

CHAPTER 1

Floors, Fields, and Famines

Greg O'Leary is walking the Chicago Board of Trade wheat pit near the close of a day's session in mid-December, 2010. Prices are up today. Egypt, the world's biggest wheat buyer, has bought 110,000 tons of hard-red winter wheat from the United States, which ships more of that crop than any other country. Jordan has bought another 150,000 tons. Exports have boomed since a summer drought pushed Russia, Egypt's main supplier, to slap an export ban on its harvest. That's driving North African and Arab nations to U.S. sellers to stave off food shortages and higher prices.

The day's most traded wheat contract, the one that requires delivery in March, ends the session up one-and-a-half cents, closing at \$7.6475 a bushel—the exactness of buyer-and-seller haggling in Chicago means futures prices are rounded to the hundredth of a cent. It's an up-and-down day in the pit. Prices had been as high as \$7.71 earlier, which would have been the biggest jump in a week. Then the dollar started strengthening, and that made buyers worry that the exchange rate may make U.S. wheat less competitive than Canada's or Australia's.¹ Wheat prices are up 41 percent for the year, and investors who had stayed on the sidelines during the global financial crisis are piling back in. After the market closes, Barclays Capital will announce that commodity assets under big-bank management have reached a record \$354 billion.² That's one-third more than one year ago and four times what it was five years ago. The world economy is growing again. That means more meat, more metal, and more gasoline as the world's producers try to meet the planet's endless appetites.

O'Leary is on the floor partly to make money, partly to share market gossip with his friends, and partly out of nostalgia. He started working in the pit in 1980, a farm kid from Newton, Illinois, fresh out of high school, running messages for a trader. The frenetic pace didn't leave time for college—"I went to the college of the Chicago Board of Trade," he says—but over three decades he accomplished something much more difficult than what many degrees require. He mastered markets—the math, the methods, and the will-power needed to successfully buy and sell soft-red winter wheat, the variety of the grain traded in Chicago.³

O'Leary makes his money watching the spread in prices among different wheat contracts, looking at the differences between March, May, July, September, and December prices and pouncing when one seems out of line with another. Profits off the spread can be very small, but they add up over time. Chicago trading is all-consuming and high-risk, with fortunes made and lost in a day—as long as you can keep your accounts in order, you can keep playing, and for more than 160 years, it's been a way of life. Collectively, the bets average out into some of the most stable food prices in the world. The runner from Newton became an independent broker in 1993. Today O'Leary heads his own firm, a member of the world's most important commodities exchange. He takes his spot in the octagon, gets an employee's update on the flow of the market, and readies for the close.

He doesn't actually have to do any of this.

Electronic trading has swallowed open outcry in the Board of Trade futures pits. On a platform where more than 150 traders used to elbow one another for position in the terraced octagon where they stand to make their bids and their offers for wheat, maybe one-tenth that many are present for today's 1 P.M. close, which, along with the opening bell, is the most heavily traded period. The pits where traders buy and sell options contracts, a more-complex instrument that's tougher to translate to the electronic world, are still close to full. In the adjacent futures pit some traders are sitting on the top step, reading newspapers, chatting, or gazing elsewhere, counseled by their thoughts. All of them, including O'Leary, have wireless laptops slung over their shoulders so they can buy and sell electronically—which they do in their offices, at home, and on their vacations—while anticipating a stray offer to be made on the physical floor.

Commodities exchanges from Sydney, Australia, to Minneapolis, Minnesota, have ended open outcry altogether. Chicago's remaining pit traders also trade electronically, where more volume and greater volatility—and thus greater potential for profit and loss—awaits. O'Leary says the floors still serve a purpose. Sometimes a seller doesn't want the electronic universe to

immediately know he's selling grain. Sometimes, a seller just wants to negotiate with another human being.

"Some days I get mad and I'm like, I'm not even going to go electronic," O'Leary says. "I'm just going to bid and offer. I don't want to play pinball."

He sighs. "Eventually it's all going to be gone. You'll reach a point where you're not going to be able to sell it the way we do it."

