E C O N O M I C S B U L L E T I N

Do the Malthusian fears ever die? A note on the recent increase in food prices

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Abstract

Beginning with a snapshot of the recent raise in food prices, the present paper put in question the hypothesis of it be a response to the near end of resources. Examining some medium and long-run factors that explain the evolution of food production, with special focus on cereals, using data of the World Bank for the last 45 years, and a regression for a cross-section of 106 countries, we show that: a) the capacity to feed a growing population has been associated to a sustained increase in productivity, measured by the cereal yields; b) the increase in cereal yields is negatively associated to the increase in land under cereal production; c) there is large room to go on increasing cereal production and productivity in low and middle-income countries, profiting from the productivity gap that differentiate them from the high-income countries. So, the main conclusion is that the Limits to Grow' perspective and the associated Malthusian fears have no empirical support.

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1. Introduction

The cost of food and other commodities has risen sharply, in recent time, generating a surge of debates and a range of policy responses, as can be seen in several Internet sites of well known international organizations[1]. All these sites have not only useful data illustrating the main related problems, but also provide some answers to the following questions: a) Why are food prices rising? b) What role has increased demand for bio-fuels played in the increases? c) What is the impact of high world food prices on income distribution- who benefits and who loses? d) How are the policy-makers responding in order to cope with negative consequences of those developments? e) What kind of influence do "emerging economies" exert on the global food markets? f) Has climate change played a significant role in influencing those developments? g) Are the prices likely to continue rising in the future? (see, IFAD, 2008). The answers provided in articles and working papers, as well as in the mentioned portals themselves, also discuss policy measures designed to minimize the negative effects of the rising food prices. A common conclusion of the abovementioned papers and debates is the undermining effect of record food prices for the economy because of their potentially harsh effects on inflation and income distribution.

However, while the impacts on inflation are uncontroversial, the negative distributional effects are debatable: some households benefit from higher prices, others are harmed by them, depending on whether they are net producers or consumers of such now-more-expensive commodities, and on the extent to which wages adjust to higher food prices. It is generally accepted that poor people, especially in urban areas, suffer due to rising food prices. Furthermore, Ivanic and Martin (2008) argue that the huge increases in food prices raise significantly the overall poverty in low-income countries. However in most, if not all, of such analyses the effects of prices are examined only on the demand side, the supply side is usually overlooked. Our analysis intends to call attention to the decisive role played by the long-run factors that shape the supply of foods, with particular emphasis in cereal production and productivity.

The range of policy responses that have been motivated by the high food prices goes from policies to reduce domestic food prices (reducing import tariffs and VAT, using buffer stocks to increase supply, generalized consumer subsidies, export bans /restrictions and producer price controls) to safety net programs (as is the case of cash transfers and food aid targeted to vulnerable people)[2]. Some of such policy responses, as is the case of the restrictions imposed on agricultural exports (see Zaman *et al.*, 2008), although understandable at domestic level in the short-run can, on the other hand, contribute to aggravate the problem both at national and international level in the near future.

We aim to show that both the accuracy of the debates and the effectiveness of the policy measures depends on the answer to the following question: Is this increasing trend in food prices an expression of the imminent ending of resources, in line with the secular Malthusian fears, or this only corresponds to the impact of short-run factors that sooner or later will be counteracted? Because the price increase for cereal crops largely surpasses prices for other food commodities the present note focuses on the performance of cereals having in mind this important question. So, after the introduction we put in perspective the Limits to Growth's approach and the most frequent explanations given for the recent increase in the food prices. In section 3 we examine the evolution of cereal productivity and the factors associated to it. Section 4 concludes.

[1] For instance, www.worldbank.org/foodprices, www.fao.org/worldfoodsituation and www.ifpri.org.
[2] See Zaman *et al.* (2008) for a more complete picture of policy responses and for country examples.

2. The causes of the record food prices and the "Limits to Growth"

2.1. The limits to growth: the implicit assumptions

210 years ago Thomas Malthus wrote: The power of population is so superior to the power of the Earth to produce subsistence for man, that premature death must in some shape or other visit the human race (Malthus, 1978). 170 years after the words of Malthus born the think tank named the Club of Rome[3], and its discussions originate a well-known book where the Malthusian prophecy is updated with the basic significance that if the growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within 100 years (Meadows *et al*., 1972).

