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Australian Export Grains Innovation Centre

Ukraine

An emerging challenge for Australian wheat exports

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Please note

1. Export and import values often vary depending on the information source — exercise caution when interpreting information presented in this publication.
2. All units cited in this report are metric measurements. Of particular note, the unit tonnes is a metric tonnes (1000 kilograms).

GOVERNMENT OF WESTERN AUSTRALIA
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GRDC
Grains Research & Development Corporation

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Contents

List of abbreviations

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ACCC	Australian Competition and Consumer Commission
ADM	Archer Daniels Midland
AEGIC	Australian Export Grains Innovation Centre
AH	Australian Hard wheat
APH	Australian Prime Hard wheat
APW	Australian Premium White wheat
ASW	Australian Standard White wheat
ASX	Australian Stock Exchange
AUD	Australian dollar
AWB	Australian Wheat Board
BAMA	Biosecurity and Agricultural Management
BOM	Bureau of Meteorology
CBOT	Chicago Board of Trade
CFR	cost and freight
CIF	cost, insurance and freight
CIGI	Canadian International Grains Institute
CPT	carriage paid to
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCFTA	Deep and Comprehensive Free Trade Agreement
EBRD	European Bank for Reconstruction and Development
EPR	end-point royalty
EU	European Union
EUR	Euro
FAO	Food and Agriculture Organisation (United Nations)
FAS	Foreign Agricultural Service
FOB	free-on-board
GASC	General Authority for Supply Commodities
GCM	general circulation model
GDP	gross domestic product
GFC	global financial crisis
GGL	Grain Growers Limited
GM	genetically modified
GPA	Grain Producers Australia
GRDC	Grains Research and Development Corporation
GSR	growing season rainfall
GTA	Grain Trade Australia
GVAP	gross value of agricultural production
ha	hectares
HRS	hard red spring wheat
HRW	hard red winter wheat
IMF	International Monetary Fund
IP	intellectual property
JSC	joint stock companies
KCBT	Kansas City Board of Trade
km	kilometres
LOC	letter of credit
MATIF	Marché à Terme International de France
MENA	Middle East and North Africa
MGEX	Minneapolis Grain Exchange
mmt	million metric tonnes
mt	metric tonnes
NATO	North Atlantic Treaty Organization
NBN	National Broadband Network
ntk	net tonne kilometre
NVT	national variety trials
OECD	Organisation for Economic Co-operation and Development
PBGI	Plant Breeding and Genetics Institute
PSE	Producer Support Estimate
R&D	research and development
RED	Renewable Energy Directive
SFGCU	State Food Grain Corporation of Ukraine
SOE	State-owned enterprise
t	tonnes
UAH	Ukrainian hryvnia
UK	United Kingdm
US	United States
USD	United States dollar
USDA	United States Department of Agriculture
VAT	value-added tax
WCC	Wheat Classification Council
WQA	Wheat Quality Australia
WTO	World Trade Organisation

Foreword

This report, which focuses on the Ukrainian grains sector, is the third in a series of comparative studies where we look closely at the factors underpinning the international competitiveness of Australian grain relative to alternative origins.

On-farm storage and grain-drying facilities in Kyshentsi, Cherkasy Oblast.
Source: AEGIC (2015)

Competitiveness is relative, not absolute, so to establish competitiveness we identify each link in the grain value chain to determine the extent to which disparities between Australia and our competitors may eventually affect our ability to compete in key markets.

The first of these reports: *The cost of Australia's bulk grain export supply chains: an information paper*, was published in January 2014 and focused exclusively on Australia. The second report: *Canada challenges Australia's grain supply chains*, focused on Canada's Pacific grain terminals, through which Canada exports most of its grain.

In this third instalment we predominantly focus on Ukraine's export grain value chain where we compare and contrast the Ukrainian and Australian grain value chains and review the factors that may influence the future of Ukraine's grains industry.

In choosing Ukraine as the third instalment of this series, we have compared two strikingly different value chains challenging Australian grain markets. Ukraine and Canada each have distinctive competitive advantages. Examining these two likely extremes of competitive advantage allows us to propose strategic responses that encompass the range of competitive challenges Australia is likely to face in the short to medium term.

Because wheat is by far the dominant crop exported by Australia, the overarching focus of this report is the wheat export value chain in Ukraine and Australia.

Grain value chains are complex, with high geographic dependency. At any point along the chain there can be considerable variation in costs and returns, which depend on economic, as well as social, cultural, political and historical factors that preside at each location. This report attempts to capture and summarise this inherent complexity, where relevant to agriculture, in order to derive insights into the forces driving change within the grains value chains of Ukraine. From these insights we have identified the nature of the challenge Ukraine is likely to pose to Australia's competitive position in international grain markets alongside the actions Australia may consider in response.

Summary of key findings

1. **Ukrainian wheat exports are currently a *modest* threat to Australia's wheat export industry in its key markets. BUT... the potential threat is large, albeit uncertain for many reasons.**

2. **Ukraine's competitiveness in the international wheat export market is underpinned by greater rates of yield advancement and greater cost efficiencies in its grain supply chains. During the next decade these advantages are likely to undermine Australia's price competitiveness.**

3. **Ukraine is *currently* less able, compared with Australia, to reliably satisfy the wheat volume and wheat quality needs of end-users in Asian markets.**

4. **Australia has time to prepare for and counter likely greater competition from Ukrainian wheat exports.**

Summary of Australia's required actions

The following **four** actions are derived from a detailed analysis of the implications of developments in Ukraine.

1. **Collate, monitor and analyse developments in Ukraine (and surrounding nations) and inform the Australian grains industry of the implications.**
   Forewarned is forearmed. Accurate and timely information about emerging competitors increases the opportunity for Australia's grains industry to make strategic decisions based on sound analysis.

2. **Investigate why (or whether) Australian wheat is preferred in our major markets and why Ukrainian wheat is or isn't preferred in those same markets.**
   If we know what customers value we can better serve their needs.

3. **Convey market and competitor information to those Australian stakeholders whose responses can increase returns for Australian wheat growers.**
   Australian grain growers need to benefit from better serving their customers and reacting to competition.

4. **Use our 'window of opportunity' carefully.**
   It's a tide (not a tidal wave) of Black Sea wheat entering some of our major markets. The Australian grains industry has time to plan and co-ordinate an effective response.

The rationale for these four required actions for the Australian grains industry is explained in the section 'Implications for the Australian grain industry and its export supply chain' on page 90.

Strategic response vital for success

For these actions to be successful, it is vital they form part of a broadly-supported and cohesive strategic response by the Australian wheat industry to the threats and opportunities the industry faces. Failure to adopt a well-coordinated approach, which minimises fragmentation and duplication, will make an effective strategic response to these challenges unlikely.

Executive summary

Wheat export competition from Ukraine is a potential threat

The massive devaluation of the Ukrainian hryvnia (UAH) during 2014 saw the currency move from seven UAH buying one United States dollar (USD) to UAH33 buying one USD — a four-fold devaluation over 12 months. Most analysts consider that over the next five years at least, the UAH is likely to remain devalued, supporting the export competitiveness of Ukrainian grain. Although the Australian dollar (AUD) has slipped from parity with the USD to be around the US$0.70s, the degree of devaluation has been relatively minor in comparison to that of the UAH in USD terms.

Ukraine is yet to heavily invest in some of the infrastructure needed to capitalise on its natural advantages, such as those required to enable the efficient flow of grain along the Ukrainian river network. Investments such as this will create a more efficient and reliable flow of grain to port, building on the low cost of labour that already facilitates a relatively competitive export grain supply chain by global standards. By contrast, the high cost of labour in Australia is reflected at each point along the length of its relatively mature export grain supply chain. In comparison to Ukraine, Australia has no large inland waterway system to facilitate grain transport, or indeed any other major source of cost-savings outside of incremental efficiency gains.

Ukraine is achieving high annual increases in wheat production with virtually no change in the area sown to wheat over the past decade, whereas Australian wheat production growth since the 1990s has come from increased plantings as well as increased productivity per hectare. Larger areas in Ukraine could be drawn into wheat production if an incentive to change the current mix of crops on Ukrainian farms arises. In comparison, there is little potential for Australia to further increase the area planted to wheat to any substantial degree. Moreover, many Ukrainian grain growers are yet to fully embrace the kinds of modern farming methods that will reduce their cost of production and improve yield stability. Clearly, if this were to occur, there is significant scope for Ukraine to enhance the international competitiveness of its wheat exports, just through increasing farm productivity.

Climate change projections indicate the combination of higher temperatures and reduced growing season rainfall (GSR) will lessen yield advancement in Australia. By contrast, projected warmer temperatures, with increased carbon dioxide (CO_2) levels and no clear trend in rainfall changes, will likely boost grain yields across Ukraine, particularly towards the northern parts of the country. However, in the medium term, not linked to impacts of climate change but rather a response to market signals, it is likely a corn–soybean belt will emerge in the most productive grain-growing regions of central Ukraine at the expense of wheat production. The preference for corn and soybeans in these regions results in the locus of wheat production shifting southwards towards climates with lower and more variable rainfall. These climate- and crop-related effects indicate the wheat export competition Australia will face from Ukraine may be less intense than otherwise would occur.

The World Bank forecasts that Ukrainian grain exports will be around 50mmt by 2035 (WBG, 2015). More importantly for Australia, the Food and Agriculture Organisation (United Nations) (FAO) and the Organisation for Economic Co-operation and Development (OECD) project Ukrainian wheat exports to only increase to 9.7mmt by 2024. These are modest increases in wheat exports. However, Ukrainian growers and their associated supply chains have the capacity to rapidly switch into and support far greater wheat production if sufficient financial incentives prevail. Hence, the potential exists for Ukraine and surrounding Black Sea nations to greatly increase their wheat exports; a possible situation that Australian wheat growers and exporters need to monitor.

There is significant scope for Ukraine to enhance the international competitiveness of its wheat exports, just through increasing farm productivity.

Unloading sunflowers from the chaser bin in Kyshentsi, Cherkasy Oblast.
Source: AEGIC (2015)

A possibly rocky future

Ukraine's per capita gross domestic product (GDP) in 2014 was only US$3100 compared to that in Australia of US$61,900. As Ukraine transitions and grows towards the status of a developed nation it is liable to face many challenges that will affect the prosperity of its export grain sector. Land reform could prove to be a problematic issue, as may the corporatisation or privatisation of key government services that support or impact on grain exports. The risk of further conflict in its eastern region will have important consequences for attracting foreign investment into Ukrainian grain production and its associated export grain supply chains.

Political and economic instability is likely as the country faces many challenges, including managing the economic aftermath of the sizeable devaluation of its currency, responding to the conflict in eastern Ukraine, repaying debt on overseas borrowings, forming closer links with the European community and meeting the aspirations of its reasonably well-educated youth.

Altering a widespread culture of theft and corruption that impacts most aspects of business life in Ukraine is a further major challenge. Theft and corruption impose additional costs on businesses and weaken the incentive to invest in Ukraine, including its agriculture sector. Lessening theft and corruption is likely to occur gradually rather than rapidly.

Ukraine's post-farm gate supply chain costs are likely to fall

Grain transport in Ukraine today relies heavily on road and rail transport. Yet apart from the highways linking major cities, most roads in Ukraine (by Australian standards) are in poor condition and most of the fleet of steel rail wagons that carry grain are more than 30 years old. Road and rail transport costs could be reduced, however expensive major investments in road and rail infrastructure are required to achieve this. Such major expenditure is unlikely to be affordable for the Ukrainian government that has, at present, a pressing priority for defence expenditure given the conflict and unrest in eastern Ukraine.

Another significant logistics problem is moving grain across the last mile into port, with truck queues of up to 30km and waiting times to deliver grain of up to 24 hours. In some grain receival facilities grain sampling services are slow and inadequate. Where newer facilities exist, sampling and testing times have been reduced to 15 minutes, which is comparable to Australian standards. Recently initiated investments by multi-national grain traders and large local agribusinesses in new grain terminals at ports and on inland waterways are liable to lessen queuing costs and lower export grain supply chain costs.

Rail facilities at a mill, Cherkasy Oblast.
Source: AEGIC, 2015

A ploughed field of rich black soil in central Ukraine.
Source: AEGIC, 2015

There is considerable under-investment in dredging and river transport infrastructure, despite the fact many grain-growing regions in Ukraine could potentially be well-served by river barge freight. The possible icing-over of key rivers for a few months each year is unlikely to affect the river transport of grain as most grain is shipped out during summer and autumn. Currently, only around three per cent of grain is exported via river transport. Strategically, greater use of inland waterways for grain freight would allow Ukraine to develop a relatively low-cost export grain supply chain, further supporting the international competitiveness of its grain exports.

Some of these logistics and infrastructure challenges are being addressed by investment supported by major European banks and via investments from multi-national grain companies. For example, grain facilities, both up-country and at port, are being constructed by local and multi-national grain-based businesses, as are oil seed crushing plants to service and add value to the growing soybean and sunflower industries. However, due to the magnitude of investment required and the sovereign and business risks surrounding those investments, remedying logistics problems will occur only gradually.

A widely acknowledged impediment to such investments in Ukraine is not only the ongoing conflict and unrest in eastern parts of Ukraine but also the prevalence of fraud and corruption at various levels of government and industry (including at the farm-level). Corruption is perceived to be endemic and is a serious issue lessening the growth prospects for Ukraine's grains sector and increasing costs across its export grain supply chain. However, through greater use of e-commerce, monitoring technologies, third-party appraisal services and by removing certain human approval processes in the export of grain, the costs of corruption are being gradually stripped out from Ukraine's export grain supply chains. Officials from the Ministry of Agrarian Policy and Food report that some changes have reduced supply chain costs by as much as US$8 per tonne.

It is likely grain production in Ukraine will increase, fuelled by higher crop yields and greater intensification. Greater volumes of grain production will assist a lowering of the unit costs of storage, handling and transport. These gradual changes will strengthen the international competitiveness of Ukrainian grain exports.

Land reform in Ukraine would facilitate crop production

There are important differences in the nature and pattern of land ownership between Ukraine and Australia. Millions of people own small parcels of farmland in Ukraine. Most often this land is leased out to farm operators rather than being farmed by the small landowners themselves. Hence, most medium to large farm operators in Ukraine lease rather than own almost all the land they farm. A third of the country's productive

farmland is now controlled by large, vertically-integrated businesses known as *agroholdings* (or *agriholdings*). By contrast, the opposite occurs in Australia. Most farmland in Australia is owned and operated, principally by farming families, although leasing additional land is also common.

In Ukraine, owners of farmland who reside in a rural region usually prefer to lease their land to a farm operator for a standard rate, provided they are also employed by the operator. This is a 'catch 22' for the farm operators, who are required to employ more people in order to access more land. The volume and cheapness of this labour more or less forces many farm operators to invest in complementary labour-intensive enterprises (e.g. vegetable growing, piggeries, dairies, etc.) and to employ a diverse set of enterprises (e.g. 6–10 land use sequences of different crops) that increases the need for labour.

If land becomes tradeable then reductions in the farm labour force and more simple rotational sequences are likely. Corn and soybean rotations could increasingly dominate crop production on the rich soils of central Ukraine.

Allowing land to be tradeable, however, is a complex social, political and economic issue in Ukraine. Progress toward making all farmland tradeable, including eventually allowing more foreign ownership, is likely to be subject to a range of political and social imperatives that will slow the rate of land market reform.

Ukraine has a rich vein of human talent and energy

The Ukrainian agriculture sector, broadly speaking, is well served by a talented pool of professionals. Young, energetic and well-educated people are attracted into the agriculture and agribusiness sectors because currently they are the most profitable and dynamic sectors in the Ukrainian economy. In addition, some Ukrainian professionals who have worked internationally are, with a sense of duty, returning to Ukraine and often are prepared to sacrifice some salary and working conditions in order to support the new political and economic hope in the country.

Political optimism has also brought to Ukrainian grain industry policy-makers support from a dedicated team of committees and working groups staffed by key stakeholders (government, industry, academics, bankers, etc.) who help ensure effective policies are designed and implemented. How long this air of collegiate cooperation lasts in the policy environment remains to be seen. Nevertheless, the same level of action cannot be said for Australia where such well-supported networks and forums are less common.

For agricultural production, however, concerns are widely expressed about the quality and skill of farm managers

Harvest underway in Ukraine.
Source: Shutterstock

and workers in Ukraine. The agricultural education and training sector, especially at the tertiary level, appears to weakly cater for the agriculture sector's on-farm needs. Old social structures remain an impediment for both smaller, traditional operators and larger, foreign-owned operators, who remain frustratingly constrained by anachronistic social obligations. Traditional farm managers are less keen and able to embrace the same modern agronomic practices being successfully implemented by agroholdings and foreign-owned operations. These agroholdings and foreign-owned operations seek skilled practitioners of modern farming techniques, often needing to import those skills.

Ukraine is also yet to establish the typical representative organisations necessary for the effective, co-ordinated action, which benefits all farming operations. Aside from the Ukrainian Grains Association, which represents the interests of the large agroholdings and trading companies, this 'industry-good' function is conspicuously lacking.

Implications for Australia

As production, storage capacity, storage standards and supply chain efficiencies improve in Ukraine, Australia is likely to face increased competition from Ukraine in its main wheat export markets. Moreover, as previously outlined by AEGIC (see White et al, 2015), Australia also already faces the prospect of greater export competition from developments in Canada's export grain sector.

Australian grain exporters face the prospect of larger volumes of wheat (and other grains) being produced in Ukraine, Canada and Argentina, relative to what Australia currently is achieving. In addition, cost efficiencies in the grain supply chains in Ukraine and Canada are more likely to improve relative to what currently seems possible in Australia. The greater competition from these grain-exporting nations signals the need for Australia to develop a grains industry strategy that protects its wheat trade and the profitability of its grain farm sector.

One element of that strategy would be the collation, monitoring and analysis of the information flow out of the Black Sea region, considering the uncertain, yet potentially large, impacts associated with developments in that region. The United States Department Agriculture's (USDA) Foreign Agricultural Service (FAS), for example, already has staff permanently based in the US embassy in Kiev, who regularly transfer important information back to stakeholders in the US. The Australian grains industry lacks a similar representative and so is at risk of being behind the eight ball in terms of gathering critical market intelligence.

Although Ukraine has the capacity to further increase its grain exports and international competitiveness, there remains considerable uncertainty regarding the role wheat will play in the country's future crop mix, as well as the geographic spread of wheat production itself. A range of different wheat production trajectories is plausible; hence the need to monitor and analyse developments in Ukraine and surrounding countries in order to understand the implications for their export of wheat; noting that wheat is Australia's principal crop.

It also would be in Australia's best interests to develop a deep understanding of the current and future needs of end-users of our wheat (and other grains). Being aware of trends and changes in end-user preferences and how they relate to the functionality of Australian grains is crucial to positioning Australian grain in those markets. In effect, Australia must understand the nature of the demand pull for its grain, principally wheat, while simultaneously understanding the supply competition that our grain exporters face, with a clear focus on wheat.

Only by deeply understanding these end-user needs can the Australian export grain sector tailor its grains to meet customer requirements and secure long-term end-user preferences for Australian grain. To develop and protect any comparative advantage Australian grain enjoys in any of its key or emerging markets requires Australia to:

- continue to develop higher-yielding varieties with qualities and segregations that target and satisfy end-user requirements. Ukrainian systems are not sufficiently well set up to achieve such end-user specificities
- improve its grading and grain specification processes to allow traders to better meet customers' needs. Ukraine has an antiquated grading and variety specification system, which is poorly regarded within the country, and the will to change or improve the system is not a priority
- provide customer support through an 'industry good' organisation that represents the Australian industry and services end-user needs for quality data and information (i.e. an Australian equivalent to the Canadian International Grains Institute — CIGI). The Ukrainian government's need to give funding priority to defence suggests it will be difficult for such an organisation that depends principally on government finance to easily emerge in Ukraine.

A current commercial advantage for Australia is that Ukraine's wheat exports typically peak around September to October — a period when Australian wheat stocks generally are low heading into harvest. Hence, a period of potentially intense competition is partially avoided. Nonetheless, if greater volumes of export grain become available from the Black Sea region then Australia will experience more direct competition. Because production changes in the Black Sea region and Canada will occur gradually, it follows that Australia has a 'grace period' in which to develop and implement its industry strategy. However, failure to act strategically will cause a rapid erosion of market share in Australia's principal markets and strip value from the Australian grains industry.

Black Sea grain — a rising tide

12 **Ukraine:** An emerging challenge for Australian wheat exports

The emergence of the Black Sea exporters (Russia, Ukraine and Kazakhstan) has created a seismic shift in global wheat markets during the past decade. In the post-Soviet era, each of these nations has been modernising both their agronomic practices and logistics infrastructure, enabling the export of large quantities of grain into local and global markets.

The introduction of modern farming practices, along with the availability of better varieties and increased farm chemical use, is boosting crop yields and lessening the likelihood of crop failure. Nonetheless, grain production in this region is subject to volatility, sometimes affecting global grain prices, and on occasion even having geopolitical implications. With a burgeoning Middle East and North Africa (MENA) population becoming increasingly reliant on the supply of grain from Black Sea suppliers, including Ukraine, this volatility in production will have a growing significance for Australian grain growers in terms of the demand (and price) for their wheat.

AEGIC is producing separate reports on each Black Sea nation (Russia, Ukraine and Kazakhstan); as each country has unique characteristics affecting its current and future capacity to emerge as a major competitive threat to Australian grain exports. This first report considers Ukraine, in part because of the immediacy of access to data, institutions and grain supply chain infrastructure.

...grain production in this region is subject to volatility, sometimes affecting global grain prices, and on occasion even having geopolitical implications.

Commercial grain storage in southern Ukraine.
Source: AEGIC, 2015

Ukraine's agricultural landscape

Ukraine's agriculture sector is blessed by the quality of its soils and the magnitude of its agricultural area. Around 41 million hectares (more than 70 per cent of total land area) in Ukraine is classified as agricultural — a European farmland endowment eclipsed only by Russia.

As a proportion of total land area, however, this is not hugely different to Australia, at 53 per cent, although Australia has more than 10 times the total land area. The more relevant land statistic for cropping is the area of arable land. Australia has only six per cent of its land area considered as arable, whereas Ukraine has 56 per cent of its agricultural land being arable. As shown in Figure 1, Ukraine has 32m ha or three-quarters the arable area of Australia, despite Australia having more than 10 times the total land area of Ukraine.

A major difference between Ukraine and Australia is the quality of soil in those arable areas. More than 40 per cent of Ukraine's land mass is endowed with humus-rich *chernozem* (also known as *chornozem*) soil, with Ukraine sitting on about a third of the world's resource of this rich, black topsoil. By contrast, Australian growers produce grain crops on soils of comparatively poor quality.

Ukraine is a major producer of corn, wheat, barley, rapeseed (canola) and sunflowers; with total grain production being around 60–80mmt per annum. In contrast to Kazakhstan, where wheat is the main crop, corn has come to dominate Ukrainian cropping, with its production forecast to be around 28mmt in 2014/15. Since 2009/10, corn production has boomed, being now nearly 10 times greater than it was in 2003. This increase has been driven by a rapidly-growing domestic compound feed industry (driven primarily by growth in poultry demand), along with strong demand from nearby markets such as Egypt, Spain and Iran.

In contrast to corn, Ukrainian wheat production has increased by a more modest 30 per cent during the past decade, increasing by around 430,000t each year, off a relatively unchanged area planted to wheat. By comparison,

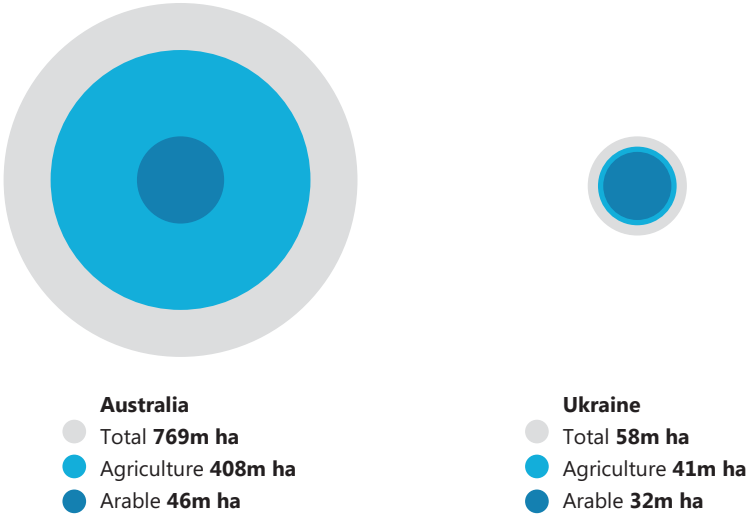

FIGURE 1 Agricultural and arable land comparison between Ukraine and Australia
Source: AEGIC, 2015

Australia's annual increase in wheat production has been around 375,000t, however this is principally attributed to a 60 per cent increase in the area sown to wheat during the past decade or so. Hence, there are some key differences in both the growth rates, and the factors driving these changes in Ukrainian and Australian wheat production.

Considering that domestic demand accounts for less than half of the country's grain output each year, Ukraine is typically a major player in many grain export markets. It is already the dominant exporter to price-sensitive markets in the MENA region. As of 2014, Ukraine has become the world's third largest exporter of corn, the third largest exporter of barley and the sixth largest exporter of wheat. Ukraine also has established itself as the dominant global producer of sunflower seeds and the world's leading exporter of sunflower oil.

In comparison to both neighbouring Black Sea producers, as well as to North America and Australia, feed wheat makes up a relatively large proportion of the Ukrainian wheat harvest, typically accounting for around 40 per cent of total wheat production. This is attributable to Ukraine's somewhat peculiar wheat classification system, along with the impacts of its climate, with wet harvests frequently causing quality downgrades. Ukrainian wheat quality also can be affected by risks not faced by Australian growers, such as Sunn pest, a problematic insect endemic to the Black Sea region and throughout parts of Africa and Asia. Newer wheat varieties are much more resistant to this pest, and combined with modernising farm management practices set to deliver additional profit, will allow increased expenditure on insecticides to control this pest. The combination of improved farming practices (including strategic herbicide and insecticide use) and plant breeding improvements, is likely to gradually lead to milling wheat making up a larger proportion of Ukraine's wheat crop, with obvious implications for Australian wheat exporters.

Ukrainian fields: To the left, traditionally-ploughed land in early September, not long after harvest and a standing corn crop on the right.
Source: AEGIC, 2015

Ukraine is not without its challenges, having experienced a rocky transition from a centrally-planned Soviet economy to a free-market economy in the wake of the 1991 collapse of the Soviet Union. While the country's grains industry is modernising, it remains largely dependent on a steady in-flow of foreign capital, at a time when the country is perceived globally as a risky place in which to do business. Ukraine's government lacks the revenue streams enjoyed by its oil-rich, grain-producing neighbours; Russia and Kazakhstan. Ukraine's per capita GDP in 2014 was only US$3100, compared with Australia's per capita GDP of US$61,900; hence Ukraine does not have the volume of internal savings and taxation revenues to draw upon for major infrastructure investments.

This challenging economic environment has been further worsened by the recent conflict with 'separatists' or Russian-supported militants in Ukraine's far east and the related annexation of Crimea. Ukraine's government currently faces the difficult challenge of needing to divert spending to defence, while at the same time dealing with the conflict's resultant impairment of investment attraction. The country's economic development is also impeded by acknowledged corruption, which permeates many aspects of Ukrainian economic life including the agriculture sector. Nonetheless, amidst all these challenges, the Ukrainian agriculture sector is emerging as an important source of economic growth for the nation and it remains an attractive destination for agricultural and grain supply chain investors.

Present-day Ukrainian grain production continues to bear the hallmarks of Soviet-era practices and post-Soviet era policies. One such important policy that continues to affect agricultural production in Ukraine has been the transfer of land ownership from former State control into the hands of Ukrainian citizens. Small parcels of land have been given to citizens, creating a highly fragmented land-ownership profile. As a result, most of the country's large, modernised farming operations are based on aggregated parcels of land, which operators lease from rural landowners.

A third of the country's productive farmland is now controlled by large, vertically-integrated businesses known as *agroholdings* (or *agriholdings*). These businesses often control their entire supply chain, from inputs through to, in some instances, export infrastructure and milling, thereby benefiting from economies of scale, which bring down per-tonne costs. However, the sheer scale of some of these businesses creates its own challenges. Managing the co-ordination and integration of the many enterprises and activities that underpin agroholdings is difficult, leading to variation in the profitability (and even viability) of these businesses. Those businesses that successfully manage these challenges and opportunities, amid the geopolitical and economic turbulence, can produce crops, such as wheat, with increasing efficiency, underpinning a more profitable Ukrainian farm sector and creating a greater threat for Australia in its traditional export markets.

In comparison with Australian grain growers, most Ukrainian growers with smaller landholdings (<1000ha), tend to be less advanced. These Ukrainian growers use traditional tillage practices, employ less crop protection and less fertiliser, and use labour-intensive operations that take advantage of the country's low cost of labour. Since 2014, the combination of high inflation and resultant high interest rates hovering around 30 per cent has placed working capital constraints on many of these smaller growers. The net effect of this tends to be the sub-optimal use of key farm inputs, a problem not shared with the agroholdings, who typically have better access to capital. The large scale (e.g. >25,000ha) of agroholdings, their vertical integration, and their access to a large, inexpensive pool of labour sets them apart from the average grain farm in Australia, which by comparison, is typically run by a single farm family, usually supported by a handful of seasonal workers.

Any ongoing analysis of the competitive threat posed by Ukraine in Australian export markets must account for the ebb and flow of the agroholdings' fortunes. To simply look at their vertical integration, lower cost of production and close proximity to significant nearby markets, and then draw fatalistic

conclusions for Australian wheat exporters, would be to do a disservice to the great deal of nuance embedded in observable trends. Much of this important nuance lies hidden from a simple viewing of statistics. For example, while agroholdings may strive to achieve the latent potential of Ukrainian wheat production, and selective evidence of their commercial success may be available, the process of this advancement is unlikely to be smooth, or even unidirectional, especially given the political and economic changes underway in Ukraine and neighbouring countries.

Many different scenarios could arise for Ukraine; and most have important consequences for Australian grain growers. Ukraine could become a major competitor in Australia's wheat export markets. Conversely they could shift production away from wheat towards other crops. Currently unforeseen or unlikely events could jeopardise Ukraine's economic progress and slow the growth of their grains industry.

This report on the Ukrainian grains industry forms part of the *Black Sea* series of reports by AEGIC. These reports aim to provide Australian stakeholders with a clear picture of the competitive threat posed by Ukraine, Russia and Kazakhstan in Australia's traditional wheat export markets. While there is a growing understanding within the Australian grains industry of the potentially disruptive impact to global wheat markets posed by Black Sea grain production, as a topic it often ranks as a minor interest. Our aim is to bring much-needed nuance to discussions regarding the impacts of Black Sea grain production on Australian wheat exports. Currently the discussion includes views ranging from those who see the loss of wheat export markets being a *fait accompli*, to those who feel that 'business as usual' will suffice and the supposed threats are grossly overstated. Not unexpectedly, reality lies somewhere between these two extremes, so it is our intention to provide empirical, nuanced analysis, along with practical outputs so any future strategic positioning is reliably informed.

Many different scenarios could arise for Ukraine; and most have important consequences for Australian grain growers.

Domed grain silos at Nibulon's main grain export terminal in the port of Mykolaiv.
Source: AEGIC 2016

Ukraine — a historical overview

After researching Ukrainian agriculture and witnessing Ukrainian farming first-hand, we have formed the opinion that any discussion of the competitive threat posed to Australia by Ukraine requires some understanding of the historical forces that have shaped Ukrainian agriculture.

After the disorderly collapse of the Soviet Union during 1991 and her consequent independence from Moscow, Ukraine experienced significant political, social and economic change and it still holds the scars of earlier tumultuous events of the 20th century (e.g. German occupation in WWII and the resultant deaths of between 5–8 million people, including the loss of 1.5 million Jews via exodus and genocide). In the 20th century, under Stalinist Russian control, Ukrainian farming was collectivised and assigned the role of 'breadbasket'. The origins of the collective farm (or 'Kolkhoz') in Ukraine were relatively benign, functioning more like a co-operative when they first started appearing during the 1920s, as enthusiasm for socialist principles gripped the entire region. However, eventually collectivisation became a policy forcefully implemented.

Under the long period of Soviet control involving collectivisation, the national psyche of Ukraine shifted from a cosmopolitan European country to a collectivist cell of a greater whole. During this period, Ukraine had no opportunity to create a self-sufficient, diversified economy. Instead, the country was instructed to play a specific role within the Soviet economic empire. So a peasant farmer who, prior to collectivisation, would have owned their land and had freedom over choice of what products to grow, subsequently became an 'employee', paid for hours worked, receiving no share of profits generated. Over the course of many decades, this imprinted an ethos linking salary to hours worked, not the *amount* of work completed nor the value added. Gradually a culture of 'clocking in' and only doing specific tasks gradually took root.

Contrast Ukraine's history with that of Australian farming. A typical Australian farming family, while beset with their own range of particular challenges, has enjoyed far more stability in comparison to their Ukrainian counterparts. Australia has experienced political, institutional, social and economic stability, by comparison with Ukraine. This environment has hugely assisted Australian farmers to be commercially successful. Most Australian farmers are second to fourth-generation growers equipped with a wealth of accumulated knowledge and significant accumulated assets. For example, the average farmer in Western Australia, a major grain-exporting region of Australia, has net farm assets of more than US$4.4 million (Planfarm/Bankwest, 2015).

When the Soviet era of control ended during 1991, some commentators assumed, with the shackles of communism removed, Ukraine's entrepreneurial spirit would quickly blossom. However, as noted political scientist Francis Fukuyama has said of nations such as Ukraine, the transition from an authoritarian state to a functioning democracy requires *'a long, costly, laborious, and difficult process of institution building'* (Fukuyama, 2011). If you ask foreign farm managers operating in Ukraine, they will tell you that even now, a quarter-century since Ukraine became a free-market economy, the communist heritage is one of the biggest challenges still facing the country's grains industry. These long-lasting impacts of Soviet-era practices and policies are discussed in more detail later in this report.

...the transition from an authoritarian state to a functioning democracy requires *a long, costly, laborious, and difficult process of institution building.*

The Holodomor

Of all the various calamities experienced by Ukraine last century, probably none has left a deeper scar on rural Ukraine than the *Holodomor* ('extermination by hunger') of 1932–33 that occurred under Stalin. Grain growers in Ukraine were instructed to cease grain production and switch to horticultural crops including sugar beets or even cotton. Not only were these Ukrainian grain growers completely unfamiliar with the cultivation of sugar beets, in many cases they lacked the basic agronomic tools for horticulture, and yet farms were set unrealistic minimum production targets. Growers were not permitted to even retain what they needed to survive, with everything produced being distributed to urban workers and Party elite. When the inevitable food shortage came with the poor crops of 1932–33, Stalin refused to relax these rules and perhaps most damning of all, he refused offers of foreign food aid. Between 3–7 million Ukrainians perished as a result.

During this time, Stalin also fostered conflict between Ukraine's urban and rural population, producing propaganda characterising the rural peasants as rich or lazy and suggested they were keeping all the food for themselves. To this day, the *Holodomor* remains a highly-charged topic. During 2006, a law was passed in Ukraine which banned '*Holodomor*-denial' and which specifically defined it as an act of genocide.

Ukraine — a present-day overview

During the period since independence in 1991, Ukraine has undergone a raft of demographic changes. Since 1991 its rural population has decreased by 2.7 million people (16 per cent of rural-dwellers), while at the same time the urban population has declined by 3.7 million people (10.6 per cent of city folk).

These changes have resulted in the disappearance of more than 640 villages and hamlets (Sarna, 2014) and a large-scale migration to cities has occurred. Because Ukraine's population has decreased in *both* the rural and urban areas, the demographic changes are not a simple urbanisation story, such as seen in China. Ukraine is leaking population at one of the fastest rates in the world. If age and gender-specific labour force participation rates stay as they were during 2015, the labour force in Ukraine is projected to shrink by more than 15 per cent between 2012 and 2035 (World Bank, 2015). A shrinking labour force and aging population represent substantial economic and social challenges for Ukraine, compounded by the geopolitical disquiet in eastern Ukraine.

Economically, Ukraine can be classified as a developing nation due to its relatively low GDP per capita — a status that belies its close proximity to the advanced economies directly to its west. However, grain production in Ukraine is well-served by enviable agronomic conditions and strategically-located, ice-free ports dotted along the Ukrainian Black Sea coastline, which enable the export of wheat into nearby MENA markets at relatively low cost.