A bell rings to note that closing is moments away. O'Leary leaps to place his bids, and for two minutes, sales fly fast, like old times. Trading closes. Everyone goes back to their e-mail, except for a couple younger brokers who have challenged one another to a ping-pong game upstairs. Chicago is covered in snow. The market settles its last contracts, and the floors are swept of a court of confetti-like receipts, artifacts of momentary profits and losses. Traders linger at their desks, mull their fortunes or lack thereof at nearby bars, and step into the cold Lake Michigan air, hustling home through the holiday night.



Chicago is asleep. Morning is warming Tunisia. Mohamed Bouazizi, who supports his mother, uncle, and younger siblings by selling produce from a street cart in Sidi Bouzid, a four-hour drive from the capital, Tunis, begins his daily walk from his three-room stucco house to the market in his hometown, where nearly one-third of the workforce is unemployed and the nearest movie theater is 80 miles away. Bouazizi buys produce from farmers and sells it to passersby. Sometimes his sales are stymied by authorities, who harass him and block his efforts to sell fruit, saying he doesn't have a proper permit. Today his food, which he bought on credit, is confiscated. His mother later says her son is publicly humiliated by a city official, a woman who slaps him when he tries to protect his apples. His scale is taken, too, and his cart is overturned, scattering its contents.⁴

Food prices are rising in Tunisia, a country that imports more than twice as much grain as it produces. Bouazizi has had enough. He heads to the local government office to complain. No one listens to him. Outraged by his treatment, shortly before noon he douses himself with paint thinner and sets himself on fire in protest. The fire sears his clothes onto his body and burns off his lips. He lingers in his hospital bed while his rage at Tunisia's government sparks nationwide protests against high unemployment, political repression—and the high cost of the food sold from street carts and supermarkets. The protests spread. President Zine El Abidine Ben Ali, for more than two decades the strongman of Tunisia, unsuccessfully attempts to defuse the

disturbances by announcing a massive jobs program to lower youth unemployment, belatedly visiting Bouazizi at his bedside, and feigning sympathy for the frustration his own government has created.⁵ The protesters greet his gesture with derision, attacking police stations and government offices.

Bouazizi dies of his burns in less than three weeks. Ben Ali's regime outlives Bouazizi by 10 days. The street vendor's death intensifies the protests, and the violence, and the president flees the country. Riots spread to Algeria, shortly to be followed by protests in Egypt, where an annual \$3 billion in subsidies for food-buyers isn't enough to curb outrage at rising bread prices. Tensions are building in Libya, which imports 90 percent of its grains.⁶ Bread becomes a common theme of the North African and Middle East revolutions that erupt. Baguettes are held aloft by protesters. Frying pans, tin-pots and water buckets are the new suits of armor—an unleavened pancake taped across one's head is useless against a bullet but powerful as a symbol.⁷ Chicago wheat is still rising. The United Nations has officially put world food prices at a record high. In Tunisia, Algeria, Egypt, Syria, and Yemen, throughout North Africa and the Middle East, bloodshed is an additional cost.



The price of food—the cost of a loaf of bread in a supermarket, brought to you via a global system of farmers, purchasers, processors, distributors, retailers, and consumers—some with more money than others—some with more information than others—some with more varieties than others—the system that in many ways decides who gets to eat and who doesn't—the system that connects Greg O'Leary, to a family budget, to Mohamed Bouazizi, to a revolution, to you—starts with a simple question:

What's it worth?

For Hugo Alejandro and his buyers, it's worth the long haul.

The white-gravel road from Estili, Nicaragua, grinds nerves and revives old injuries. The drive to the tomato farm is supposed to take 20 minutes. I've spent more than an hour veering among outcroppings of white-chalk rocks and ribbons of pavement that are modern for one mile and moonscape the next, trying not to crack my skull against the ceiling of the SUV—a veteran of the winding roads of rural Nicaragua—and still, no tomato farm in sight. Just rocky road and mountains and endless, disorienting turns.

Santos Palma, the Catholic Relief Services manager driving the SUV, jokes that the drive will do me good. "*Tienes que ver el campo para saber donde comprar su finca en Nicaragua,*" he says—you have to see the countryside so you know where to buy your farm in Nicaragua. My Spanish is limited, so

I don't try to tell him I've heard a variation of his joke before. I fiddle with my camera, which isn't working right, and hope this ride ends soon. This is the last day of my five-month, four-continent quest for answers. I would like to end it with bones intact.

