The Looming Food Insecurity: A Disappearing Window of Food Security Opportunity for China

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ABSTRACT China's involvement in the international food market has been significant. Why such involvement had not in the past generated turbulence in this market was because other countries had yet to reach the dietary transition stage at the time. As the global economy begins to recover from the pandemic fallout, other dietary transition countries' increasing demand and competition with China in the international food commodity market will become matters of concern, with significant implications for the food security of not only China, but also the world in the near future.

KEYWORDS Food security; dietary transition; middle-income economies; COVID pandemic; purchasing power; international commodity market; soybean; trade war.

JEL CODES Q17, Q18, F17.

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1. Dietary Transition and Structure of Grain Consumption

In the long-term perspective, the issue of food security is about how to not only secure enough food for people in low-income countries, but also satisfy more diversified food demand, backed by higher purchasing power when a developing country starts its economic take-off. As per Food and Agriculture Organisation's (FAO) definition, food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 1996; Leroy *et al*., 2015). Therefore, food security - as defined by the FAO - is a relatively "modern" phenomenon. When traditional economies transform into modern economies, the purchasing power of households expands, causing their demand for food to shift from a subsistence level to one with complex mixture of nutritional or taste requirements. To meet the demand of households, the food supply must also shift from subsistence-level intake (often simple starch products like grains) to a diversified source of food, which often leads to a mismatch between supply and demand in many countries during the dietary transition period. The methods used to solve this mismatch are varied, but usually involve a combination of two approaches: using international markets for import or export to satisfy domestic demand, so that even if domestic resources for producing that food are scarce, domestic consumption could still obtain international prices through international trade with other relatively abundant countries; or, when the international market cannot meet domestic demand or if there are import and export restrictions, adjusting domestic market prices to change the domestic production structure and further adjust the supply and demand balance.

For early industrial countries, food security was not a major issue, but for new industrialized countries after World War II, it was a different story. Most early industrial countries were located in Europe and North America, where population density was relatively low and land resources were relatively abundant. Therefore, when the dietary transition began, domestic production (except for labour) was less constrained by hard restrictions on land resources, and could be used in conjunction with the international market to smooth the resolve process for dietary transition period food security issue. Most of the newly industrialized countries after WWII were located in East Asia and Southeast Asia, where population density was much higher than Europe during the industrial revolution, making it more difficult to adjust domestic production. These countries relied more heavily on the international market. However, until the 1980s, the total population of countries that moved from the lower income group to the upper middle or high-income group was relatively small, so their impact on the world market and the scarcity of global land resources was relatively small. This changed with China's economic rise.

China is currently in the process of adjusting its food supply and demand mismatch. Until

upon the eve of the millennium, China's major food security concern was about intake grain supply, namely mainly rice and wheat (Lyons, 1998; Du and King, 2018). For a long time before that, China's food security was purely a domestic issue. Shortly after, China's surging per capita income in the 2000s activated a dietary transition. Increases in income have rapidly expanded the country's food menu, especially animal sourced food. China's shift, from a semi-vegetarian diet to an increasingly animal protein-orientated diet,[1] has raised the need for animal feed and the corresponding increase in grain crops production – mainly maize and soybean – to support accelerated growth of the livestock sector (see Figure 1 for details).

