**

	Price Transparency (+)	Government export measures (-)	Producer subsidies* (+)(-)	Intermediary mark-ups (-)	Logistics Restraints (-)	Producer price tools (+)	Credit availability (+)
US	High	Low	Medium	Low	Low	High	High
Argentina	Medium	High	Low	Medium	Low	Medium	Low
Brazil	Medium	Low	Low	Medium	High	Medium	Low
Ukraine	Low	High	Low	High	Medium	Low	Low
South Africa	High	Low	Low	Low	Low	High	High
China	Medium	High	High	High	Medium	Low	Medium

\* Producer subsidies refer to direct subsidies such as commodity specific price or decoupled income supports, input and credit subsidies, safety net provisions, such as crop insurance and indirect subsidies such as biofuels policies. These estimations are subjective and do not coincide completely with the OECD Producer Support Estimates (PSEs) or the WTO trade-distorting "Amber Box" measures

High
  Medium
  Low

## 12. Appendix

**TABLE 4: MARKETING TOOLS**

Marketing tool	Description	Plus	minus
Spot	Sale of commodity upon delivery to warehouse	Immediate cash	Producer forgoes potential price increase
Barter	A pledge of harvest quantity in exchange for credit	Immediate cash	Quantity pledge may impute a high cost of capital
CPR	An enforceable legal contract obligating the delivery of crop under strict security in exchange for extending credit	Credit access at below commercial lending rates	No pricing formula, producer must make-up any shortfall next year
Storage	Agreement between producer and warehouse to store grain for indeterminate time period. Producer can choose time of sale, pays storage.	Avoids distressed sales price at harvest	Storage at harvest may be expensive
Deferred Price Or "to fix"	A contract between private entities, in which the seller establishes the quantity and quality of grains to be delivered after harvest. The contract's price is to be fixed in the future, at seller's option, based on different reference markets.	Pricing flexibility	Price may decline between agreement and time of delivery
Cash forward [1]	Forward sale of commodity to warehouse at fixed price	Sales price will not fluctuate	Producer forgoes potential price increase
Cash forward to terminal point [2]	Forward sale of large commodity quantity delivered rail to export point or other terminal	Bulk freight cost advantage; choice of multiple markets	Capital expense of rail loading facility
Futures sale	Sale of futures contracts coinciding with harvest month, e.g Dec Maize or Nov Soybeans approximating the projected harvest quantity	Locks in a temporary price using low margin [7-10%] before actual sale	Futures price may rise necessitating further margins; cash basis may decline
Basis	Forward sale of commodity based on cash/futures differential only, e.g -10 Dec maize futures to be priced later	Producer chooses when to fix the actual price by tracking futures	Basis may increase; futures price may decrease
Call Options	Purchase of option to establish a long futures position at a particular price	Producer enjoys rewards of upward trending prices, avoids margin calls	Producer must pay premium for option which might expire worthless
Put options	Purchase of option to establish a short futures position at a particular price	Producer is protected against declining prices, avoids margin calls	Producer must pay premium for option which might expire worthless
Minimum price contract	Forward sale of commodity to warehouse at a fixed minimum price with the feature of being upwardly adjusted if prices appreciate	Producer fixes price while potentially securing a higher price	The fixed minimum price is discounted by the cost of the embedded call option premium
OTC swap	Exchange of payment flows based on a fixed price, e.g. \$12/bu soybeans	Price stability	High management fees

## 12.1. Data collection by survey

### Small scale grains/oilseed producers

#### Farming

- Own/Lease farm
- Farm size
- Crops grown
- Proportion of crop fed to livestock
- Seed procurement [warehouse/seed dealer vs. last year's crop]
- Fertilizer/other inputs procurement/usage
- Access to finance [state, credit facility, warehouse, barter]
- Interest rate obtained
- Farm equipment [old, leased, modern]
- Farm practice [no-till farming, precision agriculture]
- Yield enhancement best achieved? [easier credit, better seeds, cheaper inputs, better equipment, more training, other]

#### Pricing

- Grain harvested [Sell spot; store on farm - sell later; store on farm - feed livestock; store at local elevator - priced later; store at local elevator - receive WHR; sell to cooperative at average price; sell to government registered silo; other]
- Storage cost [per one month/per 3 months immediately after harvest]
- On farm silo bag storage [Yes No]
- Price information [local elevator, corporate farm, regional futures exchange, CME, other]
- Top three factors to improve farm income [higher world prices; higher local prices; minimum price guarantee; access to cheap credit; on-farm storage; less exploitation by middlemen; cheaper inputs; cheaper transportation; flexible pricing with buyer; crop insurance]

#### Small regional/local warehouses

- Storage capacity
- Type of storage [flat warehouse, silo elevator]
- Farmer owned cooperative [Yes No]
- Crops stored
- Drying capacity
- Weighing/grading equipment [modern, accurate]
- License [Yes not needed]
- Finance grain purchases [through cash flow; bank/credit facility loan; credit from buyer]

- Grain sales [One buyer, multiple buyers]
- Price information [grain brokers/buyers, internet, paid subscription, other]
- Grain cars capacity load-out per day
- Transport cost [domestic market, export market – which is usually better price?]
- Wait time in receiving grain cars after request [\_\_\_\_days, no request - buyer provides cars]
- Marketing strategies for farmer-bought grain [sell for quick shipment, store for several months until prices improve; make a forward contract, hedge with futures/options, other]
- For back-to-back purchase/sale, usual margin taken
- Provision for farmer stored grain at harvest [Yes No If yes, charge for storage at harvest? Per one month, per three months]
- Warehouse receipts issuance to owners [Yes No]
- Biggest risk in grain storage and shipment [default by producer; default by buyer; grain quality; government export restrictions; market price volatility; logistics]
- Use of domestic futures or options contracts [Yes No, futures/options do not protect against producer defaults; No, futures/options do not solve logistics]
- Greatest improvement to the agricultural system [easier credit; more storage; better logistics; more competition among buyers; easier dispute settlement process; more risk management tools]

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