We're wondering if we'll have enough gas to get back to Estili. I am not looking forward to being stranded on an isolated rural road the night I'm to leave Managua. Santos is unworried—of course, he started his Catholic Relief work as an emergency coordinator immediately after Hurricane Mitch hit in 1998, so he's dealt with bigger concerns than my red-eye flight. Just when we start serious discussions about turning back, we arrive at the farm of Hugo Alejandro. The farmer grows six acres of tomatoes, corn, cabbages, and onions in a field nestled in the sparsely populated highlands of northern Nicaragua. He's lived in the region his entire life, and he carries a daily reminder of its turbulence: a wrist that bears a silver-dollar-sized lump that's the legacy of a *Contra* rebel bullet that pierced his body and ended his two years as a draftee in the Sandinista army during the 1980s, fighting for control of the country. When asked to sign his name, Alejandro, now in his mid-forties, hands the notepad to his wife. He has never spent a day in school.

And until four years ago, his tomatoes seldom traveled far from his farm.

Alejandro has become an expert in the latest methods of growing tomatoes, as have his children, all of whom have made it through at least sixth grade. The perishable, but profitable, fruits and vegetables he grows are aided by drip-irrigation technology that reduces energy and water use, and they're being sold in supermarkets owned by a new buyer that demands consistent quality and exact food-safety standards—Walmart, which has expanded into groceries in Latin America. ACORDAR, a U.S. Agency for International Development project with partners that include Catholic Relief Services and Lutheran World Relief, is helping Alejandro's family with training and financing.

The spring harvest is beginning. Alejandro is holding ripened tomatoes in his stronger right hand. "We have to produce better vegetables if we want the supermarket to buy vegetables from us," he says in Spanish. "People who buy in the supermarket have money, and they want quality for their money."⁸

We spend about half an hour on his property, talking about irrigation, his children, and how the new supermarkets give him extra income he uses to buy fertilizer to boost yields of the crop that feeds his family as well as the grocery shoppers of Estili and Managua. Time is short because the drive took too long, and it's best to be on the highway before dark. We settle in for another

bone-rattling hour, likely the last I ever spend on this road. Tomorrow I'll be back in the United States at a reception toasting press freedom near the U.S. Capitol dome. Alejandro will have his harvest, and these roads.

To haul tomatoes.



Abebech Toga, an Ethiopian farmer and mother of six living in the country's Southern Nations region, wants to send her children to college. She markets her corn and her fair-trade coffee through her local cooperative, and she studies market trends everywhere from the local outdoor bazaar in her town of Sodo to the Chicago Board of Trade. She hears the latest prices over the radio and through her cell phone, and the information—soon, she hopes, to be accompanied by better roads—connects her to the local, regional, national, and international marketplace that needs her crops.

Like Alejandro, Toga is a smallholder farmer, called such because she farms a small plot of land in places where subsistence production and incomes are common. The walls of her mud-hut home are decorated with posters of the Periodic Table, the English alphabet, and President Barack Obama, all meant to inspire her children. She is the designated trainer of other farmers in her village, showing them how to reduce moisture in their crops and prevent losses after harvest through an initiative offered through the World Food Programme called Purchase for Progress. The initiative attempts to create a market for growers of corn like Toga who need reliable buyers for the surplus they don't consume themselves. Eventually, when the program exits her area, the hope is that she will have the training and experience to sell high-quality corn at fair market prices to become a competitive businesswoman in a better-fed Ethiopia.

"A farmer needs a market," she says.⁹

Toga and Alejandro are trying to do what every human tries to do—stay nourished, be healthy, and create a better life for their families. For many of the world's poorest people, many of them farmers in rural areas but also living in cities, many of them living in impoverished nations but some of them in the richest nations on earth, that task is becoming more difficult. For nearly one billion, it is at times impossible.

The world is in a new era of rising and shifting food costs that thwart solutions even as suffering increases around the globe. Hunger that declined for decades now stubbornly refuses to fall further as high prices and turbulent weather have stopped three decades of progress in its tracks.

In 2009, hunger affected a record number of people as costs fluctuated after a price spike that began in 2007 started pushing more people into poverty. Another surge in 2010 sent prices to a new record early the next year, at levels twice where they were five years earlier.