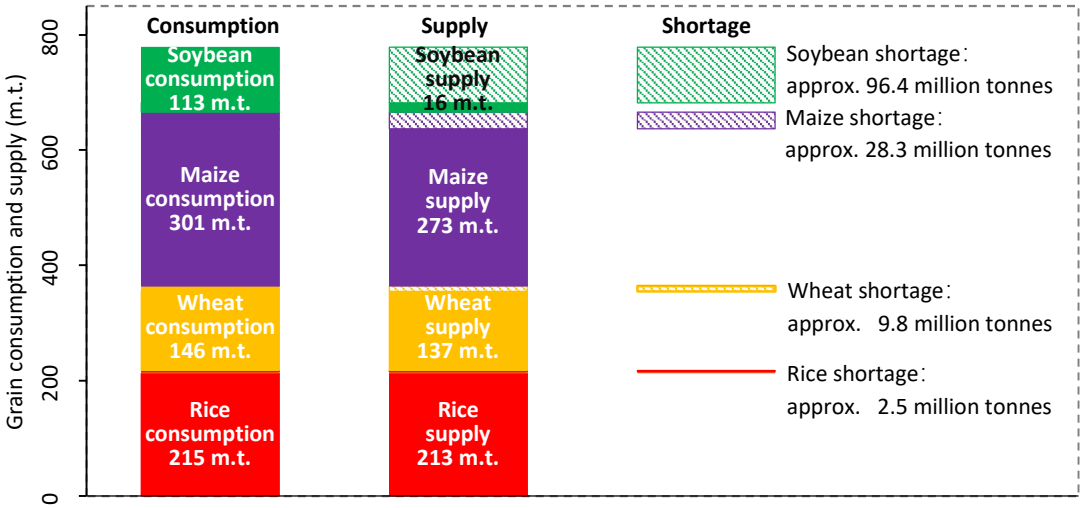

Figure 1. China's grain supply and consumption in 2021.
Source: National Bureau of Statistics of China. *Zhongguo maoyi waijing tongji nianjian* (China External Economic Statistical Yearbook). Beijing: China Statistics Publishing House, 1990–2021 editions; National Bureau of Statistics of China. National Data. Available at <data.stats.gov.cn>, accessed 15 November 2022.

Thus China's crystal clear foodgrain sufficiency policy (Jowett, 1985) started to adjust: Xi Jinping's emphasis that 'Chinese people's bowls must be filled with Chinese food' implies that China's demand for rice and wheat must be met by domestic sources – but that a greater flexibility is permissible for maize and soya, including pumping up imports from the international grain market. Considering China's grain output structure and its farmland availability, it is impossible for the country to produce adequate amount of grain for both direct (food grain) and indirect (feed grain) consumption by Chinese consumers. In this sense, China must outsource a significant part of its grain supply, in order to fulfil its needs for food and feed grains. Hence, China's current food security is strongly correlated to its position in the international food markets, not only in terms of China's own competitiveness, but also competition from other countries.

Securing a proper level of food security would hence require China's efforts to go far beyond subsistence food needs. Such food security goal setting is largely internal market driven. Any shift in dietary structure may also change a country's role in the international food

[1] It could be seen as a part of global dietary transition, or 'food system' transition. (e.g. Popkin, 1999 and 2017).

market. Nor is food security a static concept: rather, it changes as the country's level of development alters. China's food security thus needs to be addressed in the context of the changing composition of world food consumption.

2. Competition in the International Food Commodity Market

China's active presence in the international food market (such as in soybeans) over the past two decades has partly concealed the competitiveness of the market. If one views China's food demand dynamics in the international food commodity market as a result of its long-term dietary transition, then an influential shaping force behind should be Chinese consumers' ever increasing purchasing power. Nevertheless, China is not the only dynamic force in international food markets; it faces competition from country buyers with comparable purchasing power.

At the overall trend, the international food market currently shows a relatively low competitiveness level, but such competitiveness may increase rapidly soon. Since the 1990s, global developing countries, except for China, have been in an economic slump, which has weakened the competitiveness of the international market. On the one hand, from the 1990s to 2020, the total population of the upper-middle and high-income groups increased by 746 million, while in the previous 30 years, the total population of this income range increased by 1.05 billion. That is to say, for buyers, especially developing countries, the increasing level of competition in the international food market after the 1990s has actually decreased. On the other hand, after 2010, more and more economies have entered the dietary transition stage in terms of income level, and they may push up the competitiveness of the international food market.

From the perspective of buyers, there are roughly two types of buyers competing with each other.

The first type of competitor consists of developing countries which have successfully emerged from the low-income group. In the past 20 years, China's large population size, fast economic growth and huge gross domestic product (GDP) volume have masked a few obscured realities: (*i*) the rise of India, another populous country that is struggling for intake food availability and stability (Athare *et al*., 2022; Reddy, 2016) and growing to be a big competitor to China in the foreseeable future; (*ii*) developing Asian economies with strong growth momentum alongside China's rise (e.g. Vietnam and Indonesia); and (*iii*) developing countries outside Asia, such as Egypt, with increasing affluence characterising their fast-growing economy for more than a decade.

The second is middle-income countries (e.g. Turkey), apart from the aforementioned new entrants, that are transiting fast in food intakes. These countries are experiencing dietary transitions, shaping competitive behaviour in the international food commodity market. Unlike high-income countries, these countries are usually price sensitive to market changes:

if food prices remain stable, changes in living standards and dietary intakes tend to be mutually reinforcing; if such prices are subject to sharp rises, their governments are unlikely to stand idly by and risk unexpected political unrest. The same is true of China.