Agriculture forms a key component of the economic and social fabric of Ukraine. During 2012, agriculture contributed 9.3 per cent of the country's GDP, constituting 17.2 per cent of national employment and 26 per cent of exports. Agriculture's significant contribution to both employment and exports as a proportion of GDP has only increased in importance during Ukraine's most recent political and economic turbulence. The combination of economic stagnation and the underemployment of its citizens is a volatile mix — especially for a government promoting the merits of gravitating west instead of east. This same government also looks towards its agriculture sector, which is generating 26 per cent of exports, as ready source of vital US dollars.

Ukraine's 32m ha of arable land constitutes more than 12 per cent of Europe's total arable land. As Europe's largest country in terms of land area, as well as being blessed with an abundant supply of fertile, highly-productive soil, Ukraine has the capacity to produce large volumes of agricultural commodities. Despite Ukraine and Australia having similar land area devoted to broadacre farming, crop production in Ukraine is more than 40 per cent greater than Australia due to superior soil fertility and a more favourable climate. For example, Australia has more than twice the area sown to wheat compared with Ukraine, yet only produces less than a quarter more wheat than Ukraine. Moreover, as shown later in this report, higher yield trends in Ukraine suggest the country will eventually overtake Australia in production terms. However, when we look at both the quality and usage profiles of Australian and Ukrainian wheat, a dramatically divergent picture emerges. While high-quality milling wheat dominates Australian production, a large proportion of Ukraine's wheat production is comprised of feed wheat bound for domestic feedlots. This means although Australia produces less than 25 per cent more wheat, it exports 19.4mmt annually compared with Ukraine who only sends 7.6mmt across its borders each year (five-year average, 2010 to 2014).

In global terms, Australia's large expanse of land suitable for wheat production and low population allows it to be an export-dominated wheat producer. This means it is highly unlikely any domestic factors in Australia will interrupt the flow of Australian wheat to key export markets. Nonetheless climatic factors, such as drought or the occasional sodden harvest, can impact the availability of specific grades and quantities. These factors can also create second-order effects, such as when an El Niño-affected summer impedes the growth of pasture, necessitating the use of high-quality milling wheat such as Australian Prime Hard wheat (APH) for feeding livestock. However, a government ban on wheat exports to ensure wheat and its related products are affordable for Australian consumers is unthinkable in Australia.

Ukraine's comparatively modest per-capita GDP is both a blessing and a curse. It enables a low cost-base, yet at the same time restricts the ability of government to use revenue from taxes to fund the basic infrastructure needed to move grain from paddock to market. Australia, by comparison, is better-served regarding the quality of its transport infrastructure, particularly its roads. Where Australia has a relative deficiency in its infrastructure is in communication services such as broadband coverage, which can make practices reliant on real-time data streaming problematic. Ukraine's low-cost labour underpins Ukraine's ability to export competitively-priced wheat to global markets. Moreover, the reasonable quality of its education system provides a pool of skilled labour, which complements the ready supply of unskilled workers drawn from the radius around each farming operation.

Illustrated in Table 1 are a number of key contrasts between the economies of Ukraine and Australia, and their grain industries. The population of Ukraine is almost double that of Australia, providing a sizeable domestic market for food staples such as grains. However,

TABLE 1 Ukraine and Australia — comparison of key economic and agricultural statistics

	Ukraine	Australia
Population (m)	45	24
GDP per capita in 2014 (USD)	3100	61,900
Top five export destinations	Russia (18%), Turkey (7%), Egypt (5%), China (5%), Poland (5%)	China (24%), Japan (18%), Korea (7%), USA (4%), India (3%)
Top five import sources	Russia (23%), China (10%), Germany (10%), Belarus (7%), Poland (6%)	China (21%), USA (11%), Japan (7%), Singapore (5%), Germany (5%)
Export mix	Raw materials (61%), intermediate goods (16%), consumer goods (14%), capital goods (5%)	Raw materials (27%), intermediate goods (46%), consumer goods (16%), capital goods (10%)
Import mix	Raw materials (10%), intermediate goods (14%), consumer goods (42%), capital goods (30%)	Raw materials (11%), intermediate goods (21%), consumer goods (50%), capital goods (17%)
Trade restrictiveness index (2009)	0.20	0.12
Ease of doing business rank	96	10
Logistics performance rank	61	16
Production of principal crops (annual average from 2010 to 2014) (mmt)	65.8	41.0
Area of principal crops (annual average from 2010 to 2014) (mha)	21.4	21.2
Exports of principal crops (annual average from 2010 to 2014) (mmt)	35.1	28.7
Wheat production (annual average from 2010 to 2014) (mmt)	20.3	25.8
Wheat yield (2010–14, four year average) (t/ha)	3.23	1.93
Wheat exports (2010–14, four year average) (mmt)	7.6	19.4
Main export terminals	Odesa, Illichivsk, Yuzhny, Bilhorod-Dnistrovsky, Mykolaiv, Kherson, Kerch, Mariupol, Berdyansk, Izmail, Ust-Dunaysk, Reni, Sevastopol	Kwinana, Melbourne Port, Port Kembla, Port Adelaide, Geraldton, Port Lincoln, Port of Brisbane, Albany, Esperance, Newcastle
Main wheat customers	Egypt, Syria, South Africa, Thailand, Kenya, Libya, Bangladesh	Indonesia, Japan, Korea, Vietnam, Malaysia, China
Wheat planting period	Spring wheat — February/March Winter wheat — September (winter wheat is the main crop)	May/June (spring wheat only)
Wheat harvest period	July – August	November to January

Sources: http://wits.worldbank.org/countrysnapshot/UKR/textview; http://wits.worldbank.org/countrysnapshot/AUS/textview

Ukraine's rapidly-aging population is declining, whereas Australia's is growing. In addition, the only constraints on the local demand for feed grains in Australia are dietary preferences driving demand for meat and dairy products. However, the lower standard of living in Ukraine is a rate-limiting factor constraining domestic feed-grain demand. Low incomes inhibit demand for milk and meat products based on grain-feeding. The vast majority of Australians wishing to consume meat can afford to do so. However, the lower living standards in Ukraine mean for many, meat and dairy remain luxury items, only eaten when financial circumstances permit. Nonetheless, among the many future economic scenarios awaiting Ukraine are those that will see this situation gradually ameliorating, thereby supporting greater domestic demand for feed grain.

Due to its geographic location, Australia's main trading partners (China, Japan, India, US and Korea) are located a considerable distance from its shores. By contrast, until the emergence of bilateral trade with China, Ukraine's major trading partners have been nearby countries such as Russia, Turkey, Poland, Egypt and Germany. Perhaps the only major similarities in the trading patterns of both Ukraine and Australia are their shared tendency to export raw materials and import manufactured consumer goods. In the case of Australia, this lack of value-adding is driven by distance from markets and insufficient economies of scale, owing to Australia's small population. While Ukraine has similar demographic constraints, proximity to markets is not an issue. Its several challenges include such issues as: enhancing its attractiveness to foreign investors, dealing with corruption, resolving the conflict near its eastern border and transforming its institutions.

By contrast, Australia has qualities attractive to some foreign investors. Australia offers investors political stability, little corruption, a strong rule of law, proximity to growing Asian markets, a clean-green product image and stability in financial institutions. However, Australia's high cost-base means relatively little of this investment is aimed at labour-intensive value-added products. It is no surprise foreign investment in grain supply chain infrastructure in Australia has occurred through companies such as Brookfield, Viterra, Sumitomo, Bunge and Archer Daniels Midland (ADM).

By comparison, foreign investment into Ukraine is hampered by a range of factors including:

- a comparatively weak rule of law
- endemic corruption
- arcane labour practices, such as the social obligations that come with employing staff on farms
- arcane land ownership rules
- geopolitical risks, such as the conflict with Russia and the annexation of Crimea
- significant difficulties repatriating capital.

The quality of road, rail, elevator and port infrastructure in Australia is clearly a net contributor to its competitiveness, enabling the reasonably-efficient, cost-effective movement of grain to port. In addition, this infrastructure supports Australia's ability to meet market requirements (e.g. the ability to use non-contact pesticides because of the abundance of sealed storage capacity; or the ability to reliably segregate wheat of different functionality). Australia's storage and handling network is continuing to adapt to the deregulation, introduced during 2008, of Australian bulk wheat exports.

Ukraine, in contrast, has an enviably low cost-base, weakened however by inadequate infrastructure, such as substandard roads and (until recently) insufficient export capacity. The supply chain from farm fields to grain terminals by road is substandard, creating additional costs through logistical inefficiencies and port congestion, which is exacerbated by the inability to deliver grain to the export terminal with timing precision.

Ukraine is not blessed with the plentiful petroleum reserves of its eastern neighbours, Russia and Kazakhstan, who as of 2014 had GDP per capita of US$23,300 and US$12,300 respectively, compared with Ukraine's US$3100 per capita. Perhaps more instructive is the fact that Ukraine's GDP per capita a year earlier was US$3900, indicating a collapse by almost a quarter in only 12 months. Ukraine's lack of endogenous energy reserves is telling, adding to transportation costs and necessitating the import of raw materials needed to make fertiliser.

During the Soviet era, Ukraine was Moscow's 'land of plenty', a key productive asset, which functioned as the Soviet's breadbasket. Ukraine's fertile black *chernozem* soils produced a quarter of all Soviet agricultural commodities, including meat, milk, grain and vegetables. However the chaotic decade following the disorderly breakup of the union in 1991 ushered in a difficult period of structural adjustment, which saw the country's economic output collapse by more than half within that decade.

However, by the turn of the millennium, Ukraine's economic fortunes gradually turned, leading to a period of relative prosperity and growth until the global financial crisis (GFC) hit during 2009, causing the country's GDP to collapse by more than 10 per cent in less than a year, providing the necessary ingredients for social unrest and political instability. More recently, a popular uprising against an unpopular and corrupt government signalled that Ukraine would seek closer ties with Europe rather than Russia. In response, Russia annexed Ukraine's Crimean Peninsula and terminated billions of dollars of support, creating a vacuum in government coffers, which the International Monetary Fund (IMF) more recently endeavoured to fill in the hope it could mitigate an economic collapse, which would likely spill over into Western Europe.

Nonetheless, in spite of support from the IMF and European banks, Ukraine's current economic status is weak. During

the first three months of 2015, Ukraine's GDP declined by a further 18 per cent, although there are signs of a modest recovery with the economy growing by 0.7 per cent during the third quarter of 2015. Similarly, April 2015 saw the inflation rate hit 61 per cent (year-on-year), although again, in the second half of the year a slightly stronger currency and moderating food and petrol prices has seen forecast inflation for 2015 revised to 48 per cent. Understandably, domestic demand has weakened and living standards have eroded, while trade with Russia, previously Ukraine's main trading partner, declined by 43 per cent by 2015. This situation worsened further during 2016 when Russia introduced a ban on the import of all agricultural products, raw materials and foodstuffs produced in Ukraine highlighting the instability and tension in the relationship between the two countries.

A sizable portion of Ukraine's total industrial capacity sits within the breakaway eastern part of the country, further weakening Ukraine's economic strength. Responding to the conflict near its eastern borders is expensive and as a result, less funds are available for useful nation-building investments. Most recently, the IMF approved a US$17.5 billion emergency loan, which was committed under the proviso the government undertakes several reforms, such as removing domestic gas subsidies and tackling endemic corruption via the creation of an 'anti-corruption bureau'.

An additional and unwanted complication is Russia's demand during late 2015 for immediate repayment of a $3 billion Eurobond, which was provided to the former Yanukovych regime. This has led to bickering between Ukraine, Russia and the IMF, as Vladimir Putin demanded payment in full by 20 December, 2015, refusing to participate in the debt restructuring process, which would have seen Ukraine's creditors take large 'haircuts' of 20 per cent on outstanding debt. Towards the end of 2015, the price of credit default swaps (a form of insurance against sovereign default) were implying an almost certain Ukrainian government default. This was concerning as the IMF had specified Ukraine could not use IMF loans to repay debt, as the purpose of the money was to support Ukraine's economic reforms and then, hopefully, stimulate economic growth. The consensus seems to be, without the ability to use IMF loans to satisfy creditors, a default becomes likely. Such a default would have wide-ranging implications for the agriculture sector, which requires both a stable currency and international counterparties who have faith in the Ukrainian suppliers' ability to execute contracts.

Reflecting the economic gloom of 2015, the European Bank for Reconstruction and Development predicted a 7.5 per cent fall in Ukraine's GDP during 2015. However, more positively, the bank forecast a three per cent growth in GDP during 2016, noting the economic situation was gradually recovering during the latter half of 2015. What is not clear however, is how sensitive this growth prediction is to any scenario involving default.

Global competitiveness

The development of a country's economy typically proceeds in stages, which are often represented as:

1. Factor-driven stage — Economic development is based on a country's endowment of natural resources and cheap labour.
2. Efficiency-driven stage — As the country's natural resources reach a point of 'maximum utilisation', further economic development must come via the ability to extract efficiencies from the system, enabling the production of goods more cheaply or with improved quality.
3. Innovation-driven stage — When a country has reached the stage where they are harnessing the benefits of their natural resources and producing goods with efficiency or to a high-quality standard, they move to the last stage, where innovation starts driving economic development. Labour costs for countries that have reached this stage tend to be high, so governments direct funding towards entities focused on innovation for the national good or they remove obstacles that could impede innovation within industry.

While this can make it appear as if there are three discrete stages, the process of economic development is in fact closer to a continuum or spectrum, which means this should serve as a heuristic process, not as a clear cut categorisation (particularly for countries in transition).

That said, Ukraine and Australia are undeniably at different points along this spectrum. Ukraine sits firmly in the efficiency-driven group, while Australia is in the innovation-driven group (World Economic Forum, 2015). The World Economic Forum's measurement of international competitiveness indicates that overall, Australia outperforms Ukraine in all 12 measures (Figure 2). Moreover, a separate *Global Competitiveness Report 2012–2013* ranks Ukraine at 73rd among 144 economies, with its five biggest barriers to doing business listed as:

- access to finance
- corruption
- tax regulations
- tax rates
- inefficient government bureaucracy.

Note these metrics apply to overall economic competitiveness and not to the relative competitiveness of particular sectors, such as agriculture or cropping industries. Hence, although Figure 2 shows Australia has a greater quality and efficiency of support systems, this does not necessarily translate into Australian wheat having a comparative advantage over Ukrainian wheat in export markets. In fact, since the late 1990s, the *revealed comparative advantage* of Australian agriculture has eroded as Ukraine's has rapidly improved (see Figure 3).

This decline in Australian agriculture's revealed comparative advantage has largely been a function of the *mining-*

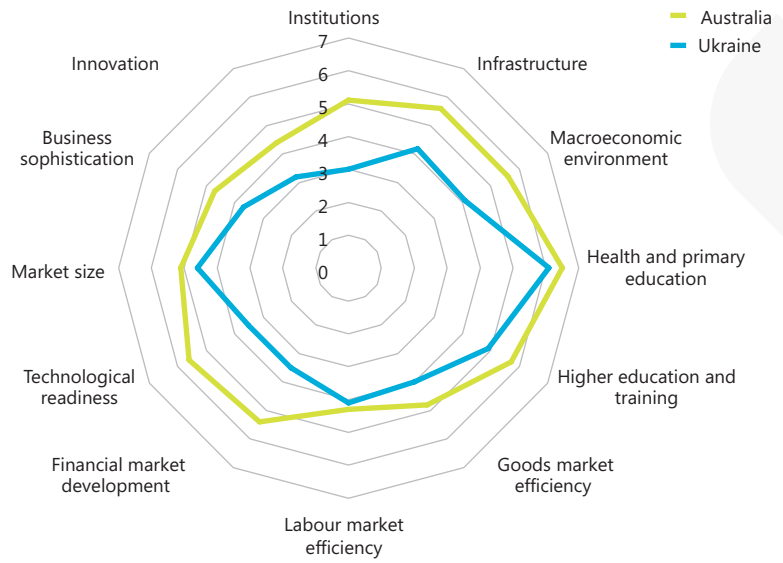

FIGURE 2 Metrics of economic performance: Ukraine versus Australia

Source: Based on data available at www.weforum.org/reports/global-competitiveness-report-2014-2015

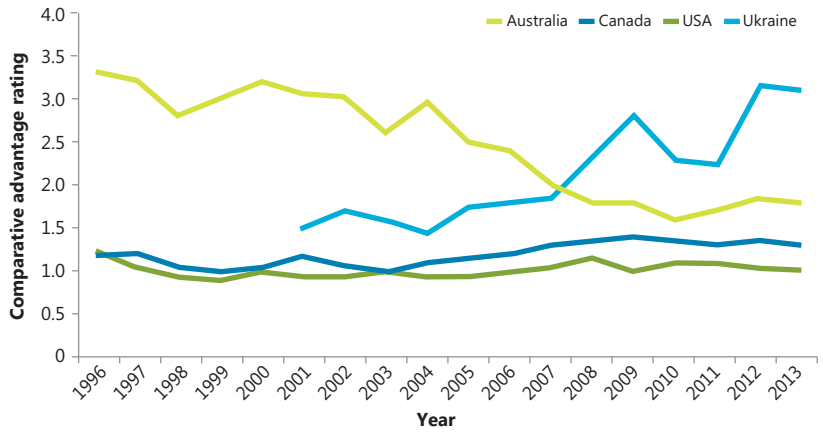

FIGURE 3 Revealed agricultural comparative advantage

Source: Based on data from Keogh et al (2015)

boom-driven surge in mineral exports and the unprecedented capital investment (such as the construction of new mines or transport infrastructure) needed to facilitate these mineral exports. This fuelled an appreciation of the AUD from around US$0.65 at its GFC nadir, to just above US$1.10 in little more than two years. Australian agriculture, manufacturing and tourism were the collateral damage of this mining and energy-driven AUD appreciation.

However this also highlights an important point we will return to later in the report:

So the exchange rate giveth, it can also taketh away (Keynes 1:22)

Since 2000 the AUD:USD ratio has changed greatly. The AUD went from sub-US$0.50 after 9/11 to be around parity just before the GFC, before collapsing to US$0.65 during the GFC in 2009, then rising to US$1.10 and then plunging back to the low US$0.70s, where it has sat throughout much of 2015. As shown later in Figure 9 (page 43), the UAH has experienced far greater depreciation against the USD than has occurred for the AUD since 2000. Since 2014 the huge depreciation of the UAH has made Ukrainian grain exports exceedingly price-competitive in international grain markets. Any assessment of a country's agricultural export competitiveness must account for exchange rate trends and volatility, especially as these changes can be due to factors wholly unrelated to agriculture.

Another driver of Australia's worsening relative comparative advantage is one over which Australia has more control; its agricultural total factor productivity. As shown later in Figure 11 (page 46), Australia's growth in its agricultural total factor productivity over much of the past decade or so has lagged behind that of its main wheat export competitors, including Ukraine.

Somewhat sobering for Australian grain exporters is the prospect of Ukraine embracing its potential to improve the above-mentioned support systems (as highlighted in Figure 2), thereby facilitating further gains in any comparative economic advantage it has against Australian wheat exports.

The structure of Ukraine's agricultural sector

Land policy in Ukraine has progressed to the fourth stage of land reform, where there is some private ownership of land.

Ukraine's agricultural industry displays the same quasi-socialist hallmarks as Kazakhstan, however with a drastically different funding profile due to Ukraine's much lower level of GDP per capita and weakened government finances.

This means Kazakhstan can use its petro-dollars to influence its domestic grains industry and shape its crop profile, using mechanisms such as grain-specific subsidies to support feed grains, rather than milling grains, for livestock production. By contrast Ukraine is cash-strapped, limiting its government's ability to usefully invest in its agriculture sector. In assessing former Ukrainian government policies and actions concerning agriculture, an FAO study carried out in 2010 found most government-funded agricultural interventions were either ineffective or were only moderately effective in growing the country's agriculture sector. However, more recently and more positively, government policy priorities have shifted toward providing an enabling environment to facilitate private rather than solely government investment in agricultural activity and infrastructure. Establishing the policies and processes that facilitate growth in agricultural and related activity is not without its challenges and hurdles.

Land ownership

Ukraine's current system of land ownership stems from its political past, as outlined earlier in this report. Following the collapse of the Soviet Union, and Ukraine's return to independence, the transition to private ownership with full property rights was planned to occur over five stages. In the first stage, the 12,000 communes in Ukraine were restructured as corporate entities, with paper shares issued to their workers. These communes however, were inefficiently managed, triggering a presidential decree during 1999 that conferred ownership of physical land parcels to the workers. This meant seven million (formerly collective) workers, amounting to more than 40 per cent of the Ukrainian population, were each given a land share, known as a *pai*, of approximately 4ha. In addition, more than seven million rural residents were granted ownership of small plots (up to 0.4ha) from a Land Reserve Fund and/or from 'reserve land' owned by central or local governments. These small plots totalled 2.6m ha and were to be used for small-scale domestic farming. By the end of 2012, title deeds to these small plots had been issued to 6.4 million people (around 93 per cent of the eligible population), placing 30.7m ha (or 74 per cent of all Ukrainian agricultural land) in private ownership (Sarna, 2014).

Land policy in Ukraine has progressed to the fourth stage of land reform, where there is some private ownership of land, although there is a moratorium on the sale of this privately-held land. In practice, this means the millions of owners of small parcels of land can either farm the land they own or they can lease out their land to another farmer or corporate entity. The latter are often large, more sophisticated farming businesses seeking economies of scale (5000 to 20,000ha). These large businesses may need to enter into upwards of 1000 individual leasing arrangements, most of which are long-term leases more than five years in duration. Currently around 60 per cent of these leasing arrangements are settled with cash, with the remainder based on in-kind payments of grain. In many cases these arrangements are entered into under the proviso (or expectation) the lessor is employed on the farm.

The Ukrainian Centre for Land Reform Policy (2013) has indicated that just over half of all lessors are retirees, with the lease payments functioning as a form of superannuation for this demographic. This also means any policies enacting further land reform have the potential to cause adverse social and economic consequences, with millions of retirees potentially impacted. This is a situation not dissimilar to the mooted deregulation of wheat imports into Japan, where reforms likely be beneficial to the country as a whole are stalled by the conundrum of how to ensure they don't unleash a new set of problems by alienating or bankrupting a sizable minority. Like Japan, Ukraine is trying to make the changes incrementally, allowing sufficient time for workable policy solutions to emerge, or at the very least, giving the affected groups enough time to adapt.

Until 2010, the average annual cost of leasing agricultural land did not exceed US$40/ha. However, a government decision to raise the normative value of farmland, and to increase the minimum land lease fee to three per cent of the normative land value, increased lease fees to US$50–70/ha. Even at these lease rates farmland in Ukraine is among by far, the cheapest in Europe, attracting many European and overseas investors.

The fifth stage of land reform is proposed to involve the removal of the moratorium on farmland sales, allowing private owners to sell their small landholdings. Whether this fifth stage occurs or not will not be known until 2017 as during December 2015 President Poroshenko extended the moratorium on farmland sales until 1 January, 2017. There is proposed legislation under review that will allow sales of farmland. However, initially foreigners (including international government organisations and non-government organisations) will not be able to acquire land in Ukraine, other than land that is an inheritance entitlement. Even Ukraine's own citizens are proposed to be subject to eligibility criteria, which will restrict who can and can't acquire land. For example, there have been moves to restrict eligibility to those who have resided within a 20km radius of the land parcel in question, for a minimum of three years. Alternatively, the prospective

buyer may be a smallholder farmer or a 'farming entrepreneur'. As long as the prospective buyer meets whatever eventual criteria are mandated, they will have the ability to accumulate tracts of farmland.

When, and if, the liberalisation of land ownership occurs, its impact could be profound. Many cash-constrained landowners could be willing sellers of their landholdings. If government policy allowed the widespread sale of land, while placing restrictions on purchasers of land, then a likely oversupply of land could generate low prices for farmland. Social disruption could be unleashed as new owners of farmland would not have the obligation, as currently occurs as a condition of some leasing of land, to employ lessors as farm labourers. Obviously some large, modernised and vertically-integrated farming businesses would benefit from the greater freedom to hire (or not hire) particular staff.

The rise of vertically-integrated agroholdings

Ukrainian agriculture is sometimes referred to as a *dualistic farming structure* (Balmann et al, 2013), with around half the country's annual grain output produced by a large number of traditional landholders and the other half of production originating from huge, modern, often vertically-integrated farming businesses known as *agroholdings*.

From 2007 to 2010, the total farmland controlled by agroholdings (defined as operations of >10,000ha) tripled from 1.7m ha to 5.1m ha. By 2013, agroholdings controlled 27 per cent (or 6m ha) of Ukraine's commercially farmed arable land (AgriSurvey, 2014). The formation of large agroholdings (see Table 2) was facilitated by low land rent costs at the start of the new millennium. However, this rapid expansion increased competition for land, boosted land rents and absorbed much of the arable land surplus created when farming contracted after 1991 (Walther, 2014).

During 2010, the average land rent paid by an agroholding was UAH347 per hectare, and by 2012 this had increased to UAH 678 per hectare (AgriSurvey, 2014). In the long run, if Ukrainian agriculture can overcome their various impediments and constraints, competition for land will eventually see more farmland come under the control of the largest, most efficient and most competitive farming operations. This will pit agroholding against agroholding, as well as other large entities, such as Chinese or Middle-Eastern sovereign wealth funds. To date, agroholdings have been by far the fastest-growing form of grain farming business in Ukrainian agriculture, however, more recently storm clouds have been gathering.

It would be no exaggeration to say agroholdings have rapidly taken over Ukraine's farm sector during the past 5–10 years. While the emergence of large-scale innovative organisational structures will almost always function as a *disruptive technology* in agriculture, and will therefore rarely be completely pain-free, the recovery of Ukraine's farm sector owes much to these goliaths of grain.

Walther (2014) makes the illuminating point that agroholdings in Ukraine, Russia and Kazakhstan have, in part, emerged as a product of the older Soviet 'collective farms'. Perhaps another way of representing this could be to say the Soviet era, and then period subsequent, created a set of *'Goldilocks'* conditions, with just the right mix of factors ideal for the emergence of organisational structures such as these. Particularly in Ukraine, a large number of highly-fragmented individual landholders are now keen to either lease their land to well-funded corporate entities, to form agroholdings, or these small landowners continue farming their own land to share in the improved fortunes of Ukrainian agriculture.

Considering the inflationary and credit environment in Ukraine, any resurgence in Ukrainian agriculture was never going to be based around traditional small family farms, strapped for cash and reliant on old technology and equipment. Larger entities, such as agroholdings, are better able to tap into foreign sources of credit, acquire USD-priced inputs and obtain political patronage, if needed.

Large-scale farming, or the amalgamation of many growers into a single, powerful entity, is by no means unique to Ukraine, Russia and Kazakhstan. Rather it is becoming a feature of broadacre farming globally, driven by either profit motives or, via state-owned enterprises (SOEs), arising to address growing food security risks. However, the model adopted differs from country to country, from quasi-contract growing arrangements, where a sovereign wealth fund pays others to grow the grain, to agricultural co-operatives such as the CBH Group, where growers generate strength through scale via collectively-owned grain handling infrastructure and grain marketing power.

What are agroholdings?

Agroholdings are large, centrally-managed corporate farming enterprises defined by both size and management structure. Unofficially, the threshold size for consideration as an agroholding is 10,000ha. However some can be behemoths, stretching to more than 100,000ha. These entities are not corporate farms in the Australian mould, as many agroholdings operate vertically-integrated, self-contained value chains, which extend from farm inputs, through to storage, transport, marketing and export. However the level of vertical integration is heavily depends on the size of the agroholding, with smaller examples operating a more 'vanilla' corporate farming model.

TABLE 2 Size and production of the 10 largest agroholdings in Ukraine

Business name	Area under control in 2013 ('000ha)	Gross output in 2012 (UAH million)	Wheat production in 2012 (kt)	Corn production in 2012 (kt)
UkrLandFarming	540	6462	375	1190
NCH Capital	482	2400	485	520
Kernel	408	2250	215	790
Myronivsky Hliboproduct (MHP)	300	7335	235	1050
Mriya	298	2100	780	180
Ukrainian Agrarian Investments	260	870	155	360
Astarta	248	1940	150	225
HarvEast (Illich-Agro)	210	600	165	<120
Agroton	165	475	135	<120
Sintal	150	<450	<120	<120

Sources: AgriSurvey (2014), Walther (2014) and Schmidt and Myers (2015)

Walther (2014) speculates that, over the long term, agroholdings in Ukraine may gradually evolve into a model where smaller, independent farming operations are owned and coordinated under a centralised structure.

Agroholdings account for close to 20 per cent of the gross value of crop production in Ukraine. In 2012, for example, these enterprises planted 1.22m ha of wheat, translating to a harvest of 4.25mmt. This amounted to 27 per cent of the country's wheat production for that year. Even among agroholdings there is further concentration. For example, also in 2012, the 15 largest agroholdings accounted for 79 per cent of the wheat harvested by all agroholdings, producing more than 3.35mmt.

Not all agroholdings utilise intensive production techniques, and intensity of production is subject to diminishing returns (see Figure 4). However, variation in yields and cost of production in Figure 4 are not solely driven by production intensity, but also affected by climate, crop rotations and soil quality discrepancies.

Typically, this kind of rapid growth requires a steady, unimpeded supply of working capital, sourced via a combination of debt and equity. Since 2005, some 18 agroholdings have gone public, listing on European stock exchanges, with 15 still listed by the end of 2013. However, due to a combination of cash-hungry models, fickle weather and an inherently risky operating environment, when these large agroholdings stumble or fall, the results are often spectacular. For example, Sintal and Mriya Agro Holding have both filed for bankruptcy, and in the case of Mriya, it failed owing US$1.3 billion in debt and is now controlled by creditors. Perhaps more worrying for the sector, in 2013/14, UkrLandFarming, the largest agroholding, reported a trading loss of US$261 million, with total liabilities estimated at US$1.7 billion. In addition, but of lesser concern, is the Warsaw-listed KSG Agro, which in May 2015 announced a loss of US$40 million, with liabilities reaching 92 per cent of assets (Iwański, 2015).

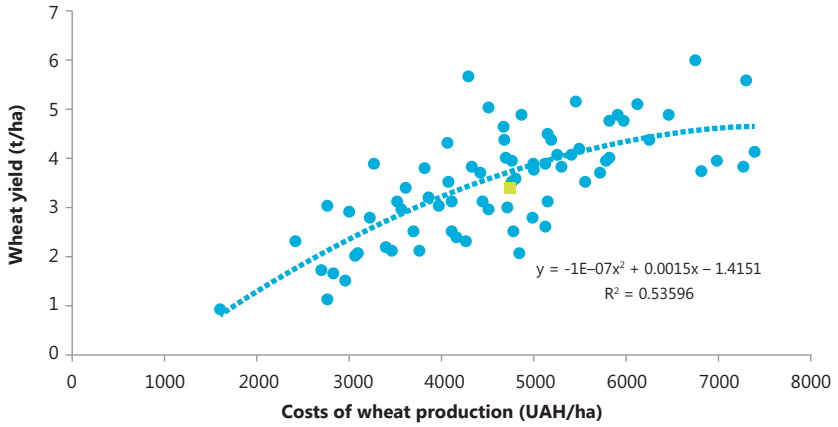

FIGURE 4 Wheat yields versus costs of production for agroholdings in 2012

Source: Based on data in AgriSurvey (2014). The green square is the average across all agroholdings.

Agroholdings are often fully-integrated, self-contained value chains, controlling almost every individual stage of the grain production and processing life-cycle, including:

- procurement of finance for working capital and capital works
- import and/or procurement of all inputs including seed, fertilisers and agricultural chemicals

- acquisition of agricultural machinery
- harvest, storage and transport of the grain to domestic end-users
- container packing or delivery to bulk export terminal (selling on either an FOB or CFR basis).

In addition, some of the larger entities also own processing assets, such as flour mills or compound feed mills, which creates the scenario where the agroholding can create a virtual 'paddock-to-plate' operation. This kind of scale and vertical integration makes possible the kinds of large infrastructure holdings not possible in countries with a more fragmented, family-farm oriented production base. At this scale, it is often cheaper to build your supply chain infrastructure and it is more profitable to create a model with the end-product demand pulling grain through the value chain. At the very least, the immense scale of these organisations gives them a powerful footing in any negotiations with the owners of existing supply-chain assets. Nothing incentivises cheap pricing quite like the knowledge that the customer's business could underpin your entire operation, or worse, they could build their own competing asset to imperil your own.

Ukraine faces the familiar problem of traders and elevator operators preying on smaller, often less market-savvy growers, leveraging their global footprint and global grains supply and demand knowledge to gain advantage in any negotiations. Due to the fact smaller, traditional wheat growers are less plugged-in to the short-term ebb and flow of international market prices, as well as the fact traders and elevator operators know growers are forced sellers (often due to a lack of on-farm storage or cashflow constraints), the 'little guy' is often vulnerable and exploited.

This asymmetrical power distribution between growers and multinational grain traders is a phenomenon not unique to Ukraine. While there are serious doubts about the long-term prospects of agroholdings, at the very least, they show what happens when the commercial interactions between buyer and seller are carried out on a more level playing field. Unless the trader is sitting on market-moving information that is not publicly available, the agroholdings can access the same market wires and real-time information platforms (e.g. Bloomberg or Reuters) as major grain traders.

By controlling the entire value chain, many agroholdings can shift the balance of power in their favour. On any given day, having the luxury of selling or not selling provides great protection from the more predatory traders and this is seen as a competitive edge for the larger agroholdings. For similar reasons, larger feedlot and poultry farm operators are increasingly producing their own feed grains in order to avoid being beholden to traders and elevator operators. For example, in Ukraine, grain owned by the elevator or their trading arm receives preferential treatment over grain owned by third parties in many cases. If we look solely at grain handling infrastructure, fortunately a key difference in Australia is that since deregulation, bulk handlers have been mandated to treat all users of their facilities in (relatively) equitable terms by the Australian Competition and Consumer Commission (ACCC). While it is unclear how long this situation will continue, this ACCC oversight and the 'fungible' grain-type systems it has spawned has prevented the types of preferential dealing practices seen at Ukrainian elevators.

Whether or not the agroholdings model endures remains to be seen. However, what is not in doubt is the powerful competitive advantage they have over both traditional Ukrainian farming enterprises and many family farms in Australia — at least in theory. They enjoy the combination of relatively unconstrained access to modern machinery, economies of scale, a devalued local currency, a low-cost production base and the ability to bide their time selling without the pressure of cashflow constraints. In terms of ongoing monitoring by Australia, a key factor to remain abreast of is whether or not diseconomies of scale will eventually arise, whereby the increased complexity of both farm operations and business management eventually imposes additional costs, which diminish the profitability and flexibility of the larger agroholdings. Note, however, the findings of Deininger et al (2013) that it is not economies of scale underpinning the performance of large agroholdings; rather, their success is revealed to be a function of their ability to derive advantages from access to credit and vertical integration.

An added difficulty faced by large agroholdings in Ukraine is the problem of corruption and theft within their large structures. It can be an overwhelming task to properly monitor employees to ensure they are not taking advantage of their position to receive bribes from suppliers or steal unsecured company property. And this also assumes the owners and senior management have prevention of corruption as a managerial priority. Some may turn a blind eye to the minor, day-to-day corruption so prevalent in Ukrainian commerce, acknowledging and accepting 'this is how things are'.

This contrasts with smaller, mostly foreign-managed farm operations, which are better able to overcome these challenges via nimble operating structures that enable pragmatic solutions to be implemented. They do this via greater managerial and operational flexibility and incentive structures, which are backed up by ample security in case some workers remain attached to the old ways, where 'impromptu bonuses' would see both grain and farm property go missing, presumed sold.

In addition to agroholdings, there are corporations with considerable vertical integration, such as the Nibulon group, which has transitioned from an orthodox grain trader to a vertically-integrated business participating up and down the value chain, from production through to grain marketing and shipping, along with the logistics required to move grain within its value chain. Together with Toepfer International (recently bought

A typical example of modern machinery used by agroholdings and many medium-sized farm operations in Ukraine.

Source: AEGIC, 2015

out by ADM) and Louis Dreyfus, Nibulon is one of the major Ukrainian grain exporters.

Do not assume a universally rosy picture for these large, vertically-integrated farming conglomerates. Their apparent advantages of scale, integration and access to credit are not fail-safe recipes for success. Some have failed spectacularly and some others are rumoured to be in financial difficulty, hit hard by the economic volatility or, as occurred for Nibulon, an antagonistic relationship with the previous Moscow-aligned Yanukovych regime.

