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Food Security and Agricultural Crises in a "Financialized Food Regime"

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Abstract. The paper explores the impact of finance's penetration into agriculture and the global food system. The authors analyze the causes of the recent global food crises, unveiling the key role played by financial speculation and explaining why this phenomenon is likely to affect food security more than the problems related to the supply and demand dynamics taking place in the "real economy". Financial markets, the authors argue, are engendering pricing mechanisms and dynamics of wealth distribution that have consequences on the agrarian structures, but also on everyday life of both producers and consumers. While creating new profit opportunities for speculators and the agribusiness, the penetration of finance into food systems increase uncertainty and imply new risks for local actors, to the point of compromising their capability to respond to exogenous shocks, such as the COVID-19 pandemic. In any case, to make sense of these phenomena they must be linked to the broader transformation of the global food system and to the long-term trajectories of capitalist development. This operation is here made with the support of the analytical tools provided by some approaches inspired by the world-system analysis, bringing to light the roots of what can be defined as a "financialized food regime" and discussing some of its important ecological and socio-economic contradictions.

Keywords: financialization, food, food regimes, agricultural crises, world-ecology.

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INTRODUCTION

In the last few decades, the global food system has faced multiple crises. According to the FAO's *State of the Food Security and Nutrition in the World* (FAO 2021a), hunger and malnutrition have reached critical levels, and threats to global food security have increased in frequency and intensity. The drivers behind these phenomena are several, including local conflicts and wider geopolitical tensions, economic slowdowns and rising inequality. Climate change also deserves a particular mention: extreme weather events

are increasing and negatively impacting smallholders (FAO 2021b), which are the most vulnerable portion of family farmers and produce 80% of the food consumed worldwide (FAO 2014). Simultaneously, the agroindustry model has been recognized as directly and indirectly responsible for over 30% of greenhouse gas emissions (OECD 2021).

Population growth – 9.7 billion by 2050 (FAO 2018) – will increase the demand for food, and this will take place in more challenging conditions due to the loss of biodiversity and soil fertility. This scenario is further complicated by the enduring effects of the COVID-19 pandemic, as well as by the unpredictable consequences of the war between Russia and Ukraine, two countries that play a key role in the global provision of food and energy.

Against this background, mainstream solutions point to a combination of (bio)technological innovation, local empowerment and global trade reinforcement, with the aim to increase agricultural productivity and the resilience of food chains (OECD 2020; Torero 2020). From this perspective, hence, food insecurity is conceived as a problem of scarcity that can be overcome through market efficiency, while climate change is regarded as an issue to be addressed through "green" market-based solutions (Fama, Corrado 2021). This way, a wider diffusion of market dynamics and tools, including the financial ones, is recommended to improve the sustainability of the global food system (McKeon 2017; Spann 2017).

An opposite point of view, adopted by critical scholars and transnational agrarian movements (Edelman, Borras 2016), focuses on the asymmetries of power which characterize the agribusiness model, denouncing the dispossession processes underlying agricultural value chains (Patel 2007) and the destabilizing role played by financial markets (Clapp, Isakson 2018). In this case, the food price crisis burst in 2007-2008 is considered emblematic of how, in a food system controlled by transnational corporations, food insecurity is linked to financial speculation much more than to shocks affecting supply and demand fundamentals (Sivini 2009, 2008).

The goal of this paper is to outline a theoretical framework for better understanding the relationships between agriculture and finance, how this is affecting food security and its connection with the wider socio-economic transformations of the world system.

Several analyses on the "financialization of agriculture" identify the roots of this process in neoliberal globalization, which has redefined the global economic order after the end of the Bretton Woods agreements (Epstein 2005, 2008; Kotz 2015, 2009; Palley 2007; Krippner 2005). There is also a common understanding of financialization as a process that has deeply affected the entire society, instead of being limited to specific actors and sectors of the economy (Clapp, Isakson 2018; Gosh 2010). Despite this, sectoral approaches tend to prevail that do not adequately consider the broader picture in which the process of agricultural financialization has arisen. Thus, the relationship between the long-term trajectories of capitalism and the recent transformations of the global food system remains unclear, ultimately resulting in analysis and policy recommendations that are limited to the agricultural sector or to some kind of regulation of financial markets, as if this could protect food systems from general socio-economic tendencies.

Our argument is that most recent food security emergencies and agricultural crises are symptoms of a "systemic chaos" (Arrighi, Silver 1999) that reflect the inability of capital accumulation to overcome a set of economic, social and ecological barriers. The result is the reproduction of what, following Burch and Lawrence (2009), can be defined as a chaotic "financialized food regime", in which even in the case of exogenous shocks, such as the COVID-19 pandemic, the supply/demand fundamentals are less relevant than other financial dynamics in the determination of food prices and possible related crises. This has precise implications on the agrarian structure, as well as on the daily life of both producers and consumers – considering also the central role played by food in productive and reproductive relations.