The way as the present food crisis is occurring rendered evident the fear of interaction between the increase in prices of energy with the move up in prices of food. This interaction can propel several negative effects, such as the beginning of an inflation spiral, with the well-known detrimental impacts on economic growth and income distribution. This fear was present in the recent G8 Hokkaido-Toyako Summit, as well as the recall of the first oil shock occurred in 1973 (see Zaman, *et al.*, 2008).

The price of energy can be related to the food prices in two ways. On the one hand, as energy prices increase, costs of some production factors, as well as the processing and transportation of agricultural products, go up. This results in an increase in food price, with varying effects for different people. On the other hand, the raise in petroleum price may turn out to be increasingly efficient to produce energy from agricultural products. Consequently, competition for land and other resources will rise between productions for food versus for fuel (Henniges, 2005), raising once again the ghost of imminent ending of resources.

In fact, the resource constraints prophesied by the Club of Rome were more evident two months ago than at any time since 1972, when the well-known book "The Limits to Growth" (Meadows *et al*., 1972) was published. But, such evidence can be determined by short-run factors that may be quickly reversed. As already was noted, "the next few months will be critical for stemming this joint crisis and avoiding any potential ripple effects" (Zaman, *et al.*, 2008, p. 1). But, there is always the danger of the end-of-resources' ghost reappearance, if we don't distinguish the short-term fluctuations from the medium-to-long-run trends.

The basic argument of the *Limits to Growth*'s perspective can be summarized as follows. The history shows that after the Industrial Revolution, the world population grew at unprecedented high rates and this population increment needs an equivalent augment in production. Furthermore, as the world grows more populous it also is growing more affluent, and so the average person is consuming more food, water, and power than before. The result is that if demand for resources climbed and supply doesn't keep pace, prices must increase further, and so economic growth in rich and poor nations alike could suffer.

The decline in economic growth makes the poor part of population more vulnerable and, so, some violent conflicts can occur. Additionally, some of the resources now in great demand have no substitutes, or the substitutes known contend with the global warming[4]. Furthermore, can be no hypothesis of substitution for arable land and fresh water. So, the conclusion follows: The world cannot sustain the last century level of growth.

However, both the original prophesy of Malthus (1798) and the updated version of Meadows *et al*. (1972) are based on the assumption of a natural law that generates two different dynamics. One model for demand, which grows in a geometric progression in the argumentation of the former, and evolves according to an exponential function in the latter.

[3] See www.clubofrome.org.

[4] In the 18th century, England responded to diminishing timber supply by shifting to abundant coal, but today, coal is out of question. It emits greenhouse gases that most scientists say contribute to climate change.

Another very different for supply, which grows at an arithmetic progression in Malthus, and is conducted by technologies for expanding resources and controlling pollution, allowed to increase, if at all, only in discrete increments in the *Limits to Growth*' perspective. So, in our view, what governs the evolution predicted by such analyses is not the evidence but such a priori assumptions. On the contrary, we consider that the evidence of the past 40 years shows that there is no reason to predict a significant different pace for increases in demand and in supply.

2.2. The increase in food prices: short or long run factors?

The comparison between table I and table II shows that the sharp increase of food prices is a recent phenomenon. It is subsequent to a long period of low food prices (see table II). Also, although the debate on the food prices had been stimulated by the recent price move up, it was ignited by riots in several low and middle-income countries like Senegal, Mauritania and other African countries and mass protests in Mexico City, appealing to immediate solutions. It is worth noting that riots and protests have deeper roots that the increase of food prices only makes emerge, however for policymakers is easier, and more urgent, to combat symptoms rather than causes.

Table I. Evolution of the FAO Food Price Index

2007							2008					
June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June
150	155	161	170	174	180	186	196	215	218	215	216	216

Source: FAOSTAT (2008).