When assessing how changes in Ukraine may impact the wheat export market (and therefore affect Australian growers), the proliferation of agroholdings serves as a microcosm for the prospects of Ukraine more generally. The agroholdings and Ukraine in general both create an initial favourable impression of burgeoning growth. However, on closer inspection, a much more nuanced set of implications emerges. In a decade from now, both could either be world-beating competitors or they could be highly constrained by greater conflict, political and economic insecurity. At this point in time, during early 2016, the fact both scenarios are probable is perhaps the best way to reflect the range of uncertainty.

Government and industry bodies affecting the agriculture sector

In stark contrast to Kazakhstan's sizeable spending on agriculture, underpinned by energy sector revenues, the Ukrainian government's support for its agriculture sector has been limited, patchy, inconsistent and sometimes ineffective according to various sources including the FAO. Often, government intervention has been hobbled by a lack of funds. For example, the government has implemented programs, such as paying growers a per-hectare payment to encourage production or compensating growers for crop failure, but the ability of these programs to affect behavioural change has often been limited by the paucity of funding.

The Ukrainian government's dearth of financial resources results in Ukraine's *Producer Support Estimate* (PSE) being very low in comparison to fellow Black Sea producers and other grain-exporting nations (see Table 3). According to the OECD, the PSE is '*... an indicator of the annual monetary value of gross transfers from consumers and taxpayers to support agricultural producers, measured at farm gate level, arising from policy measures, regardless of their nature, objectives or impacts on farm production or income.*' The comparative value of PSEs is one area where Australia and Ukraine share commonality. Both governments provide a low level of support to their agricultural producers relative to the support other grain-producing nations dedicate to their producers. However, as a word of caution it should be noted the published PSE value is an aggregate value across a range of agricultural commodities. As outlined in Fellmann and Nekhay (2012), support for wheat production in the Ukraine is very low. What support is available in Ukraine mostly goes to the poultry, sugar, pig meat, beef and veal and egg sectors.

The government of Ukraine has been active in at least attempting to create a modernised legislative framework to encourage the prosperity of its agriculture sector. It has enacted an array of laws, such as the *Agrarian Subsidies Fund*, the *Law on Basic Principles of the State Agrarian Policy* and the *Law on Grain and Grain Market in Ukraine*. In terms of government policy, the 2004 *Law on State Support to Ukraine's Agriculture* is widely viewed as a key reorientation of the government's view on its own role towards the agriculture sector. This policy creates a framework and foundation for the various policies that have underpinned the recent growth in Ukraine's agriculture sector. However, not all these policies are fully funded, well enacted or are as effective as they could be.

As in Kazakhstan, the Ukrainian government must always attempt to balance its Soviet-influenced quasi-socialist desire to control the natural volatility of grain prices (and therefore ensure food remains affordable for the local population) and the need to attract private investment capital into a profitable agriculture sector. In general, a market where the government intervenes to distort market prices or restrict exports is not attractive for investors. In this sense, the government must play a delicate tightrope act, balancing these competing requirements.

TABLE 3 Producer support estimates (subsidies) as a percentage of gross farm receipts (including support)

	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)
Ukraine	3.0	7.9	6.7	-4.4	1.3
OECD — total	20.7	21.9	19.2	18.3	18.6
Australia	4.4	3.1	2.8	2.9	2.7
Canada	13.2	17.5	16.7	15.1	14.3
United States	8.8	10.6	7.8	7.7	7.1
EU27	23.5	23.3	19.8	18.0	19.0
Brazil	3.7	6.5	4.5	4.8	4.6
China	2.9	11.5	15.3	12.9	16.8
Kazakhstan	3.9	13.8	9.4	10.8	14.6
Russian Federation	20.5	20.7	21.5	15.1	13.5

Source: Producer and Consumer Support Estimates: Agricultural support estimates 2013, OECD Agriculture Statistics

In terms of overarching responsibility, the Ministry of Agrarian Policy and Food controls all aspects of the government's various programs and policies, with close linkage to the Finance Ministry in instances where government funding is required. Similarly to Kazakhstan, the Ministry of Agrarian Policy and Food controls state-owned joint stock companies (JSC) that are tasked with managing or implementing directives flowing down through government. The three main agriculturally-focused JSC controlled by the government are the Agrarian Fund, the State Committee on Material Reserves and the State Food Grain Corporation of Ukraine (SFGCU). Khlib Ukrainy (lit: *bread of Ukraine*) was an important JSC that controlled a number of elevators and processing assets including a port elevator in Odesa. During 2010, the government restructured (the essentially bankrupt) Khlib Ukrainy and created, via a rather Byzantine series of transactions and name changes, the SFGCU.

The volumes handled by the SFGCU have quickly dwindled post-inception, but the company still controls more than 3.5mmt of storage along with export terminals in Odesa and Mykolaiv. The restructured group has often received preferential treatment via rather opaque processes resulting in uncompetitive *one-bid* tender arrangements, which have handed them rights to supply grain into the country's national reserves. Additionally, in 2010 they gained the majority of export quotas to the detriment of private companies and ultimately to the detriment of a competitive grain trading market. This perhaps would be understandable if Khlib Ukrainy/SFGCU were 100 per cent government owned, however a sizable minority of shares are in private hands creating a curious hybrid of government reach and individual commercial interests.

These arrangements do not support an attractive investment environment. Government activities, as typified by the Agrarian Fund and Khlib Ukrainy, risk creating additional complexity, potential conflicts of interest and opportunities for corruption. To illustrate; several years prior, during the Yanukovych era, Khlib Ukrainy was granted the lion's share of export quotas, essentially locking out Nibulon (the dominant player in this space, and noted target of Yanukovych ire). Nonetheless the Ukrainian government is keen to attract foreign investment in Ukrainian agriculture. For example, the European Bank for Reconstruction and Development (EBRD) has already committed US$1 billion towards agricultural investments in Ukraine, along with providing loans for investors and working capital for agricultural producers. As an indication of the close relationship between the EBRD and the Ukrainian government, during September 2015 they both hosted a conference in London where foreign investors and Ukrainian agricultural companies discussed ways in which more foreign investment could be encouraged. During November 2015 the EBRD announced a US$20 million working capital facility provided to Ukrainian Agrarian Investments, an agroholding with activities in northern and western parts of the country. This perhaps demonstrates the importance the current Ukrainian government places on foreign investment by indicating a growing willingness to take pragmatic and proactive steps to remove the blockages in the investment pipe, which attracts foreign capital into their agriculture sector.

Under previous governments a key competitive disadvantage for Ukraine was the sporadic application of export quotas in response to poor crops. Such quotas disincentivised supply chain infrastructure investment, as the return on these investments is a function of the unimpeded flow of grain through the asset in question. To understand the effects of these quotas, imagine their implementation in Australia's or Canada's bulk-handling network. In the case of Australia, imagine the lower value placed on Australian grain industry assets if the Australian government habitually restricted exports. Similarly, imagine the value of grain terminals in the Port of Vancouver if the Canadian government regularly restricted grain exports from Canada.

Government export bans also have an impact on the reputation of Ukrainian wheat among buyers, who must factor in potentially disrupted supply when they make comparative evaluations against other exporters such as Australia. For a large mill, sudden export bans can be incredibly expensive, as the mill can be faced with the choice of scrambling to secure cargoes for prompt delivery on the spot market, or as a worst case scenario, face the prospect of halting production until a replacement cargo arrives. Larger mills with spare storage and no working capital constraints can make opportunistic purchases throughout the

year, with the luxury of being able to buy when values are favourable, rather than just-in-time purchases constrained by cashflow or storage. Depending on the washout clause stipulated in the contract, a government ban could cost the buyer several million dollars in replacing a single panamax cargo. Each buyer attributes a different value to this risk, with less risk-averse buyers finding the lure of cheap wheat hard to resist, confident non-performance of the contract due to an export ban will not imperil mill operations. Other mills may attribute a higher probability to this event, or may not have either the financial or storage capacity to reduce the exposure to their business, so they often prefer to stick to origins with less risk of export bans.

This would also make the task of any Ukrainian wheat marketing organisation (if, against all odds, it were to spring into existence) more difficult, as years of technical extension activities could be undone by a single, sudden export ban. At the very least, such an organisation would need to market Ukrainian grain on other strengths, such as price, as buyers would greet any attempt to make unwise claims around stability of supply with scepticism.

However, more recently the government has shown its awareness of the perils of imposing an export ban on grain. For example, during 2012 rather than placing a reactionary blanket-ban on exports, the government negotiated export limits with key players to avert any potential issues with the price or availability of wheat for staples.

In terms-of-trade relationships and the broader regulatory environment, since 2008 Ukraine has been a member of the World Trade Organisation (WTO), and must therefore comply with the WTO's rules covering tariffs and quotas. Ukraine is also a member of the CIS Free Trade Agreement with Russia, Ukraine, Belarus, Kazakhstan, Kyrgyzstan, Tajikistan, Moldova and Armenia. Since early 2014 the popular support in most regions of Ukraine for closer ties to the European Union (EU) has signalled a shift in trade intentions, to the dismay of Russia, who has been Ukraine's main trading partner for decades. If we look at the annexation of Crimea and the proxy war with Russia in eastern Ukraine, it would be difficult to argue this change in stance by Ukraine's government has been unquestionably successful. This closer alignment with the EU was foreshadowed in the government's most recent agriculture policy document, which detailed a five-year strategy covering the period from 2015–20 (see Table 4). It was developed in an admirably consultative manner, a product of experienced and skilled working groups, backed by extensive public consultations and a public submission process.

In mid-December 2015, President Poroshenko stated that from 1 January, 2016 the negotiated Deep and Comprehensive Free Trade Agreement (DCFTA) between Ukraine and the EU would be introduced in full, in spite of opposition from Russia. Ukraine is formalising ties with North Atlantic Treaty Organization (NATO) to strengthen its defence capability.

In comparison to Australia, agriculture plays a more central role in Ukrainian society, both socially and economically, employing more of its population in agriculture and contributing more as a share of total GDP. Ukraine has lacked the massive mining and energy boom Australia has enjoyed in the several years leading up to 2014. One demographic trend shared by both countries however, is increased urbanisation. Yet despite the fact Ukraine is urbanising at a greater rate, more than 30 per cent of its population still lives in rural areas, compared with only 11 per cent in Australia. It will be interesting to see how Ukraine's aging and declining population affects this demographic shift in coming decades. In Australia, post-retirement sea-change is often followed by a pragmatic return to the city, where geriatric health services are concentrated. These longer-term trends need to be monitored to determine their impacts on domestic demand for different grains and the impacts on labour availability and labour quality.

Interestingly, in spite of Ukraine's much lower GDP per capita, its rural regions are better served by telecommunication services than many rural regions in Australia. Mobile phone coverage and data download capabilities are noticeably greater in the rural regions of Ukraine, compared with Australia. Reliable phone and internet services are seen as a key driver of cost efficiencies in modern economies (which was no doubt a central rationale for the roll-out of the national broadband network [NBN] in Australia) and this is at least one area where Ukrainian farming businesses are not constrained by the government's lack of revenue.

The picture is less positive when we look the Ukrainian government's direct financial support for agricultural research and development (R&D) (see Figure 5). Between 2006 and 2010, Ukraine's average annual spending on agricultural R&D was only US$36m, which equates to a research intensity (R&D expenditure as a percentage of the gross value of agricultural production) of only 0.33 per cent. By contrast, over the same period, Australia's annual public expenditure on agricultural R&D was about US$590m, which resulted in a research intensity of around 2.4 per cent (see Figure 5).

Government spending on agricultural R&D in Ukraine also significantly lags behind the other major grain exporters, such as Brazil, US, Canada and the EU. However this may change as governments in Australia and Canada become complacent or budgetarily-constrained, diverting funding away from GDP-positive agricultural R&D to other political or economic priorities. Unfortunately, unlike the US, this void is not being filled by private investment into agricultural R&D in Australia, as less than 20 per cent of Australia's total agricultural R&D expenditure originates from non-government expenditure (Keogh and Potard, 2011). As Ukraine's economy develops and its volume of agricultural production increases, greater government funding

TABLE 4 Key objectives of the Ukrainian Strategy for agriculture and rural development 2015–20

Main objectives	Action
Approximation	Approximate Ukraine's laws to those of the EU in accordance with the Association Agreement and relevant international standards, in particular related to food safety, sanitary and phytosanitary issues and to the measures listed in the Action Plan for the Implementation of the Association Agreement resulting from the Cabinet of Ministers of Ukraine Resolution No. 847, in order to ensure a predictable and sound framework for production, processing and to facilitate trade.
Deregulation	Modify or abolish any regulations and administrative acts that have been proven to be not in compliance with EU and international standards or to cause an unjustified cost for the operator, ensure the measures taken are correctly implemented and assess their impact in order to ensure a fair, transparent, stable and predictable production, to improve business climate for the producers and operators, reform state agricultural property and state-owned enterprises to stimulate investment.
Factors of production	Address the main challenges related to factors of production, including land reform, access to finance, modernisation and upgrading of production and processing capacities, infrastructure and logistics, in order to lower production costs, increase the competitiveness of the agriculture sector, and to contribute to GDP growth by increasing exports and domestic income.
Agriculture policy and innovation	Respond to producers' and agro-industry needs regarding competitiveness, innovation and value adding by reorganising agricultural research and education, establishing vocational training and extension services, and by supporting an efficient agriculture policy in this respect, in order to facilitate the adaptation of the agriculture sector to medium-term trends, new markets and opportunities.
Production and market management	Address food security, increase the transparency and efficiency of production and market management measures, by: reforming the state price regulation and the State Food Reserve and State Agrarian Fund, abolishing export restriction, and promoting the representation and organisation of producers as well as fair and transparent contractual relationships in the marketing chain, in order to establish management tools and business practices adapted to the global challenges and the increasing world price volatility.
State support and taxation	To improve the efficiency of the state support to agriculture by establishing the simplified and targeted support system and to enhance state revenues by the modernisation of the taxation system in a transparent and equitable manner.
Rural development	Develop a rural development program and implement measures aimed at supporting small farms based on the development of niche markets, quality production, functioning marketing channels, diversification of activities including green tourism, production of non-food products, and improve the quality of life in rural areas while fostering local governance and rural communities, in order to maintain a vital economy including in the most disadvantaged rural areas where agriculture is the main source of income.
Environmental resources management	Establish a regulatory framework for developing environmentally-friendly agriculture and production methods by establishing minimum requirements and promoting best practices for management of natural resources in order to ensure a sustainable growth of the agriculture sector and contribute to tackling global environmental challenges.

Source: http://minagro.gov.ua/en/node/15843

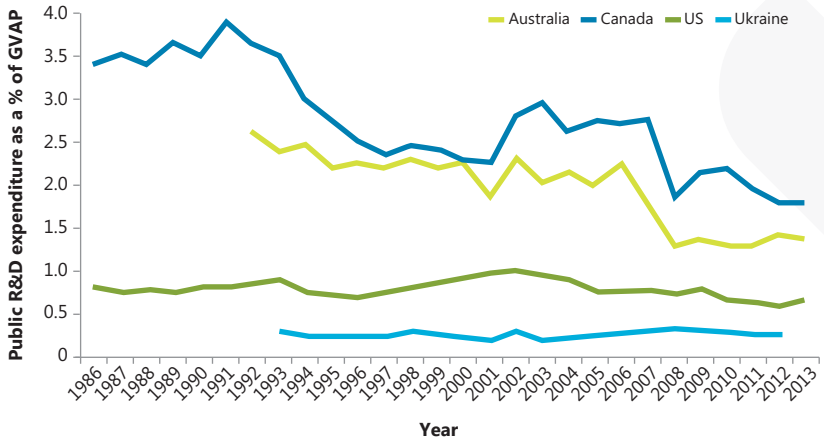

FIGURE 5 National public agricultural R&D expenditure (as a percentage of the gross value of agricultural production (GVAP))

Source: Australian Farm Institute 2015

of agricultural R&D may occur, further fuelling productivity and production growth in Ukraine.

As shown in Table 5, Ukraine's annual growth in its *total factor productivity* for agriculture has greatly outstripped that of Australia, in spite of its small expenditure on agricultural R&D. Since 2000, Ukraine's annual growth in total factor productivity has often been double that of Australia's. Admittedly, several years during the 2000s were heavily impacted by drought in Australia, affecting grain production throughout the country, and thereby affecting productivity growth. Ukraine has clearly benefited from the inflow of investment and technology into its agriculture sector since the early 2000s, which continues unabated (although tempered somewhat by recent economic uncertainty).

As this report will soon demonstrate, Ukrainian agriculture heavily relies on technology spill-ins, such as hybrid seed, herbicide technologies, genetically modified (GM) plant technologies, and modern cropping machinery, in which a range of technologies are deployed. In addition, large multi-national grain traders continue to invest in handling and port terminal infrastructure, which utilises state-of-the-art, leading-edge engineering technologies. Australian grain production also increasingly relies on the same technology spill-ins. Although cropping conditions in Australia and Ukraine may differ, advances in crop production technologies have enabled the commercialisation of intellectual property (IP) with global applications. Multi-national biotechnology firms, such as Monsanto, and major farm machinery manufacturers, such as John Deere, are increasingly main sources of R&D innovation, which was historically the remit of government agencies and universities.

Ukraine has clearly benefited from the inflow of investment and technology into its agriculture sector since the early 2000s.

TABLE 5 Average annual rates of growth in total factor productivity in key cereal exporting nations in different periods (% per annum)

	1961–70 (%/p.a.)	1971–80 (%/p.a.)	1981–90 (%/p.a.)	1991–00 (%/p.a.)	2001–10 (%/p.a.)	2001–12 (%/p.a.)	2003–12 (%/p.a.)
Australia	1.0	1.8	1.2	3.1	0.9	1.2	1.6
Ukraine	n.a.	-0.3	1.0	-0.3	3.2	2.7	2.6
Canada	0.3	-0.5	2.3	2.3	2.1	1.8	1.6
US	0.4	1.7	0.9	2.0	2.2	2.0	2.1
Ratio of TFP growth rates (Ukraine vs Australia)	n.a.	-0.2	0.9	-0.1	3.7	2.3	1.6

Source: Data downloaded as Excel file from www.ers.usda.gov/data-products/international-agricultural-productivity.aspx

Grain production and trade

Ukraine not only has an impressive 32m ha of arable land comprising more than 12 per cent of Europe's total arable land area, but much of the agricultural land is highly fertile, flat, deep, black, humus-rich soils.

Blessed with about a third of the planet's rich *chernozem* soil, until its recent political turmoil, Ukraine was viewed as one of Europe's potential breadbaskets. Ukraine's independence from Russia in 1991 and the subsequent turmoil led to vast tracts of land lying idle as the country dealt with its difficult political, social and economic adjustments. It is worth noting that much of this idle land was due to curious, centrally-planned Soviet policies, where marginal and unviable land was cropped without any regard for agronomics. So the area cropped was always going to initially retreat back to land where grain could be produced viably using traditional technologies and noting the prevailing market price conditions. However during the past decade, Ukraine has gradually increased its utilisation of prime farmland as economic conditions and new technologies have facilitated additional crop production.

Geographically, Ukraine can be broadly divided into three agricultural zones: Forrest (Polissya), Forrest-Steppe and Steppe (Figure 6). Cropping mainly occurs in the latter two zones. The Forrest-Steppe zone occupies about 30 per cent of the country's area and tends to be the most reliable for cropping. Annual rainfall ranges from 450–550mm in the east, to 550–700mm in the west. The Steppe zone occupies about 40 per cent of the country and, compared with the Forrest-Steppe zone, has lower annual rainfall, with less-reliable snow melt for recharging soil moisture. Annual rainfall decreases southward from about 450mm at the border of the Forrest-Steppe zone to about 300mm at the coastline with the Black Sea.

Adding to Ukraine's edaphic riches, are the benefits of a strategically-valuable location in the region, positioned between Eastern and Western Europe. For more distant markets, Ukraine has a number of year-round, ice-free Black Sea ports, which facilitate the export of grain to the nearby MENA region and beyond that, to Australia's valuable Asian markets.

Adding to Ukraine's edaphic riches, are the benefits of a strategically-valuable location in the region, positioned between Eastern and Western Europe.

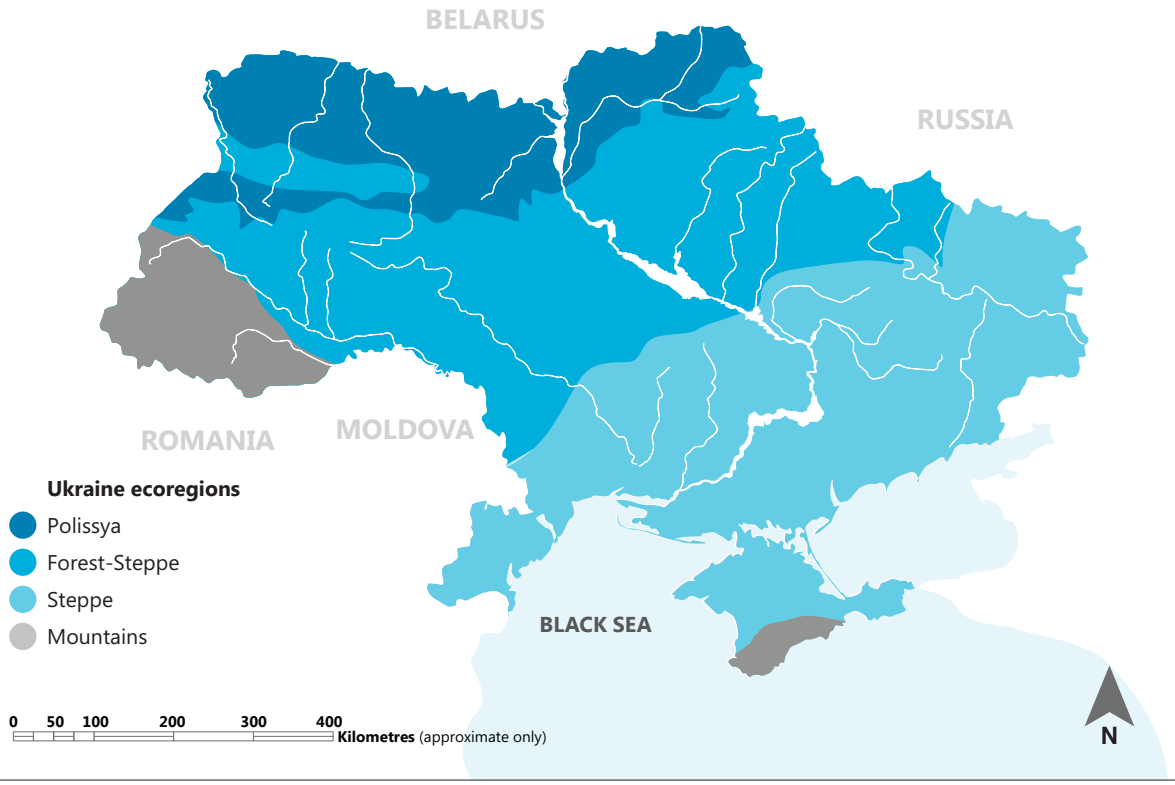

FIGURE 6 The main agricultural zones in Ukraine

Source: Available at http://biomodel.info/wp-content/uploads/2009/11/N-A-ZoningUa.png

A sunflower crop in Mykolaiv in early September, a few weeks before harvest.
Source: AEGIC, 2015

More than 75 per cent of the arable area in Ukraine is used for crop production, with wheat making up the largest area. For the past 15 years (apart from 2003/04), a relatively stable area has been harvested, fluctuating between 5–7m ha annually (Figure 7). During the same period, the areas of sunflowers, maize and soybeans have increased substantially. By contrast, barley and canola areas have both decreased slightly since 2009/10. The period spanning 2000 to 2015 has seen a 65 per cent total increase in the area of land being cropped, as idle land has been brought back into production.

The significant increase in area sown, together with steady increases in yield, has seen substantial increases in the volume of grain and oilseed produced and exported by Ukraine, with corn, sunflowers and soybeans experiencing particularly rapid growth from 2008/09 onwards (Table 6 and Table 7).

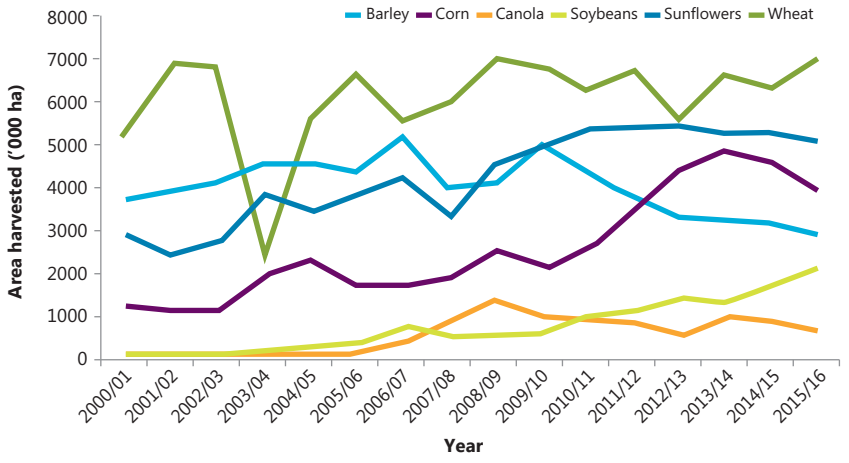

FIGURE 7 The area of major crops harvested in Ukraine since 2000/01
Source: Official USDA Estimates: PSD Online

TABLE 6 Ukraine's main crop production by volume

Crops	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	(mmt)						
Corn	11.5	10.5	11.9	22.8	20.9	30.9	28.4
Wheat	25.8	20.8	16.8	22.3	15.7	22.3	24.7
Barley	12.6	11.8	8.4	9.1	6.9	7.6	9.4
Soybeans	0.8	1.0	1.7	2.3	2.4	2.8	3.9
Sunflowers	7.0	7.6	8.1	9.8	9.0	11.6	10.2
Canola	2.9	1.9	1.5	1.5	1.3	2.4	2.2
Total	60.6	53.6	48.4	67.8	56.2	77.6	78.8

Source: Official USDA Estimates: PSD Online

TABLE 7 Ukraine's major grain exports by volume

Crops	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	(mmt)						
Maize (corn)	5.5	5.0	5.0	15.1	12.8	20.0	19.0
Wheat	13.0	9.3	4.3	5.4	7.2	9.7	11.3
Barley	6.4	6.2	2.8	2.4	2.1	2.5	4.5
Soybeans	0.3	0.3	1.0	1.3	1.3	1.2	2.4
Sunflower oil	2.1	2.6	2.6	3.2	3.2	4.2	3.9
Canola	2.6	1.8	1.4	1.2	1.3	2.2	1.9

Source: Official USDA Estimates: PSD Online

Corn, soybeans, canola (rapeseed) and sunflowers enjoy significantly higher profit margins than wheat, depending on seasonal climatic conditions. These profit incentives have stimulated increased production of these crops, supported by their favourable rates of yield increase and the burgeoning demand for feed grains across the globe.

In addition, Ukraine has shared in the spoils of the EU biofuel market, which has been such a bonanza for Australian canola growers of late. In 2009, the EU published the Renewable Energy Directive (RED), which mandated that by 2020, 20 per cent of all energy used by member states must come from renewable sources instead of fossil fuels. As a result, a huge biofuel industry, dominated by ADM and Cargill, has sprung up to produce biodiesel for this nascent market. While this directive did not proscribe GM oilseeds per se, due to stringent labelling requirements within the EU, GM canola is rarely used outside of Spain and Portugal. The problem however, was the EU produced insufficient quantities of rapeseed to meet the biodiesel demand, necessitating the need to look further afield. Canada, the world's largest exporter of canola, being predominantly GM, was effectively locked out of this market, clearing the way for Australian and Ukrainian exporters to extract sizable premiums in the absence of meaningful competition.

The biodiesel market in the EU, however, has been subject to further policy change. During April 2015 the European Parliament passed a revised arrangement with EU member states that mandated a new seven per cent cap on conventional biofuels (up from five per cent) that would apply to the EU 2020 transport target under the RED. Moreover, this new legislation requires biodiesel producers to demonstrate lower life cycle emissions from the use of imported rapeseed or canola as a feedstock. The need for this reporting of emission savings has been driven by the realisation the RED had inadvertently incentivised the clearing of rainforest to plant feedstock crops such as palm oil. Australian exporters of canola could benefit from this policy change if they can demonstrate the manner of canola production in Australia is a low-emission system.

The area sown to canola and soybeans has increased by 24 per cent and 18 per cent respectively from 2003 to 2013, while the area sown to sunflowers has increased by about four per cent during the same period. Since 2014, with a tightening of credit availability and an escalation of local prices (due to a rapid depreciation of the UAH), some growers have reduced canola plantings in favour of soybeans and sunflowers, despite yield or gross margin advantages, as the higher variable costs of production associated with growing canola can put too much pressure on limited working capital availability. However, this was not a problem shared by the agroholdings, who were either abundantly funded or were sufficiently sophisticated to have USD hedging in place.

While much of Ukraine's grain production growth has come via feed grains, the USDA estimates feed grain prices are not expected to support the continued growth of these crops over coming harvests. The USDA forecasts grain production in Ukraine to remain at current levels for the foreseeable future (Allen, 2015).

When the production figures in Table 6 are translated into a percentage change over the past seven years (Figure 8), there has been huge growth in corn and soy, and moderate growth in sunflowers; the other crops neither increasing nor decreasing in volume over the period.

Given Ukraine's population of 45 million people, its low birth rate, low GDP per capita and high income inequality, there is a significant and stable domestic demand for all grains, with the Ukrainian government keen to ensure domestic food security is maintained, especially in drought years when production is low. The combination of those characteristics of Ukraine and its government's desire for food affordability is that export volumes from Ukraine can be hugely volatile, even when compared against Australia, which is renowned for its production variability. For example, Ukrainian export volumes of wheat have ranged from nearly 13mmt during 2008/09 to just over 4mmt during 2010/11 (Table 7).

Crop production in many grain-growing regions, including Ukraine, is often increasingly influenced by biotechnology. The system for regulating biotechnology in Ukraine is

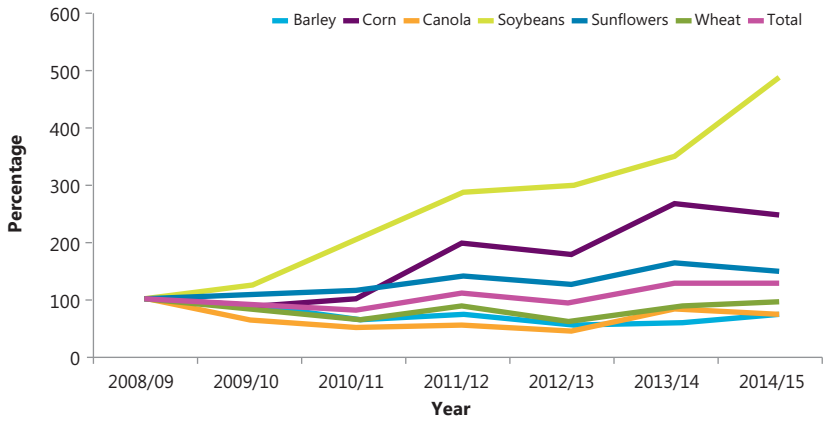

FIGURE 8 Percentage change in production of various crops relative to 2008/09 production levels

Source: Official USDA Estimates: PSD Online

not yet fully developed. The Ukrainian government has signalled its intention to align itself with prevailing EU standards, but both producers and consumers in Ukraine remain sceptical of GM crops, although for different reasons. Industry insiders have speculated that a large share of soybeans and about a third of corn is GM (Sobolev, 2015), despite the fact that Ukraine does not 'officially' export any GM products. GM technology is neither approved for sale nor, for that matter, even officially registered by the government.

According to the USDA (2015):

> *'Although the planting of genetically engineered crops is officially prohibited, private commodity analysts estimate that 70–80 per cent of Ukraine's soybean output is from genetically engineered varieties. Farmers claim they can plant soybeans using 'saved' seed (i.e. seed from the previous year's harvest) for as many as six years with no significant deterioration in yield.'*

There have been examples where Ukrainian grain has tested positive for GM upon arrival at the buyer's port. However this is rarely going to be an issue as most grains and oilseeds exported from Ukraine are delivered to destinations with no GM restrictions. Nonetheless, as we have seen with China during recent years, while GM per se presents no issues, at the very least, the GM event in question must be an approved variant and the cargo must be properly labelled as such. During the next few years, China is forecast to buy around 5mmt of Ukrainian corn annually, so this is clearly an issue both the government and grain producers will need to soon address and resolve.

The challenges of grain production in Ukraine

Corruption and theft

Foreign farm managers who run grain production enterprises in Ukraine often bemoan the challenges of theft and corruption, which is fairly prevalent in parts of Ukrainian society. For example, the internationally-renowned investment bank Morgan Stanley had its Golden Fields farm investment plagued by pervasive theft of both crop inputs and the crop itself and some local officials additionally extracted various payments from the operation. Those familiar with such stories explain them in terms of Ukraine's Soviet past, with workers accustomed to supplementing their meagre incomes with needed 'bonuses' in the form of fuel, pesticides, herbicides, fertiliser, grain and anything else with a tradable value or not securely fastened. Many crop inputs are stored under lock and key or are subject to surveillance and trucks carrying a farm's grain to market must be accompanied by management or security or have hand-over protocols or third-party monitoring to prevent theft of the cargo.

In some cases as much as 30 per cent of a farm's wage cost is spent on security and other means of preventing theft. Typically, security staff reside in distant villages, unrelated to the farm workers, and therefore are more likely to actively prevent theft. In addition, these staff are incentivised to uncover examples of theft via the payment of bonuses. At the sixth annual Large Farm International Conference held in Kiev during September 2015, one of the seven main discussion topics was on-farm security systems, an indication of the importance of addressing the problem of theft and corruption.

According to the Transparency International Corruption Perceptions Index, Ukraine remains one of the most corrupt countries in the world, ranked 142 out of 179 countries. Corruption and theft are seen by many workers and officials as an acceptable means to supplement wages in a post-Soviet economy. Furthermore, the rapid devaluation of the local currency in 2014 has greatly increased living costs in Ukraine, with salaries failing to preserve spending parity, therefore incentivising workers to supplement their incomes through theft or corruption.

Endemic corruption is seen as a key barrier limiting Ukraine's economic progress. However the government and business leaders are aware of the magnitude of the problem and are endeavouring to gradually stamp out these practices. During 2014, the Ukrainian government disbanded the widely derided National Anti-Corruption Committee and replaced it with a new body — the National Anti-Corruption Bureau. Only time will tell how effective the Bureau is at achieving their brief. However, in the meantime, many businesses have adopted various practices to minimise the impact of theft and corruption.

While their true intentions remain frustratingly obscure, the government has been making all the right noises in order to improve Ukraine's reputation for corruption. After decades of corruption being woven into the fabric of its commercial and political culture, wholesale rapid improvement is unlikely. Nonetheless there has been a flurry of activity, including:

- Adopting a new law — 'On Amendments to Some Laws of Ukraine on Access to Public Information in the Form of Open Data' aims to introduce transparency of financial relationships between the government and the private sector.
- Ukraine's accession to the international program (CoST) during November 2013, now requires the construction industry in Ukraine to use fair and open international bidding procedures on major projects.
- The government has been looking at which processes create opportunities for corrupt practices and adjusting them accordingly. For example, there has been a concerted push towards the use of third-party audits and monitoring, along with eCommerce or computerised systems, which make it difficult for government officials to corrupt the process if they have taken bribes

These moves have considerable relevance for Ukrainian wheat exports. For example, the Ministry of Agrarian Policy and Food of Ukraine has removed a range of approval processes involved in the export of grain, thereby lessening opportunities for corruption by officials. The Ministry suggests these changes have reduced supply chain costs by as much as US$8 per tonne, by either precluding opportunities for corruption or by reducing the amount of time-consuming paperwork. Some changes have been indirect, for example, some firms provide third-party inspection and certification services, extending to upcountry facilities, for export buyers.

More broadly, preventing theft and corruption in Ukraine is made difficult by a weak rule of law. In most western countries, foreign investors generally gain comfort knowing that, as long as they operate within a country's legislative framework, they will avoid running afoul of regulators and officials. More importantly, they would typically expect to be able to seek remedy if their own legal rights were not respected. However in Ukraine, the social acceptance of corruption, along with a relatively impotent judiciary, creates a form of sovereign risk, which not only makes the business of grain production and grain trading difficult, but creates a disincentive for much needed foreign investment.