The article is divided into four sections. To better understand the relationship between finance and agriculture, the first section focuses on different explanations of the 2007-2008 crisis, briefly comparing the mainstream hypothesis based on the supply/demand fundamentals to the one that emphasizes the role played by financial speculation. The second section discusses the financialization impact on food security. The last two sections seek to connect the financialization of agriculture to the long-term social, economic and ecological transformations of the capitalist world system. To this end, we depart from Giovanni Arrighi's (1994) understanding of financialization, integrating it with some key insights of the "food regimes theory" (Friedmann, McMichael 1989; Friedmann 2004; McMichael 2009, 2005) and the "world-ecology" approach (Moore 2018, 2017, 2016, 2014, 2010).

LESSONS FROM THE 2007-2008 GLOBAL FOOD CRISIS

The 2007-2008 food crisis consisted in a prolonged period of extreme agricultural commodities' price volatility and high prices that threatened global food security and increased the number of undernourished people to over 170 million (FAO 2010). It ushered in an era of strong instability in the global food markets, being followed shortly by another important crisis in 2010-2012. It is commonly believed that these events also played a significant socio-political role, fuelling the Arab spring and other social riots in more than thirty countries worldwide (Perez 2013; Zurayk 2011).

While the magnitude of the impact produced by the 2007-2008 food crisis is widely recognized, there is no consensus on its causes. Mainstream explanations point at structural economic forces related to classical supply/demand dynamics. Hence, from this perspective the crisis is ascribed to factors such as the strong growth in demand from countries like China and India, productivity decline, rise in input prices, trade restriction, etc. (Headey, Fan 2010).

In both academic and public debates, a particular emphasis has been placed on the market growth of agrofuels, presented as one of the main reasons for the dramatic increase in agricultural commodities prices. This point is made on the basic assumption that, given a certain supply capacity, if a portion of agricultural outputs is shifted from food consumption to agrofuels production there will be a supply shock with a consequent increase in prices. According to critical observers, however, most of the explanations focused on the agrofuels market do not properly distinguish high prices from high price volatility, the latter being a phenomenon that cannot be understood through the supply/demand fundamentals (Chefurka 2011; Masters 2008; Sivini 2009; Lagi 2011)[1]. Furthermore, empirical evidence shows that when the food crisis erupted in 2007, the food supply system was more than capable of meeting the global demand (FAO, IFAD, WFP 2011). Official data from FAO (Figure 1), for instance, show that the 2007-2008 increase in food prices occurred in a scenario in which wheat, coarse and rice consumption was lower than production, which also led to a growth of end-of-season stocks (Gosh 2010). This suggests that the increase in agricultural commodities prices is not fully explainable through the classical dynamics of supply and demand.

A different narrative focuses on the role played by the financial sector, where the deregulations carried out at the turn of the last century[2] encouraged the expansion of complex financial derivatives and structures, such as the Commodity Index Funds, which enabled investors to yield from different commodity futures markets without having to invest directly in each single commodity futures[3].

Also due to the increasing demand from institutional investors, between 2002 and 2008 commodity futures contracts traded globally increased by more than 500% (Lilliston, Ranallo 2011). It must be stressed that commodity futures markets are predominantly traded "over the counter", which means that they are customized bilateral contracts made directly between two contracting parties, lacking the transparency of being traded on an open exchange at the stock market.

Speculators on Commodity Index Funds were not interested in buying underlying goods or in short-term movements in futures prices. Their strategy was to "go long", i.e., to continuously buy back futures contracts pur-

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[1] Price volatility refers to a continuous change in prices within a short period of time. Higher prices are usually related to an increase in market demand or to a decrease in supply. Extreme price volatility, on the contrary, is one the main symptoms of speculation.

[2] The "Gramm-Leach-Bliley Act", passed in 1999, completely repealed the Glass-Steagall Act approved in 1933 with the aim of mitigating financial speculation. The "Commodity Futures Modernization Act", passed in 2000, prevented the Commodity Futures Trading Commission from regulating most over-the-counter derivative contracts, including credit default swaps.

[3] A Commodity Index Fund is a fund based on financial instruments whose performances are linked to an index of selected commodities prices. A future is a contract that *derives* its value from the value of an underlying asset (an index, a commodity, a financial obligation). It is used to buy or sell something at a predetermined future date and price between parties not yet known to each other. Like other derivatives, a future can be used for different purposes, including insuring against price movement or speculation. What is important to stress here is that all these financial instruments enable new investment opportunities that are increasingly detached from the underlying assets, since they are driven by expectations and logics that are internal to financial markets.