As is apparent from table I, the FAO's Food Price Index[5], which was 92 in 2000, averaged 150, in June 2007, and 216 a year later. Among the several explanations for the causes of this increase there are the cumulative effects of the following: (1) the low levels of world stocks (especially for wheat and maize) following two years of below-average harvests in Europe in 2006 and 2007; (2) the crop breakdown in major producing countries partly due to poor weather conditions in North America, Europe and Australia, in 2006; (3) gradual changes in agricultural policies of the OECD countries, and particularly in EU, where reduced levels of subsidies have led to lower surplus production (4); and rapidly growing demand for cereal-based bio-fuel production supported by subsidies[6].

Though all these causes have acted cumulatively, some authors think that there is a chief factor: the large increase in the production of bio-fuels. This is, for instance, the case of Mitchell (2008). This author, after examining the reasons behind the quick increase in internationally traded food prices since 2002, concludes that the most important factor was the large increase in bio-fuels production in the U.S. and the EU. To put the table I index in perspective, it is useful to examine the evolution of the World Bank's price index of food and prices of other commodities since the 1970s (table 2).

Table 2 makes apparent some important facts:

First, prices of food are highly correlated with the price of cereals (maize, rice and wheat) and, in a less extent, with the price of beef. But, because cereals are dependent of weather conditions, and have fixed periods for production, its world prices tend to be more volatile than world prices of industrial goods. This relationship between inelastic demand and volatile

[5] The FAO food price index is a trade-weighted Laspeyres index of international quotations expressed in US dollar prices for 55 food commodities (see http://www.fao.org/worldfoodsituation/FoodPricesIndex).

[6] Some add to these factors the action of the "Edge Funds". They argue that, with the instability of shares in stock markets, the cereals are object of speculation with consequent increase in their prices.

supply creates more uncertainty for investors in cereal production and so policies aimed to reduce uncertainty are usually succeeded in increase the cereal production and the corresponding stocks. It is partly in light of this fact that we must interpret the declining trend in the World Bank's food price index.

Table II. World Bank's food price index and prices of other commodities

	1970	1980	1990	1995	2000	2001	2002	2003	2004	2005	2006	ρ
Food price index (1990=100)	166	177	100	100	87	91	97	96	103	103	109	1
Prices of:												
Maize ($/mt)	208	159	109	105	91	95	107	105	104	92	110	0.91
Rice ($/mt)	450	521	271	274	208	183	206	197	222	267	276	0.97
Wheat ($/mt)	196	219	136	151	117	134	159	146	147	142	174	0.93
Beef (cents/Kg)	465	350	256	163	199	226	226	198	235	245	231	0.88
Petroleum price index (1990=100)	19	204	100	64	127	113	117	126	154	218	254	-0.03

Source: World Bank (2007). *Note*: ρ is the correlation coefficient.

Second, the government subsidies to farmers particularly in the beginning of the 1980s, helped stimulate cereal production in Western Europe and North America. The subsidies led to a surplus of cereals, leading to the emergence of Western Europe as an important net exporter of cereals.

Third, partly due to the increasing openness consequent to the movement of globalization, and partly due to the financial restrictions that governments face, in the late 1980s and the 1990s (Pessoa, 2008), North America and Western Europe reduced in some measure the financial support and adjusted the form of subsidy to less directly influence production decisions. In consequence, the growth in production of cereals slowed, beginning a resulting smoothly increasing price trend, from 2000 onwards.

Fourth, whereas the food price index is positively correlated with prices of cereals and beef, it is not significantly correlated with the petroleum price index, indicating that in the medium-to-long-run the increase in price of food don't have been associated to the price of petroleum.

In face of the above facts, the inversion of the price trends around the ending of 20th century is explained by the lagged effect of shifts in policy and not by the predicted ending of the existent resources. If this is so, the recent sharp increase in food prices documented in table I will tend to dissipate, giving place to the underling factors that govern the long-run evolution. Of course, this don't mean that the instability of the food prices will be stopped but only that the long run trend will not be the extrapolation of the 2007-2008 increase. In this respect, we agree with Rosegrant *et al* (2001, p. 1) when they argued: "using short-term trends in global markets to make judgments about long-term food security is next to useless".