Labour-related issues

As with many third-world countries in Asia, the general view held by foreign farm managers working in Ukraine is that Ukrainian workers generally require close and overarching guidance and supervision. We want to stress this is not a value judgement, but one arising from the historical, political and social context of farm and bureaucratic life in Ukraine. Importantly, outsiders may view the work behaviours of Ukrainian farm workers may using their particular cultural eyes, as being lazy or lacking initiative. More often what is observed is simply ingrained, culturally accepted work habits created under decades of Soviet rule. Indeed, a grower we spoke to in Ukraine indicated that when this value-laden hurdle was negotiated and a staff member was given strong financial incentives to perform; perform they did. For example, traditionally the person driving the harvester was paid by the hour. Under a novel system implemented on the new, modernised farming operations, this person was paid on a per-tonne basis, with bonuses payable when certain tonnages were achieved. The net effect was to transform the efficiency and profitability of harvest with the potential for harvester drivers to be remunerated at a rate multiple times the average annual wage.

Gradually, as the present-day Ukrainian worker puts increasingly more distance between now and their Soviet past, and as the younger generation, never exposed to Soviet rule, enters the workforce, the issues of corruption and theft should lessen and staff will be rewarded for effort and initiative. The Soviet era afforded little opportunity to experience cross-pollination with Western Europe, creating a kind of '*Galapagos Island effect*' where certain practices evolved in relative isolation. Today around 20,000 Ukrainian students go abroad each year to study, and as English training is considered a must for a successful career in Ukraine, many travel to the United Kingdom (UK). The benefits from cross-cultural intermingling generated by travel and work in other countries are likely to be large for Ukraine. Ukrainians will see and learn first-hand the advantages of effective law and order, being multi-skilled, displaying initiative and working with purpose.

In the meantime, implementing modern farming practices via the local Ukrainian workforce will continue to be a challenge for farm managers. Many older workers have grown up in an era with a lack of financial incentives for performance or efficiency gains. Ukraine has the luxury of an already low cost base, despite low labour productivity in some industries, creating a rare win–win opportunity, as better-utilised labour creates the kinds of efficiency gains that allow farm managers to pay staff more without adverse effects to the cost of production. For example, as previously mentioned, some producers have implemented a highly-incentivised earning arrangement with combine harvester operators, which not only creates the potential for a driver to earn significant bonuses, but also delivers spill-over gains in other post-harvest activities. These arrangements, which usually involve earnings being tied to grain volumes harvested, rather than a flat per hour payment, appear so obvious it is surprising they have not been adopted sooner.

A similar challenge lies in the historical arrangements involving farm workers and their employers. With low prevailing wages, it seems intuitive farming operators would simply employ more staff to boost output. However, traditionally the employer also takes on a range of other responsibilities, such as having to provide food for the worker and their family. This means a large workforce creates complexities and hidden costs for the operators. Hence, in spite of the apparent low cost of farm labour, it is usually more worthwhile to extract greater efficiencies out of a smaller labour force. In the longer term, a trend of farm businesses employing fewer workers and boosting labour productivity is likely to emerge.

Fellmann and Nekhay (2012) reported a general lack of qualified farm labour or experienced agricultural managers. It appears the agricultural education and training sector does not provide the necessary opportunities for education, on-the-job training or professional development, which the farm sector acutely needs. For example, Balmann et al (2013) note:

> *"According to AgriSurvey (2012b), 40 per cent of agricultural enterprises urgently need qualified labour in spheres such as agronomy, veterinary and machinery. As a result, 51 per cent of agricultural enterprises are ready to employ 'fresh' university graduates with little work experience and educate them on-site. However, only 10 per cent of the graduates are interested to work in rural areas while 67 per cent prefer to work in cities. These concerns primarily reflect poor living conditions in rural areas.*
>
> *In general, structural misbalances in agricultural employment are persisting. The number of low-qualified labour in rural areas is high because of both low level of education and non-willingness of qualified employees to work in rural areas. At the same time, agricultural enterprises need employees with at least basic knowledge of modern technologies." (p. 23)*

Balmann et al (2013) state that some agroholdings have developed their own educational and qualification improvement programs where students are given training to prepare them for working in an agricultural enterprise. Increasing numbers of universities with agricultural courses have signalled their willingness to strengthen cooperation with the industry.

Transportation network

Ukraine's road network is poorly maintained, with much of it in disrepair. This situation is compounded by load limits on trucks rarely being enforced. The usual allowable weight for a loaded truck in Ukraine is 38t (CFTS, 2014). This is often exceeded by almost 50 per cent (loaded trucks up to 60t). Almost half of all state roads do not meet adequate standards, and more than half of all overpasses in the country are considered unsafe (World Bank, 2015). Ukraine also has one of Europe's poorest track records with regard to injuries and deaths resulting from car crashes. During 2015, the budget allocation for road maintenance and development was UAH2.7 billion, estimated to be less than half than the bare minimum required for maintenance alone. Recently, however, the World Bank approved a US$560 million loan to Ukraine for the upgrading and rehabilitation of its road network. Although this won't be the immediate panacea for all of Ukraine's grain transportation problems, it may form a first step in a more comprehensive overhaul of the country's road network.

While overloaded trucks increase damage to roads, they provide some advantages. Firstly, they increase the distance grain can be economically transported. This increases the flexibility of the grain transportation system and reduces per-tonne costs. Secondly they reduce the total size of required truck fleet. A stricter enforcement of the truck load limits may reduce road damage, but would also likely increase per-tonne transportation costs and lead to a deficiency of trucks, stimulating competition for trucks bolstering prices charged for the road transport of grain. This in turn would push more grain onto rail, which currently only has just enough rail wagons to meet demand.

The rail network is also associated with a range of problems. Wagons laden with cargo occasionally going missing en-route. In addition, the cash-strapped government has leased out wagons to nearby countries, creating regular wagon shortages for domestic users. The government-owned Ukrzaliznytsya is the only rail provider in the country. It owns 86 per cent of the rail wagons, with the remainder being privately owned (CFTS, 2014). Most market participants indicate access to rail wagons is the main bottle-neck for rail transportation for grain. Ukrzaliznytsya officials apparently preferentially allocate wagons to companies with 'supportive connections'.

Currently there are just enough grain wagons to meet peak transport demand from July to December. Increasing grain production and disposing of old wagons will lead to a deficiency after 2015 without considerable investment in new wagons and maintenance of older wagons (CFTS, 2014). Unfortunately the charging structures are not conducive to further private investment in rail wagons. The tariff applied to a private wagon is $3–7/t higher than for government-owned wagons, due to the cost of returning the empty wagons; a charge not applied to government-owned wagons. Limitations to transporting grain by rail will affect wheat to a lesser degree than corn or soybeans, because much of the wheat area is located close enough to the Black Sea ports to make road transport a viable alternative to rail.

Recently...the World Bank approved a US$560 million loan to Ukraine for the upgrading and rehabilitation of its road network.

Grain wagons near the Port of Odesa.
Source: AEGIC, 2015

Financial hurdles

Ukraine's financial system is currently in a parlous state, with a bond default and systemic financial collapse forecast by some experts. The rapid large deterioration of the exchange rate during 2014 (Figure 9) was a sign of severe financial problems, although in the latter half of 2015 the currency stabilised.

During March 2014, the World Bank Group announced it would provide up to US$3.5 billion in loans to Ukraine by the end of 2014, followed by an additional US$2 billion commitment in February 2015, as a means of helping stabilise the country's finances. The currency weakness, nonetheless, is causing problems for grain growers, who need USD access to pay for certain inputs or to repatriate earnings. For smaller operators, obtaining finance is especially difficult. Interest rates for working capital are high — around 30 per cent during 2015. There are government-sponsored mechanisms for obtaining finance at levels below this, but access to this funding is subject to transactions costs and a range of conditions regarding sale of the grain produced.

Foreign and multinational grain producers face the additional problem of how to repatriate earnings. Foreign companies commonly use transfer pricing arrangements to understate local company earnings thereby creating a proxy mechanism for repatriation of profits. This is unlikely to be a course of action the Ukrainian government will tolerate over the long term, so eventually some policy response is expected. The difficulty of repatriating earnings is a further disincentive for foreign investment into Ukraine's agriculture sector.

Another weakness of Ukrainian agriculture is the high interest rate for borrowings. Nominal and real interest rates in Ukraine historically have been exceedingly high, relative to interest rates charged in Australia (Figure 10 — note the different scales). Since 2014 interest rates have again surged in Ukraine, effectively rationing credit and restricting some farmers' use of purchased inputs.

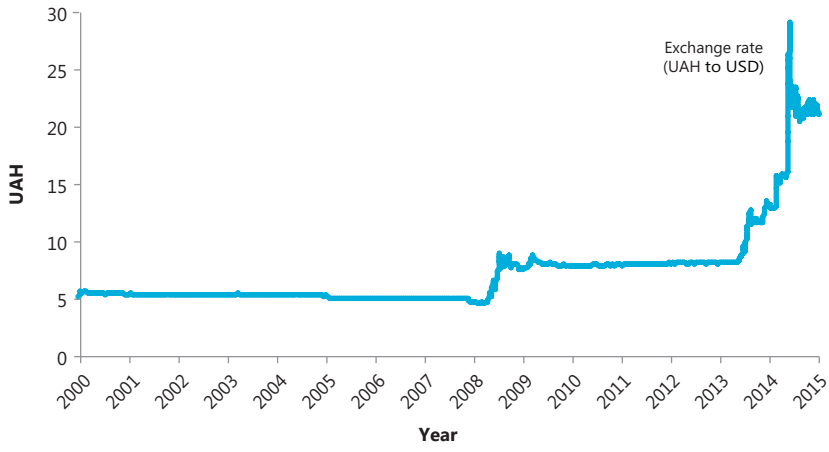

FIGURE 9 The UAH vs USD exchange rate since 2000

Source: Chart based on data from www.quandl.com/data/CURRFX/USDUAH-Currency-Exchange-Rates-USD-vs-UAH

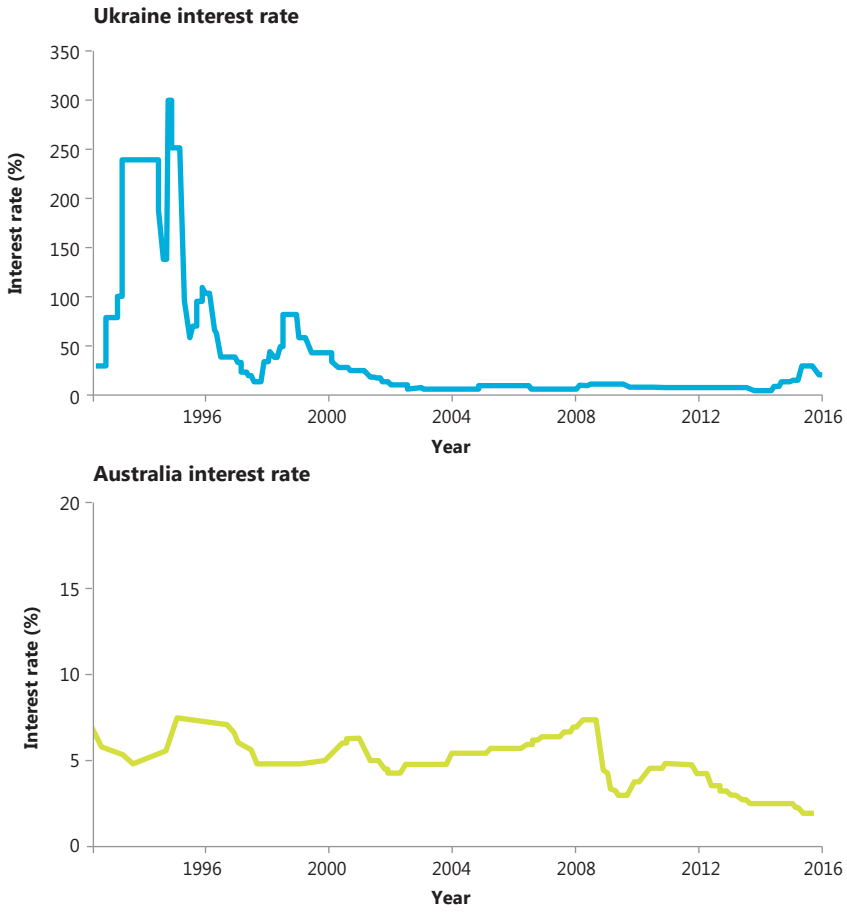

FIGURE 10 Interest rates in Ukraine vs Australia after 1991

Note: Differences in scale used on y-axis

Source: www.tradingeconomics.com, National Bank of Ukraine, Reserve Bank of Australia

Weak rule of law

Another issue tangentially related to the problem of theft and corruption is the general perception by foreign investors that Ukraine is subject to a comparatively weak rule of law. Legislation is drawn up in ways that seemingly encourage corruption by allowing individual 'interpretations' by some officials prepared to be bribed. This system is further corrupted by official approval processes that, in some cases, act as sources of additional revenue for some bureaucrats.

For some foreign operators, this problem can also be compounded by the perception some local officials (unless bribed) will use the law's lack of precision to interpret in favour of smaller, local landholders to the detriment of the foreign-owned business. Such actions further disserve the attraction of foreign capital into Ukrainian agriculture.

Issues of trust, reliability and counterparty risk are central to grain trade globally. For a seller to offer payment terms of '30 days after B/L (bill of landing) date', payment would not be received until the cargo was in the latter part of its ocean voyage. So the seller must have trust in both the buyer's ability to pay and the receival port's compliance with global standards regarding title transfer of goods. Insufficient trust in this process leads to a letter of credit (LOC) being required, which then creates the issue of whether the seller trusts the issuing bank. The issue of trust in commerce is so central, it even extends to the money used to pay for the goods. A US$20 note is really just a promise, as clearly it lacks US$20 worth of intrinsic value (hence the occasional heightened interest in owning precious metals).

Flour mills want to buy wheat as cheaply as possible, however they usually also like buying from those they trust. By illustration; if a mill has been buying Australian wheat from an exporter with whom they have accumulated many years of trust, then if they were offered cheaper Ukrainian wheat, the price discount would need to be large enough for them to consider buying. This discount would be a factor of any quality differences, their lack of familiarity with the milling properties of the Ukrainian wheat, the risk of non-performance and finally, what remedies they might have, such as arbitration with the Grain and Free Trade Association, or in the exporting country via legal means. Given the political and financial turmoil in Ukraine during the past several years, Ukraine's trading partners understandably have some trust issues. This is another case where Ukraine's ability to be a low-cost source of grain is a necessary but not sufficient advantage for it to be competitive. A weak rule of law is an impediment to trade. By contrast a reliable and effective legal system facilitates trade.

Another effect of Ukraine's weak rule of law is it results in a lack of trust in forward grain contracts. To contract grain forward you need confidence your counterparty will honour their commitments by either delivering, or, alternatively, satisfying the terms of any washout clause. However in Ukraine, if the market moves against a seller during the delivery period, depending on the individual seller, they could quite simply elect not to honour the contract. Even if the aggrieved party had confidence in the courts to enforce any contractual obligations, the general perception is you would never find anyone to sell you grain again. Ludwig Striewe (Toepfer International Ukraine) (see Fellmann

and Olexandr, 2012) has pointed out that contract enforcement is difficult and time-consuming, because contracts are commonly regarded as *promises*, but not as obligations. Thus, default risk is high, with between 20–40 per cent of sellers defaulting when commodity prices rise after the contract is agreed upon, leading to losses of more than US$5 million per vessel.

This is another example where Ukraine's weak rule of law disadvantages that nation. As an example, this situation leads to fewer forward contracts (and only with reliable counterparties), which then creates cashflow constraints, as forward contracts are used to secure much needed finance. Domestically, long-dated forward contracts have limited utility as a means of locking in prices, affording domestic mills and feedlots none of benefits seen in countries with both a culture of honouring forward contracts and the means to enforce the terms of those contracts.

Globally, larger flour mills can use a mixture of currency hedging and forward contracts as a means of smoothing out volatility, locking in prices to enable better forward planning and as a means of taking advantage of transiently appealing prices, without having to worry about where to store the wheat bought at harvest, as a 12-month delivery schedule can drip feed cargoes. Flour mills are businesses that use a commodity with a highly variable cost (wheat), yet have a relatively fixed retail price (flour). So any mechanisms for locking in wheat at margin-positive levels are extremely valuable. However, depending on the counterparty, long-dated contracts give limited comfort to mills and exporters buying Ukrainian wheat. If, after the contract is confirmed, wheat shoots up by $100, suppliers may look to sell on the spot market. Unfortunately, this is the very scenario where contracts such as these demonstrate value for mills. It therefore becomes a 'lose–lose' situation. If the price rises, the other party may walk. If the price collapses, the buyer would still be expected to honour the deal.

Risk must always be priced, so the additional risk from Ukraine's weak rule of law and inconsistent behaviour regarding the honouring of contracts, results in lower farm-gate prices for growers. Whether talking about risks associated with a Ukrainian exporter's non-performance of delivery, or whether talking about shipping slots in Australia creating risks for new entrants (thus reducing the attractiveness of Australian wheat as an origin), risk premia are reflected via lower grower prices.

Any lack of counterparty trust also impacts grower cashflow at the opposite end of their production process, with the vast majority of all input suppliers requiring prepayment before delivery. The volatility of the hrvnyia, the high rate of domestic inflation and even higher interest rates mean concepts such as supplying inputs with payments on 30-day terms are virtually unknown in Ukraine.

In a similar vein, insuring expensive assets such as harvesters is often pointless, with local insurers having a reputation for refusing to pay out in the event of loss. The inclination of local insurers to pay out claims on less-valuable items (e.g. motor vehicles) is better. For farm businesses, the combination of exposure to theft and the absence of affordable and trustworthy insurance greatly increases the financial risk of farming in Ukraine.

Political system

During recent years, corruption within the country's ruling class and bureaucracy also impedes increased foreign investment. Even if bribes are not specifically involved, the fortunes of any particular company can be affected by their relationship to those in power. For example, Nibulon had a notoriously antagonistic relationship with the previous Moscow-aligned Yanukovych government, which threatened the survival of the company in Ukraine. During 2011, despite being the single largest exporter of Ukrainian grain at the time, Nibulon was suddenly locked out when the government decided not to grant the company a grain export quota, resulting in Nibulon's announcement they would be suing the government. Unsurprisingly, Nibulon has been one of the chief corporate beneficiaries of Yanukovych's ousting.

The ongoing civil unrest in the eastern and south-eastern oblasts has further accentuated an already risky landscape for foreign investors and grain growers, who are faced with blocked supply lines needed to get inputs in and grain out. At present, a combination of militant road blocks and actual fighting near transportation links is making grain production a relatively unattractive proposition for foreign investors. This is also against the backdrop of the Russian annexation of Crimea, making any establishment of grain-growing enterprises in the east of the country fraught with some fairly severe (albeit low-likelihood) sovereign risks.

Events such as occurred on 11 December, 2015, when the Ukrainian parliament descended into fist-fighting, and thereby gained world-wide media attention, do not send an enticing signal to foreign investors. The fact such events are not rare in the recent history of Ukraine is further concern for investors as it demonstrates the weak political stability and democratic immaturity characterising Ukraine. Such political turmoil introduces political and sovereign risks that can unexpectedly impair any investment in Ukraine.

Land ownership impediments

Ukraine's land ownership restrictions are yet another challenge as medium and large-sized agricultural businesses cannot currently own the land they farm. At present they can only lease the land, although often the length of leases extends beyond six years (Table 8) and the *Land Code of Ukraine* allows rental lengths of up to 50 years, providing at least some security. Nonetheless, there are problems associated with an inability to own the land farmed, such as ensuring enduring soil health.

TABLE 8 The proportion of land leased each year, grouped by the duration of the lease

	Year			
	2001	2005	2010	2015
Duration of land lease	The share of leases each year in each lease duration group			
1–3 years	45.7	26.2	10.0	3.1
4–5 years	41.2	61.4	49.0	35.5
6–10 years	11.3	10.2	30.6	46.4
More than 10 years	1.8	2.2	10.4	15.0
Total	100	100	100	100

Source: AEGIC

Soil is a living entity, requiring stewardship to maintain its utility. Such stewardship is facilitated by long tenure. By illustration; if you have a five-year lease on land to grow grain, with no assurances of the arrangement continuing past that point, you have no strong incentive to maintain the quality of the soil. Maintaining diverse crop rotations or leaving fields fallow would in many situations be financially unattractive where leases only last a few years. Over time, the net effect of short-term leases, without proper regulation, is likely to be additional soil degradation, with agricultural production constrained by that degradation.

Land ownership restrictions do not extend to investments in grain handling, storage, processing and logistics as industrial land does not fall under the same law. As a result, foreign investment in these assets has continued apace during recent years. For example, Cargill owns at least four grain elevators and two sunseed (sunflower) oil crushing plants in Ukraine. In addition, during December 2013, the company bought a '25 per cent + one share' in a grain terminal at the Black Sea port of Novorossiysk, which has the capacity to handle 3.5 million tonnes of grain per year (Fraser and Mousseau, 2014). Other companies, such as Bunge and ADM have similar infrastructure holdings.

Productivity improvements in Ukrainian grain production

Improvements in technical efficiency

Ukraine is becoming more heavily reliant on modern farming systems and technologies, including hybrid seed, cutting-edge herbicides, modern machinery and GM seed. Coupled with recent foreign investments into Ukraine' grain handling and port terminal infrastructure, utilising state-of-the-art farm-based technologies ensures a lift in the technical efficiency of grain production.

The rapid emergence of agroholdings and their adoption of technology spill-ins has fuelled productivity growth in Ukrainian agriculture. Figure 11 shows that agricultural total factor productivity growth has rapidly increased in Ukraine since the mid-1990s. By contrast Australia's agricultural total factor productivity has slowed such that it is now the lowest ranked among the four principal wheat-exporting nations listed in Figure 11.

Grain yields have increased substantially in Ukraine and are likely to increase further as Ukrainian farming draws on improved seed, more inputs, reduced losses from diseases and insects, better planning, improved timeliness of operations, and higher-quality storage and transport infrastructure. Given Ukrainian growers have widely adopted corn, soybeans and sunflower-growing during recent years, this indicates their acute awareness of the relative profitability of various crops and the wisdom of crop sequencing. Furthermore, Ukrainian wheat yields during the past 15 years have increased faster than in Australia, US, Canada and Europe, indicating Ukrainian growers are adopting a range of practice changes.

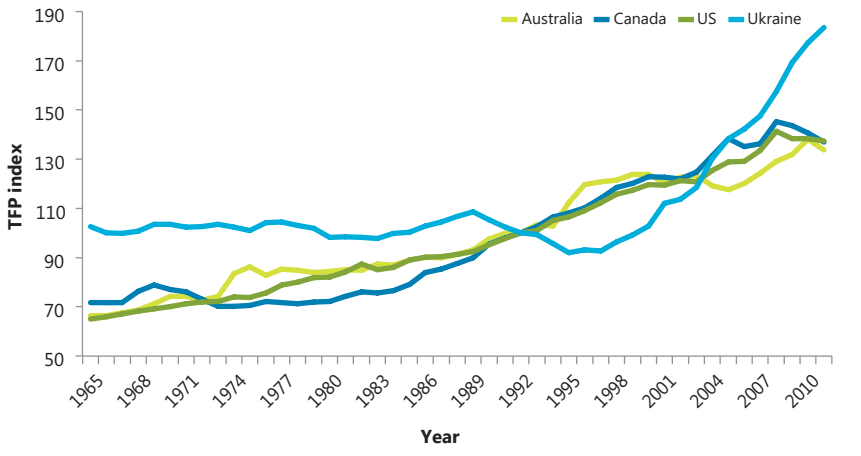

FIGURE 11 Agricultural total factor productivity in major wheat exporting nations (TFP=100 in base year 1992)

Source: Based on Keogh et al (2015)

A useful expedient path for some Ukrainian growers is to learn from the experiences of advanced European, Australian and North American growers. This allows these them to more quickly catch up to their competitors, by avoiding technologies and management actions shown to be inferior, while embracing those found to be effective. In other cases, especially for large foreign-owned agroholdings, rather than gradually accumulating local experience in modern farming practices, it is preferable to import the management know-how directly, by employing experienced European, Australian or North American farm managers.

Many of the modern farming practices required are widely applicable, whether the farm is in Moree or Mykolaiv, making Australian and North American growers an in-demand resource due to their ability to deliver sizable productivity gains. For example, until only recently, 'no-till' farming was unheard of in Ukraine (Collis, 2013), and while it has started to make inroads via foreign farm managers, for much of the country, full cultivation incorporating crop stubble remains standard practice. This is despite full cultivation drying out the soil and in years with limited growing season rainfall, leads to lower yields. This compares with 'no-till', which increases moisture retention, improves soil structure, reduces erosion, lessens fuel use, expedites crop sowing and eventually boosts yields.

Ukraine's ability to further increase yield or productivity (and therefore, ultimately, gross margins) has obvious implications for Australian wheat growers and marketers, as there is the distinct possibility greater production in Ukraine is likely, accentuating the price competitiveness of Ukrainian grain in Australia's major wheat markets. Due to fairly stagnant domestic demand growth against the backdrop of a falling population, it is more than likely that any additional volume of production in Ukraine will be earmarked for export.

However, the shape of crop production is a more relevant statistic, as Australia's prospects in our wheat export markets will largely depend on whether a larger Ukrainian crop consists of feed grains, such as corn, or milling wheat. Ukrainian farmers have already demonstrated their ability and preparedness to switch into corn, soybeans and canola production. How often, and to what degree, Ukrainian farmers switch away from wheat into these other crops has huge implications for wheat growers in Australia and potential purchasers of wheat, in general.

Implications of climate change

Crop production volumes are heavily influenced by climate, and Ukrainian wheat is produced in regions with varying prospects under climate change, so understanding how projected climate change may affect Ukraine and Australia will be a key aspect of any ongoing monitoring of grain production in both countries. The overwhelming scientific consensus is that higher concentrations of carbon dioxide (CO_2) and higher average temperatures are likely in coming decades, with wide-ranging implications for grain-producing countries. Higher temperatures pose a major challenge to grain production in countries such as Australia, where heat stress during grain filling is already an emerging issue.

Drawing on an ensemble of 30 different simulation models, Asseng et al (2015) state:

> *For each ˚C increase in global mean temperature, there is a reduction in global wheat grain production of about 6 per cent, with a 50 per cent probability of between -4.2 and -8.2 per cent loss, based on the multi-model ensemble. Considering present global production of 701mmt of wheat in 2012 (www.fao.org) and impacts of temperature only, and assuming no change in production areas or management, 6 per cent means a possible reduction of 42Mt per ˚C of temperature increase. To put this in perspective the amount is equal to a quarter of global wheat trade, which reached 147Mt in 2013* (USDA Estimates: PSD Online).

If we focus solely on Australia and Ukraine, the evidence from farm surveys and grain production statistics is that during the past decade or so, yield increases in Ukraine have outpaced Australia's, and more importantly, as found by Asseng et al (2015), Australian wheat yields compared with those in Ukraine face a greater threat from higher temperatures. Moreover, as reported by Asseng et al (2015), declines in wheat yields in response to increased temperatures are likely to be larger than previously thought, impacted by even small increases in average temperatures. In Australia, the potential impacts of higher temperatures will necessitate additional investment in adaptive seed breeding, such as germplasm screening for heat tolerance, shorter-growing-season cultivars and soil shading.

In southern Australia, where most grain is grown, climate change is projected to become an enormous challenge for grain growers. Australia has already experienced a 17 per cent decline in winter rainfall and a 15 per cent decline in late autumn rainfall since 1970. Looking at the key sowing period of April and May, the drop in rainfall has been even more pronounced, with the Bureau of Meteorology (BOM) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) finding rainfall has declined by around a quarter. This trend towards lower rainfall is forecast to continue, with both the intensity and frequency of droughts likely to increase. Moreover, although increased CO_2 concentrations can be beneficial for plant growth, and higher temperatures at certain stages of a plant's growth are also beneficial, nonetheless crop simulation modelling that jointly considers the projected changes in rainfall, temperature and CO_2 concentration indicates overall adverse impacts on wheat yields in key grain-growing regions of Australia (Tas Thamo, *pers. comm*.).

Climate projections based on 23 different general circulation models (GCMs) of the Earth's atmosphere and ocean system suggest adverse warming and drying trends in Australia are likely

to continue to 2030 and beyond. These changes are forecast to impact wheat producers globally, albeit at varying degrees, depending on the region (Challinor et al., 2014). It is important to note the effects of climate change are not uniformly negative, with northern parts of Europe and the US, along with parts of western Canada, likely to benefit from warmer temperatures. For example, Walthall et al. (2012) suggest the spring wheat belt in North America is expected to move north by more than 10 degrees into western Canada by 2050. This means winter-sown spring wheat could become a viable proposition in parts of southern US. However, similar to Australia, grain production around the Mediterranean is projected to be adversely affected by higher temperatures and a greater incidence of drought.

Ukraine's climate is classed as continental (Metzger et al., 2005), with Kovats et al. (2014) showing the continental climatic region in Europe (Figure 12) is projected to experience longer growing seasons, a 10 per cent median increase in rainfall, fewer frost events, more warm spells and generally higher temperatures. These changes, combined with higher concentrations of CO_2, are likely to result in higher grain yields, yet with greater season-to-season yield variability (Maracchi et al., 2005).

It would be unrealistic to assume growers, breeders and government will passively accept the challenges of climate change, or to overlay today's technology onto tomorrow's climate change in order to predict its effects. The modelling of climate change's impacts cannot fully anticipate the ways in which the various stakeholders will either ameliorate these effects, or conversely, enhance the advantages bestowed by favourable climate change. As an example, Challinor et al. (2014) found that by relying on already known adaptations, simulated wheat yields could be increased by between seven and 15 per cent by crop-level adaptations in different grain-growing regions. Preventative measures, such as early sowing, early harvesting or the use of longer-growing-season cultivars could help maintain and even boost European wheat yields during the 2030s compared with the 2000s (Donatelli et al., 2012).

FIGURE 12 Sub-regional classification of IPCC Europe region
Source: Based on Metzger *et al.* (2005)

In countries such as Canada and the Ukraine, responses to climate change will largely be focused on exploiting opportunities created by a northerly shift in the viable grain-growing area. Whereas for Australia, the theme will be one of harm minimisation as Australian growers adapt to warmer, drier conditions in southern parts of the country.

Even within areas of Ukraine expected to be impacted by climate change, there is a range of potential scenarios and outcomes. For example, towards the Carpathian region, an increased prevalence of heavy rainfall events could trigger more regular flooding of agricultural land, while the south east of the country is expected to suffer through widespread and potentially commonplace drought events. Within the forest steppes, rainfall is predicted to become more unevenly distributed.

Another factor that often receives limited attention is the impact of climate change on the incidence of pest damage, with balmier climes in Ukraine forecast to create ideal conditions for some grain pests. Responding to the increased threat of insect damage will require a thorough modernisation of grain storage practices and infrastructure throughout Ukraine.

In the case of Australia, already there seems to be early signs of forecast climate change, with drought now being

experienced more often, especially in southern regions, and growers adapting to its effects in ways that lessen its impact. In addition to the direct effects of climate change, soil erosion is creating challenges as a secondary effect. While Ukraine is still the envy of farmers around the world with its fertile soil, according to some sources, the country is losing as much as 500mmt of soil per annum due to erosion. To some extent, the abundance of *chernozem* soil provides Ukraine with a safety net, helping to mitigate the challenges of reduced rainfall and now soil erosion. The humus-rich soil stores yearly rainfall extremely well, providing a moisture bank during periods of reduced rainfall. It is worth remembering the size of this safety net is not unlimited, so sooner or later the country will need to tackle the threat of soil loss.

Varietal improvements

Ukraine has a well-established wheat breeding program managed under the auspices of the Ukrainian Academy of Agrarian Sciences, with about 13 institutes located throughout the country, developing new varieties for all the major crops grown in the country. The Plant Breeding and Genetics Institute (PBGI) based in Odesa has a strong history of developing and releasing improved wheat varieties, particularly for the Forrest-Steppe and Steppe zones. The institute obtains about half of its revenue directly from government and about half from seed sales. Reduced government funding and difficulties in recovering revenue from seed sales has substantially curtailed the activities of the institute during recent years.

Many see the privatisation of the breeding system as the only viable option to ensure the future of crop breeding within Ukraine. However, weak intellectual property law would limit the viability of private breeding companies. It is unlikely plant breeders rights could be enforced and subsequently neither an end-point royalty system, as in Australia, nor a seed-royalties scheme, such as in the France, could be implemented in the near term.

Only varieties certified on the State Register of Plant Varieties can be legally distributed and sold in the Ukraine. Certification involves three years of testing supervised by the State Seed Certification Inspectorate and paid for by the breeding institute or company wishing to release the variety in question. At present, about 20 per cent of all wheat varieties on the register are of foreign origin. The constrained budget of the local breeding institutes is making it increasingly difficult for them to afford the testing costs and remain competitive against foreign seed breeders. Local breeding institutes have increased their focus on yield at the expense of grain quality and functionality in order to compete with the high-yielding foreign varieties.

Newly-released varieties are sold for about twice the cost of the prevailing grain price and require a year or two to bulk up to commercial quantities on farm. Varieties are often kept for about five years in progressively modern farms, and up to 15 years on traditional farms. With the gain in yields attributable to genetics estimated at 5–10 per cent above currently-used varieties at the time of release, this equates to an annual increase through genetics of about 1–2 per cent per annum, which is comparable to wheat breeding achievements in many other wheat-growing regions across the world. However, the adoption rate of new varieties in Ukraine generally is poor, with some growers indicating many of the varieties currently used are 15–20 years old.

The Ukrainian process for releasing new varieties is not as thorough and transparent as occurs in Australia with the Grains Research and Development Corporation (GRDC)-funded national variety trials (NVT). In Ukraine the benefit attributable to a new variety is difficult to ascertain given the nature of the data available on release. The lack of transparency in the testing procedure does not facilitate varietal adoption. Given the lack of transparency regarding the relatively simple to assess attribute of yield, it is unlikely breeding companies could increase adoption of their grain based purely on quality attributes with the promise of price premiums.

Aside from breeding within Ukraine, the other major source of varietal improvement in grains other than wheat has been through importing newer varieties with improved agronomics. During late 2015 Ukraine's parliament adopted a law to bring seed and seedling legislation in line with European and other international standards. According to some industry experts, previous legislation made importing wheat and barley varieties (but not corn or oilseeds varieties) difficult by creating barriers to entry, presumably to protect Ukraine's plant breeding industry. The new legislation will facilitate cereal seed importation, which should accelerate wheat and barley yield advancement in Ukraine.

As an illustration of the advantages of facilitating seed imports, corn and oilseeds production in Ukraine has benefited from not being as subjected to the seed importation impediments as are cereals. There has been a marked increase in the importation of hybrid seed for corn (Figure 13) and sunflowers, along with the rapid adoption of GM soybeans. It has been estimated imported hybrids now account for around 70 per cent of the total area planted to corn in Ukraine. As shown in Figure 13, there is a strong positive relationship between corn yields and use of imported hybrid seed.

A representative of a major US seed company with seed-processing facilities in Ukraine has indicated if weather during the growing season is favourable, the difference in yield between domestic and imported hybrids is not substantial. However, imported hybrids come into their own during challenging years, with higher-than-average temperatures or drought-related stress.

The area planted to soybeans in Ukraine has doubled during the past five

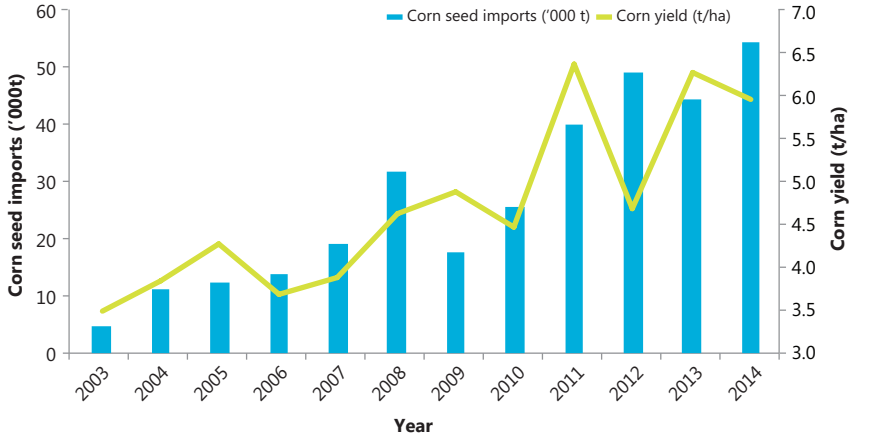

FIGURE 13 Corn seed imports into Ukraine and corn yields in Ukraine: 2003 to 2014
Source: AEGIC, 2015

years and this trend shows no signs of abating while soybeans remain such a profitable crop for Ukrainian growers relative to other spring crops. With strong domestic feed demand from the poultry and livestock sectors, along with robust export demand for both beans and soybean meal, Ukraine's soybean market prices support further acreage expansion.