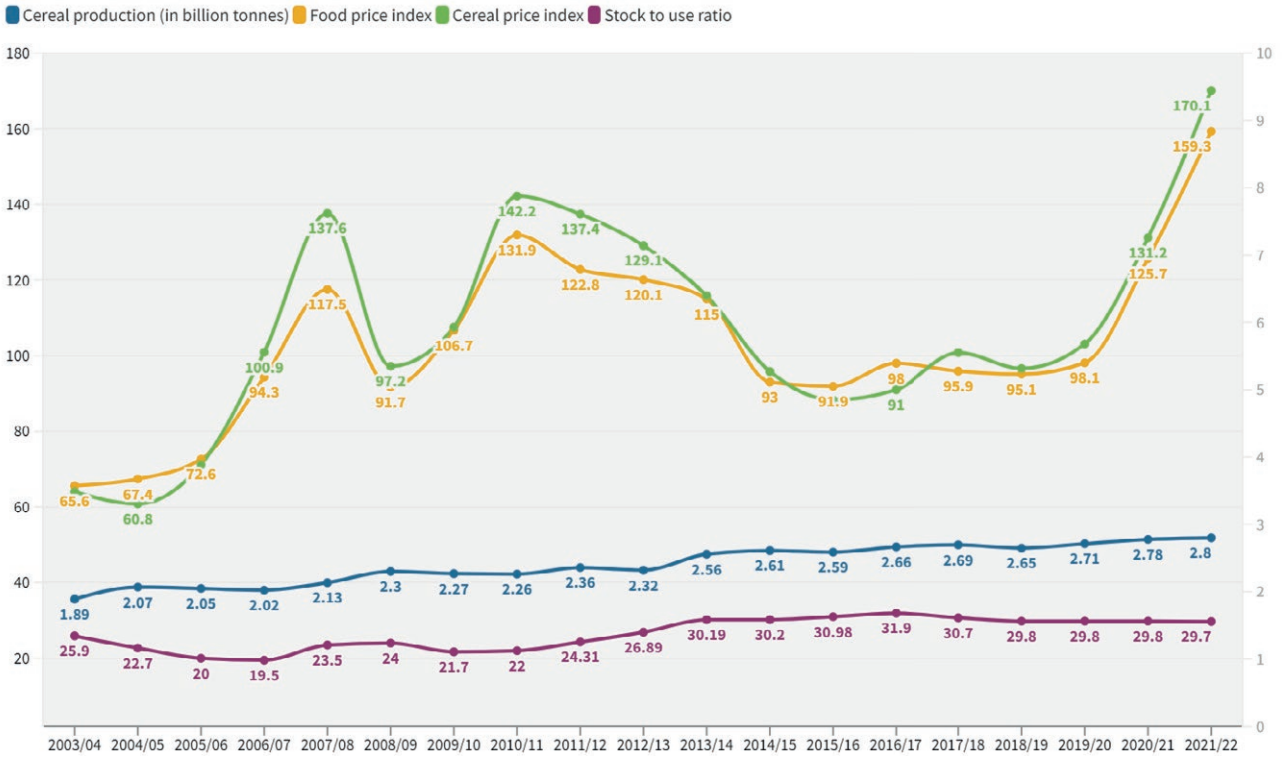

Figure 1. Cereal Production VS Food Price Index. Source: FAO - Data for 2021/22 are estimates. Originally published in The Wire, May 2022: https://thewire.in/economy/speculation-is-contributing-to-global-food-insecurity-significantly. Related data from FAO are available at: https://www.fao.org/worldfoodsituation/foodpricesindex/en/.

chased at a lower price and resell them at a higher price before their deadline, thus reinvesting in futures with later maturities. Financial analysts fed this process by providing forecasts of further price increases. Real market players were encouraged to increase their agricultural reserves in anticipation of future earnings, thus increasing farm prices by reducing supply in accordance with the traditional speculative approach (Gosh 2010; HLPE 2011; Conti 2012; Sivini 2009).

Mainstream refusal of the speculation hypothesis is based on the argument that there would not be robust theoretical and empirical elements linking speculation to discrepancies between future and spot prices (Sanders, Irwin 2010). Food securitization, it is argued, could also improve the economic efficiency of the food marketing system, allowing buyers and sellers of agricultural commodities to indicate their expectations of price movements. As well as classical forward contracts between producers and buyers, used to provide a guaranteed future price to producers, futures traded on exchanges such as the Chicago Board of Trade (CBOT) are expected to reduce risks related to price fluctuation.