From 2007 to 2009, more than 60 food riots erupted worldwide, leading to violent deaths in Egypt, Cameroon, and Haiti and putting the number of global hungry on a trajectory that, in 2009, topped a billion for the first time.¹⁰ (See Table 1.1.) The food-price spike of the past decade has returned in this one. Starting with the drought that withered wheat in nations of the former Soviet Union in 2010, a new round of unrest began with food riots in Mozambique in September, gained traction in Tunisia, and ultimately became a crucial part of the volatile blend of youth unemployment, long-simmering dissatisfaction with corrupt rulers, and political awakening that has touched off demonstrations from Morocco to Oman, toppled dictators in Tunisia and Egypt, and fed civil war in Libya. Frustration with the price of bread, gasoline, and other consumer staples fed the riots, with governments unable to calm the discontent. Low-income countries are especially vulnerable to instability when food prices rise and have been for decades, a 2011 International Monetary Fund report found; more frequent rises in food prices creates more frequent unrest.¹¹

Dissatisfaction with the price of groceries, and its part in an explosive mix of politics and outrage in developing regions, has brought crop supply-and-demand, normally the realm of agricultural economists, to public attention. By April 2011, World Bank President Robert Zoellick warned that the planet was one more shock away from a full-blown food catastrophe. As high food prices pushed an estimated 44 million people into poverty, according to the World Bank, forecasts for global hunger were rising, and the United States,

TABLE 1.1 Number of Undernourished People in the World (in Millions) and Proportion of Undernourished People in Developing Countries

Year	1969–71	1979–81	1990–92	1995–97	2000–02	2005–07	2008	2009	2010
Number of undernourished people	878	853	843	788	833	848	921	1023	925
% share of undernourished	33	25	20	17	17	16	17	18	16

Source: "The State of Food Insecurity in the World," United Nations Food and Agriculture Organization, 2010.

food supplier to the world, struggled through a flooded spring and scorching summer just to keep up with demand.¹²

The losses due to hunger aren't only today's. Malnutrition stunts children's growth, weakens immune systems, and permanently lowers mental development, ending what little chance poor economies may ever have of developing their human capacity and competing with the rest of the world, according to Jeffrey Sachs, head of the Earth Institute at Columbia University and former director of the UN Millennium Project, which fights poverty in famine-prone regions.

"This isn't a short-term problem or fluctuation," he said. "The effects of hunger now last for generations. What we have right now is a large and rapidly growing world economy that is pressing against its limits. We're facing a world of scarcity."¹³

The failure to bring food security—the condition in which people know they will have reliable access to affordable nutrition—to the world isn't presently a failure of having enough food. World agriculture produces more calories per person, per day, than it did in the 1970s, even as the planet's population doubled.¹⁴ Crop and livestock production today is adequate to feed everyone, with food to spare—the world produces almost 2,800 calories per person each day, well above the 2,100 needed for adequate nutrition.¹⁵ Hunger comes from a lack of available food, caused by the disruption or disappearance of supplies or an inability to buy what's in stores. In a cruel irony, the people most trapped by hunger are often farmers themselves, stuck at subsistence levels that tip toward famine when crops fail and money is unavailable for necessary nutrition.¹⁶

Uncertainty over one's next meal isn't strictly a developing-world problem: About one in six Americans struggled to have enough food at some point in 2009.¹⁷ Hunger in richer nations, however, is less connected to volatile prices than in poorer regions. Food is more available in developed nations, as evidenced by the coexistence of hunger with obesity, which affects more than one-third of the U.S. population and more than 20 percent of the population in a half-dozen other countries.¹⁸ Problems with food waste, a major factor of inefficient food distribution, are also different. Rich countries throw away food bought from a store, while in poorer places food never even gets there because of inadequate storage. About 40 percent of food waste in sub-Saharan Africa happens in farms or warehouses.¹⁹ Better storage alone would save up to 20 percent of African grain production that is lost to microbes, pests, and lack of access to markets, according to a U.N. study.²⁰

Hunger may worsen in coming decades. The world's population, topping 7 billion in 2011, is expected to rise to 9 billion by mid-century and surpass

10 billion by century's end.²¹ Food demand will rise more steeply—70 percent by 2050.²² More people will want more food. They will also want better-quality nutrition, more convenient access to it, and more variety in their diets, as poor consumers become middle-class consumers in China, India, Brazil, and other emerging countries.