The make-up of soybeans in Ukraine is interesting. Despite GM soybeans being prohibited in Ukraine, estimates of the GM share of the crop range from 30–80 per cent, with production being based on contraband seed saved years ago when there was a brief moratorium on GM. Growers plant their GM soybeans using seed from the previous year's harvest, and thereby avoid paying technology use fees.

The Ukrainian government is likely to eventually grant GM soybeans official approval, considering the current widespread use of GM soybeans. GM soybeans could become even more widely used, with some analysts estimating this could add US$500 million worth of new production. The basis for this is the fact some GM soybeans are potentially viable on land currently viewed as marginal, thereby effectively increasing the area of arable land in the country. Another source of pressure on the government will be their EU aspirations, as there are explicit requirements for member states to respect international patents and provide IP protection to patent holders. If these changes lead to enhanced soybean production then the supply and demand dynamics in the region will change, which could gradually erode their position as the most profitable crop, as prices ease with greater supply. Eventually, in some areas this could trigger a switch back to wheat, which would have implications for global wheat prices.

Parallel to the potential greater production of GM soybeans are the efforts by certain players in Ukraine to target the European culinary soybean market, which amounts to about 35mmt annually. Naturally there are concerns around GM contamination due to ineffective segregation of GM and non-GM soybeans. Instances already have occurred where GM soybean events have been detected in what were ostensibly non-GM cargoes. Culinary soybeans enjoy none of the *laissez-faire* guidelines of the cooking oil market, so Ukraine's ambitions in this space will largely depend on how they manage segregation.

Given the potential for increasing yields through improved management practices, Ukraine is likely to continue to improve its crop yields and productivity. Some of these potential gains may be partially or wholly offset by any negative effects of climate change. Though, as noted, the effect is somewhat uncertain, as the net climate change effect is not unanimously agreed to be positive or negative.

Again this is justification for maintaining a strategy of monitoring the situation in Ukraine and beyond to other Black Sea producers. Climate change could subtract 5mmt from the south of the country, yet add 5mmt in the north, or it could do neither. There are large timescales involved, with different parts of Ukraine predicted to enjoy (or endure) varying fortunes as the effects of climate change reveal themselves.

Grain pricing in Ukraine

Lacking wheat of differentiated quality or specific functional advantages, Ukrainian growers are beholden to prevailing global prices, their wheat is perceived as lower quality, yet attractive to mills due to its relatively cheap price. Ukrainian wheat is regularly among the cheapest origin in Middle-Eastern tender markets, where its low free-on-board (FOB) price is further advantaged by Ukraine's proximity to MENA buyers. Ukrainian wheat prices usually take their cues from the Russian values that tend to set the world price as large volumes of Russian wheat enter the global markets during late July.

One challenge Ukraine has in common with Australia, and many other wheat producers, is a lack of a usable local futures contract to track local values (basis notwithstanding). The operative word here is 'usable', as Australia has an Australian Stock Exchange (ASX)-managed grain derivatives product with futures and options contracts for west coast and east coast delivery. However, outside of the major grain exchanges, such as the Chicago Board of Trade (CBOT) or Marché à Terme International de France (MATIF), sufficient liquidity tends to be the limiting factor. For example, if a flour mill in Australia, with a bearish view, was holding a

long position of 100,000mt, they would typically be unable to adequately hedge due to a lack of depth. Their only option to reduce their flat price risk would be to take out imperfectly correlated cover such as the Kansas City Board of Trade (KCBT) hard red winter wheat (HRW) for Australian Premium Hard wheat (APH) Australian Standard White (ASW) or a Minneapolis Grain Exchange (MGEX) hard red spring wheat (HRS) contract for Australia Premium Hard wheat (APH), for example. The ASX wheat contract is also skewed towards domestic players and attracts minimal foreign interest, further limiting depth. This protects against major global movements, but not against localised factors.

There have been attempts to introduce a wheat futures market into the region, most notably during 2012 by CME, who operates a number of futures markets around the globe. However, their efforts were in vain as the market was rarely used, due to both a lack of liquidity/depth, similar to ASX wheat contracts, plus there was a lack of trust the party holding the contract at expiry could actually expect delivery to the point nominated, if they so nominated, because if the market had moved against the party obliged to deliver, the chances of them doing so would be remote. Traders in the MENA region we consulted indicated the CME product was cash-settled, unlike US contracts, further impeding interest from traders and speculators.

The pricing and trade of wheat in Ukraine heavily depends on who the seller is, with traditional growers utilising what some might call more 'rudimentary' means than those employed by agroholdings and foreign-owned farming enterprises. Smaller, traditional farmers typically sell 'carriage paid to' (CPT) buyer's nominated point of delivery, which could be a grain elevator or a mill, depending on the buyer. Payment terms are usually the commercial equivalent of grabbing money with the left hand as you hand over the goods with the right, minimising any lag where opportunities for commercial treachery may arise. If a grower has ambitions to remain in business beyond the current season, they will require payment in hard US currency. This not only gives them an 'asset' which has less chance of depreciating, but also gives them the ability to purchase USD-denominated inputs and machinery for the following season. There is also another reason for sticking to hard currency. By law, the government requires at least 75 per cent of any USD payments be converted into UAH — something growers are naturally loathe to do, considering the precipitous drop in the value of the currency during recent years.

Aside from the larger agroholdings, such as UkrLandFarming, most of the other agroholdings and larger farming enterprises sell CPT into the buyer's nominated port or processing facility, or occasionally FOB. In Australia, larger traders almost always prefer to sell 'cost and freight' (CFR) or 'cost, insurance and freight' (CIF) because it gives them an opportunity to profit on the ocean freight component and also allows them to obscure the individual components of the price (i.e. if they sold FOB plus freight and their buyer thought the FOB value or the freight cost was unreasonable, it could lead to further negotiations, even if the landed CFR price was reasonable). Potentially due to UAH-related complications, while the largest players in the Ukrainian market have an interest in offering CFR/CIF terms, most prefer to avoid further dabbling in the ocean freight market.

A major difference between the smaller players and the agroholdings is the level of sophistication applied to their selling programs. In Ukraine, most grain traders are well aware of the various pressure-points facing smaller farmers and so time their buying accordingly. Buyers know which farmers are most exposed to cashflow pressure and at what time of the year, knowing that either cashflow or USD requirements can motivate farmers to sell under the market. By contrast, transactions with agroholdings tend to be more of a meeting of equals, with a more strategic selling program and less forced selling, reducing opportunities for bargain hunting.

There is another major difference in the mind-set of grain growers in Ukraine compared with their Australian counterparts. In environments where the value of the local currency is volatile, confidence in the local currency is weak and inflation is high, then grain is perceived as a safe store of value (as long as it is properly stored and secured). By contrast, in Australia, unless there is a particular view grain prices are going to appreciate substantially, growers and traders are loathe to simply hold unsold grain, associating it with an interest cost. In light of the fact the average non-agroholding, locally-owned farming enterprise is rarely able to access finance, and physical grain during recent years has held its value more than the Hryvnia, then the inclination to sit on any surplus grain is strong, when there is enough USD and UAH to fund the next season's harvest.

One particular point of enormous difference between Ukraine and Australia is that most Ukrainian grain growers, relative to Australian and other grain growers in exporting regions, receive a low share of the world price (i.e. FOB price) (Guadagni and Pachon, 2015). From 2009 to 2012, the average farm gate price for wheat in Ukraine averaged only 68 per cent of the FOB price. By comparison, farmers in the US and Canada received 90 per cent and 79 per cent of their respective FOB prices over the same period, with Australian growers receiving between 80–90 per cent of FOB values (Stretch et al, 2014). However, since the devaluation of the UAH, this situation should shift favourably towards Ukrainian growers. Schmitz and Meyers (2015) outline some of the government policy decisions in Ukraine that have led to Ukrainian growers being relatively disadvantaged.

Government policy is not solely to blame, with transfer pricing by grain traders and higher costs at Ukrainian ports also partly explaining lower farm-gate or CPT prices received by Ukrainian growers. To illustrate, consider the

example described by Ludwig Striewe in Fellmann and Nekhay (2012). A panamax vessel with a grain capacity of 50,000 to 60,000t costs, on average, about US$30,000 per day to maintain. During 2002, the lay-time of ships in Ukrainian ports was about six days, which meant costs of about US$3.60/t. By 2010, the lay-time of ships had decreased to about two days, which translates into costs of US$1.3/t. Over a yearly volume of around 40mmt per year, this decrease in lay-time for ships translates into an annualised benefit to growers of about US$92 million. Hence in the early 2000s, Ukrainian growers were effectively losing approximately US$92 million each year due solely to congestion at ports. If this analysis was repeated using current shipping costs then the cost-savings would be much lower.

Ukrainian wheat — production, consumption and export

Production

During the period covering the collapse of the Soviet Union until now, Ukraine's wheat industry has gone through two distinct phases. From 1989 to 2001, the yield per hectare, area harvested and total production of wheat steadily declined. Since 2001, these trends have reversed, with each metric returning to pre-1991 levels (USDA Estimates: PSD Online). The USDA estimates Ukraine wheat production for 2015/16 at 27.0mmt, the third-highest wheat harvest in Ukraine's history. The harvested area of wheat is forecast to be 7.0m ha and wheat yield is estimated to be 3.9t/ha, 26 per cent above the five-year average. Hard red winter wheat accounts for more than 95% per cent of the country's total wheat output, harvested between the end of June and mid-August. The principal regions for growing wheat are the south, south-eastern and central regions of Ukraine (Figure 14) known as the Forest-Steppe and Steppe zones (Figure 6 page 37).

Figure 15 shows that since 2000/01, average wheat yields in Ukraine have increased by about 85kg/ha annually, which is not only substantially higher than Australia's 19kg/ha, but also higher than the US, the EU and Canada. Average wheat yields in Ukraine nevertheless remain about 66 per cent lower than those in the EU, which suggests continual rapid growth in average yields in Ukraine may still be possible. Based solely on recent trends of wheat area and yield improvement, rough extrapolation gives a potential Ukrainian wheat production

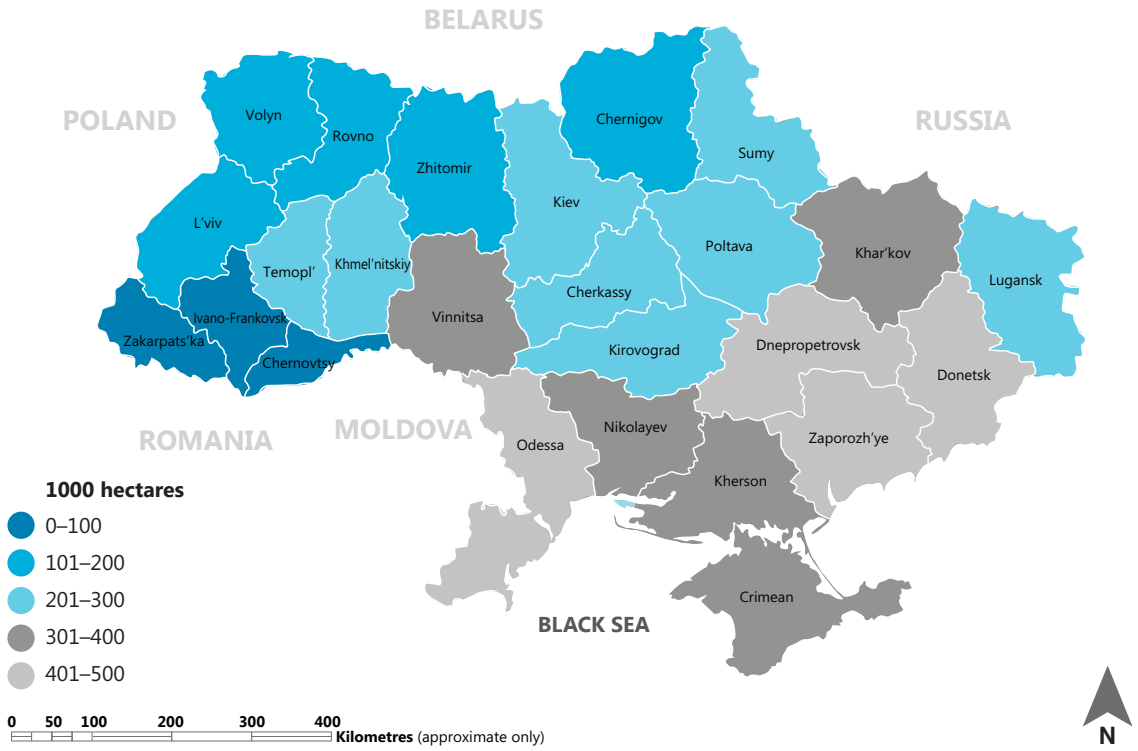

FIGURE 14 Area allocated to wheat production in Ukrainian oblasts from 2008–12

Source: USDA, 2015

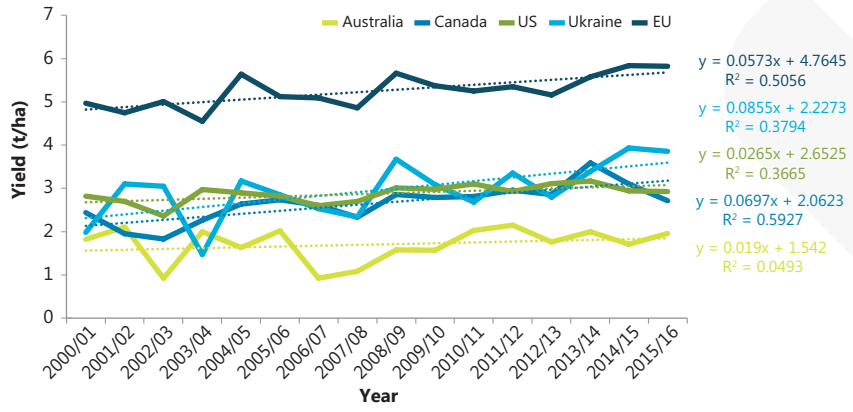

FIGURE 15 Average wheat yields in Ukraine, Australia, Canada, EU and the US
Source: Official USDA Estimates: PSD Online

of more than 30mmt by 2025. Given there is still considerable potential for improvement in agronomic practices in the country, this seems like a reasonably conservative forecast. In particular, the use of high-yielding varieties, greater use of high-quality seed, increased input use (fertilisers and insecticides) and adoption of modern machinery, all point towards continued increases in production.

A continued lift in wheat production through to 2025 is far from predestined. Several factors could limit growth. At present, the biggest risk to increased wheat production is the relative profitability of corn, soybeans and sunflowers, which may gradually push wheat production into the less productive and more variable areas of the Ukrainian steppe. This emerging trend could limit total production of wheat and increase annual yield variability.

Both anecdotal accounts by local growers and government statistics support the notion wheat is gradually being pushed into the more variable Steppe zone (Figure 16), due to its ability to tolerate low or variable rainfall, compared with corn, soybeans and sunflowers. If this trend continues it will see corn, soybeans and sunflowers take up residence on Ukraine's prime agricultural land, where, blessed by abundant rainfall and fertile soils, they will generate significantly higher gross margins than wheat. An added advantage of the switch from wheat to these alternative crops is the value-added activities that will flow (oil-crushing, feed pelletisation, intensive animal farming). Figure 16 shows wheat production growth in oblasts located in the Steppe zone has outpaced production growth in oblasts located in the other zones of Ukraine, reflecting a land allocation switch leading to a small increase in the total area of wheat harvested since 2006 (Figure 17).

This geographic shift of wheat production is also reflected in the variability of wheat yields. The coefficient of variation of de-trended wheat yields from 2000/01 – 2015/16 was 19 per cent for Ukraine compared with 24 per cent for Australia. This compares with a much lower five per cent for both the US and EU, and 11 per cent for Canada. By comparison, the coefficient of variation of de-trended corn yields is only 11 per cent in Ukraine, relatively close to the 8–9 per cent variability of de-trended corn yields in the US and EU. For the 1989/90 – 2000/01 period the coefficient of variation of de-trended wheat yields in Ukraine was only 10 per cent.

A consistent theme permeating almost every aspect of wheat production in Ukraine is one of production variability. Ukraine's climate has a major influence on wheat production. More than 95 per cent of the country's total wheat output is winter wheat, harvested between the end of June and mid-August. Winter wheat growers are often at the mercy of winter kill, which knocks out about 15 per cent of production each year, but can reach more than 60 per cent in particularly difficult seasons. Even if disaster strikes and the bulk of the winter wheat crop is lost, some growers can plant an alternative spring crop during March for harvest during July – August. Additionally, the range of alternative spring crops available to Ukrainian growers significantly reduces risk, as they are not locked into one or two crops with potentially poor supply and demand fundamentals. According to a grower who runs a farming business in Ukraine on behalf of Asian investors:

> *"In 2011 we didn't get enough sowing-season rain and the wheat crops were unable to develop enough before the winter hit. We lost most of our winter grain that season, but when that happens we can sow a spring barley in March, sunflowers in April or sorghum in May. In other words, we still have time to sneak in a rescue crop."* (Collis, 2013).

During recent years, despite Ukraine producing more wheat than Australia, due to its higher domestic demand Ukraine has had less volume to export. Its variable production and larger domestic demand, causes higher variability in annual volumes of exportable wheat. For example, the coefficient of variation for de-trended wheat export volumes from Ukraine from 2000/01 – 2015/16 was 62 per cent, compared with only 26 per cent for Australia, based on USDA export estimates (though there were some policy decisions within this period that artificially reduced the export volumes).

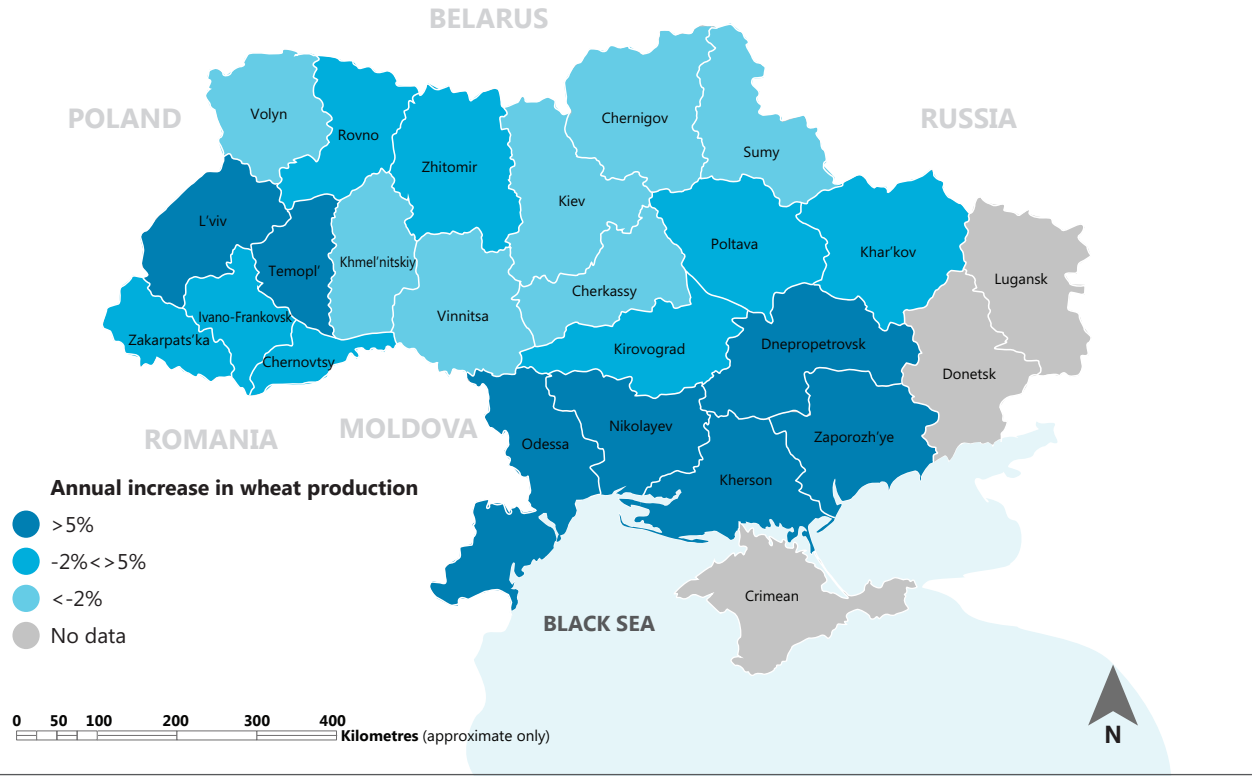

FIGURE 16 Annual increases in wheat production by oblast (2010–15)

Source: AEGIC analysis of UkrStat data

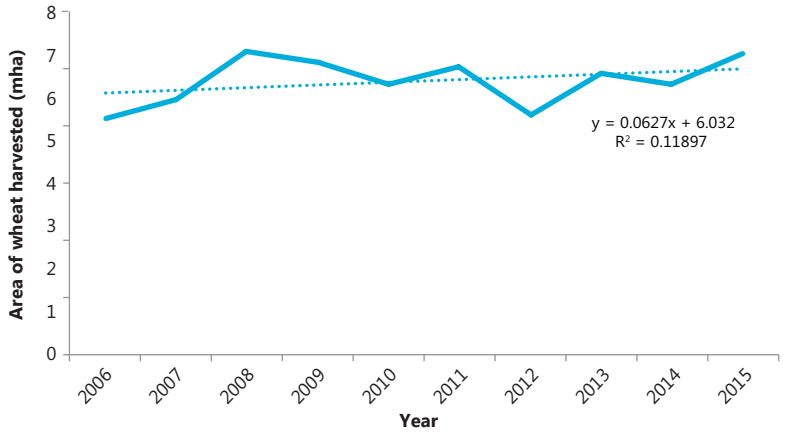

FIGURE 17 Area of wheat harvested in Ukraine

Source: USDA FAS reports

The coefficient of variation of export supplies is a statistic of great consequence to wheat importing countries with precarious food security. For flour mills in these countries, it is economically rational to study the milling performance of Ukrainian wheat so they can take advantage of attractively-priced filler wheat at low inclusion rates, to reduce the cost of their grist. However to make Ukrainian wheat the mainstay of the grist would be exceedingly risky given the variance in Ukrainian export volumes — something mills are well aware of. This is especially important for South East Asian millers as the Ukrainian export volumes available to them are often a remnant after Ukraine's servicing of the nearby MENA region. Servicing their local and nearby markets allows Ukrainian exporters to avoid the additional cost of transporting grain through the Suez Canal and any subsequent freight costs.

Ukrainian wheat production is also influenced by the high price of inputs such as fertiliser and herbicide in local currency terms, to a much greater degree than occurs in Australian production. In any given season, it would be rare for an Australian grower's area planted or grain yield to be constrained by a lack of access to inputs. An Australian grower may adjust the size of their program due to financial considerations or risk appetite, however in the vast majority of cases, if they wanted to crop a certain area to wheat, they usually could do so in local currency terms. Alternatively, it would be unthinkable for an Australian grain grower to be ready to buy inputs, yet unable to do so, due to an inability to source USD to pay for these inputs. In contrast, in Ukraine, outside of the large agroholdings, this is an ongoing issue and not always limited to the smaller, traditional growers. Even some moderately-sized, foreign-owned operations are occasionally constrained by restrictions in the flow of USD in and especially out of the country.

Aside from situations where banks have lost confidence in the viability of an individual grower's operation, it would be nigh on unthinkable for an Australian grower to have no access to finance, or for the currently-available finance to be at unsustainably high interest rates. In Ukraine grain growers commonly face these problems. In response, Ukrainian growers must reduce application rates or area planted; sometimes resorting to non-chemical weed control due to the lack of access to finance. The other option to manage this risk is to plant a lower-input crop, which, in the case of Ukraine will be wheat rather than corn or soybeans. This is an unfortunate competitive disadvantage for Ukrainian grain growers, where they can face a limited choice of crops due to financial access restrictions.

Interest rates paid by growers globally are determined by a complex interplay of factors, such as the wholesale cost of credit, central bank cash rates and currency exchange rates. Another factor is risk. Bank lending to a Ukrainian grower versus bank lending to a grower in Australia, in most cases, will be seen as more risky due to a range of factors:

- A riskier currency — Most people are surprised to learn just how intrinsically linked exchange rates (particularly forward rates) and interest rates are. High interest rates relative to US interest rates often support a currency's exchange rate through the *carry trade*, as was seen most recently with the AUD after the GFC passed.
- Systemic corruption and weak rule of law — Ukraine would be viewed by a foreign bank as an inherently risky place in which to do business. Banks would need stringent rules in place for the approval of loans, with the risk of local staff being bribed to approve risky loans potentially figuring in their assessment. Or, in the event of loan default, they may have concerns as to whether there is sufficient recourse under Ukrainian law or whether officially-prescribed recourse is enforceable.

Modern crop preparation machinery at Kyshchentsi.
Source: AEGIC, 2015

- **Commercial risks** — A grain-growing enterprise in Ukraine is faced with a range of risks not seen in Australia, such as theft of grain and unanticipated export restrictions.

In terms access to credit, the biggest challenge Ukrainian growers face is the country's arcane property laws. If you are one of the modern farming businesses who leases land from small title-holders, you cannot put up the land as collateral, meaning you must give the bank lien over plant and machinery, or the grain itself. A traditional farmer who owns the land they farm on, is no better off as they still cannot put their land up as collateral due to restrictions on title transfer, which limit the bank's ability to repossess the land in the event of loan default. In this sense, liberalisation of these restrictions could feasibly increase access to credit and thus, lead to grain production volume unconstrained by a lack of debt-funded working capital. Change is occurring within the Ukrainian banking sector to recognise the value of long-term leases. Significant portions of IMF loans depend on liberalisation of the land market, so land reform could occur sooner rather than later. However, in December 2015 the Ukrainian president announced the moratorium on land sales would be extended until at least 2017.

Domestic wheat consumption

Domestic wheat consumption in Ukraine is relatively static, accounting for about 11mmt per annum of the country's wheat crop. This typically comprises about 5–6mmt for food use (primarily flour milling), 3–4mmt for feed use and the remaining 1mmt or so is kept as retained seed for subsequent crops.

Flour consumption is stable, albeit decreasing slowly, due to the declining population and a shift in diet towards animal protein. This decline is only partially offset by an increase in per capita GDP and disposable income. Unlike Kazakhstan, Ukraine's domestic flour milling industry is not internationally competitive, so flour exports mostly occur in times of short supply, rather than providing a steady demand source year in year out.

While Ukraine's need for animal feed is gradually increasing, and in particular, compound feed, most of this increase is supplied via increased corn production and is not seen as a bullish driver of wheat production.

With relatively static domestic demand, any increase in Ukraine's wheat production will mostly flow through to export markets.

Exports

Combined with predicted quality improvements as farming systems improve and improved cultivars are adopted, Ukraine's wheat future is focused on the export market, which is of potential concern for Australian wheat growers. This point noted, there is some question as to whether the export volumes will eventuate, with FAO and OECD projecting Ukrainian wheat exports to only increase to 9.7mmt by 2024. During the past handful of years, Ukraine's export of wheat has grown (Table 9), although against a backdrop of volatility. As with wheat production levels, the volatility surrounding Ukraine's wheat exports is attributable to the combination of impacts of: climate variability, government policies affecting grain export and availability of credit, and key inputs.

To illustrate the impact of government policies on grain exports, note that although Ukraine became a member of the World Trade Organisation (WTO) during 2008, in 2008 and again in 2010 and 2011 the Ukrainian government imposed export restrictions on cereals and sunflowers. During 2010 specific export quotas were imposed on wheat, corn, barley, rye and buckwheat. From October 2010 to March 2011 the combined export quota on all these crops was 4.2mmt.

TABLE 9 The world's major wheat exporters by volume

Country of origin	2009	2010	2011	2012	2013	2014(p.)	2015(est.)
	(mmt)						
US	21.9	27.6	32.8	25.8	33.2	22.8	26.2
Canada	19.3	18.4	16.3	17.9	19.8	24.2	20.0
France	16.9	21.1	20.3	16.5	19.6	-	-
Australia	20.7	15.9	19.7	23.5	18.0	17.5	18.0
Russia	16.8	11.8	15.2	16.1	13.8	22.2	22.0
Germany	9.7	8.9	6.1	6.8	8.2	-	-
Ukraine	12.9	4.9	4.1	8.6	7.8	11.5	12.5
Kazakhstan	3.2	5.1	2.9	7.5	5.0	6.0	6.0
Romania	2.3	2.5	1.6	2.3	4.8	-	-
India	0	0	0.5	4.6	4.3	-	-

p. — preliminary, est. — estimated.

Source: Trademap and the USDA FAS

Perhaps more concerning from Australia's perspective is the recent increase in Ukrainian wheat exports to Indonesia (Table 10 and Table 11). Indonesia is Australia's most valuable market in terms of volume and is geographically Australia's closest main grain export market. While Ukraine is yet to become a consistently large supplier of wheat to Indonesia, its recent export reach into this main market is a challenge for Australia's wheat export industry.

Concerning from Australia's perspective is the recent increase in Ukrainian wheat exports to Indonesia.

Grain storage at the newly-built export terminal for Allseeds Black Sea LLC at the port of Yuzhny.
Source: AEGIC, 2015

TABLE 10 Major customers of Ukrainian wheat

Importers	2009	2010	2011	2012	2013	2014*
	(mmt)					
World	12.9	4.9	4.1	8.6	7.8	10.5
Egypt	0.6	0.8	0.4	2.5	2.0	2.8
Syria	0.4	0.1	0.08	0.19	0.6	0.15
South Africa	0.05	0	0	0.22	0.51	0.23
Kenya	0.6	0.35	0.04	0.23	0.46	0.34
Thailand	0.03	0.06	0.06	0.09	0.38	0.44
Bangladesh	2.3	0.42	0.12	0	0.34	0.44
Libya	0.17	0.25	0.13	0.41	0.32	0.30
Israel	0.66	0.49	0.37	0.77	0.3	0.39
Indonesia	0.16	0.008	0.001	0.03	0.27	0.31
Tunisia	0.57	0.49	0.24	0.5	0.26	0.45
Philippines	1.02	0.13	0	0	0.24	0.28
Jordan	0.2	0.16	0.05	0.41	0.23	0.30

* Note: In 2014 Spain (0.69mmt), Pakistan (0.50mmt) and Korea (0.50mmt) became major buyers of Ukrainian wheat.
Source: CFTS 2014 and USDA Estimates: PSD Online

TABLE 11 Wheat exports to Indonesia from Australia, Russia and Ukraine

Exporters	2009	2010	2011	2012	2013	2014
	(mmt)					
Australia	2.65	3.30	3.74	4.59	3.67	4.07
Russia	0.28	0.07	0.005	0.01	0.27	<0.01
Ukraine	0.16	0.008	0.001	0.07	0.27	0.31

Source: ComTrade

Wheat quality and end-product functionality

Recent conversations with buyers indicate the price differential at which they will now switch to Ukrainian grain is at a discount of about US$10–15/t.

Ukraine predominantly produces hard red winter wheat suited to lower-to-medium quality baking applications, such as cheaper Western-style bread or Middle-Eastern flat bread.

This means much of Ukraine's export volume has been, and will continue to be, absorbed by lower-paying, price-conscious markets in the MENA region. This pattern is reflected in various markets across the region. For example, during the past few years Ukraine and Russia have dominated Egyptian General Authority for Supply Commodities (GASC) government tenders, replacing the market share of the US and France.

Grain quality, classification and grading

Ukraine has six main grades of wheat (Table 12). For trading purposes, there are four main grades based on protein levels (dry matter basis) — >14 per cent, 12.5–14 per cent, 11–12.5 per cent and <11 per cent. Individual grain elevators typically have about three different segregations — >12.5 per cent, 11.5–12.5 per cent and feed. Most exported wheat is sold at 13.1 per cent (dry matter basis).

Wheat with less than 11.4 per cent protein is graded as feed, irrespective of any functional traits, and so some wheat classed as 'feed' can actually be suitably used for human consumption. Indeed, much of Ukraine's exported feed wheat is consumed as food, mostly by MENA countries, with the protein levels below 11.4 per cent creating staple foods throughout the MENA region.

While there are six wheat classes based on protein, Ukraine's export wheat is mostly in Class 3 (11.5 per cent protein). Little high protein Class 1 grain is exported as Class 1 as it is generally blended down to Class 3 for export. These standard grades imply a significant upside to increasing wheat quality in Ukraine. This is evidenced in the South East Asian markets via a closing of the price differential at which buyers are willing to pay for Australian grain. Anecdotal evidence suggests in the early 2000s the Ukrainian grain was seen as valuable when the difference to Australian grain reached about US$30 a tonne discount. Recent conversations with buyers indicate the price differential at which they will now switch to Ukrainian grain is at a discount of about US$10–15/t.

There appears to be some uncertainty in Ukraine about who manages the grading system and how the industry would go about changing or improving this system or, perhaps more accurately, to what extent exporters would feel bound to any changes in the system. This is yet another example of where Australia benefits from a range of regulatory or industry bodies, such as Grain Trade Australia (GTA), Wheat quality Australia (WQA) and the like, who have buy-in from all participants. For the Australian grains industry, perhaps a disbelief that Ukraine lacks an equivalent wheat quality assurance body is not dissimilar to the disbelief felt by Canadians, Americans and our major wheat customers when they hear Australia lacks a Canadian International Grains Institute (CIGI) or US Wheat Associates equivalent.

It is possible to readily acquire information about the spatial quality of the wheat harvest in Ukraine each year from independent commercial providers (Figure 18). For example, SGS-Ukraine currently makes available timely information on the quality of the annual harvest of wheat, barley, canola and sunflower seeds for EUR 700–1200 depending on the amount of data required.

The spread of protein content in wheat grown in Ukraine in 2015 (for both domestic consumption and export), based on 526 samples across all wheat-growing regions (apart from the conflict oblasts of Crimea, Donetsk and Lugansk) is shown in Figure 19. The most commonly-reported protein levels

TABLE 12 Ukraine's main grades of wheat

	Grades					
	Food and export A			Food, feed, export B		Mostly domestic C
Parameters	1	2	3	4	5	6
Protein content on a dry matter basis (%, not less than)	14.0	12.5	11.0	12.5	10.5	Not limited
Natural weight (g/L, not less than)	760	740	730	710	690	Not limited
Vitreousness (%, not less than)	50	40	0	0	0	Not limited
Moisture content, (%, not more than)	14	14	14	14	14	14
Grain impurities (%, not more than)	5	8	8	10	12	15
Wet gluten content (%, not less than)	28	23	18	-	-	Not limited
Falling number (seconds, not less than)	220	180	150	150	130	Not limited

Source: Ukrainian wheat technical specifications National Standards of Ukraine 2010 — DSTU 3768:2010

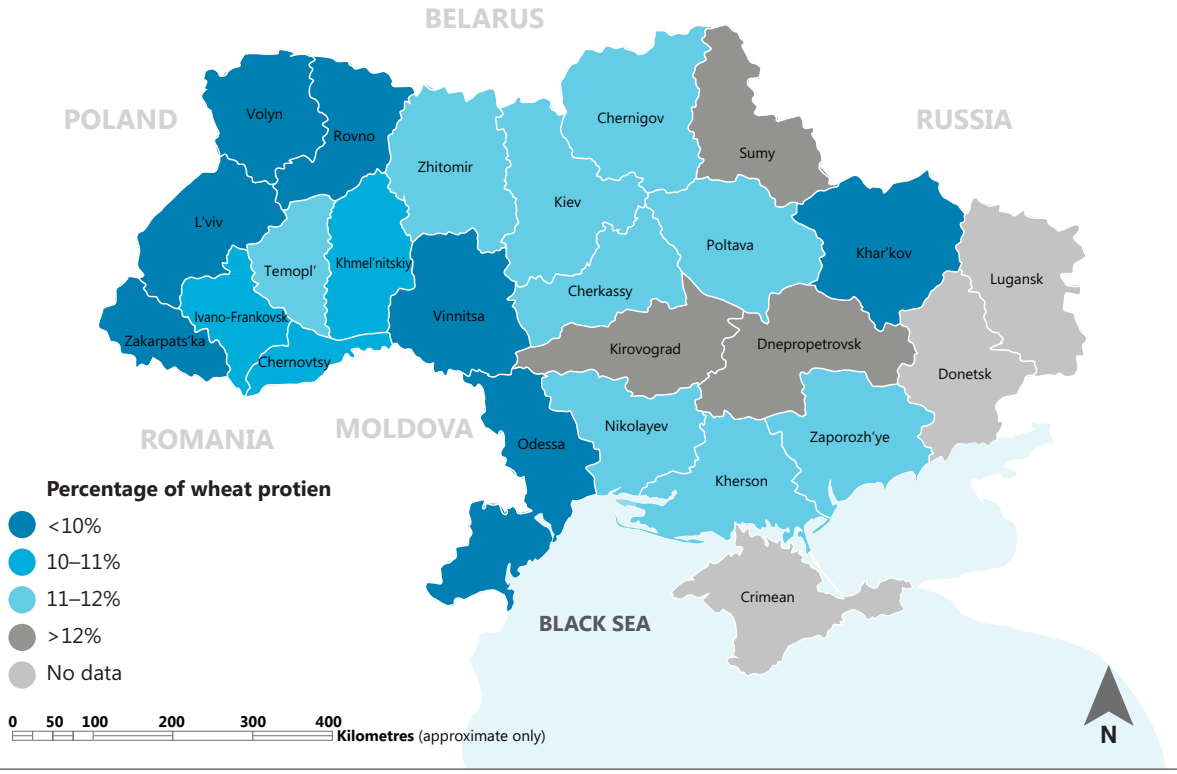

FIGURE 18 Average wheat quality across oblasts for the 2015 harvest in Ukraine

Source: SGS Ukraine, 2015

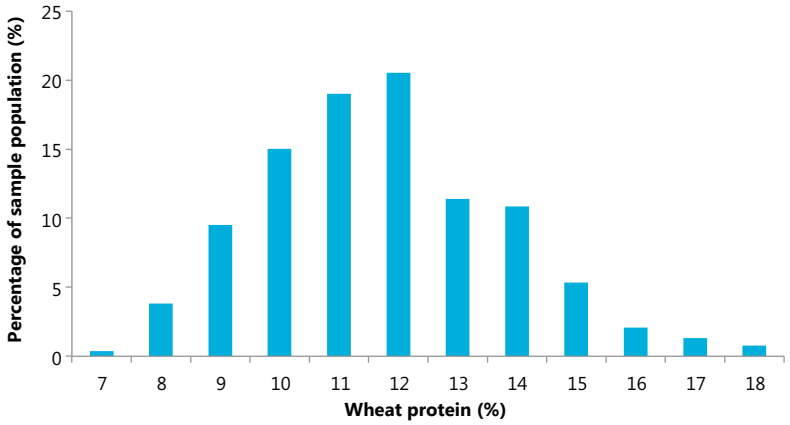

FIGURE 19 Wheat quality of the 2015 harvest in Ukraine (based on 526 samples)

Source: SGS Ukraine, 2015

range from 10–12 per cent, with a skew towards the lower protein levels.