A possible counter argument is that, unlike in the case of forward contract subscribers, participants in financial markets usually are not directly engaged in agricultural production or distribution. Indeed, as financial exchanges linked to agricultural commodities have been progressively deregulated, new non-commercial players have emerged who are not interested in increasing price transparency and stability, but, on the contrary, in realizing capital gains through speculation on price fluctuations.

In the case of financial derivatives on agricultural commodities, the latter are used as collateral (a real product to be consumed) to justify the financial exchanges on the futures markets. Due to the deregulation of financial markets, however, the overall amount of commodity traded in the futures markets is much higher than the real quantity produced globally (Sivini 2009). Therefore, financial speculation does not provide liquidity to the com-

modity market with the aim to make it frictionless and more efficient in the definition of prices. Instead, the prices of agricultural commodities are defined by the financial markets according to the expectations of financial speculators, this being increasingly disconnected from trends in the production of real goods. This way, agricultural production (including stocks and food reserves) becomes a secondary aspect driven by financial speculation.

This is not to say that existing reserves do not have any impact on the decisions made by the different economic actors. Yet, it should also be considered that many reserves of food are now controlled by transnational corporations (TNCs) which, despite being originally trade-oriented, make most of their profits through financial operations (Burch, Lawrence 2009). Hence, reserves are affected by the price volatility caused by financial operations much more than by the underlying dynamics of agricultural production (Lagi 2011)[4]. As clearly shown by Figure 1, the high fluctuation in food prices over the last two decades is disconnected from food production, which has increased. This also applies to the dramatic increment of food prices from 2020 onwards. In this case, price inflation has been fueled by the pandemic and ongoing geopolitical tensions which deeply affected the behavior of financial investors, while having a limited impact on the global food supply[5].

FINANCIALIZATION AND FOOD SECURITY

In the light of the above, to fully understand food security emergencies it is necessary to look at the mechanisms through which prices are transmitted from financial markets to products and local markets, as well as to analyze the wider impact of financialization on wealth distribution and agrarian structures.

In the case of the 2007-2008 crisis, even though at first large farms may have benefited from price inflation, as seen in the United States, in the long run they had difficulties avoiding the effects of price volatility and high borrowing costs. They suffered from the price differential between the stock market and real market prices, the rising production costs caused by the oil peak, and soaring consumer prices. At the same time, farmers in developing countries distilled false messages from volatile prices (Polgreen 2009). This phenomenon led to bankruptcy and the abandonment of production by small farmers who were investing and borrowing to expand their production during the rising prices – thus exposing themselves to the risk of being wiped out as global food prices dropped. Ultimately, financial speculation on agriculture commodities, and the subsequent food price volatility, led to the expulsion of the weaker actors from the market, resulting in a further concentration of the land in the hands of agribusiness (Sivini 2009).

This suggests that, while creating new profit opportunities for speculators and agribusiness, the penetration of finance into food systems is also likely to increase uncertainty and imply new risks for producers. Some of these risks are widely acknowledged also by key global development actors. Yet, such as in the case of the United Nations 2030 Agenda, the dominant narrative keeps being rooted in a "market episteme" (Weber 2017), portraying finance as an effective solution to improve food security (Fama, Corrado 2021; Fama 2019a; McKeon 2017; Spann 2017).

Needless to say, the same definition of financialization, and the way to frame it, may vary enormously whether one decides to embrace a neoclassical, a Keynesian or a Marxian approach[6]. It is far beyond the scope of this

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[4] To be more precise, depletion of reserves is a consequence of speculation, which commonly generates volatility, while the reconstitution of reserves, although affects the supply and demand mechanism, cannot influence the price volatility generated in the financial market.

[5] The surge in fertilizer and energy costs that followed the invasion of Ukraine certainly contributed to the rise in food prices, but it has itself been largely driven by financial speculation.

[6] At the risk of simplification, neoclassical theory can be described as a microeconomics-based approach assuming that individual choices are determined by perfectly rational maximizing behavior, with the resulting supply and demand dynamics leading the economy toward a "natural" market equilibrium in which unemployment is essentially voluntary. From this point of view, financial speculation can be simply seen as the rational activity of an economic actor taking certain risks against the possibility of adequate remuneration. Keynesian theory builds on macroeconomics, showing that effective demand strongly influences economic income and that there can also be a non-optimal market equilibrium with high rates of unemployment, except by accident or design, especially when

work to delve into existing theoretical disputes. From an empirical standpoint, however, the 2007-2008 food crisis provides overwhelming evidence that financial markets, in a context marked by their increasing deregulation, are engendering pricing mechanisms, and dynamics of wealth distribution, that cannot be fully explained from a neoclassical stance.