So, the future of food supply and demand, and the consequent level of prices, must be explained by not only the evolution of long-term forces such as income growth and population growth but, primarily by the technological change in agriculture, driven by investments in agricultural research complemented by well suited investments in infrastructures for irrigation and transport and communications.

3. The structural factors of the long run evolution

The classical model of economic growth, and the Principle of Population of Malthus (1798), considers land as a fixed factor or as a factor that only can grow with a decreasing productivity. The Limits to Growth's perspective also stress the shortage of land and, for the reasons alleged in the previous section, particularly land affected to cereal production.

Furthermore, in the present conjuncture of high food prices and high prices of energy, the alleged competition between food and bio-fuels make the short supply of land more evident. So, we begin by analyzing the evolution of the amount of land under cereal production in the last 25 years (Table 3).

Table III. Land under cereal production (thousand hectares)[7]

Countries/region	1979-81	1990-92	2003-05
Low income	199,696	211,290	230,781
Middle Income	232,195	350,107	310,863
Lower middle income	175,911	228,729	208,372
Upper middle income	56,284	121,378	102,492
Low and middle income:	431,892	561,397	541,644
East Asia and Pacific (EAP)	139,904	142,270	133,753
Europe and Central Asia (ECA)	37,380	140,517	114,042
Latin America and Carib. (LA)	49,847	47,720	49,696
Middle East and N. Africa (MENA)	25,655	30,593	29,108
South Asia (SA)	132,128	129,690	129,043
Sub-Saharan Africa (SSA)	46,978	70,608	86,002
High Income	156,710	143,278	135,941
Europe EMU	35,999	32,976	31,419
World	588,602	704,675	677,585

Source: World Bank (2007).

As is visible in table III, from 1980 to 1991 land under cereal production increased at world level, but such increase is due to low-income and middle-income countries. High-income-countries show a decline in land under cereal production, being the decrease in relative terms more evident in the Europe EMU. According to geographical regions, the increase is visible in Africa (more intense in Sub-Saharan than in North) and in Europe and Central Asia (associated to the political instability of the Central Asia in the period). From 1991 to 2004, apart from the slight increase occurred in Latin America, the amount of land under cereal production only increased in low-income countries and particularly in the Sub-Saharan region.

Is this reduction of the amount of land translated in a decrease in cereal production? The answer is clearly no. On the contrary, cereal production registered a significant increase, which have permitted to feed an ascending population. In fact, from 1951 to 2000 the amount of cereals produced per capita only decreased in two periods, and not by any expected ending of resources: around 1960, reflecting the disastrous agricultural policy in China, and in the period from mid-1980s to mid-1990s in consequence of the economic and political disruption resulting from the fall of communism in countries of Eastern Europe and the Former Soviet Union[8].

So, the bulk of the increase in cereals production came from additions to productivity — that is, getting greater cereal yields from a given hectare of land as is visible from table IV, which uses as indicator of the level of productivity the cereal yields measured as kilograms per hectare of harvested land. In fact, in the last twenty-five years the cereal productivity at

[7] In order to smooth annual oscillation in agricultural activity, the indicators of this, and of the subsequent tables, have been averaged over three years.

[8] See Dyson (1999) for a more complete view on the evolution of cereal production per capita in the second half of the 20th century.

world level was doubled, which means that, it was increased at a pace significantly higher than the rate of growth of the world population (from 1980 to 2005 world population grew from 4.45 billion to roughly 6.44 billion).

Table IV. Cereal yields

	1979-81	1990-92	2003-05
Low income	1,090	1,753	2,086
Middle Income	1,811	2,987	3,312
Lower middle income	1,771	3,206	3,629
Upper middle income	1,892	2,453	2,673
Low and middle income:	1,422	2,452	2,791
East Asia and Pacific (EAP)	2,034	3,816	4,460
Europe and Central Asia (ECA)	2,854	2,657	2,324
Latin America and Carib. (LA)	1,842	2,234	3,204
Middle East and N. Africa (MENA)	965	1,632	2,405
South Asia (SA)	1,510	1,992	2,497
Sub-Saharan Africa (SSA)	895	986	1,102
High Income	3,400	4,263	5,041
Europe EMU	4,035	4,656	5,426
World	1,608	2,868	3,247