Ukrainian wheat is generally higher in protein than Australian wheat. There is, however, more tolerance for defective grain, along with falling numbers lower than those acceptable by Australian standards. The food and export grades, A1, A2 and A3 roughly translate to the Australian grades of APH, Australian Hard wheat (AH1) and APW1 respectively. This implies some substitutability of these grades into markets currently occupied by Australian wheat. Further testing is required to assess the gluten and protein quality, as initial conversations with mills using Australian grain indicate a considerable gulf between Ukrainian and Australian milling wheat. Processed Australian wheat appears to have much higher viscosity compared with Black Sea wheat, indicating a preference towards Australian wheat in the manufacture of products such as Asian noodles.

It is worth noting in Figure 19 that 20.3 per cent of the 526 Ukrainian samples had protein levels at or above 14 per cent. The range of protein contents of wheat able to be produced in Ukraine indicates some large Ukrainian agroholdings may have an emerging capability to supply specific types of wheat quality requested by some customers. Recent anecdotal reports have appeared suggesting the first signs of non-standard wheat specification contracts being written. Buyers in one of Australia's key markets have indicated Ukrainian suppliers have become much more amenable to contracts with specific quality requirements than Australian suppliers, who usually can only supply standard bulk grades. This kind of tailored service for customers is a key point of differentiation, although it is mostly associated with high-cost suppliers, not low-cost suppliers such as Ukraine.

Considering the current financial constraints imposed by Ukraine's macroeconomic and geopolitical situation, increased government investment in breeding for quality traits is highly unlikely. Only when the country's economic malaise passes will greater government investment in plant breeding be more likely. Yet such investment, especially for wheat, is warranted as it is arguable private breeding companies would have little confidence in their ability to be fully rewarded for growers' use of their privately-bred wheat varieties, whose harvested seed Ukrainian growers can retain for sowing in subsequent years. An Australian-style, self-declaration-based end-point royalty (EPR) system is unlikely to work in Ukraine due to enforcement and trust issues. The most workable model involves crops other than wheat and requires the sale of bulked-up hybrid seed, such as for corn or soybeans, at margins that support further private breeding.

In light of these challenges, only gradual and incremental improvements in wheat quality are likely, so in the short to medium term, Ukrainian wheat is likely to be perceived in export markets as a cheap, vital filler wheat, which will help drive the cost of their grist lower. In markets like those in the MENA region, Ukrainian wheat will increasingly form the back-bone of a country's food security strategy, providing a source of affordable wheat, which can be made into inexpensive staple foods.
In other countries, such as Australia's key South East Asian markets, Ukrainian (and Black Sea in general) wheat will be viewed from several angles. At the national level, certain countries look at their burgeoning population and assess Australia's relatively static wheat production potential, and realise that alternative sources of supply must be cultivated. This is why Australia's competitive strategy must not be based entirely on the notion of a zero-sum game, where increased Ukrainian exports to our traditional markets automatically mean our own exports must decrease by the same amount. Again this is where we wish to introduce nuance into any analysis to drive strategic or tactical change. For example, if one of our markets increasingly relies on Ukrainian wheat to feed their people, due to the inability of Australia's wheat production levels to keep pace with population growth, our market share will naturally decline. This is especially so in markets where Australia has enjoyed long-term market dominance. However this declining market share does not capture the fact our total exports to this country have remained largely unchanged, due to the size of the pie increasing.

Packing containers in Cherkassy with flour for direct export to China.
Source: AEGIC, 2015

The wheat supply chain

Producing a tonne of grain and getting it into a shipping position costs about AU$105 less in Ukraine than in Australia.

Depending on a host of factors, any given country's grain export sector often has a unique complement of transport, storage and port assets. To illustrate, Figure 20 outlines those assets for the wheat export industries in Canada, Australia and Ukraine.

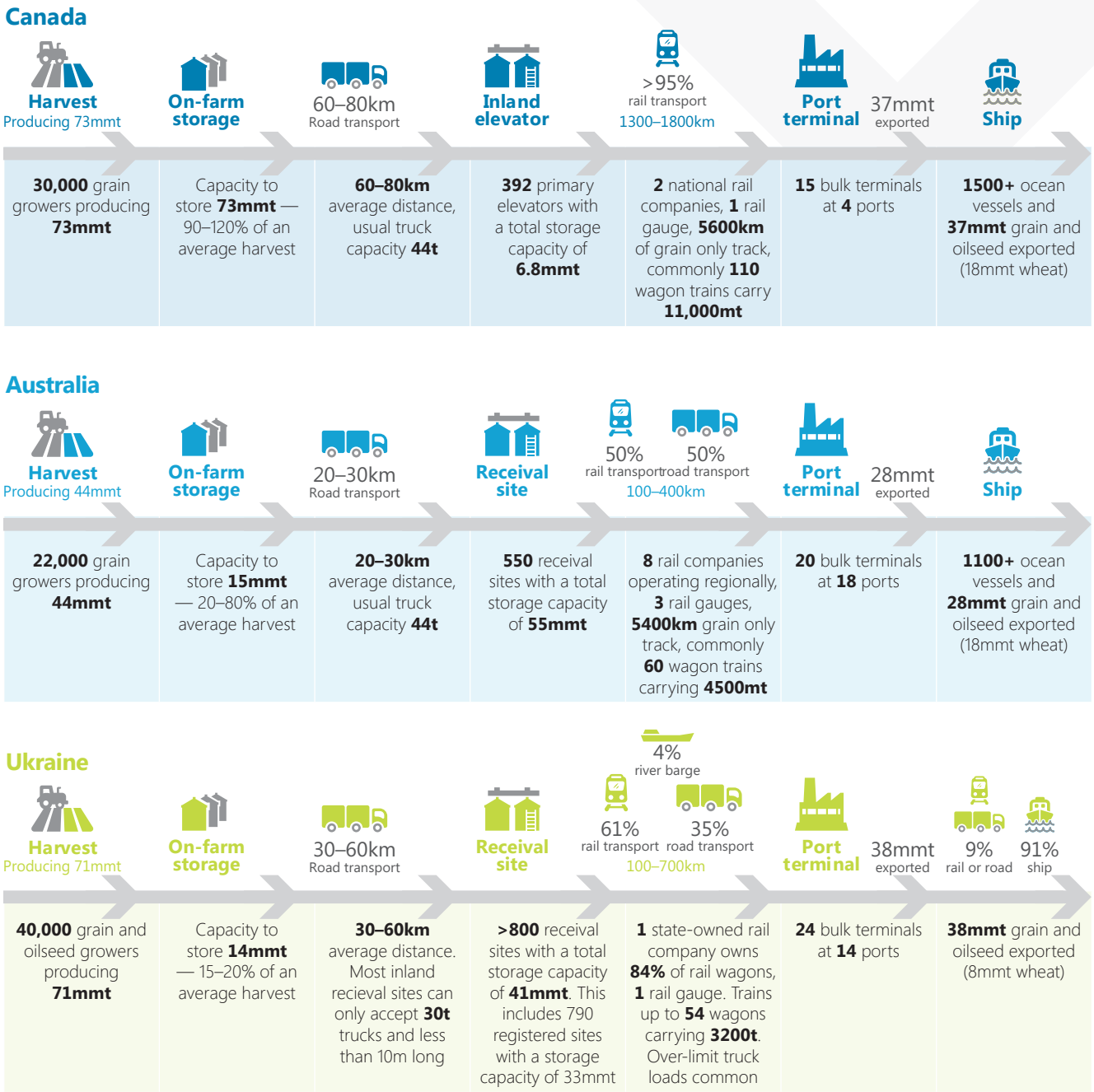

FIGURE 20 Wheat supply chain comparisons

Source: AEGIC, 2015

Often coastline geography has historically determined the location of ports. Soils, climate and proximity of markets determine where grain is produced. Then the length of the transport journey from the regions of grain production to ports influences the most economical mode of transport.

For Ukraine, grain transport is a key component of its total transport task. Currently 36 per cent of the road freight task is bulk transport of grain. During 2014, the state railway had 13,562 grain wagons making up 14 per cent of the total wagon fleet. The average age of these grain wagons is 26 years and 27 per cent of the grain wagons are more than 30 years old. More than 91 per cent of the Ukrainian grain trade goes through its seaports, which in aggregate have a loading capacity of 36mmt. Transporting one tonne of grain 650km in Ukraine costs US$10.60 via river barge, or US$15.30 by truck or US$12.60 by rail.

The 91 per cent of grain flowing to seaports for export travels via the following means: 61 per cent by rail, 36 per cent by truck and three per cent by river barge. Currently grain exports total about 33mmt and this volume is expected to eventually grow towards 100mmt, necessitating massive additional investment in transport, handling and port infrastructure.

When trying to ascertain emerging trends in wheat-producing nations competing with Australian wheat, it is important to get a clear sense of production and supply-chain-related efficiencies and constraints. For example, India, a country that can produce almost 100mmt per annum of wheat, suffers food spoilage losses (caused by poor grain storage and handling infrastructure) estimated at between 20–40 per cent of all food production. Aside from the humanitarian issue of food spoiling in a country where its poorest citizens go hungry, a key question to ask is — "What will happen in Australia's wheat markets when India solves these issues?".

Similarly, in Ukraine, despite its many recent advances, some estimates put wheat crop losses caused by supply chain deficiencies at between 10–20 per cent; although this figure is disputed by at least one industry insider. These losses are mostly attributable to smaller farm operations with no, or expensive, access to modern harvesting machinery and inadequate grain storage. These growers either use inefficient and unreliable old harvesters that cause harvest losses, or they pay for third parties to harvest their crop with modern machinery. These third parties often charge up to 25 per cent of the total crop value to harvest the crop. As a result, many smaller Ukrainian wheat growers continue to use old, less-efficient machinery and sometimes inadequate storage and suffer losses. If these crop losses can be avoided via modernised grain harvesting, storage and handling, then Ukraine's export potential could increase further. Where agroholdings and foreign-owned operations can access capital then usually use of modern farm machinery is fairly commonplace. In addition to losses during harvest, some spoilage of stored grain is possible where grain storage infrastructure is deficient.

The adoption of new farming systems and modern machinery, especially by agroholdings and foreign-owned operations, is creating two tiers of cost structure and productivity in many regions. The newer production systems are generally more profitable, with lower costs per hectare and higher yields. The vertical integration commonplace with newer farms is allowing those businesses to receive a higher proportion of the FOB price for grain, whereas the older systems, typical among small operations, are struggling with high input prices, restricted access to credit, older and less efficient machinery, and low productivity, thereby receiving a lower share of the FOB price for their grain.

All this been said, the cost of moving grain from the farm to the ship in Ukraine is lower than in Australia (Table 13). Combining the production with the supply-chain cost, the difference in producing a tonne of grain and getting it into a shipping position is about AU$105. While this figure varies for various individual supply chains around Australia (and for different oblasts in Ukraine and types of wheat grown), nonetheless the Australian estimate is a weighted average of the cost of each production region around the country and the cost of moving grain to each region's major ports through the relevant bulk export grain supply chain.

Some of the supply chain cost differences can be explained by the geographical, farm size and infrastructure differences between Ukraine and Australia. Ukraine has many small grain farms compared with Australia, the average distance from farm to elevator is shorter (Table 14) and there are more elevators and more aged elevators in Ukraine. By contrast, Australia has many large upcountry off-farm storage facilities such that its ratio of upcountry storage to average production is much higher than is the case for Ukraine.

On-farm costs of wheat production

In Ukraine and Australia there is a broad range of farm cost structures, covering high-cost through to low-cost production systems, so determining a country-wide average cost of wheat production is difficult. Wheat crops grown in different regions, or on different soil types in a single region, require different inputs of varying cost. Rotational sequences, weed burdens, soil fertility and soil moisture levels can all affect a crop's cost of production and seasonal conditions can force or encourage changes in a grower's expenditure. In Ukraine a further complication in forming an estimate of the cost of wheat production is that wheat can be grown as a winter or spring crop, although the vast majority (95 per cent) of wheat production is based on winter wheat (Table 15). An example of the wide spread in possible costs to produce wheat can be gauged

TABLE 13 Export grain supply chain costs in 2015/16

	Ukraine		Australia		Canada (2015 est.)	
	Cost (AUD/t)	% supply chain cost	Cost (AUD/t)	% supply chain cost	Cost (AUD/t)	% supply chain cost
Cartage to bin	4.30	8	7.80	9	11.40	13
Storage	2.90	5	9.00	11	17.70	21
Upcountry handling	7.70	15	18.40	22	16.20	19
Transport to port	13.30	18	26.70	32	49.80	59
Handling at port	22.90	43	13.10	15	10.70	13
Shipping	0.88	2	6.80	8	4.00	5
Levies	4.90	9	2.80	3	3.20	4
Supply chain cost	56.90	30	84.60	29	113.00	37
Production cost (wheat)	133.00	70	206.60	71	191.00	63
Total cost (AUD/t)	189.90		291.20		304.00	

Source: Ukraine — Industry Sources, USDA PSD, Australia — GRDC, Planfarm/Bankwest Benchmarks, ABARES, Canada AEGIC 2015. Based on the AUD:UAH exchange rate as at 23/10/2015

TABLE 14 Comparison of supply chain metrics — Australia and Ukraine

	Ukraine	Australia
Distance from farm to elevator (km)	15	29
Percentage of grain delivered direct to port (%)	35	~30
Elevators (number)	600+	300+
Total upcountry storage (off farms) (mmt)	36	55
Upcountry storage to total production ratio (%)	56	125

Source: AEGIC, 2015

by converting the data on agroholdings' costs, back in Figure 4, page 29, into costs per tonne.

In broad terms, after accounting for the main differences in yields and wheat-growing costs between Australia and Ukraine, it is highly likely the costs of production on a per tonne basis will be markedly less in Ukraine (Table 15). These lower costs of production in Ukraine convey a large comparative cost advantage to its export of grain. Moreover, as superior crop establishment methods (e.g. 'no-till') and better crop agronomy gradually become more common, and as improvements in supply chain infrastructure occur, then a further comparative advantage in Ukrainian grain export will follow. For example, wheat production is likely to be increasingly concentrated in the Steppe zone of Ukraine and this region

Field in Kyshchentsi post-harvest during early September; local farmer Kees Huizinga (blue shirt) discusses fertiliser applications

Source: AEGIC, 2015

TABLE 15 Costs of wheat production in Ukraine and Australia and in two regions of Ukraine

	Southern Ukraine winter wheat (no-till)	Southern Ukraine winter wheat (full tillage)	West Ukraine winter wheat (full tillage)	Ukraine weighted average	Australia weighted average
Yield (t/ha)	3.80	3.33	3.30	3.35	1.82
	(AUD/ha)				
Seed	35	45	35	42	27
Fertiliser	75	175	215	181	90
Chemicals	90	50	130	74	110
Diesel	25	50	70	54	15
Labour	15	25	25	25	11
Variable costs	240	345	475	376	253
Direct salary and tax	10	10	10	10	43
Land	35	35	125	60	80
Total costs (AUD/ha)	285	390	610	446	376
Total costs (AUD/t)	75	117	185	133	207

Source: Ukraine — Industry sources, USDA PSD, Australia — GRDC, Planfarm/Bankwest Benchmarks, ABARES. Based on the AUD:UAH exchange rate as at 23/10/2015

is directly adjacent to southern Black Sea ports. In many situations grain will be transported over relatively short haul distances that favour use of trucks. This ensures the grain supply chain has a relatively low cartage cost, plus it provides flexibility in the delivery of grain to port from upcountry sources, either farm storage or upcountry elevator storage. These advantages and trends represent serious challenges to the competitiveness of Australian wheat exports. Australia's ability to be price-competitive, especially in price-sensitive markets, such as those in the MENA region, risks being seriously eroded.

As noted previously, Ukrainian agriculture can be described as a dualistic farming structure (Balmann et al, 2013) with many smaller farms operating in parallel to far fewer large farms. Often the small farms retain older Russian farming system practices, involving multiple passes over the ground to prepare for sowing and the machinery for crop establishment and harvest is small and aged. By contrast, larger farms tend to rely more on modern machinery and often apply higher levels of inputs, being less cash-constrained. A small group of large farms use modern crop establishment methods, such as no-till technologies, and thereby further reduce their costs of wheat production.

Modern production systems rely heavily on imported inputs, including chemical and fertiliser. Given the rapid depreciation in the exchange rate during 2014 and 2015, these inputs have become more expensive in local currency terms. The larger businesses, who sell grain in USD, can largely offset these costs. Conversely, growers without a high level of vertical integration who are locked into selling grain in UAH will see a significant decline in their terms of trade. Because access to credit for payment of operating expenses is difficult and expensive in Ukraine, and with wheat being one of the lower-input crops, there is a renewed interest in keeping wheat as a key crop in farm rotations, at least in the short term.

Imported modern harvesters are increasingly commonplace in Ukraine
Source: AEGIC, 2015

An old Soviet era tractor pulling a narrow plough on a small farm in Cherkaska Oblast.
Source: AEGIC, 2015

This runs counter to the recently-emerging trend whereby wheat has played a diminished role as the cash crop (Figure 21). With the increase in areas of corn, soybeans, sunflowers and other crops, the contribution of wheat to the total returns from cropping has diminished in all regions, including the south, despite the increased levels of wheat production (Figure 21). This diminished role for wheat is especially the case in the eastern and western regions. This implies that while there is significant growth in cropping, crops other than wheat are often preferred.

Taxation

On 24 December 2015, Ukraine's government passed amendments to the tax code that affect farmers and agricultural exporters. On 1 January, 2016 the President of Ukraine, Petro Poroshenko, approved these taxation amendments. During 2016, farmers can keep some portion of their value-added tax (VAT) in special accounts for their own use, with those portions differing for dairy and meat, grain, and other farmers. By 2017, however, the special VAT system will be completely axed.

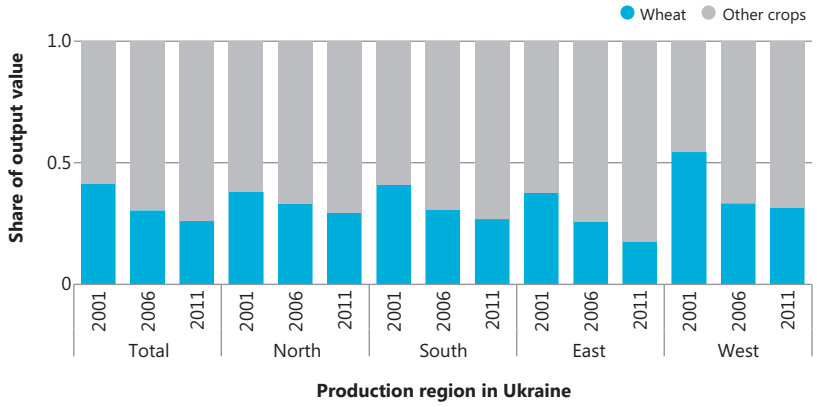

FIGURE 21 Change in the role of wheat in the production system in regions across Ukraine
Source: World Bank: Policy research working Paper 6544, 2013

In 2016 producers of grain and industrial crops will have 15 per cent of their VAT payments held in special accounts (for later use at the discretion of the enterprise) and the other 85 per cent of their VAT payments will go to the Ukrainian government. For livestock and dairy producers the respective shares of VAT distributions are 80 per cent to special accounts and 20 per cent to the government.

Another key change is the reinstatement of VAT refunds on grain exports. This will further encourage the export of grain from Ukraine and support further investment in Ukraine's export supply chains. For example, during February 2016 Cargill announced a US$100 million joint venture with MV Cargo to construct a new export grain port terminal at Yuzhny. The terminal will be capable of exporting 5mmt of grain and will accommodate vessels with a carrying capacity of up to 100,000t.

For a useful description of the VAT system in place before 2016, and other assistance and taxation measures that apply to Ukrainian agriculture, see Samusenko (2015).

Elevators and grain handling

The first link of the supply chain is the cartage service, taking grain from the header to the elevator or to the on-farm storage site. Increasingly, the Ukrainian wheat crop is being delivered by truck directly to the port terminal rather than taking the intermediate step through an upcountry elevator. This shift away from rail as the dominant form of transport is for wheat mostly, as rail is still important for alternative crops more likely to be grown further from port. This section of the report investigates the costs associated with the cartage of grain to the elevator, and the costs associated with the elevation and storage of the grain.

Costs associated with handling, elevation and storing grain in Ukraine are in general less than those in Australia for the same service (Table 16). However, it requires noting, as with

TABLE 16 Estimated Ukraine storage and handling costs

Process	Ukraine		Australia	
	AUD/t	% service cost	AUD/t	% service cost
Handling (receival fee)	0.80	5	10.10	43
Drying	1.20	8	negligible	
Cleaning	1.20	8	negligible	
Storage (five months: including on-farm)	2.90	19	9.00	38
Elevator outturn	1.40	10	1.90	8
Other charges*	4.30	29	7.80	33
Storage	2.90	19	9.00	38
Handling	7.70	52	18.40	78
Total cost (AUD/t)	14.90		23.50	

* Other charges: Ukraine — fumigation, Australia — shrinkage, title transfer

Source: AEGIC, 2015

many parts in the Ukrainian supply chain, that there exists in Ukraine both modern, high-cost, efficient facilities alongside older, less-efficient facilities, each with vastly different cost structures and operational efficiencies. Operating costs of all these facilities are generally lowered by access to cheap labour, less stringent quality assessment and less rigid standards for storage. Operating efficiencies in the newer privately-owned elevators are high with up to 2.5 turns of the storage capacity in a year, whereas the older government-owned facilities are not as efficient, with fewer turns, around 0.6 (CFTS, 2014). There are however additional costs per tonne above the Australian system through disinfection (where required) and higher rates of cleaning. While there are some areas in Australia where drying and seed cleaning are commonplace, in Ukraine the combination of some poor grain storage infrastructure, a wet harvest period and lower harvest efficiency mean these services are required before export, and even before sending grain into domestic markets.

Elevator ownership

Ukraine currently has around 33mmt of registered storage capacity (for a total grain crop as high as 56mmt per annum), of which around 80–85 per cent is privately owned and the remainder government owned. Including uncertified sites and on-farm storage, this capacity is estimated at around 56mmt. However, appearances can be deceptive; much of this capacity was constructed during Soviet times and is aged and less efficient compared with modern storage infrastructure, with greater loss in capacity through division of storage for multiple grain types. This old infrastructure can restrict the volumes Ukraine can bring quickly to the export market, but also impacts the country's ability to reliably target premium end-use segments, which demand world-class storage conditions to preserve grain quality.

Other than the state and farm-owned storage facilities, the third category of grain storage owners is multinational traders who are gaining an increasing foothold in the Ukrainian grain storage market. Particularly strong are Glencore and Toepfer (ADM), with Glencore alone controlling almost 2mmt of storage capacity. Also active are Cargill, Louis Dreyfus and Bunge. Worthy of mention is the dominant Ukrainian agricultural enterprise Nibulon, which controls the Starobelskiy elevator, one of the largest in the country, along with an extensive network of additional storage, which supports their grain production and trading activities.

In terms of integrated Ukrainian agricultural companies, Kernel, Agrotrade, UkrLandfarming and Mriya Group are some of the bigger players in the storage and elevation space (Table 17).

Supply chains without suitable storage options typically force grain growers to sell when everyone else is selling — at harvest, when prices are often lowest. Compounding this is a lack of reasonable finance options, which means even if a grower happened to have on-farm storage, cashflow issues would usually force a sale at harvest anyway.

TABLE 17 Approximate storage capacity of grain traders in Ukraine during 2014

	Capacity (mmt)	% of total storage
Kernel	2.3	7.0
Glencore	1.9	5.8
Nibulon	1.7	5.2
AC Toepfer	0.8	2.4
Bunge	0.6	1.8
Rise	0.6	1.8
Agrotrade	0.5	1.5
Cargill	0.4	1.2
Trigon	0.4	1.2
Louis Dreyfus	0.4	1.2
Other	23.1	70.6
Total storage capacity (mmt)	32.7	

Source: CFTS, 2014

Rail delivery of grain to an oil processing plant at Odesa
Source: AEGIC, 2015

Until problems associated with the lack of short-term (required for crop sowing and harvest) and long-term (required for machinery and storage asset purchases) credit options are addressed, irrespective of how much storage a grower wishes to build, or how many harvesters they wish to buy, credit will remain a main limiting factor. While there is available short-term credit for crop establishing, the terms are often onerous, with interest rates as high as 30 per cent and collateral requirements that are difficult to comply with. The government does offer services that allow for this interest cost to be reduced, but the real interest cost still remains high at about 12–13 per cent.

Naturally, much of this cost is avoided by emerging agroholdings who tend to have plentiful cashflow (with some exceptions) and modern equipment — sporadic and reportedly impending bankruptcies notwithstanding. Not only are these large, vertically-integrated entities able to get their crops off quickly with modern equipment, they can store the grain until market conditions are optimal and can even get their grain direct to market, bypassing third-party storage and handling. Added to this, as many of these entities have their own livestock and flour milling operations, quite often wheat does not even need to leave their own value chain. Being able to combine the production and exporting activities also provides opportunities for the agroholding to minimise their tax burden by loading profit towards the production sector (through manipulation of the transfer pricing), which is less highly taxed than the corporate and other business sectors. This, quite obviously, is a strong advantage.

Where the vertical integration extends to shipping and delivery to market, there is an additional risk for the Ukrainian exporter, added through government policy. The policy dictates that on settlement of the contract in USD with a Ukrainian registered company, the Ukrainian company must on the same day, exchange 75 per cent of the value of the sale to UAH. In this way, exporters are exposed to exchange rate risk, as they cannot exchange currency when they choose to do so. This policy is offset by not having to pay VAT on grain purchased for export, allowing more competitive pricing in grain markets.

Storage use and operation

In each of the major grain-growing oblasts there are about 30–60 elevators, with about 80 per cent of storage available to growers for use on a commercial basis (Figure 22). Farms of economic scale have storage options they own or lease, either as part of the farm, or within the network of local farmers.

Where there are larger storage and handling facilities owned by commercial operators, growers can generally deliver grain to these facilities. The grain will change ownership at this point, usually denominated in UAH. According to Schmitz and Meyers (2015) Ukraine has about 36mmt of upcountry storage of which 15 per cent is state-owned and about 40 per cent of harvested grain is stored in these elevators with the rest stored in farm warehouses.

Where local commercial facilities are unwilling to provide access, those smaller traditional growers may deliver grain to the local farm — which would previously have been the base of the communal farm operated by the local village — and may use a central flat pad to store grain. The grain may be stored in the open, though covered where necessary. This service is provided for a minimal charge if any at all.

Where access to storage is not available or practical, growers deliver grain using the least costly mode of transport — the farm truck — over longer distances than would be required in an integrated bulk handling network. Growers without access to local storage facilities often travel directly to port, though the distances involved in this direct delivery are not high, especially for wheat.

Where medium-sized farmers (<10,000ha) have access to on-farm storage, the cold winters reduce the threat of pests. It is not uncommon for storage to be either open air, or covered, though with high levels of ventilation. During summer high grain temperatures are of some concern, with underfloor ventilation used to cool the grain (often large pipes running under the grain, into which air is pumped). While some silo-type storage is used, it is usually high volume, with individual silos in the 3000–4000t range as opposed to the smaller farm silos in Australia and Canada. There is significant investment in grain dryers, using either gas or bio-solids such as corn straw, as the main fuel source.

Elevators perform a range of services, including drying, cleaning and certification, at what can often be wildly varying prices, depending on the location and whether the elevator operator has a monopoly position in

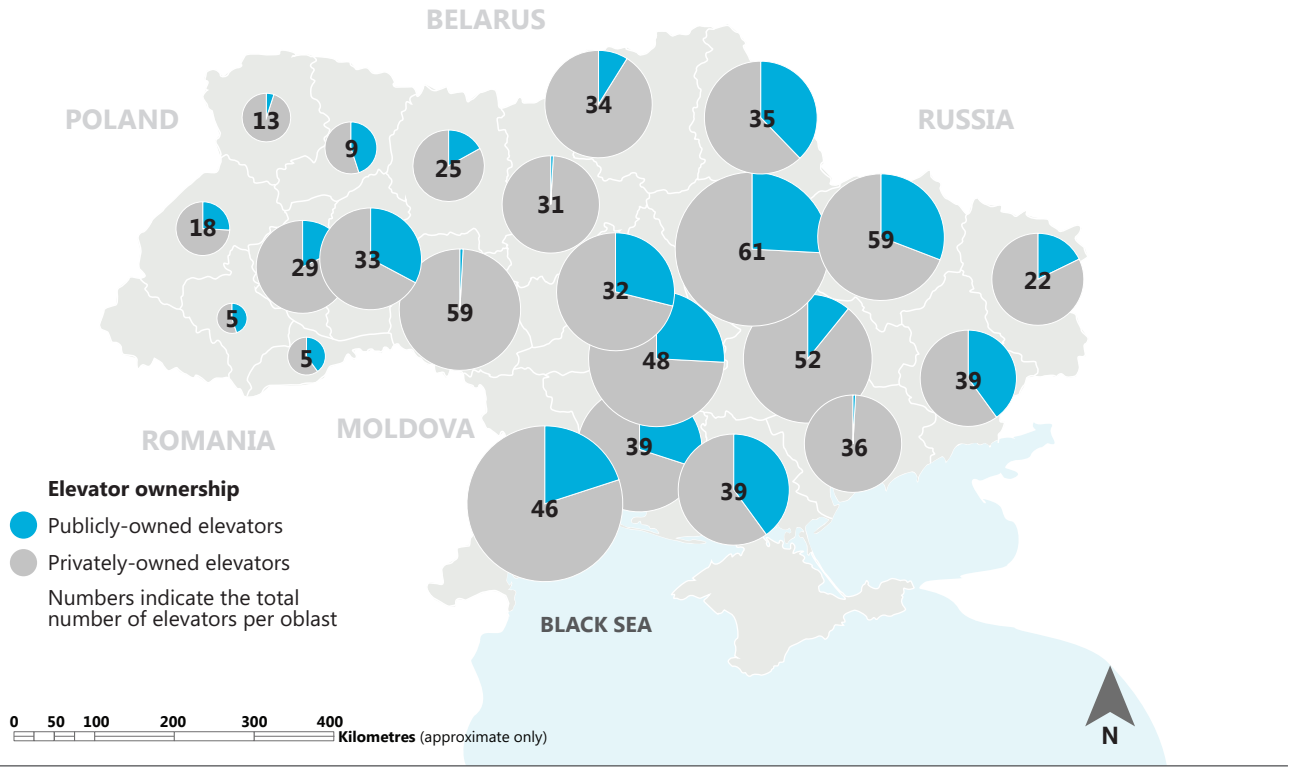

FIGURE 22 Location and breakdown of elevator storage in Ukraine, where numbers indicate the number of elevators per oblast

Note: Bubble size indicates volume

Source: CFTS 2014

Local elevator near Tal'ne.
Source: AEGIC, 2015

their particular geographical catchment area. Typically, the grain deliverer pays all applicable costs, such as receival, storage, testing, drying and outturn, whereupon the buyer pays an ex-elevator price with all costs included in the cost base.

A recent development has been the increasing popularity of harvest bags as a low-cost alternative to long-term fixed storage. Considering the various challenges facing grain growers in Ukraine, caused by a lack of suitable and flexible storage options, this seems like a logical intermediate strategy for these growers. Unlike Australia, Ukraine does not face the challenge of grain storage insect pests nor mice plagues that can affect grain in open storage.

In Ukraine, the use of harvest bags can sometimes reduce storage costs by half, so they are consequently an attractive

Grain stored uncovered in open sheds on farm in central Ukraine without any apparent serious risk of infestation from insects or rodents.
Source: AEGIC, 2015

option for many growers. According to UkrAgroconsult, more than 2.5mmt tonnes of grain are stored in harvest bags each year. However, the popularity of these grain bags is constrained by their inherent lack of security.

Premium milling markets hesitate to buy milling wheat stored in harvest bags. A 2006 Australian survey by the CSIRO found the:

> *"...majority of bags showed evidence of film damage, and punctures and small tears had resulted from a variety of causes, including wandering stock, foxes, rodents and birds, and the placement of bags directly onto stubble and poorly-prepared ground. There was also evidence of mechanical damage caused during grain loading and ineffective closure of the bags ends."*

Evidence of the risk in storing grain in silo bags is not limited to Australia, with Canadian grain growers citing moose and snowmobile damage as a primary reason for use of coloured and decorated bags to increase their visibility in deep snow. In reality, Ukraine is likely to face fewer of these challenges (perhaps replaced by frost and other low-temperature-related damage, depending on the durability of the bag), so it will remain a main market for harvest bags, provided the risk of grain theft can be lessened.

Elevator to port

The elevator to market or port segment of the supply chain in Ukraine has significant potential for improvement, mostly due to the poor quality and poor efficiency of use of much of this infrastructure. Significant investments in transport infrastructure are required to expedite the export of grain. There is increasing interest from the Ukrainian government to induce private investment. Already the government is investigating public/private models for provision of rail services, and negotiating with private companies to reinvigorate river transport.

The bulk of the handling task starts during August, when the wheat crop is the first to be harvested, with peak handling demand during December through to February or so, after which volumes tend to drop away. The timing of the transport task is interrupted by winter, in which one of the possible modes — river transport — loses efficiency as the Dnieper River freezes over. This restricts the flow rates through this mode, however, most grain flows via rail and road transport.

According to UkrAgroconsult, about 60 per cent of all grain delivered to port is transported via rail, but, there is concern about the efficiency of this service with anecdotal evidence suggesting high rates of loss of grain from the system. In Australia about 50 per cent of the grain transported to port is via rail (AEGIC, 2014) whereas in Canada it is about 99 per cent (AEGIC, 2015). The distance of the freight journey is an important component of the supply chain cost (Table 18).

The distance at which truck use becomes cost competitive with rail in Ukraine is about 150–200km (World Bank, 2015). At this distance the cheapest supply chain option is to truck grain directly to port. While current restrictions limit truck gross weights to 24t, these are not widely followed, despite significant penalties for overloading trucks. Increasing the size of allowable trucks to 40t changes the economics of delivering grain to port, and would mean trucking grain becomes the lowest direct cost mode of transport for much of the grain-growing region (see Figure 23). This, however, ignores external costs associated with road construction and maintenance.