As observed by André Orléan (2005), financial markets rarely function as supposed by the advocates of the Efficient Market Hypothesis (Jensen 1978). Instead, they tend to be "self-referential", characterized by information asymmetries and mimetic behaviors which are all but guided by a perfect economic rationality. This is not to say that financial markets are completely irrational and unpredictable. On the contrary, the decisions made also by a single big investor can deeply affect price fluctuation, which means that the entire market can be controlled by restricted groups of exclusive players. In this sense, financial markets cannot be regarded as a neutral instrument, as they reproduce asymmetrical power relations, having specific effects on wealth allocation.

The case of the food system is, in this regard, insightful. Some of the most relevant works on the financialization of agriculture after the food crisis have been developed by Isakson (2014, 2015) and Clapp (2014, 2012), first individually and more recently together (Clapp, Isakson 2018; Clapp, Isakson, Visser 2016)[7].

According to the two authors, the process of financialization contributes in several ways to what they define as *distancing*. Financialization, they argue, "abstracts food from its physical form into highly complex agricultural commodity 'derivatives' that only seasoned financial traders fully understand" (Clapp 2012: 2). Moreover, the financialization process increased the actors and steps involved in the global commodity value chains. In this context of *distancing*, farmer organizations' capacity to influence the agrifood sector decreases, and it becomes difficult to distinguish a) the agricultural sector and financial sector, b) the actors involved in agrifinance, c) the activities related to financial investments vs 'real' investments (including the distinction between hedging and financial speculation in the agricultural commodity markets).

Ultimately, for Clapp and Isakson financialization is a process that "opens up new arenas for capital accumulation", entailing the "increasing prioritization of returns to shareholders over other values in corporate management" and "the permeation of financial values and activities into the everyday practices of social provisioning" (Clapp, Isakson 2018: 438). Their main conclusion is that this process generates inequalities and compromises the socioecological resilience of food systems, feeding a mechanism through which TNCs and financial actors extract wealth from the agriculture sector at the expense of farmers and consumers. Furthermore, they make the point that the opacity of the financial system also plays a role in inhibiting collective and political action, enhancing the *distance* between local actors and decision-making spaces.

The lens provided by Clapp and Isakson sheds new light on the nature of financialization as a process that entirely pervades social relations. Its power to deeply affect food security shows that finance functions as an arena that dictates the conditions of possibility under which everyday life decisions, not only the economic ones, are taken.

In this regard, even departing from a different analytical angle, Isakson and Clapp's understanding of the implications of financialization largely coincides with that of more radical finance scholars, who read financialization as a stage of the accumulation (by dispossession) processes underlying capitalist development (Harvey 2011; Marazzi 2009; Fumagalli, Mezzadra 2009). In this case, the penetration of finance into new spatial and social spheres is understood as an effect of a political response to the crisis of capitalism that is aimed at reorganizing the entire economic structure, and the underlying processes of value extraction, from above. The resulting subordina-

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uncertainty about the future pushes liquidity holders to hoard their money. Demand for money, according to Keynes, can also be driven by speculative purposes, fuelling financial dynamics detached from economic production. Marxian critique of political economy analyzes the evolution and the crises of capitalism – including the surge of financialization processes – from a dialectical and historical perspective, focusing on the nature, the origin and the distribution of economic surplus-value, as well as on how class relations and struggles, along with other factors such as technological innovation, affect the dynamics of social production and reproduction (Lucarelli, Lunghini 2012).

[7] Isakson and Clapp assume Epstein's "agnostic" definition of financialization (2005), understood as the "increasing importance of financial markets, financial motives, financial institutions, and financial elites in the operation of the economy and its governing institutions, both at the national and international levels".

tion of economic production to financial speculation would imply the transformation of all aspects of social life into financial assets, that is, into a potential source of financial profit[8].

THE FINANCIALIZATION OF AGRICULTURE AND THE LONG-TERM TRAJECTORIES OF CAPITALIST DEVELOPMENT

For the purposes of this paper, it is important to achieve a better understanding of how financialization is linked to the long-term social, economic and ecological transformation of the global food system. To this end, the food regimes theory, along with other approaches inspired by the world-system analysis, is particularly insightful.