To understand the structure of international food market competition, we first identify middle-income economies with per capita gross national income (GNI, Atlas method, constant 2015 price) close to and above USD 2,400 – the level at which most countries started their dietary transition and the level that coincides quite closely with China's per capita GNI in 2000 (USD 2,200 at 2015 constant price);[2] further, we pay less attention to countries with fewer than 10 million population. Our considerations are twofold: *i*) small economies are usually price takers and unable to influence the international commodity market; and *ii*) they would more readily resort to regional markets and/or international aid in order to meet unexpected shortfalls. Figure 2 presents the results.

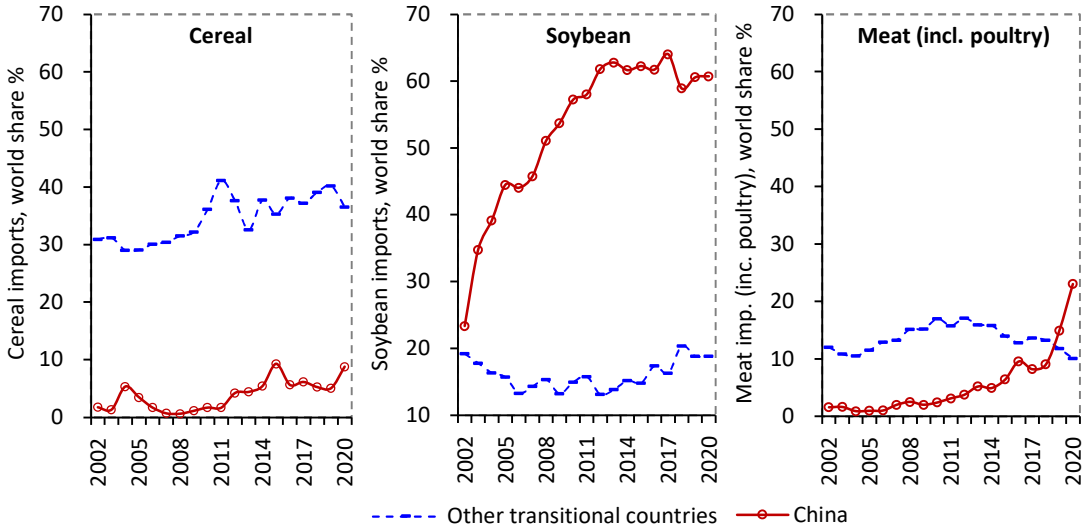

Figure 2. Competitive relationships of food imports between China and other transitional countries.
Source: World Bank. (n.d.). World Development Indicators. Available at <databank.worldbank.org/data/home.aspx>, accessed 15 November 2022; World Bank. (n.d.). World Integrated Trade Solution. Available at <wits.worldbank.org>, accessed 15 November 2022.

The outcome shows first that China's key food security-related interest is in soybean trade. As a result of its food self-sufficiency policy (mainly rice and wheat), China's demand in the international cereal market has remained small, accounting for around 9% of internationally marketed cereals. However, the country takes more than 60% share of world soybean trade. The meat market is mainly dominated by developed countries, with China and other transition countries accounting for a minor share. The sudden increase in China's 2016 meat import was to substitute for its reduced soybean imports to offset soybean price hikes and resultant domestic pork supply instability.[3] As soybean yield has reached a plateau, its global output level will strongly rely on its sown area and is unlikely to expand quickly in the coming years; China has thus formed a competitive relationship with other transitional countries on the soybean-based grain market, including even the meat market.

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[2] This follows the World Bank's income classification criteria (2020).

[3] For example, the 2018 price hike was a result of the sudden outbreak of African swine fever.

Second, huge increases in middle or upper-middle income consumers signal greater competitiveness in the international food market. By the end of 2019, the combined population of dietary transition economies (excluding China) had reached 2.1 billion, 28.4% or 0.5 billion more than that in 2000. Dietary transition economies are comparable with China in terms of structure of food demand and price sensitivity. Thus, in the face of threats to their food security, they are as likely as China to resort to the international food markets (e.g. Vietnam; see Harris *et al.*, 2022) to meet unexpected shortfalls in domestic food supplies. Following years of buoyant income increase (and resultant growing purchasing power for foods) up to and including the COVID outbreak in 2019, the rapid expansion in food demand from these countries has put a strain on China's food imports. However, the COVID-19 and subsequent events have changed the situation.