Given that most wheat is grown within 250km of the Black Sea ports, the transport cost for this crop is likely to be less than for the other crops, mostly are grown further north. Because most of the wheat crop is transported by trucks this also provides growers with flexibility to chase marketing advantages. This flexibility disappears after grain is deposited into the rail or river systems.

Nearly all the rail, road and river transport infrastructure is owned and operated by either the federal or provincial governments. Given the competition for funding within depleted government budgets the infrastructure networks are in need of considerable repair and upgrade. So while revenue is generated through provision of the railways, this revenue is not necessarily

Grain wagons at Odesa.
Source: AEGIC, 2015

TABLE 18 Total costs of moving grain from farm to port in Ukraine and Australia

	Ukraine			Australia
	Road transport	Rail transport*	Weighted average	Road and rail transport
Modal share for wheat (%)	57	43		100
Average distance (km)	192	443	301	267.8
Cost per net tonne kilometre (ntk) (AUD)	0.05	0.015		0.08
Fixed cost component (AUD/t)	2.43	6.66		4.40
50km	4. 70	7.70		8.50
100km	7.00	8.80		12.70
150km	9.20	9.90		16.80
200km	11.50	10.90		21.00
250km	13.70	12.00		25.20
300km	16.00	13.10		29.30
350km	18.30	14.20		33.50
400km	20.50	15.20		37.70
Total costs (AUD/t)	11.10	16.20	13.29	26.70

* Rail transport routes incorporate loss of efficiency due to less direct routing.

Source: Australia — Industry documents (2015), Ukraine — CFTS (2014), WTO(2015)

FIGURE 23 Grain road transport costs for delivery to southern ports in Ukraine

Source: World Bank 2015

tipped back into the railways for their proper maintenance, leading to a situation where the infrastructure is being mined of its value.

The Ukraine 2020 Strategy has identified the government cannot solely afford the required investment in infrastructure. Hence the Ukrainian grains industry must identify new sources of capital, or ownership models to encourage additional funding. However, state-owned assets such as the railways will not be easily or quickly privatised, so this must be seen as a long-term action.

The state-owned rail company, Ukrzaliznytsia, is a significant employer within Ukraine with more than 300,000 staff. The railway system is comprehensive, though also in need of repair. The government has started to investigate privatising the railway system as a means to recover much needed capital, though the expectation is this is a long and complex process and will not happen quickly.

Given the ownership structure of the rail and roads — and replacement costs associated with rail — government policy favours the use of roads, as the railways are operated on a cost recovery basis — not that the costs recovered are used to maintain the rail system. The road system, while lacking in high-efficiency pathways, is free of official tolls and allows trucks to compete over longer distances than would be possible if there was full cost recovery.

A further incentive to use trucks is that the execution risk of using railways to get grain to port is high. The government-operated railways are inefficient in both cycle times and volumes within cycle times. For example, the cycle time for delivering grain from upcountry Cherkassy to the port of Odesa is 7–8 days.

The standard road truck for grain transport is a single-trailer truck carrying approximately 24t of grain. Admittedly, the trucks are not accurately measured, nor are there strict controls on the weights of loads placed on trucks. These grain trucks are responsible for significant damage to the road system. There is no policy to enable full cost recovery for this damage and so road quality is diminishing. The World Economic forum ranked Ukrainian road quality as being as 139 out of 144 nations in 2015.

The trucks are a combination of purpose-built modern trailers and trailers with open-lidded cargo containers. The heterogeneity within truck types impacts efficiency at the point of grain receival — non-tipping trailers require additional unloading infrastructure, alongside traditional grates for tipping trailers. Many of the elevators are not set up to receive trucks with a capacity to carry more than 30t, or with more than one trailer, due to length restrictions on the weighbridges. It is not uncommon for a port to have a line-up of trucks during the harvest period of about 20km long. The cost to have a truck standing in the line-up is 150UAH per day (~US$7).

There is strong seasonality in grain transport, with most grain being shipped before January following harvest, before the onset of winter (Figure 24). This grain enters the market before the Australian crop (see *Competitor analysis on page 82*).

Even though only about three per cent of the grain transported to port travels via river barge it is widely acknowledged as the least-cost transport option. For example, WBG (2015) cite Nibulon costs for moving grain from Kremenchuk to the port of Mykolaiv via different modes of transport. The road journey is 314km, whereas the river barge journey down the Dnieper river is more convoluted and far longer. Nonetheless the freight costs per tonne were US$16.40, US$10.50 and US$8.90 for road, rail and river freight respectively.

Despite its potential cost advantages, river transport of grain in Ukraine is greatly hampered by a range of physical and regulatory barriers. The Dnieper riverbed has not been well maintained, so there are at least five points on the river too shallow for barges carrying more than 3000t. Moreover, there are six locks and two moveable bridges in poor condition and the bridge-opening fees are between US$1000 to US$2000 per single passage. In addition, foreign vessels need a permit each time they enter a river port and the fees are fixed, being unrelated to vessel size or type.

Regulations require the locks in the upper reaches of the river to be closed

Ukrainian truck holding 40 tonnes of sunflowers in the dolly trailer alone.
Source: Lawrence Richmond, 2015

A queue of trucks awaiting delivery to an oilseed plant near Yuznhe.
Source: AEGIC, 2015

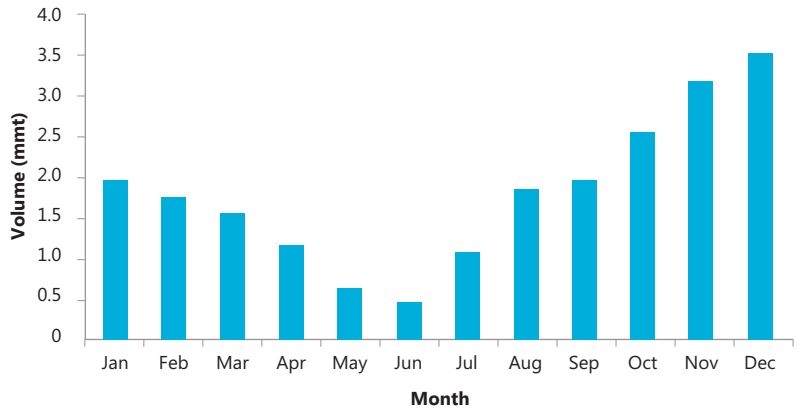

FIGURE 24 Railway grain transport volumes in 2013
Source: World Bank (2014)

from November to March, due to the risk and likelihood of freezing. Similarly the lower parts of the river are closed to navigation from December to near the start of March. Yet the warming trend in climate indicates the river increasingly can, and should, be open for grain transport. In addition, the rush to export grain typically occurs at, and immediately after, harvest (August to October) rather than during late winter, so it remains possible to take advantage of even the current limited access to the river.

Certainly, the large grain firm Nibulon sees a major advantage in using river freight. During 2016 it will increase the size of its fleet of river barges and build an additional shipping berth at its Mykolaiv port. The key current limitations to greater use of the river system are firstly, the need for regulatory reform and secondly, capital investment to improve the navigability of the river.

Port operations and shipping

Ukraine has 13 seaports, including five seaports in annexed Crimea. However, the Crimean ports only usually handle about five per cent of Ukraine's sea freight (Figure 25). The largest seaports are Odesa, Mykolaiv, Illichivsk and Yuzhny; all located in the Odessa region. During 2014 these ports accounted for 70 per cent of Ukraine's total seaport cargo turnover.

There has been a surge of investment in port facilities in both Australia and Ukraine during recent years, with the Ukrainian industry set to increase the export capacity to reach up to 90mmt per year. The large trading houses and agroholdings are driving this investment.

The post-2002 frenzy in port construction has been driven by a range of factors including:

- the ability of private operators to be independent of state-owned or public port facilities, which enables them greater control over the timing of movement of grain from upcountry and onto vessels
- a need to operate modernised terminal infrastructure to enable them to load grain quickly and with better control over quality parameters
- an opportunity to construct export terminals with better connections to either grain-growing regions or rail infrastructure.

Ukraine has no shortage of grain export terminals, with 12 Black Sea ports and two additional ports located on the Sea of Azov. Unlike major Australian grain export terminals, Ukrainian terminals are relatively heterogeneous, with a range of different storage capacities and draft restrictions. Full loading of Panamax vessels is only possible at certain ports. At Mykolaiv, draft restrictions mean Panamax vessels require top-up loading in deep water at the outer harbour. Some ports are restricted to handymax vessels and there are many smaller shallow water ports that can only service smaller coastal vessels, of about 5000t, for servicing Mediterranean and nearby markets.

Ukraine exports grain in a multitude of ways, each with a difference cost structure, of which two are presented in Table 19. While there are several deep-water ports, which can load panamax

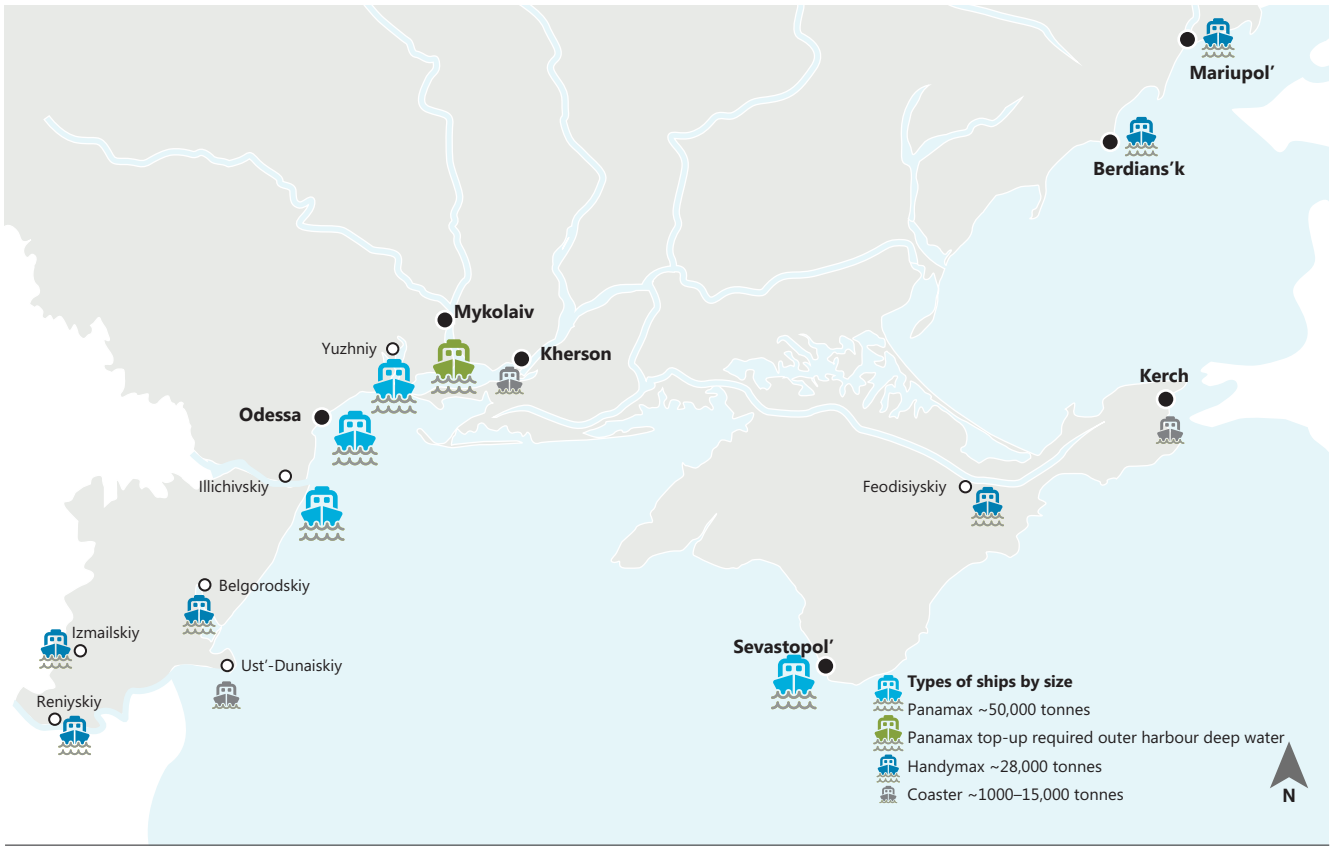

FIGURE 25 Maximum ship size accepted at grain ports in Ukraine
Source: The UK P&I Club

TABLE 19 Costs associated with port activities

	Ukraine			Australia	
	Container (AUD)	Bulk (AUD)	%	Bulk (AUD)	%
Receipt of goods	-	0.99	4	1.50	7
Inspection services	2.25	2.25	10	-	0
Fumigation (additional)	0.70	0.70	3	-	0
Packing	18.80	-	0	-	0
Vessel loading	-	19.00	83	11.60	51
Vessel nomination	-	0.88	4	6.10	27
Other	-	-	0	0.70	3
Handling at port	21.75	22.94	-	13.10	-
Shipping	0.00	0.00	-	6.80	-
Total	26.66	22.94	-	19.90	-

Source: Ukraine — CFTS (2014), APK (2015), Australia: Industry documentation (2015)

vessels, and some that can, in the right conditions, extend to capesize, many of the ports are shallow-water ports, which are used to either part load larger ships, or fill 5000t coaster vessels to service nearby markets. There is some use of containers to facilitate grain trade, though the volume is low (<three per cent of total wheat exports, up to six per cent for canola).

Grain export terminals in Australia are typically large, deep-water ports able to load panamax vessels (although wheat shipments from Australia are often still on handymax-size vessels). Many Ukrainian ports have shallow drafts, part loading ships at the terminal and then loading the remainder in deeper water with barges and floating cranes. This is standard practice for companies like Nibulon. As an example, in Odesa, it is not uncommon to load ships up to the 55,000t mark then put them out to sea to be loaded from a barge, or smaller coaster.

As with the other grain handling assets in Ukraine, there has been an immense period of growth in export capabilities during the period following the collapse of the Soviet Union. According to some estimates, between 1991 and 2014, the volume of grain handled at Ukraine's coastal grain terminals grew from around 6mmt per annum to 33mmt per annum. However, even as recently as 2002 Ukraine only had about 7.5mmt of port export capacity, so a boom in construction of port capacity has occurred since 2002. To give a sense of just how much things have changed since the end of the Soviet era, it is worth noting that before 1991 much of Ukraine's port infrastructure was geared towards *receiving* imported grain, rather than exporting grain.

By far the bulk of Ukraine's wheat exports now go out via Odesa, Nikolayev or Yuzhny, with the remainder being handled by one of the smaller ports. In the case of Odesa and Yuzhny, this is at least partially driven by the ability to load panamax (or even capesize, in the case of Yuzhny) vessels. In comparison, Nikolayev, which is located around 50km up the Dnieper estuary, cannot handle panamax vessels (without two-stage loading). However Nikolayev is located within easy reach of Ukraine's wheat-growing regions.

Another difference between Australia and Ukraine worth noting is that, in addition to the major ports, there are also numerous smaller, shallower ports where agroholdings and other grain trading entities export grain via third-party infrastructure or through their own small terminals. These ports often operate coaster vessels, to deliver into the Mediterranean, at about 5000t per ship.

The opportunities available through these smaller vessels provide strong competitive pressure for the Ukrainian industry. During 2014, 453 individual companies exported grain from Ukraine. While most grain is exported in bulk there are still opportunities for export in containers; and following that, coastal vessels, then larger handysize and panamax vessels. With the more graduated increase in vessel and contract size, entry into the exporting sector in Ukraine — as compared to Australia, where there are containers, then handymax as the next realistic option — affords smaller exporters the incentive to continue to grow, compete and increase the size of the vessel they can charter. This competition also drives the larger companies — of which the top 10 currently export 75 per cent of the wheat — to focus on service provision, as they cannot rely on barriers to entry (ship size) to prevent smaller players competing in the same markets.

Estimates put the current maximum capacity of Ukraine's ports at just less than 40mmt per annum around 6mmt per annum of extra capacity over and above the quantity of grain currently handled each year. Such a snapshot of grain handling capacity does not reveal the misallocations of capacity within the overall grain handling infrastructure.

At this stage the trend appears to be away from the smaller, older port

terminals and towards the newer, more modernised terminals. This trend is in some cases due to restrictions on possible terminal expansions at some ports. In the Odesa port, for example, the volume of grain deliverable to the terminal is restricted by the number of train movements per day, where 16 trains movements a day is the maximum allowable, due to siding size. Given the location of the port within the city, there is little room to expand. Hence investment in terminals away from the city, with deep water is preferable, if possible. Where investment does take place in the mature ports, it will be in technologies such as direct loading from rail to ship, as at GNT Odesa where rail wagons are lifted over the ship and emptied directly into the cargo bay.

In terms of temporal capacity, September to December is typically the busiest period for grain exports from Ukraine (wheat exports are a little earlier). Interestingly, this coincides with the lull in supply of grain out of Australia, as stocks run low heading into the Australian harvest period. If Australian grain traders were wishing to attenuate at least some of Ukraine's competitive position into key markets, clearly this period is vital.

Port access

In Australia, the main export terminals operate under a code of conduct that gives mandated third-party access to their facilities. Ukraine has no such restrictions, so terminal operators can pick and choose who they allow to utilise their services. In practice, as long as you commit to regular throughput, as an exporter you should have little trouble in establishing a relationship with a terminal. Even more so if you can commit to a take or pay arrangement.

In terms of storage at port, Ukrainian export terminals tend to operate a model closer to North American ports rather than Australian ports, with relatively little actual storage capacity at port. The total storage capacity at Ukrainian ports is about 2.7mmt, which is roughly equivalent to the storage CBH, the principal grain handler in Western Australia, owns at its four ports. CBH's Kwinana terminal alone has about 1mmt capacity, with Australian ports tending to rely more on port-based storage than their Ukrainian equivalents.

Ukraine's 2.7mmt includes about 400,000t at Odesa and a similar capacity at Yuzhny. In addition to this, there is another 350,000t of storage at Illichevsk and almost 500,000t spread across multiple ports in Mykolaiv.

In keeping with the *'just in time'* theme, Ukrainian ports tend to only store enough to supply upcoming vessels, with some additional small buffer. Where there are limitations on port storage, they may be partially offset through accumulation sites nearby, which can operate as feeders to the port's loading facilities.

In terms of what drives wheat volumes towards particular ports, unsurprisingly the key driver is cost. Farmers will choose the best price on a farm-gate basis. Most ports have multiple export terminals with more than one buyer at each terminal.

For small farmers (1000ha or less), most have no on-farm storage so sell their grain for cash at the farm to local traders. These traders then have a relationship with a major exporter and trucking company. They then truck the grain to the port and sell to the exporter. This is not dissimilar to *'truckie traders'* in Australia.

Port ownership

Most port capacity in Ukraine today is shared between:

- state-owned ports
- private port operators, such as Avlita, Traninvestservice, Transbulkterminal or Ukrelevatorprom
- multinational grain trading entities, Ukrainian agroholdings and major Ukrainian grain traders.

Ukrainian grain exports to the MENA region are facilitated by Ukrainian Black Sea ports being ice-free and capable of handling vessels of different sizes. Most grain exports flow through the ports of Mykolaiv, Illichivsk, Yuzhny and Odesa. TIS – Grain Fertiliser and Nibulon are major port terminal operators and there are several other smaller companies often owned by multi-national grain companies (e.g. ADM, Bunge, Glencore) or large Ukrainian corporates (Kernel, DF Group, Boryvazh, Brooklyn – Kyiv).

The boom in post-2002 port infrastructure construction has not been limited to private entities, with the state also bolstering the country's export abilities. According to their own figures, the State Food Grain Corporation of Ukraine controls about 12 per cent of Ukraine's overall grain export capacity at its port facilities in Odesa and Mykolaiv. However the Corporation's 2.4mmt of export capacity remains inadequate for meeting Ukraine's various intergovernmental food security commitments including an agreement to provide 4.5mmt of corn to China. Indeed, flush with US$1.5 billion of credit provided by the Import Export Bank of China, the Corporation must ensure it can reliably first acquire and then export to China the grain expected under this financing arrangement.

With additional agreements looming, such as a mooted revitalisation of grain exports to Qatar, the Corporation must either construct additional infrastructure or remain exposed to the whims of private port operators. To this end, an expansion and modernisation project has started at Mykolaiv port, with the government also pledging to expand existing infrastructure at a range of other ports including Berdyansk and Yuzhny. Local experts have pointed out there is often a weak nexus between government decrees and implementation. Considering the current budget constraints facing the Ukrainian government, most additional port expansion will be privately funded. It is therefore fair to say some of the proposed government-funded expansions may not be actualised.

More certain however are the privately-funded projects slated for future commencement or those already underway. Brooklyn-Kyiv, along with

joint-venture partner Louis Dreyfus, is building a massive new grain terminal within the Odesa seaport, which will have as much as 4mmt of capacity and about 240,000t of storage. This new terminal will be state-of-the-art, enabling simultaneous intake of rail wagons and vessel loading, minimising the need for dedicated on-site storage. The continued financing of this project was bolstered by a US$60 million loan from the EBRD, announced during 2014. Interestingly, as part of its media release following this deal, the EBRD believed this project was

> *"...addressing the shortage of modern, deep-water port grain trans-shipment capacity in Ukraine..."*

Perhaps foreshadowing similar deals, the bank also said they are

> *"...paying special attention to the development of port grain terminals, which handle more than 95 per cent of grain exports from Ukraine..."*

They indicated they expected to invest up to EUR1 billion in Ukraine during 2014, with a total of EUR9.2 billion already allocated to 329 projects in Ukraine — many of which were directly or indirectly linked to agriculture.

Another potentially-large project could be UkrLandfarming's proposed terminal at Yuzhny, which could involve as much as 5mmt of throughput capacity. To this end, 68ha near Yuzyny port has been acquired. However the general sense within Ukraine is the group is currently financially stretched, making this project unlikely to go ahead in the short term.

Compared with Australia, Ukraine has little containerised grain trade, accounting for just two per cent of all export volume according to UkrAgroconsult. That said, there is an upward trend in containerised exports — particularly out of Odesa. While the economics of containerised grain versus bulk grain will ensure most of Ukraine's grain will be exported in bulk for the foreseeable future, an increase in container capacity will help the country supply niche markets with specific price and functionality requirements. It is envisaged this will, for the meantime, be limited to Class 2 wheat going to price-discerning Asian buyers with functionality requirements not directly linked to overall grain quality per se.

Duties and regulations

Compared with Australia, Ukraine has a broader set of certification processes for exporting grain (Table 20). Australia has a grains industry research levy, administered by the GRDC, and there are some lesser state levies used for industry good functions, including the Biosecurity and Agricultural Management (BAMA) levy in Western Australia and the South Australian Primary Industry Funding Scheme. Fees in Ukraine are mostly for certification services (customs, phytosanitary, fumigation, quarantine) and they provide information useful when arbitrating any dispute over exported grain. However, fees in Ukraine are also a mechanism to collect revenue from the export industry and often do not simply reflect the cost of providing a particular service. The reputation of the certification services in Ukraine is not overly high, as it is not unusual for exporters to employ third-party suppliers to undertake quality testing in order to better manage the quality of grain being exported, with the tested grain being held to assist arbitration if required.

While the costs of each certification process in Ukraine are explicitly stated, in Australia the costs of the equivalent processes are less transparent, being built into port costs. Grain is tested every 200t by authorised officers who certify both the quality profiles of the grain being loaded onto each ship and phytosanitary requirements. These services, while provided by the federal Department of Agriculture and Water Resources, are funded through a full cost-recovery model.

TABLE 20 Cost of duties and certification when exporting grain

	Ukraine		Australia	
Duties	AUD/t	% of supply chain cost	AUD/t	% of supply chain cost
Quarantine certification	2.70	55.5	0.30	8.5
Phytosanitary certification	1.30	26.5	-	0.0^
Customs documents	0.60	13.3	-	0.0^
Fumigation certification	0.20	4.7	-	0.0
Industry levies*	-	-	2.80	91.5%
Total (duties AUD/t)	4.90	8.2	3.10	3.0

* Principally the GRDC levy

^ In Australia these charges are incorporated into the vessel loading charges

Source: Ukraine — Personal communications with Ukrainian operators, CFTS, 2014. Australia — Industry documents

Organisational support into markets

Ukraine does not have any cross-industry organisations actively promoting Ukrainian wheat in markets. There is also little promotion by traders of how to use Ukrainian wheat and there is no formal reporting of the crop quality or functionality attributes of the Ukrainian crops. This is mostly a function of the fragmented nature of the industry in Ukraine and the reputation its grain already enjoys for being price competitive. However, in some cases, the low prices offered for Ukrainian wheat include a risk margin, as end users are uncertain about the milling or end-use properties of the Ukrainian grain they purchase. This uncertainty leads buyers to often rely on personal relationships with known traders to ensure they receive grain of preferred quality.

As well as the lack of reporting or technical support, there are no quality certification systems available for Ukrainian grain growers, or to offset risk to buyers. While millers report the quality of grain from the region is improving, nonetheless the quality of grain is typically acknowledged to be variable, being highly dependent on their counterparty in the purchase of the grain.

As with many things, witnessing an extreme example of something can often be instructive of what not to do. Ukraine can therefore serve as an example to the Australian grains industry on the value of technical extension and industry-good promotion in key markets for our wheat. Despite widespread murmurings from key customers that the quality of information flowing out of Australia post-deregulation has suffered, in comparison to Ukraine, Australia is still viewed as providing better information on grain quality. Given the greater export reach of Ukrainian wheat, anything Australia can do to improve support to its key markets in South East Asia should be viewed as imperative, especially in markets where a mechanism exists for generating competitive advantage or an appropriate return on investment. This topic is discussed further in the later section on competitor analysis.

Industry maturity

The Ukrainian grains industry simultaneously displays the characteristics of a mature industry and of a new industry. The Ukrainian grains industry was, under the centrally-planned regime, a mature industry with a focus on domestic food security. However, the mature structures that served the country well for many years no longer were best suited to facilitate an industry and economy in transition. By illustration, progressive grain growers have adopted grain technologies, crop sequences, machinery and agronomic practices similar to those successfully practised in the US, Canada and Australia. However, the traditional state-funded agricultural colleges and universities in Ukraine were not universally abreast of these new practices and technologies. So while there is a well-developed, well-attended and mature agricultural education system, the traditional curriculums often being taught are not as relevant or as useful as they could be to support and enhance innovation and growth in agricultural production. Nonetheless, the younger, well-educated farm staff learn about modern production techniques and management practices via farm work in advanced economies in the EU or through work on progressive agroholdings. In addition the agriculture sector is attracting many well-educated, talented and motivated people from other sectors of the Ukrainian economy because it is currently the most profitable and progressive sector and therefore can attract and reward the highest calibre people. These people, while not formally educated in agriculture, bring with them business talent and acumen often hard to attract to the agriculture sector in many other countries. This informal education and talent pool will translate into enhanced productivity and profitability of Ukrainian agriculture.

The change in farming from a structured, centrally-planned agricultural industry to an export-focussed industry has occurred without the development in Ukraine of major organisations with important industry-good functions. For example, Ukraine has no equivalent to CIGI, the US Wheat Associates or Australia's GRDC.

Supply chain monitoring

Ukraine, like Australia, has no formal or frequent monitoring of the cost and performance of its grain supply chain. By contrast as outlined by White et al (2015) Canada, via statute, conducts frequent and detailed monitoring of the cost and performance of its export grain supply chains. By providing transparent information about its grain supply chains, firstly private investment in Canada's grain supply chain is facilitated and secondly the need for action by government is highlighted, thereby helping to deliver cost-efficiencies in the supply chain. The Ukrainian and Australian export grain supply chains are not administered or monitored to provide transparency to investors and industry stakeholders so investment risk is increased. In addition, opportunities for informed and appropriate action by government cannot be easily created.

Ukraine can...serve as an example to the Australian grains industry on the value of technical extension and industry-good promotion in key markets for our wheat.

Competitor analysis

Despite its higher costs of production compared with Ukraine, the geographical proximity of Australia to Indonesia, gives it a freight advantage.

Ukraine, Russia and Kazakhstan produce massive quantities (Table 21) of medium to high protein hard wheat and achieve this at low costs of production, by global standards. Although wheat production in Ukraine can be variable, nonetheless there is an upward trajectory in the volume of production.

A key issue for Australia is whether or not that trajectory will continue. We explored this issue using simulation modelling (see Appendix 1). The modelling confirms other evidence that indicates Australia faces a likely narrow range of growth prospects for its wheat production compared with Ukraine. The causes for this restricted range of outcomes are: there is little prospect of Australia greatly increasing the area sown to wheat during the next decade or so; and yield advancement is also likely to be highly constrained by rainfall limitations, soil quality impediments and the challenges of herbicide-resistant weeds.

By contrast, Ukraine has a more diverse set of wheat-production possibilities; potentially being less affected by soil-quality impediments and area and climate restrictions. Plus higher rates of yield advancement are plausible due to increased use of fertilisers, better crop varieties, improved tillage technologies and little immediate threat of herbicide-resistant weeds. The wide spread of production possibilities, evident for Ukraine, is further rationale for Australia needing to monitor developments in Ukraine and surrounding Black Sea grain-growing neighbours.

Much of any additional volume of Black Sea wheat production is likely to make its way into the price-sensitive MENA markets, such as Egypt and Syria (see Figure 26). As outlined previously, Black Sea wheat is produced cheaply due to a few factors: the region's natural agronomic advantages of fertile soils and supportive climate, the low cost of its labour, and especially in oil-rich Kazakhstan, useful government support. In Ukraine and Russia, where living standards have fallen during recent years, the costliness of local food is an important social and political issue, so ensuring grain production is maintained or enhanced remains a priority. High volumes of production place downward pressure on local prices and exportable surpluses become a source of needed foreign exchange. Nearby markets in the MENA region will continue to benefit from this lift in Black Sea wheat production via their access to these exportable surpluses (see Figure 26).

It is unsurprising that during recent years, MENA countries feature in the list of the top 10 importers of wheat from Ukraine (Table 22). By contrast the top 10 importers of Australian wheat during more recent years are mostly South East Asian and East Asian countries. However, there are several countries in both countries' top 20 importers of their wheat. Countries like Indonesia, Korea, Yemen, Philippines, Thailand, Iran and Egypt are important outlets for Ukrainian and Australian wheat, although relative market shares

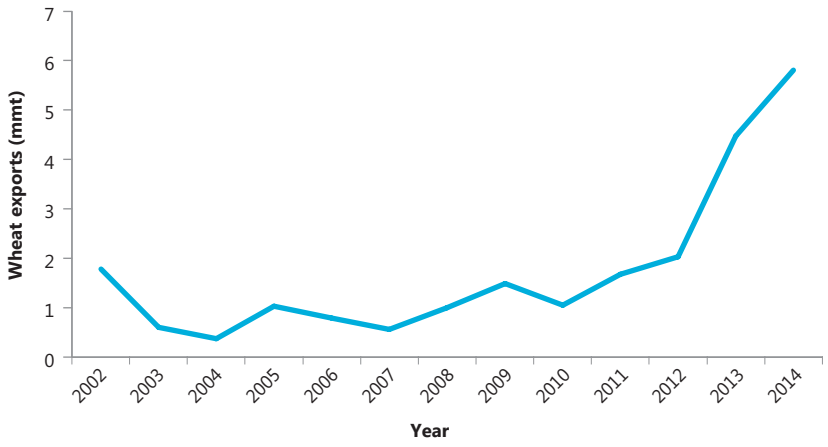

FIGURE 26 Ukrainian wheat exports to the MENA region: 2002–14

Source: Comtrade (2015)

TABLE 21 Black Sea wheat production

Country	Wheat production (mmt)							
	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16 (est)
Kazakhstan	13.0	17.1	9.6	22.7	9.8	13.9	13.0	14
Russia	63.8	61.8	41.5	56.2	37.7	52.1	59.1	61
Ukraine	25.9	20.9	16.8	22.3	15.8	22.3	24.5	24
Total	102.7	99.8	67.9	101.2	63.3	88.3	96.6	99

Source: USDA, Foreign Agricultural Service

TABLE 22 Key importers of Ukrainian or Australian wheat during different periods (ranked from higher to lower)

Top 10 importers of Australian wheat		Top 10 importers of Ukrainian wheat	
2008–12	2013–14	2008–12	2013–14
Indonesia	Indonesia	Spain	Egypt
Korea	Vietnam	Korea	Thailand
Japan	Iraq	Tunisia	Kenya
China	China	Philippines	Bangladesh
Yemen	Korea	Jordan	Syria
Malaysia	Japan	Turkey	South Africa
Thailand	Malaysia	Pakistan	Spain
Philippines	Iran	Italy	Morocco
New Zealand	Yemen	Kenya	Tunisia
Italy	Sudan	Lebanon	Israel

Source: ComTrade

and types of wheat sold in each of these markets can be quite different (Figure 27).

Figure 28 and Figure 29 are novel pictorial presentations of the export of wheat from Ukraine and Australia to their respective major regional or country destinations. The first circle in Figure 28 shows Ukraine's top 10 markets during recent years are mostly MENA countries and Australia exports only around one fifth of the same volume as Ukraine to those same markets; and mostly to Egypt and Bangladesh. By contrast, the second circle in Figure 28 shows Australia's top 10 markets during recent years are mostly in South East Asia and Ukraine has exported only around a twentieth of the same volume as Australia to those same markets; mostly small volumes to a wide array of markets.

Egypt and Indonesia are two of the world's major wheat importers, but the implications of Ukraine's exports to these two markets from Australia's perspective are vastly different. Bread is central to Egyptian life and, due to its population's need, the Egyptian government subsidises bread. The costliness of this policy to the government causes it to ensure imported wheat is bought at the lowest possible price through its GASC wheat tenders. Consequently, GASC tenders rarely favour Australia, as Australia is no longer a low-cost source of wheat, except during years where global stocks are tight and Australia may have ample supplies of downgraded wheat. As such, on occasion, Egypt is

FIGURE 27 Top 10 importers of wheat from Ukraine (blue) or Australia (green) 2007–13

Source: Based on data from Australian Bureau of Statistics and USDA Estimates: PSD Online

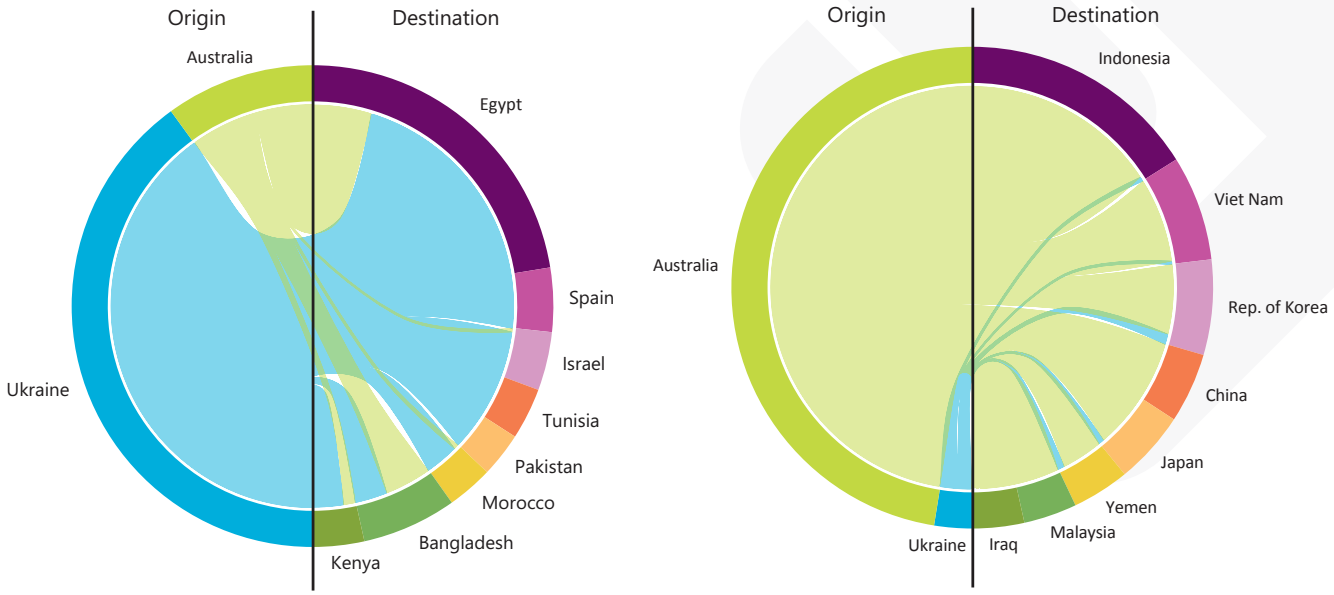

FIGURE 28 Comparison of the average wheat volumes (2010–14) exported from Australian and Ukrainian origins, into the respective top 10 markets by volume for each country

Green ribbons indicate the volume of grain exported from Australia into the respective markets, and blue ribbons indicate the volume of grain exported from Ukraine into particular markets.