A good starting point for understanding financialization also from a historical perspective is represented by Giovanni Arrighi's "Systemic Cycles of Accumulation". For Arrighi (1994), who is deeply inspired by Fernand Braudel, the history of capitalism can be described as a sequence of accumulation cycles hinged on specific hegemonic centers. Each cycle is characterized by a first phase of material expansion, where surplus capital finds reinvestment opportunities in the "real economy", and a second phase of financial expansion, in which over-competition and social conflicts led to a dramatic fall in the rate of profit. In this latter circumstance, fixed capital investments decline, and liquidity shifts to financial markets. For a certain period, as long as they continue to grow, financial markets allow the accumulation cycle to be prolonged by the means of dispossession processes driven by financial speculation. Eventually, however, the cycle enters a terminal crisis, that may lead to a phase of "systemic chaos" (Arrighi, Silver 1999), until the global economy is reorganized under the guidance of a new hegemonic center that is able to re-establish the opportunities to invest in the real economy, giving rise to a new material expansion.

Focusing on the role played by agriculture in the long-term trajectories of capitalist development, McMichael and Friedmann (1989) elaborated a scheme similar to the one proposed by Arrighi. They show that accumulation cycles also tend to coincide with specific ways of organizing the world food system, since hegemonic centers exercise control over food production and distribution at a global level. Thereby, agricultural transformations and agrarian change dynamics should be read in the light of geopolitical patterns of accumulation.

From this perspective, the crisis of the accumulation cycle guided by the United States would coincide with the crisis of a specific food regime that emerged after World War II. This regime was characterized by the strategic role played by US food surpluses in the establishment of a new geopolitical order, as well as by the diffusion of heavily subsidized agricultural models, oriented toward continuous productivity improvements through mechanization and chemical inputs.

From the late Seventies onward, neoliberal globalization – by redefining state interventionism, transferring regulatory powers to global institutions and opening new spaces for private actors – would have paved the way for the emergence of a new "corporate food regime" (McMichael 2005). As a matter of fact, from structural adjustment in the 1980s, to the WTO Agreement on Agriculture that came into force in 1995, public support to farmers has been progressively dismantled, and so has their guarantee to have access to land, credit, insurance, inputs, and cooperative organizations.

World Bank and International Monetary Fund's support to the liberalization of agricultural markets was intended to allow developing countries to pay their debt, as well as to improve global food security through market expansion. Thus, developing countries were forced to promote export monocultures and import food staples from industrialized countries, which, on the contrary, continued to protect their domestic markets and subsidize their agriculture. This way, local products have been expelled from national and regional markets, with an increase of people suffering from food shortages. Farmers from developing countries have been marginalized, while subsidies in Europe and the US caused strong concentration processes, building an agricultural model largely based on big farmers working for the agribusiness (Sivini 2008).

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[8] It is worth recalling that food plays a central role in both the productive and reproductive sphere. Food can be a means of subsistence, a commodity, a vehicle of sociality, and a symbolic tool for identity construction at the same time.

These transformations have been widely discussed in the realm of food regime theory, where scholars have not always agreed on whether, and in what terms, we should speak of a "new" food regime. Friedmann (2005), for instance, elaborated on the notion of a "corporate-environmental food regime", stressing the increasing power of the food retail sector over agri-food supply chains and the parallel emergence of "greening strategies" inspired by contrasting visions and discourses of sustainability.

Here, we believe it is important to underline that the financial markets have been key to the recent redefinition of the global food regime. As observed also by Clapp and Isakson (2018), the progressive withdrawal of public support to agriculture has allowed financial actors to play an increasing role. Most importantly, by taking over the reins of global agriculture, TNCs ended up subordinating food production and distribution to profit expectations increasingly determined by financial dynamics. While in past decades TNCs used to set agricultural prices by monitoring production along the global value chains, over time they started to act as financial investors controlling the sale of rights on future prices of agricultural products, a behavior that is likely to engender speculative bubbles and consequent food price crisis, such as in 2007-2008.

Ultimately, to quote Burch and Lawrence (2009: 275), what is new in the current scenario is "the role played by a number of financial institutions and instruments that have the capacity to re-organise various stages of the agri-food supply chain, and to alter the terms and conditions under which other actors in the chain can operate". This brings us to the notion of a "financialized food regime", in which global commodity markets are increasingly seen as a source of potential opportunities for a quick speculative profit, at the expense of food security and price stability.

From an empirical standpoint, and merely focusing on price dynamics, it must be said that the neoliberal/financial reconfiguration of the food regime has, at first, allowed for a general decrease in food prices. In the medium term, however – with the consolidation of the agribusiness model and the increasing dependence of agriculture on oil, chemical inputs, mechanization and transportation – food prices have started to dramatically increase (McMichael 2008).

THE END OF "CHEAP FOOD"?