Bigger crops that can stave off famine will need to be grown without major expansion of land devoted to farming. Global growth in farm yields that averaged 2 percent per year from 1970 to 1990 have since stalled at just over 1 percent. Stagnant growth may continue as climate change and soil degradation trump new technology in the struggle for more productive land.²³ Much of the additional land that is available is in sub-Saharan Africa, the world's most hunger-prone region. Still, about 90 percent of food increases will have to come through intensification higher yields on efficiently used cropland, much of it already under cultivation, according to the UN.²⁴ Exhausted soils, depleted water, and pests will require sustainable farming practices, the UN said: "The food price spike of 2008 and the surge in food prices to record levels early in 2011 portend rising and more frequent threats to world food security."²⁵

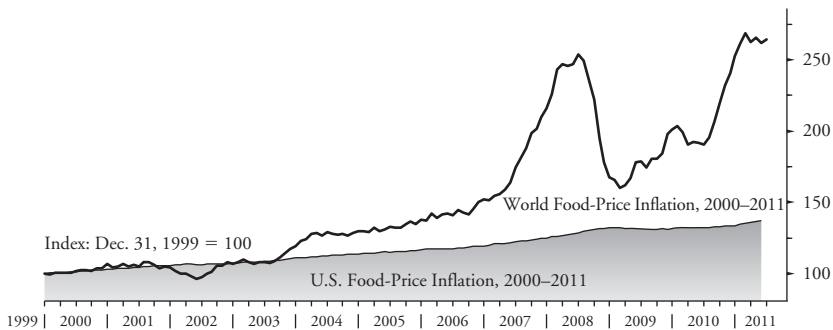
A globalized economy is interdependent, with more people wanting more food from beyond their own borders. Most of the food shipped around the world still is sent from the world's richer nations—the United States, the European Union, Canada, Australia—to the poorer, while rising powers like Brazil become more important. Go to a G-8 summit of the world's leading economies, and the people there will look very, if not exceedingly, well-fed. This global food market has brought wealth to some places—U.S. farmers in 2011 may see both record exports and profits.²⁶ Farmers today produce greater varieties of food for ever-more-diverse diets, from more meat in Asia to organic foods in the European Union and fresh-food farmers' markets of locally grown goods across the developed world. Yet, more than half of respondents in a global survey conducted in mid-2011 said they had changed their diets in the previous year because of higher food prices, in some cases by cutting back on fruits and vegetables.²⁷ Malnourishment is making a comeback.



Evidence of the market turmoil is the volatility of global commodity prices that's rising just as millions of investors have found new ways to speculate in crop prices, ironically in a quest for financial stability. Global financial instability and volatile markets are "contaminating" commodity prices, the newly

elected head of the United Nations Food and Agriculture Organization, Jose Graziano da Silva of Brazil, said in his first press conference after being selected to head the agency starting in 2012.²⁸ World prices set on trading floors that smoothed prices for decades are exporting volatility and creating unrest, even as a new class of investors—us, through our 401(k) plans and mutual funds—tie the fortunes of rich-nation wealth seekers to poor-nation consumers and farmers who struggle to feed themselves. Investment in vehicles tied to commodities prices—the energy, food, and metals that comprise the raw materials of human life—by early 2011 was 55 times larger than in 2000, directly connecting rich-world investors to volatile food costs. The effects of commodities trading on food prices is controversial. Regardless of cause, the price swings of global crop and energy markets have turned a quarter-century of stable food costs into a marketplace casino where demand pushes prices higher—and droughts drive them higher still—while a cooling economy or an unexpected gain in supplies cascade them down faster than any changes in how much people actually eat. From mid-2007 to mid-2008, world food prices rose 46 percent, then plunged 34 percent in the second half of that year, bottoming out in February 2009, even as U.S. prices, where commodity-price increases are more smoothly integrated into grocery costs, rose more slowly and steadily. From June 2010 to 2011, prices rose another 39 percent (see Figure 1.1). High prices are more harmful in countries that depend on imports for food and where poorer citizens spend a larger percentage of their income on food. The U.S. share of income devoted to food is less than 10 percent. People in impoverished nations may spend 70, 80 percent on a meager diet.