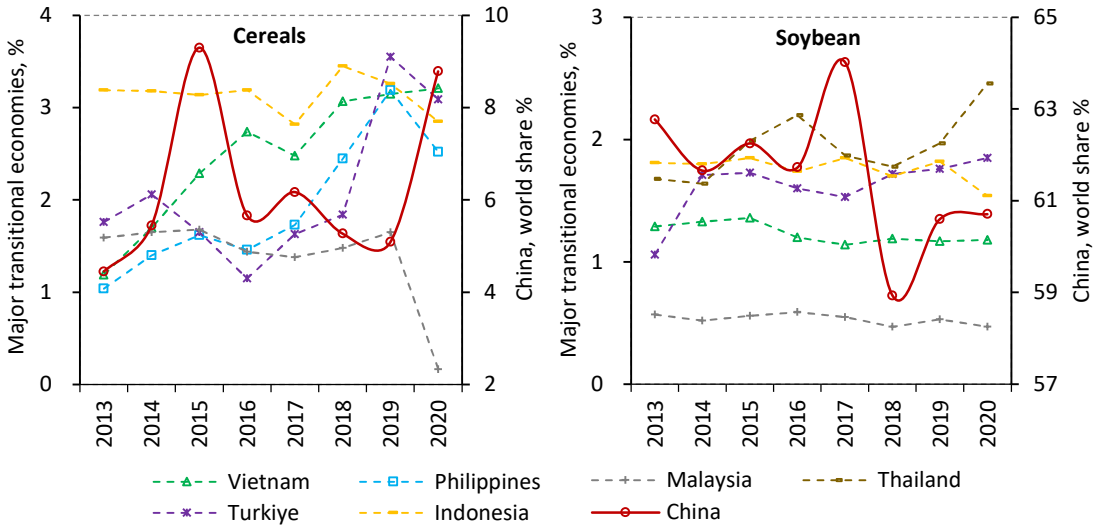

Figure 3. Stagnating demand for major grain crops in the immediate aftermath of COVID-19.
Source: World Bank. (n.d.). World Development Indicators. Available at <databank.worldbank.org/data/home.aspx>, accessed 15 November 2022; World Bank. (n.d.). World Integrated Trade Solution. Available at <wits.worldbank.org>, accessed 15 November 2022.

3. Time Window Created by Recent Triple Crises

As is shown in Figure 3, many transition countries (e.g. Indonesia, The Philippines, Turkey and Malaysia) saw declines in cereal demand in 2020, due both to the pandemic and resulting economic fallout. The combined effect of the subsequent Russo-Ukrainian War and the more recent appreciation of the US dollar has further postponed the onset of the potentially critical global demand for food.

The COVID pandemic

While most developing countries registered significant slowdown in GDP growth, Beijing's draconian controls prevented a steep fall in growth. China's reaction to COVID-19 has largely safeguarded its economic capacity in the immediate aftermath of the pandemic, providing China with higher purchasing power over food imports

compared with that of most transition countries during this period.

Russo-Ukrainian War

In 2020, Ukraine supplied about a quarter of China's maize and barley imports, and one third of wheat. Compared to China's domestic cereal output (e.g. wheat in Figure 1), the small actual volume of these imports is mainly to supplement China's food diversity and to diversify the source of imports.[4]

However, both Russia and Ukraine are important suppliers of potash fertiliser, a key material for grain production.[5] Since the war, the direct fertiliser exportation has been interrupted, along with reducing fertiliser supply and/or rising fertiliser prices due to the disruption in energy supplies (fertiliser production is by now energy intensive). Thus, while the Russo-Ukrainian War has inevitably affected world grain production, thereby increasing food price on the international commodity market, its impact on China's immediate food supply has been indirect. Moreover, as the purchase power of China's residential sector remains relatively intact, such impact remains minor.

Appreciation of the US dollar

The recent change in US monetary policy, especially appreciation in the US dollar, had a limited impact on the purchasing power of the Renminbi (RMB). Compared with its exchange rate against the US dollar two years ago in mid-2020, the RMB has, in fact, appreciated. This is not to mention that compared with its most recent peak on 6 June 2022 after a round of interest rate increase by US Federal Reserve,[6] the RMB had depreciated by no more than 7% as of mid-November 2022. In short, whereas dollar appreciation has lowered the purchasing power of most developing countries' local currencies and increased their imported food prices, China has been less impacted by currency devaluation.