A slightly different framework for understanding agricultural crises and the rising trend in food prices is provided by Jason Moore (2018, 2017, 2016, 2014, 2010). Drawing on Arrighi's intuitions, Moore elaborates on the role played by agriculture in the shift from the financial to the material phase of an accumulation cycle. Moore redefines the accumulation of capital as a socio-ecological process based on two key concepts: the ecological surplus and the capitalization of nature. The ecological surplus is provided by four main socio-ecological relations: labor-power; food; energy; non-energy inputs (metals, wood and fibers). All these socio-ecological relations or inputs can be considered "cheap" in relation to the organic composition of global capital – the fixed and circulating moments of constant capital. The ecological surplus stems from the combination of capitalized production (e.g. farm mechanization) and appropriation of nature at zero cost: e.g. energy-intensive agriculture is based on the appropriation of geological production of nature as water and oil.

Moore traces back capitalist agricultural revolutions to the goal of achieving food surpluses. In his view, agriculture plays a foundational role in the capitalistic system, provided that the price of food is the main driver of the reproduction costs of the whole system. The food-labor relationship is the core relationship of capitalistic development, as the price of food determines the value of commodified labor-power and the capacity of capital to extract surplus value.

According to Moore, all the hegemonic cycles of accumulation are based on agriculture (organizational) revolutions. On the contrary, a *crisis* of an ecological regime[9] begins when the conditions for an expansion of the eco-

[9] In Moore's view, capitalism *is* an ecological regime, i. e. a specific way of ordering the relationship between humans and the rest of nature. An ecological regime corresponds to a historically defined combination of class relations, technological configurations and geopolitical dynamics that participate in the production of nature (by which, in turn, they are influenced).

logical surplus start to erode and food, energy and inputs become more expensive (Moore 2010).

In the Arrighi-Moore paradigm, the accumulation processes find their premises in the capital penetration of the countryside. If this penetration does not generate agriculture innovation, the accumulation regime will shift to a financialization phase, within which profits turn into financial gains sustained by dispossession practices at the expense of the countryside[10].

In Moore's view, the recent crises are related to the incapacity to keep engendering an ecological surplus, something that in previous cycles of accumulation was obtained through agricultural revolutions causing a great leap in the yields (with small capital investments), rather than a simple increase based on a better allocation of resources.

The assumption of Moore is that in the neoliberal phase the opportunities for capital to appropriate nature – through an expansion of the existing ecological frontier – are reduced. As he explains, the previous drivers of agricultural revolutions were based on different forms of bourgeois territorial and property relations, technical innovations, and still available un- or undercapitalized nature. The neoliberal project pointed at starting a new era of "cheap food" through biotechnological revolution (such as GMO) and a new wave of "enclosures". However, while it has deepened differentiation and proletarianization processes among farmers, this project has not delivered any real leap in yields[11], or not enough to create a new expansion of production within a new systemic cycle of accumulation.

Moore's analysis of capitalism as a world-ecology is helpful to update the analysis of Arrighi on agriculture and connect with the analysis on the "financialization of nature" (including agriculture).

Arrighi pays close attention to how capital penetrates rural structures and to the related process of proletarianization of peasantry. He notices how the surplus capital accumulated in the cities brought into existence in contiguous rural areas commercial agriculture oriented towards the production of food for the urban population, incorporating these contiguous rural spaces within urban political jurisdictions either for strategic or for economic reasons, and to promote further their commercialization and modernization. In Arrighi (1994) the penetration of capital in the countryside is mostly related to the surplus of capital flowing in the agricultural sector and to urban gentrification. Arrighi (2007) also recalls the Smithian distinction between the *natural progress* of China and the *unnatural progress* of European nations, the former being directed towards the agricultural sector first, then to manufacturers, and lastly to foreign trade, while European progress started with foreign trade, to then develop manufacturing, and finally agriculture. According to this scheme, the capital invested in agriculture in China was more stable and secured.

What is relevant for our analysis is how the overaccumulation of capital during the financialization flows to the countryside to find new financial arenas. A good example of this trend is the land in the analysis of Fairbairn (2020, 2014), where the overaccumulation of capital reaches the farmland with the objective of portfolio differentiation, given that land is, at the same time, an essential factor of production and a reserve of value that can be, for all intents, compared to a financial asset.

By reshaping agriculture and investing in organizational revolutions of the production system, the financialization phase may shift back to material expansion. However, following Moore, this is not the case in a context where new opportunities to appropriate nature are reduced and emerging innovations do not allow to move the ecological frontier forward. In such circumstances, the financialization of nature became an end in itself, a process that implies the real subsumption of nature to capital. In other words, those used by the international network "Friends of the Earth", nature is divided "into different 'ecosystem services' that can be quantified, measured and above all, broken up into individual units, so profit can be made from selling rights to these individual units of nature" (FOEI 2015: 2).