Source: Comtrade, 2015

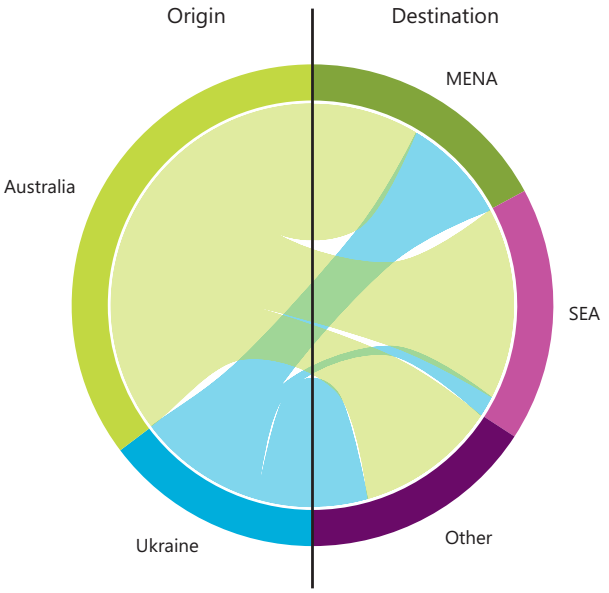

FIGURE 29 The comparative average volumes of wheat (2010–14) exported from Australian and Ukrainian origins to major regional destinations

Source: Comtrade, 2015

an opportunistic and important outlet for lower grades of Australian wheat. Ukraine on the other hand, is often awash with affordable, low-to-average-quality wheat.

Australian wheat is often only opportunistically exported to the MENA region, as it normally at a disadvantage against Ukrainian wheat due to Australia's higher cost of production and higher freight costs. The relatively small volume of feed wheat grown in Australia and exported to MENA countries like Egypt comes mostly via east coast ports of Australia, as sufficient volumes of downgraded wheat are occasionally grown in eastern Australia when climatic conditions are problematic. The long sea journey for wheat exported from Australia involves traversing the Indian Ocean, passing through the Gulf of Aden where the risk of piracy is high and then passing through the Suez Canal to eventually arrive at Alexandria's Dekheila Port. By contrast, Ukraine can load wheat out of one of its Black Sea ports and quickly and safely head down through the Bosphorus into the Mediterranean and into Alexandria.

It would be commercially and strategically naïve to think Australia could, in the short to medium term, enjoy any particular cost or quality advantage over Ukraine into the Egyptian market. Australia should naturally continue to view Egypt as a useful price-sensitive buyer, but returns to Australian growers are likely to be strategically better-served by focusing efforts in markets with greater prospects for higher returns.

By contrast to the situation in Egypt, Indonesia is a significantly more nuanced and important market for Australian wheat exporters. Despite its higher costs of production compared with Ukraine, the geographical proximity of Australia to Indonesia, gives it a freight advantage. This advantage is further enhanced by the Indonesian market's recognition of Australian wheat quality, with its superior extensibility for the production of various types of noodles. Mills throughout South East Asia have stated that wheat out of Ukraine needs to be as much as US$10 to US$30/t cheaper than Australian wheat to be considered as an alternative in the grist. This sentiment reveals the perceived value of the greater functionality of Australian wheat for this particular end-use.

Another key advantage of Australian wheat into Indonesia is the millers are deeply familiar with Australian wheat due to the history of its use in Indonesia. They understand how Australian wheat performs in their milling and end-use processes and have long-standing commercial relationships with Australian exporters. For example, the Interflour Group is a joint venture between Indonesia's Salim Group and the CBH Group — a Western Australian farmers' cooperative. Interflour is the second-largest flour miller in Indonesia, with their Eastern Pearl flour mill in Sulawesi being the fourth largest single-site flour mill in the world, producing 700,000t of flour per year. Although it uses wheat from a variety of sources, its familiarity with Australian wheat and its commercial linkages to Australia suggest Interflour is likely to maintain its focus on Australian wheat until such time as the proven consistency of functionality and lower price of Ukrainian wheat make it a preferred ingredient.

There are signs emerging, however, that such a transition has commenced. Ukrainian wheat is increasing its market share in Indonesia. Mills in the region have indicated they are becoming familiar with Black Sea wheat and how it performs in the grist. While a 100 per cent Ukrainian wheat grist is not expected any time soon, nonetheless the share of Black Sea wheat in certain blends is likely to increase — particularly for the price-sensitive end of the blend spectrum. This highlights the danger to Australia of being a high-cost supplier of a mostly bulk commodity. Although Australia must always commit to productivity improvement in grain production to lower costs of production and also ensure its supply chains are cost-efficient, nonetheless Australia is unlikely to ever be the globally preferred source of cheap wheat.

Ukraine's lower cost of wheat production (see earlier Table 15, page 66), its lower storage and handling costs (see earlier Table 16, page 68) and its lower costs of transporting grain to port (see earlier Table 18, page 73) increase its global export reach (Figure 30). Hence, Australian wheat will face price pressure from Ukrainian wheat even in Australia's key nearby wheat markets, such as Indonesia.

What remains as an advantage for Australia is the difference in timing of the main supply of wheat from each country. This leads to a different profile of availability in markets (Figure 31). The Australian export volume peaks around a month or two after harvest, as do the Ukrainian wheat exports. The peak in Ukraine is much more significant than in Australia as a percentage of the crops, with up to 20 per cent of the wheat exports occurring during September — this is significant. The higher moisture content of grain of Ukrainian wheat compared with Australian wheat, the problems with storing higher moisture wheat in Asian markets and the cost of storing grain in Asian markets, mean the Ukrainian grain may only be most strongly competing in a limited capacity and interval when the bulk of the Australian crop is available (Figure 31).

So the challenge for Australia is to maintain productivity and cost efficiency while providing unique or appropriate end-use functionality for strategically-important buyers of Australian wheat. The Australian wheat industry is well served by trustworthy institutions, sound policing and judicial services, effective R&D structures, adequate regulations, and a dependence on export markets that, in combination, protect and incentivise the Australian wheat industry to supply grain to end-users. However, there is a key weakness in the Australian wheat industry that limits its ability to export grain with preferred functionality — Australia lacks efficient and perhaps sufficient coordination and cohesion across the range of entities operating in

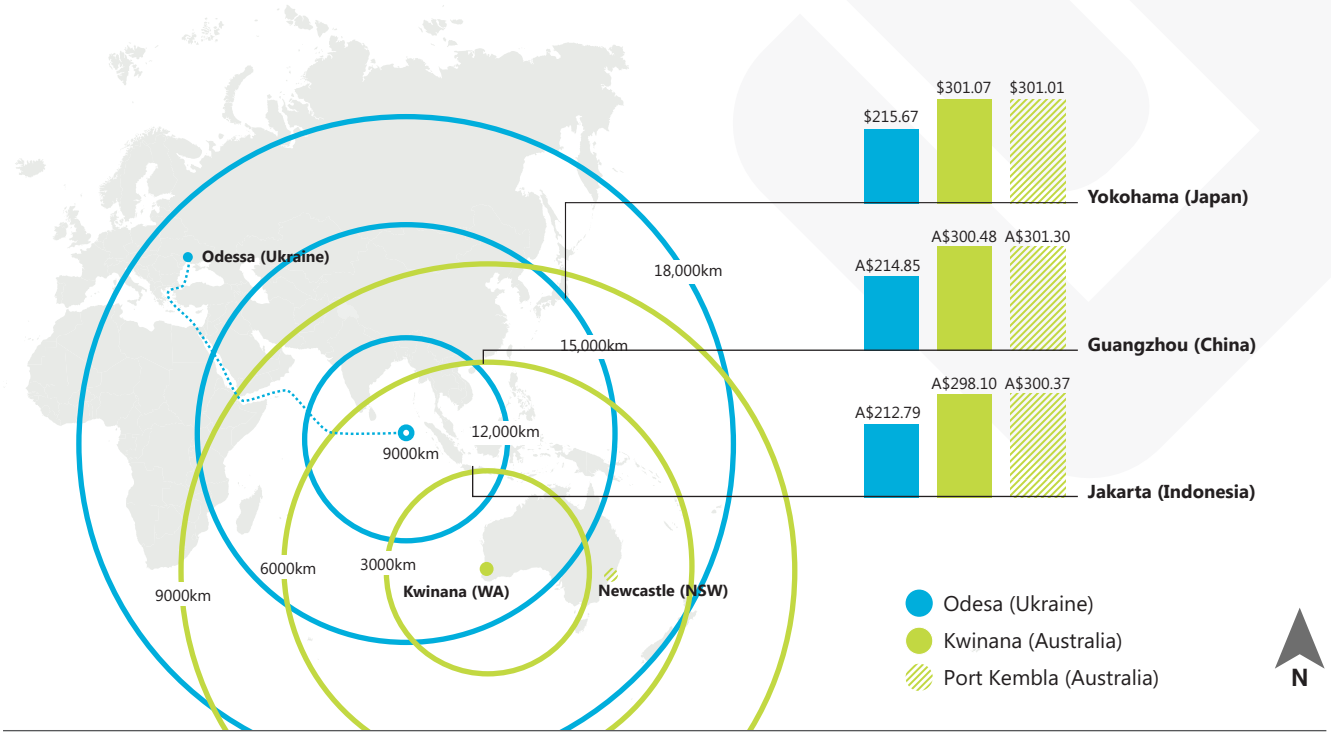

FIGURE 30 The global export reach of Ukrainian wheat: cost of landing wheat from Odesa into key Asian ports

Source: AEGIC, 2015

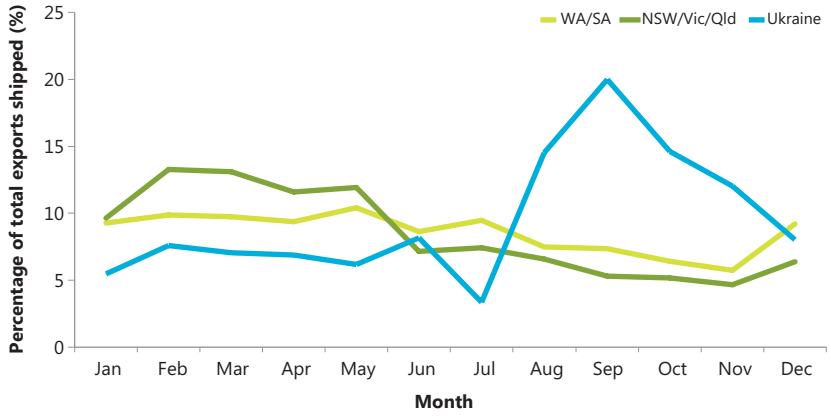

FIGURE 31 Percentage of total exports shipped each calendar year, by month

Average over period of 2011–15

Source: APK Inform, ABS

the grains industry to ensure the grain functionality preferences of end-users are being constantly identified and relayed back to local plant breeders and grain marketers to the benefit of the industry. Hence, Australia's ability to profit from providing appropriate functionality for strategically-important buyers of our wheat is somewhat impaired.

By contrast, the wheat industries in the US and Canada are well-served by flagship organisations that champion wheat produced in these respective countries and are constantly collecting market and technical intelligence about what aspects of wheat functionality are preferred or are undergoing change in various markets.

If Australia improved its provision of market and end-user intelligence then its likely areas of deserved focus would include:

- breeding varieties with:
  - higher paddock yield and higher milling yield
  - better water absorption, allowing end-product makers to produce more with less flour
  - targeted end-product functionality (e.g. processing consistency, better *mochi mochi* texture for Udon noodle, loaf volume, crumb texture, colour, colour stability, etc)
- a review of segregation standards to ensure an appropriate balance between segregation for maximum logistical efficiencies versus isolating grain volumes with appropriate functionality for key markets
- improving (and in certain cases exceeding) the pre-sales and after-sales service provided to customers relative to the services provided by other higher-cost producers — US and Canada
- providing technical extension services in markets where there are strong prospects for a sound return on such investment
- engaging in appropriately-targeted market development in either key markets or in markets with strategic potential, for example, in the Philippines, Australian wheat is erroneously viewed as 'feed'. Countering this widely held view would require considerable effort and would erode the market dominance of US wheats.

In addition to avoiding a strategy focused primarily on competing with Ukraine on price, Australia also needs to avoid battles based solely on the achievement of high protein levels. Australian wheat has some competitive advantages in the global market, however reliably producing exportable surpluses of high protein wheat is not one of them. Protein is undeniably an important factor in producing end-products from bread to noodles. However, basic protein values tell only part of the story. Some wheat varieties can produce better bread at 12.5 per cent protein than others can at 14.5 per cent protein. Some end products, such as sponge cake and Udon noodles, actually require lower protein. Putting aside some of the inherent issues with the Udon noodle market for a moment, this is a market with around 1.8mmt per annum of demand[1] for wheat between 9.5–11.5 per cent protein, with 10.5 per cent protein performing much better than 11.5 per cent.

Even when referring to end products, which typically require higher protein, such as bread or yellow alkaline noodles, mills look at the gluten quality, not just the raw protein content. Australian wheat is consistently viewed as having superior gluten quality compared with Black Sea wheat. However, the question is; "At what point does any price disparity negate this difference in gluten quality?". And what is the potential for countries like Ukraine to improve the gluten quality of their wheat varieties and thereby erode the commercial attractiveness of Australian wheat?

1 Based on combined Japanese and Korean demand for ASW blend

Ukraine wheat — a SWOT analysis

Strengths

- Ukrainian traders are viewed as being more flexible around delivery specifications compared with Australian equivalents; although some Ukrainian suppliers have a poor reputation in the global market (see *Weaknesses* below). Ukrainian suppliers are often happy to provide flexibility in order to meet a customer's specific requirements.
- Ukrainian suppliers are typically awash with exportable surplus during the August–December period, allowing them to take advantage of low Australian stocks heading into harvest.
- Ukraine possesses the world's most enviable storehouse of rich, deep *chernozem* soils. If the country can address some of its major impediments (see *Weaknesses* below), its global competitiveness will be underpinned by a long-lasting access to fertile soil and a climate mostly conducive for plant growth.
- The country's low-cost labour creates additional benefits throughout its grains industry; from lower on-farm costs of production through to lower support costs in R&D, logistics and marketing.
- The prevalence of large-scale, vertically-integrated agroholdings creates economies of scale and integration benefits, reducing production costs and spreading exposure along the value chain. Smaller holdings managed by competent foreign managers also are an emerging source of competitive strength for Ukrainian agriculture.
- Due to inherent geography, the country enjoys a powerful freight advantage into key MENA markets, which are major grain importers.

This is helped by direct access to the Black Sea via a range of large deep-water ocean ports and smaller ocean and river ports.

- While it is difficult to own land outright, land rents are low by western standards, further accentuating cost of production benefits.
- Ukraine produces low-to-medium quality wheat more cheaply than Australia and North America. As most demand growth globally is forecast to come from third-world countries with undemanding quality specifications, this appears to create an ongoing advantage for Ukrainian suppliers.

Weaknesses

- Due to acknowledged corruption and bribery in Ukraine, major Asian buyers remain nervous about contracting directly with Ukrainian companies for grain cargoes. These buyers often contract with major ('ABCDs'[2]) traders to mitigate counterparty risk. In comparison, outside of drought-driven contract washouts, non-performance of contractual obligations is largely unheard of when buying out of Australia from major, mainstream suppliers.
- Transportation networks are mostly in poor condition and are poorly maintained, creating risks, additional costs and bottlenecks for producers and transportation companies.
- The banking system is outdated and at times dysfunctional, impeding the flow of foreign currency in and out of the country and limiting access to the credit necessary to fund grain production.
- Theft and corruption permeate most aspects of grain production, creating additional costs and uninsurable risks.
- Ukrainian farm workers, while generally hard working, are often seen as lacking initiative and requiring supervision. Their persistent requirement, often by experienced foreign farm managers, is seen as necessary to ensure timely and efficient farm operations. However, due to a range of factors, not least of which is civil unrest in eastern Ukraine, it can be difficult for farming operations to attract suitably qualified foreign management.
- A company's fortunes can be indelibly tied to their relationship with whichever political party is in power. Bluntly; a change in government can sometimes be the difference between bumper profits and bankruptcy.
- As with Australia, Ukraine is exposed to weather fluctuations. Occasional severe drought can impact on grain production, thereby affecting export revenues and farm profits.

Opportunities

- A change to the current moratorium on land ownership flagged for review during 2017 may provide the catalyst for increased foreign investment into Ukrainian grain production and encourage better stewardship of farmland.
- A gradual (or at times, sudden) drift towards the EU may create greater opportunities in this market through favourable tax treatment and closer ties.
- The westernisation of grain production in Ukraine should improve the utilisation of the country's land assets and enhance the profitability of grain production.
- Ukraine is now a major exporter of corn, creating freight economies of scale and combination cargo opportunities. If Japan's wheat importation system deregulates, this could provide base cargo to enable Ukraine to target Japan's valuable wheat flour market.
- Climate change will generate a range of spatial and temporal effects in Ukraine. In some regions, particularly more northerly regions, opportunities for greater production of a range of crops are likely.

Threats

- If living standards continue to fall in Russia and its currency comes under further devaluation pressure, its ability to maintain or enhance its competitiveness as a global grain exporter will increase. Ukraine and Australia would be casualties through lower market shares or lower global grain prices.
- If Ukraine fails to address its endemic corruption problems and political instability, it will impede further foreign investment; and Ukraine will not realise its economic and social potential.
- If the government is unable to stabilise the economy and defaults on its bond obligations or the currency devaluates further, it will create an environment that will dissuade further investment into agricultural production.
- The most southern parts of Ukraine may be disadvantaged by climate change, especially if extreme warmth and longer periods without rainfall characterise future climate.

2 ADM, Bunge, Cargill, (Louis) Dreyfus

Implications for the Australian grain industry and its export supply chain

The ability to commercially benefit from exporting grains has been an enduring characteristic of Australia's grains industry. However, Australia faces an emerging challenge from Ukraine and other Black Sea region nations. How well Australia strategically responds to this challenge will affect the profitability of grain production in Australia.

Collate, monitor and analyse developments in Ukraine

If Australia is serious about appropriately responding to the prospective export challenge emanating from Ukraine, then monitoring the information flow out of the Black Sea region (and Europe, more generally) is essential due to the magnitude of possible change in Ukraine and nearby countries.

Forewarned is forearmed. Accurate and timely information about emerging competitors increases the opportunity for Australia's grains industry to make strategic decisions based on sound analysis. USDA's FAS, for example, has staff based in the US embassy in Kiev transferring timely information back to its local industry representatives.

When AEGIC reported on the competitive challenge from Canada, AEGIC did not recommend the need to frequently monitor developments in Canada. However, because of the magnitude and uncertainty of possible changes in grain production in the Ukraine (and its Black Sea neighbours) we conclude that monitoring is essential. Without the insights from regular reviews of developments in those nations Australia is less likely to make appropriate strategic choices for its grain sector.

The massive devaluation of the UAH during 2014 saw the currency move from 7UAH buying one USD to 33UAH buying one USD — a four-fold devaluation over 12 months! Most analysts consider during the next five years at least, the likelihood is the UAH will remain at current devalued levels, supporting the export competitiveness of Ukrainian grain. Although the AUD has slipped from parity with the USD to be around US$0.70–75, the degree of devaluation has not matched that of the UAH.

Ukraine is yet to heavily invest in the river infrastructure to create an even lower-cost route for grain freight. These investments will facilitate the low-cost delivery of grain to port and complement Ukraine's low cost of labour further enhancing the cost efficiency of all components of its current export grain supply chain. By contrast, the high cost of labour in Australia is embedded throughout the cost structure of Australia's export grain supply chain and Australia has no large inland waterway system to facilitate grain transport.

Already Ukraine has achieved higher annual increases in wheat production with virtually no change in its area sown to wheat during the past decade, whereas Australia's increase in wheat production has principally been due to greater plantings of wheat. Larger areas in Ukraine could be drawn into wheat production if an incentive to change the current mix of crops on Ukrainian farms arises. By contrast in Australia there is a low likelihood of any further substantial increase in the area planted to wheat. Moreover, most Ukrainian growers are yet to embrace no-till farming methods. These techniques will further reduce grain costs of production and improve yield stability, strengthening even more the international price competitiveness of Ukrainian wheat exports.

Climate change projections indicate the twin combination of higher temperatures and reduced growing season rainfall will lessen yield advancement in Australia. By contrast, projected warmer temperatures with enhanced CO_2 levels, and no clear trend in rainfall changes, will likely advantage wheat yields in the Ukraine, especially in more northerly parts of Ukraine. However, in the medium term it is likely a corn–soybean belt will emerge in the most productive grain-growing regions of central Ukraine, at the expense of wheat production in that region. The wheat export competition Australia faces from Ukraine may be less intense than otherwise would occur if Ukraine did not shift its emphasis in grain production towards feed grains and oilseeds. The World Bank forecasts Ukrainian grain exports will be around 50mmt by 2035 (WBG, 2015). However, more importantly, the FAO and OECD project Ukrainian wheat exports to only increase to 9.7mmt by 2024.

The main reason for the perhaps smaller than expected increase in Ukrainian wheat exports is that in many parts of Ukraine alternative crops, such as corn and sunflowers, offer more attractive gross margins for growers (Figure 32). Hence, in many regions large changes in prices, costs and yields are needed before these higher-value crop options are displaced in favour of wheat.

Investigate why (or whether) Australian wheat is preferred

Due to the competitive pressure emanating from Ukraine's ability to produce affordable grain, Australia needs a strategy to better secure the functionality of Australian grain for its end-users, especially regarding Australia's principal export grain — wheat. Understanding what our customers value allows us to better serve their needs. To develop and prolong end-user preferences for our grain, Australia must:

- develop higher-yielding varieties with qualities and segregations that target and satisfy end-users' requirements (Ukrainian systems insufficiently set up to achieve such end-user specificities)

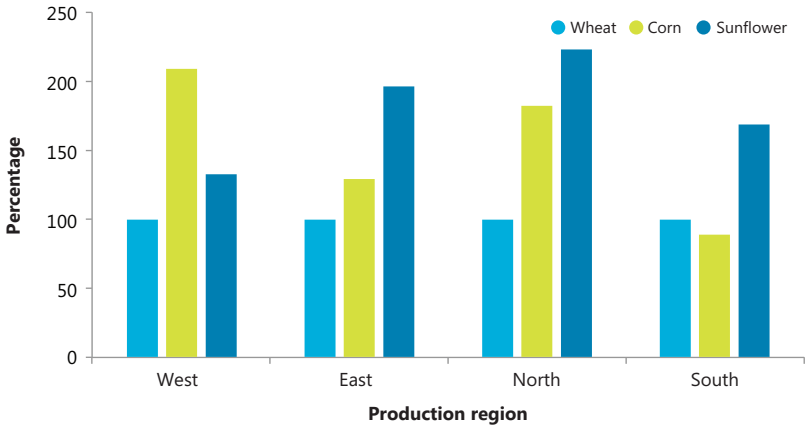

FIGURE 32 Gross margin of corn and sunflower as a percentage of the wheat gross margin, by production region

Source: Deininger 2013, Borsch 2013, Richmond 2015

- improve its grading and grain specification processes to allow traders to better meet customers' needs (Ukraine has an antiquated grading and variety specification system, which is poorly regarded within the country and the will to change or improve the system is not a priority)
- provide customer support through an industry-good organisation representing our grains industry and servicing end-users' needs for quality data and information (i.e. an Australian equivalent to the CIGI), (the Ukrainian government's need to give funding priority to defence suggests it will be difficult for such an organisation, which depends on government finance, to easily emerge in Ukraine).

Australia needs to produce a differentiated product, which targets end-user preferences, particularly in less-price-sensitive markets. Helping end users better understand and appreciate the functionality of certain grades or varieties lessens the risk of purchasing behaviour being solely price driven. Australia's competitive strategy in the global wheat market must account for the heterogeneity of the various grades we produce. Tactics aimed at capturing destination markets for ASW may be inappropriate for APH and vice versa. For example, in markets with a broad range of quality requirements, breeding activities directed at maximising grain yield whilst jointly honouring quality requirements are appropriate. By contrast, in premium, quality-sensitive markets, such as Japanese Udon or sponge and dough bread, breeding must strike a balance between enhancing grain yield and preserving or improving unique or narrowly specified end-product quality.

With reference to the emergence of Ukraine as a potentially-significant export competitor, Australia's competitive strategy must consider, whether or not the industry is best placed to compete on:

- price
- product differentiation
- service differentiation
- some combination of two or more of the above.

As this report illustrates, with reference to the challenge posed by Ukraine, a strategy primarily aimed at competing on price is not advisable — Australia is a high-cost producer compared with Ukraine. While noting Australia's need to always seek to be cost-efficient, nonetheless it is our contention the Australian grains industry increasingly needs to focus on supplying the market with superior functionality, backed up by comprehensive technical support and crop quality information.

Convey market and competitor information to Australian stakeholders

An effective process to ensure Australian grain growers benefit from better serving their customers and react in a timely manner to competition will require a coordinated and aligned effort between breeders, the Wheat Classification Council (WCC), bulk handlers and traders, along with 'industry good' organisations, such as Grain Growers Limited (GGL), Grain Producers Australia (GPA) and AEGIC to address the following four pillars of support:

i. Breeding

Breeders should continue breeding a portfolio of varieties that allows Australia to compete across a range of specific market segments including: sponge and dough bread, rapid dough bread, ramen noodles, udon noodles and confectionary. We must ensure these varieties have sufficiently attractive yields so the market price adequately encourages their adoption. Ukraine's grains industry is generally not set up to target specific end-product markets, with their focus mostly being on high-yielding varieties for nearby markets with lower minimum quality requirements.

In addition to targeting specific market segments, Australia must continue breeding general purpose, high-yielding varieties that capture market share in some less quality-conscious markets and reduce growers' concentration risk.

ii. Classification

Ukraine has a grading and variety segregation system dubiously regarded both by those within the country and end users in destination markets. In talking with well-informed players in the Ukrainian grains industry, AEGIC found little current impetus to address these concerns. This means for the foreseeable future, the bulk of competitive pressure from Ukraine will be in markets or market segments

Ross Kingwell (AEGIC) left and Stuart Kearns (GRDC) right, discussing the international competitiveness of the Australian grains industry at the GRDC Research Updates 2016.
Source: AEGIC, 2015

either less quality-conscious or with less specific functionality requirements.

If Australia targets markets and segments requiring higher-quality wheat, with specific functionality traits, then the role of Australia's wheat classification system is a vital in order to create grades that meet particular requirements, based on varieties that preserve the desired character of each grade. This is easier said than done.

The WCC and WQA juggle a range of competing factors when deciding on how to shape Australia's wheat crop, taking into account the interests of parties including: growers, breeders, traders and end-users. For example, the Asian sponge and dough bread market typically uses North American grades, such as DNS, HRW or CWRS, as they are comparatively bucky, with high dough strength and low extensibility.

Australian breeders can produce bucky wheats that approximate North American competitors, however the WCC would probably be unable to give these varieties APH classification as they would change the character of this grade. The existing character of APH is highly esteemed in many of Australia's key markets; its relatively extensible properties contribute towards its status as arguably the world's best wheat for making Chinese-style noodles. In order to preserve the character of the APH grade, bucky wheats would need to be accepted into a lower grade, negating any incentive for growers to adopt them. The net result is the retention of traditional noodle markets, while North America remains unchallenged in the sponge and dough bread segment.

The emergence of Black Sea producers, such as Ukraine, means Australia may need to examine how it classifies its wheat, to make sure the grade profiles remain 'fit for purpose' in a global wheat market potentially awash with cheap, medium-protein hard wheat.

Identifying the most beneficial course of action is a challenging task. To give a purely hypothetical example, the above issue of whether or not to split APH may be suggested as being a potential net benefit to the grains industry. However, further analysis may then show that due to the poorer yield of the 'baking' varieties, growers will need at least AU$40 above APH to break even. The bulk handler then explains that, if APH is split into two grades, due to the impact on logistical efficiencies, the supply chain costs would increase by AU$10/t.

Then, the bulk handler further indicates they have insufficient capacity to offer both services at each receival point, so each location will have one or the other (but not both) receival facility. This means many growers will need to cart their APHB grain much further, as their local site does not receive the APHB class. Hence, an additional AU$10/t is required to compensate growers for this additional transport cost.

Consequently, when the grade is calculated all the way from grower to mill (or at least, on a CFR basis), the yield penalty, added transport costs, along with storage and handling costs, makes the grade uncompetitive against other origins.

iii. Segregation

Using the above hypothetical as an example, it would be pointless to encourage growers to adopt varieties with better functional traits if there were no grain receival services in close proximity set up to segregate their grain. In the absence of these services, a grower's economically rational response will be to gravitate towards the highest yielding variety for a given grade. Similarly, a bulk handler's economically rational behaviour will be to only provide segregations for commercially viable grades of sufficient scale. An overly fragmented segregation and grading system will drive up storage and handling costs, worsening Australia's ability to compete with low-cost exporters, such as Ukraine.

Therefore, the creation of any new segregation must be based on sound analysis of all factors including grain yield, storage and handling costs as well as market prices. This analysis must clearly demonstrate a net benefit for the grains industry if the initiative is to proceed.

In order to ensure sound investment decisions are made for the overall enhanced profitability of the grains industry it is imperative breeders, WCC WQA, industry-good grains bodies and bulk handlers work cooperatively. It would be pointless to create a new

grade if there were no yield-competitive varieties with the appropriate traits, or if bulk handlers could not provide segregations.

iv. Customer service and technical extension

The provision of high-quality customer service and technical extension service is another avenue through which Australia can differentiate itself from low-cost suppliers such as Ukraine. The stark reality of Ukraine in 2016 is the government is unlikely to be able to financially support an 'industry-good' entity focused on promoting Ukrainian grain or providing technical support, due to the parlous state of the Ukrainian government's finances. In particular, as long as the more pressing need to fund military expenditure continues, a government-funded CIGI or US Wheat Associates-style grains promotion and technical extension entity appears unlikely. In addition, while the Ukrainian grains industry remains fragmented, the widespread, co-ordinated effort needed to establish an industry-funded equivalent appears unlikely.

There is, however, one small hitch. While the current level of service the Australian grains industry provides to end-users compares favourably with Ukraine, according to many of the major export customers of Australian wheat, Australia's technical, collaborative and post-sales support falls well short of that provided by the US and Canada. Feedback from several buyers reveals that since the deregulation of wheat marketing in Australia, the service to buyers has deteriorated.

There is a need to verify how widespread and deep-seated are these concerns in Australia's main markets. Nonetheless the anecdotes to-date include the most common complaints being:

- The quantity and quality of crop quality information they receive has deteriorated. And when they *do* receive this information from individual traders, the data is usually self-serving and may not resemble the quality of grain they subsequently buy.
- The information provided on the actual quality of wheat loaded onto the vessel has deteriorated. Many complain they are inadequately informed about the quality of their shipments, making forward planning difficult.
- There are huge variations in the quality they receive from vessel to vessel, or from trader to trader. There is a perception that, during the single desk era, the Australian Wheat Board (AWB) had full visibility of the crop quality profile and could minimise quality fluctuations.
- Buyers have no idea who is responsible for what, or who they should contact regarding service. During the single desk era, if there was any problem with Australian wheat, they could contact the AWB representative located in-country, who would be able to address any concerns or questions. Now, they see a confusing array of traders, bulk handlers and industry bodies, with a lack of clear information regarding the mandate of each to address their issues effectively. Mills often ask; "Why does Australia not have an equivalent to CIGI or US Wheat Associates?".

Use our 'window of opportunity' carefully

It's a tide (not a tidal wave) of Black Sea wheat entering some of our major markets. The Australian grains industry has time to plan and co-ordinate an effective response to ongoing events. Since deregulation of grain marketing in Australia during 2008, a number of grain industry bodies have emerged, each providing useful functions. Australia can consider changes to these bodies such as amalgamation or redirection of some that may take time to implement. Patient, well-considered reform will be essential to establishing the capability for clear and coordinated strategic action for Australia's grains industry.

Australia also needs to assess Ukraine's current situation objectively and understand that besides being a competitive threat, Ukraine may be an investment opportunity, particularly for Australian investors who want to participate in farm production. Ukraine's fertile soils, affordable land leases, proximity to major markets, devalued currency and relatively cheap and skilled labour are attractive characteristics. However, investors need to be mindful that government ownership of rail and road infrastructure, when combined with the government's limited capability to invest in either, results in the cost of getting grain from farm to port forming a larger share of the FOB grain price than occurs in some other international grain-growing regions.

In addition, Australian investors need to be aware the costs of doing business in Ukraine can be high; and there are geopolitical, economic and sovereign risks. Nonetheless, there can be significant rewards for competent Australian businesses who carefully invest and operate in Ukraine. Some risks may eventually lessen while others will require on-going effective risk management. Expertise within the Australian agriculture sector is highly relevant to the current stage of development of the Ukrainian agriculture sector. However, the window of opportunity for Australian businesses to enter Ukraine may not necessarily be long lasting.

Appendix 1

To objectively estimate the trajectory of grain production in Ukraine compared with Australia a scenario analysis was performed using three main factors influencing wheat production.

These were:

- increases in farm productivity (yields)
- area sown to wheat
- the shift in the production region.

Indicative ranges in these three factors for Ukrainian and Australian wheat production are shown respectively in Table 23 and Table 24.

Drawing on the parameter values in Table 23 and Table 24 generates the histograms of likelihoods of annual growth rates of wheat production for Ukraine and Australia shown in Figure 33.

TABLE 23 Likelihood of observing influences on Ukrainian wheat production and their effect on annual trend

		Productivity growth	Change in sown area	Shift in region of production
Variable	a	High	Increase	North
	b	Moderate	Stable	Current
	c	Low	Decrease	South
Slope coefficient	a	3.5%	1.0%	2.0%
	b	1.5%	0.0%	0.0%
	c	0.5%	-1.0%	-2.0%
Likelihood	P (a)	20%	40%	10%
	P (b)	60%	35%	30%
	P (c)	20%	25%	60%

Source: AEGIC, 2015

TABLE 24 Likelihood of observing influences on Australian wheat production and their effect on annual trend

		Productivity growth	Change in sown area	Shift in region of production
Variable	a	High	Increase	Coast
	b	Moderate	Stable	Current
	c	Low	Decrease	Inland
Slope coefficient	a	1.2%	0.5%	0.5%
	b	0.8%	0.0%	0.0%
	c	0.4%	-0.5%	-0.5%
Likelihood	P (a)	5%	5%	10%
	P (b)	85%	90%	85%
	P (c)	10%	5%	5%

Source: AEGIC, 2015

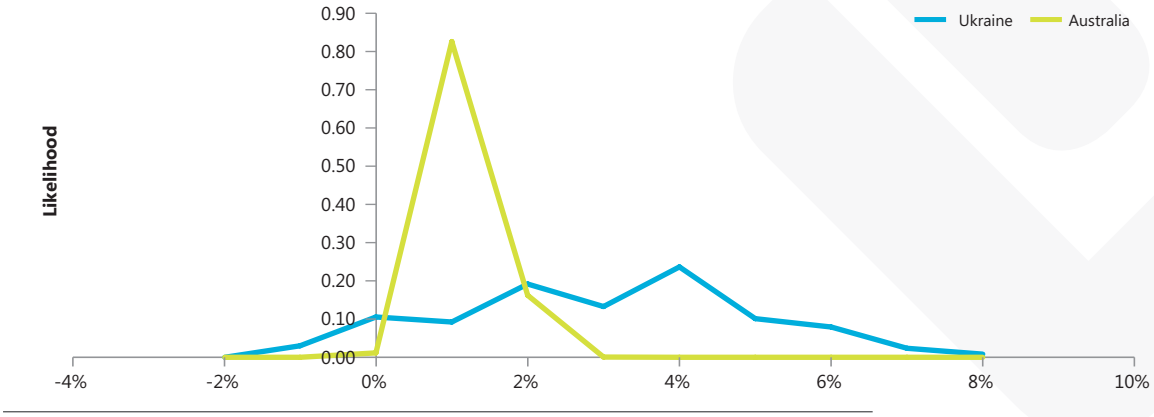

FIGURE 33 Histograms of likelihoods of annual growth rates of wheat production for Ukraine and Australia
Source: AEGIC, 2015

Australian wheat crop.
Source: AEGIC, 2013

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Peter White (left), Lawrence Richmond (centre) and Chris Carter (right) examining a sunflower crop near Mykolaiv.

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(From left to right) Ms Anna Shcherbak, Professor Ross Kingwell and Dr Chris Carter at the Ministry of Agrarian Policy and Food in Kiev.

Source: AEGIC 2015

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