Under the combined effect of these three factors, most countries' purchasing power vis-a-vis food has deteriorated substantially after 2019, giving China greater bargaining power in the international commodity markets. Nevertheless, when global market condition tightens, the time window for China, granted by these adverse developments, will also fizzle off.

4. Developing World's Food Security – Likely Future Trends

[4] But for those countries whose grain consumption (including both food and feed grains) is wheat- or maize-based (for example Turkey and Malaysia), the Russo-Ukrainian War may cause significant increase in food price.

[5] To date, 56% of China's arable land is still potassium deficient; in 2021, about 30% of China's imports of potassium chloride were from Russia.

[6] Average price of Chinese Yuan against US Dollar was 6.6499 on 6 June 2022. WSJ Markets. (n.d.). Chinese Yuan Historical Prices. Available at <www.wsj.com/market-data/quotes/fx/USDCNY/historical-prices>, accessed 15 November 2022.

The pattern of the international food market and food security in developing countries may be reversed. Prior to the COVID pandemic, developing countries could largely rely on the international market to smooth their dietary transition process, with China being the biggest beneficiary. In 2022 many developing countries have rebounded from COVID-19. Some Asian emerging economies are continuing to benefit from a shift in global supply chains, with extra trade and investment opportunities afforded by the fall-out from China's zero-COVID policy in response to the pandemic. As recovery stimulates renewed growth, their purchasing power will be restored to their previous dietary transition trajectory, making them strong competitors to China. Some trends in the international agricultural market have been tied to China's rise in purchasing power over the past two decades or even longer, but with the rise of new players and their expanding purchasing power, fluctuations in agricultural products may increase.

The likelihood is that the recent increase in China's purchasing power vis-a-vis food imports will start to decline. On the one hand, decades of dietary transition have turned China into the world's largest consumer of meat. Gradual stabilisation in its per capita animal protein intake will propel China's feed grain demand – primarily maize and soyabeans – to enter a maintenance phase. On the other hand, China's per capita income has now reached the threshold at which further rises in per capita income will require more fundamental structural reform. Without such reforms, as per the current situation in China, China's economy had witnessed dramatic increases in youth unemployment in 2021 and 2022. This reduces China's purchasing power in a more diversified food market as the youth group could have been the main driving force behind its dietary transition.

Moreover, having witnessed Russia's use of energy supplies to disrupt European economies, major grain producers in the international commodity markets (e.g. the US) may be tempted use grain trade as a weapon in a trade war with China. China's most serious grain demand-supply gap (see Figure 1) is that of soybeans, a resource exported chiefly by Brazil and the US.

Lastly, the inexorable contraction of both farmland (National Development and Reform Committee, 2008) and agricultural labour force in China is posing a serious threat to agricultural production.[7] As a result, the Chinese government will find it increasingly difficult to fill the gap between domestic grain supplies and consumption, thereby undermining the fulfilment of its long-held goal of maintaining grain self-sufficiency. This may propel the Chinese government to increasingly overcome grain shortages through greater involvement in the international commodity markets.

From a global perspective, the competitiveness of the international food market is increasing, which may lead some economies to rely more on their domestic markets and

[7] According to World Development Indicators of the World Bank, China's total area of arable land in 2020 decreased to 119.5 million hectares, down 0.5 million hectares below the red line of 1.8 billion Chinese acres of arable land (equivalent to 120 million hectares). The data released by China's Ministry of Land and Resources was 127.9 million hectares, much higher than that of the World Bank.

production to smooth the dietary transition process. Again taking China as an example, since the 2000s, China has diverted some agricultural resources from the grain sector to non-grain crops with higher returns. If China's food security cannot be guaranteed in the international food market, agricultural resources may be redirected from the non-grain sector back to the grain sector. This will have a huge impact on China's agricultural technology advancement and rural society. For most developing countries with smaller populations and geographic scales than China, the negative effects of similar agricultural resource redistribution may be even greater.

5. Conclusion

China's involvement in the international grain market has been significant thus far. Why such involvement had not in the past generated turbulence in this market was because there were fewer developing countries had yet to enter the dietary transition stage at the time. However, as the global economy begins to recover from the pandemic fallout, latecomers' increasing demand and competition with China in the international food commodity market will become matters of concern, with significant implications for the food security of not only China, but also the world in the near future.

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