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[10] This is the case of the expropriation of collective land rights and seed patenting mechanisms. Financial instruments are also used to incorporate small farmers into global value chains with the aim to redress apparent food shortages, exposing them to new debt and power relationships that jeopardize local food security (Fama 2019b, 2017; McMichael 2013b).

[11] Indeed, the aim of the globalization of agricultural biotechnology was not to increase the yields, but to stop the progressive decline in yield growth worldwide. In this case too, the failure was clear, (e.g. RoundupReady® crops) as super weeds have evolved to survive herbicides (Benbrook 2012). The result was a quicker evolution of biophysical nature than what capital can control.

CONCLUSION

The increasing penetration of finance into agriculture and the global food system is producing highly controversial outcomes, as shown by the 2007-2008 food crisis.

Mainstream reading of food insecurity keeps looking at supply/demand fundamentals, connecting high prices to food shortage and promoting market-based solutions aimed at improving agricultural productivity and fostering smallholders' integration into global value chains. Even for the analyses that recognize the risks inherent to the financialization of agriculture, policy recommendations are limited to some sort of mild adjustment of financial markets. Often, there are even calls for incrementing the role of the financial actors in the agricultural sector, as a way to build a more "sustainable" and resilient global food system (McKeon 2017; Spann 2017).

On the opposite side, critical studies link food insecurity to the extreme price fluctuations caused by financial speculation, pointing a finger at the agribusiness model and its progressive hybridization with the world of finance (Sivini 2009). In this case, the agribusiness formation is understood as the result of multiple dispossession processes (McMichael 2013a) that have penetrated agriculture at a global level, causing the expulsion of millions of peasants, the marginalization of millions more, and the subordination to global value chains of those who still carry out agricultural activities.

On closer inspection, financial speculation created the conditions for the agribusiness to increase its profits by transferring price management risks from the futures market to the real one, as the latter can be controlled more easily (Patel 2007). This is nourishing unequal distribution dynamics that are likely to seriously jeopardize global food security, also compromising local actors' capabilities to cope with exogenous shocks such as the COVID-19 pandemic.

More in general, the impact of finance on food systems further proves that financialization is far from being a process that affects only specific actors and sectors of the economy, since, on the contrary, it pervades the daily life of millions of people. This has become particularly evident during the subprime mortgage crisis that occurred between 2007-2008, which also provided clear examples of how the same instruments that were supposed to improve financial inclusion and risk mitigation ended up becoming a vehicle of speculation, allowing the extraction of value from new nonfinancialized sectors. As pointed out by Saskia Sassen (2014: 137):

> Finance has been extremely successful at extracting value from many an economic sector and from chains of derivative on derivative in an often long sequence. However, when everything in a sector has become financialized in a long chain that consists basically of finance building instruments on finance, then there is no longer value to extract. At that point the sector needs new nonfinancialized sectors to build on.

According to Sassen, this dynamic is at the core of the processes of exploitation and "expulsion" that characterize the development of contemporary capitalism, in which even non-financial economic sectors, regardless of their product, are exposed to the structural crisis of financial markets.

At any rate, if we assume a historical perspective, financialization should not be read as a kind of technical or moral "degeneration" of global capitalism, but rather as a predictable evolution of it caused by obstacles that cyclically interfere with the process of accumulation. Hence, to fully understand the roots and to analyze the possible evolution of agricultural financialization, it must be linked to the long-term trajectories of capitalist development. With the support of the analytical tools provided by world-system (Arrighi 1994) and food regimes theories (McMichael 2009), this operation allows us to grasp the deepest meaning of the recent agricultural crises, as symptoms of an overall redefinition of the accumulation strategies that, while seeking to reactive the capitalist development, engender new contradictions.

The rise of a "financialized food regime" (Burch, Lawrence 2009) can be understood, at once, as an example of these contradictions and a result of a period of "systemic chaos" (Arrighi, Silver 1999) that could lead to other crises, until producing the conditions for a new phase of material expansion.

At the same time, the extraordinarily frequent crises of the last few decades, in a context increasingly affected by climate change and characterized by the end of "cheap nature" (Moore 2014), may also represent the signals of the decay of a specific – historically determined – ecological regime.

Against this background, the proposals of transnational agrarian movements (Edelman, Borras 2016) for the reshaping of the global food systems should be taken seriously, as they offer practical solutions to cope with ongoing food and environmental crises and fill the *distance* evidenced by Clapp and Isakson (2018). In any case, these movements must confront themselves with the new challenges posed by finance, since this currently represents the main arena in which the conditions of change are set. Further research able to equip both the academic community and civil society with the instruments needed to succeed in this arena is more than welcome.

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