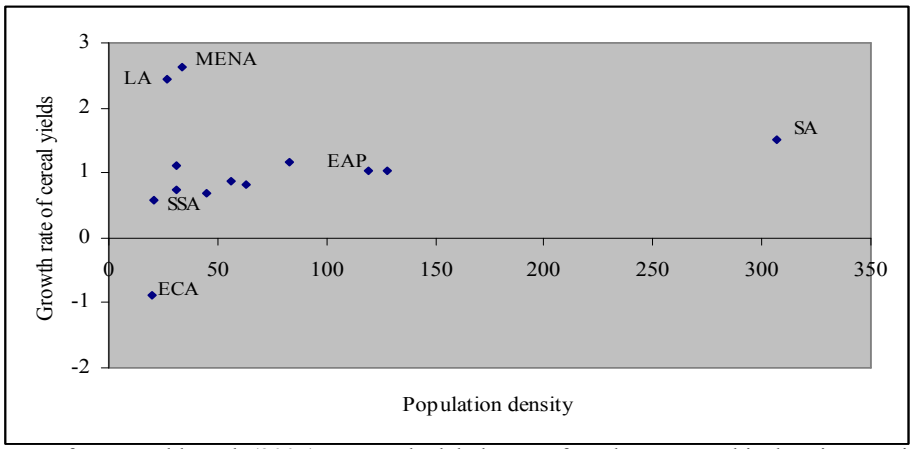
Source: World Bank (2007).

But, behind the global average increase in world cereal productivity illustrated by table IV are large differences in regions, expression of the different technologies used for production. Especially noteworthy is the low level of productivity of Sub-Saharan Africa and the decrease in productivity in low and middle-income countries of Europe and Central Asia in consequence of the large increase in land under cereal production associated to the above-mentioned disruption due to political factors.

So, the momentous problem is how to increase cereal yields in low-income countries, and particularly in Sub-Saharan Africa. This region has a lot of problems that conflict with food production. It is composed by ethnically heterogeneous nation states, with widespread political instability, absence of governamental policy directed to agriculture, AIDS epidemic, and a rather quick population growth. To search solutions to this problem generates two basic questions: i) has the pressure of population growth on the land, measured by population density, a negative effect on the growth of cereal yields? ii) What are the more relevant factors, from which depends the increase in cereal yields?

Figure 1 helps to understand the relationship, if any, between the growth rates of cereal yields from 1990 to 2005 and the population density in 2005, for samples of countries grouped by level of development and by geographical origin. As is apparent from figure 1, according to the geographical criterion the image is one of diversity, we see low density regions like ECA and MENA with very different performance in cereal yields, and a high density region like SA with above average growth rate of cereal yields. But, if we look at the samples of countries from the point of view of income per capita what seems to emerge is a positive relationship between the two variables, contrary to the Limits to Growth's view. So, the answer to the first question is clearly negative.

Figure 1. Growth rate of cereal yields and population density



Source: Data from World Bank (2007). *Notes*: the labels are referred to geographical regions, as is represented in Table III. Points without labels correspond to the samples of countries grouped by income per capita of the same table.

Now, what can we say about the second question. Cereal yields depend on what? The obvious answer is that they depend on the several production inputs like land, seeds, qualifications of farmers, the use of fertilizers, the machinery and so on. Many of these types of factors are qualitative or, when quantitative, are not represented in statistics. So, in a first sight we have tried to extract some conclusions from table V, where it is shown the figures of two important inputs in cereal production: the consumption of fertilizers and use of agricultural machines in three points of time: 1980, 1991 e 2002.

As is apparent from the table whereas the fertilizer consumption decreases in high-income countries. This group of countries, which had already the highest productivity in 1980, and that have continuously increased the cereal yield, did not need to increase the consumption of fertilizers to increase the yield, showing that increases in productivity can be associated to other technological improvements like soil fertility management and plant varieties.