FIGURE 1.1 U.S., World Food Costs



Source: Bloomberg.

Our appetite for food is accompanied by a thirst for energy, which raises food-transport and processing costs. The price of a barrel of oil, barely over \$10 at one point in 1998, reached more than \$147 a decade later, placing an added tax on nutrition. Efforts to combat climate change and encourage alternatives to oil have increased production of biofuels, whose backers promise freedom from energy dependence while drawing acreage and production away from food in pursuit of that goal. As those demands increase, so does their pressure on food prices.

Weather has always been central to food markets; in the past century, everything from floods in South Asia to multiyear Dust Bowl droughts in the United States have crimped supplies. In a world of rising populations and food needs, destructive weather creates supply swings and trade disruptions that shutter borders and throw prices into chaos. Globally, changes in weather patterns may double food prices by 2030, with half of the increase attributable to climate change.²⁹ Water requirements may rise 40 to 100 percent, numbers that have been boosted by global warming.³⁰ Irrigation has been crucial to increasing food supplies, but it's being used inadequately in some regions while in others—including Saudi Arabia—over-reliance on irrigation depletes water tables and creates food-security mirages that won't last another generation. In 2000, half a billion people lived in countries short of water. By 2050, it will be 4 billion.³¹

Governments also contribute to higher, volatile prices, erecting trade barriers that inhibit the flow of goods from places of surplus to places of need. And in the most direct expression of the go-it-alone approach, some of them have turned to snapping up land in less-developed countries to grow food for their own consumers, a new land grab of questionable benefit to poorer nations. The list goes on. Declining crop surpluses have made food prices more sensitive to small shifts in supply and demand as a just-in-time model of food inventories leaves the planet vulnerable to shortfalls between harvests. A weaker dollar, the global food trade currency, raises export costs.

In the past half-decade food prices have spiked twice—in 2008 and in 2011—with riots and revolutions as results. The farmers who underpin global food security can raise production in response to higher prices and, over time, lower consumer costs while lifting themselves. But the fast ups and downs of the market add risk that poorer farmers can't take on. And so riots rise again, in Algeria, and Tunisia, and Egypt, in Oman, in Bahrain, in Uganda. . . .



Globalized supply and demand turns problems in one region into crises in others. Still, from that failure comes a chance for solutions that can help lift

millions of the world's poorest people from poverty—with the right access to markets and incentives. Today's casino is tomorrow's opportunity for the world's smallest farmers, its biggest businesses, and the consumers in between. The casino can be tamed, the planet can be fed, and famine can be banished to the past.

In Sabasaba, Kenya, a new agribusiness center is creating a gathering place for storing and selling bananas to shoppers in Nairobi and other growing Kenyan cities. Rebecca Wairimu Njoroge sells her fruit at the Sabasaba Agribusiness Centre in the Muranga's region and helps organize sales for her self-help farmers group, which local growers formed to bunch their bananas and finance investments in higher production.

"People are waking up, because what happened before was that we had produce, but we had no market," she said.³² She and her fellow farmers now benefit from connections to one another and to other customers, she said. Njoroge, whose education was limited at first because her brothers' training came first, eventually became a nurse. "In the old days, the girl had nowhere. It was not necessary to educate that girl. The boy was preferred. But today they are equal, even in job opportunity," she said. Now retired and returned to farming, she has extra money she uses to visit her son, who is a minister.

In Ohio.

In Nakhon Sawan province, in the heart of Thailand's rice bowl that feeds hundreds of millions around the world, Ronnachai Ruasrichan left nine years at a Taiwan factory making air-conditioning units for cars so he could return to the rice-growing he learned as a child. "I didn't want to live overseas as I got older," he said.³³ His paddies, on which he has learned to grow high-quality rice varieties, have yielded him enough income to buy additional land and an Isuzu pickup truck. He's wondering now how he can sustain his fortunes as grain prices rise and fall.

And in Soddo, Abebech Toga is showing her fellow farmers how to grow more crops, getting them beyond the age-old famine fears to using their potential to prevent it among others. All of them need a better market. But how to build it? The first clues are found on the floor—the trading floor, in Chicago.