On the contrary, on average, in low and middle-income countries, the raise of cereal yields was accompanied by increases in the use of fertilizers. Of course there are regional differences in low and middle-income countries: whereas South Asia has showed a sustainable increase in both the consumption of fertilizers and the agricultural machinery used in line with the "Green Revolution" occurred, Sub-Saharan Africa has followed the inverse path. But the most significant decrease in fertilizer consumption has occurred in ECA, which is not a surprising fact due to the previously mentioned reasons.

However, this shows that there is great potential to raise cereal production in ECA, and particularly in Poland, Ukraine, Russia, and Kazakhstan, when the disruptive effects of the end of communism disappear, and the reforms of the farming sector begin to produce results. Certainly, the recent EU membership will be an additional factor in help to accelerate the structural transformation in some of the Eastern European countries[9].

Respecting to the agricultural machinery, the most spectacular increase in the variable occurred in low-income countries in spite of the raise in arable land. However, in this group of countries the level of mechanization is yet extremely low: is less than a half of the world average. So, there is large room for increasing agricultural inputs with expectable improvements in production. The recent increase in food prices, together with some improvements in financial system, can be an important starting point for extended the "Green

[9] Of course, the reform of the Common Agricultural Policy has also some role to play.

Revolution" to parts of the developing world were investment in agriculture was been overlooked in the near past.

Table V. Agricultural inputs

	Fertilizer consumption (100 grams per hectare of arable land)			Agricultural machinery (Tractors per 100 sq km of arable land)		
	1979-81	1990-92	2000-02	1979-81	1990-92	2001-03
Low income	290	541	686	20	52	84
Middle Income	969	970	1,110	114	127	137
Lower middle income	996	1,278	1,573	101	99	112
Upper middle income	914	553	471	139	164	173
Low and middle income:	635	817	951	67	100	117
East Asia and Pacific (EAP)	1,117	...	...	55	63	89
Europe and Central Asia (ECA)	1,445	581	347	266	172	185
Latin America and Carib. (LA)	587	587	896	95	123	123
Middle East and N. Africa (MENA)	422	643	833	61	115	142
South Asia (SA)	360	767	1,067	25	67	129
Sub-Saharan Africa (SSA)	158	136	125	23	19	13
High Income	1,328	1,213	1,212	385	417	431
Europe EMU	2,704	2,332	2,059	878	992	1,002
World	870	925	1,020	175	186	200

Source: World Bank (2007). *Note*: (…) means data not available.

The comparative analysis of the tables III, IV and V shows that the increase in the cereal production necessary to feed the growing world population came essentially from increases in productivity, and that the higher productivity was obtained without significantly investments in agricultural machinery. If so, there is a large margin to continue increasing agricultural production even if the production of bio-fuels is now efficient.

But, to support and complement the above ideas on the causes and prospects of cereal productivity evolution, we have regressed the growth rate of cereal yield on the rates of growth of two variables: land under cereal production and fertilizer consumption. The regression is for the 1960-2004[10] period and uses a cross-section of 106 countries. To control the country level of development we add to the explaining variables the GDP per capita (in log scale), converted to current US$ by PPPs (purchasing power parities). The results are in table VI.

The results show that whereas the increase in land under cereal production exert a negative effect on the growth rate of cereal yields, the consumption of fertilizers acts positively, being the level of development of the country an important control factor. That is, we can expect that, maintaining other factors constant, the more the level of development of a country is the more the growth rate of cereal yields will be. Perhaps not surprising is the statistically insignificant coefficient of agricultural machinery, indicating that the surplus labor in the generality of low-income countries renders the investment in machinery not worthwhile.

[10] The indicators for the arable land in the World Bank (2007) are very sparse for 2004 and 2005, and so in practice the rate of growth of arable land is only representative of the 1962-2002 period. As in the other calculations, in this paper we take for beginning and end of the time periods averages of three years.

Table VI. Regression results.
Dependent variable: annual growth rate of cereal yields in the 1960-2004 period

	1960-2002	
GDP per capita (log)	0.0091* (4.254)	0.0090* (4.225)
Land under cereal production	-0.179* (-2.772)	-0.183* (-2.777)
Fertilizer consumption	0.0930* (3.422)	0.0965* (3.288)
Agricultural machinery	---	-0.008 (-0.457)
Intercept	-0.0199** (-2.416)	-0.0197** (-2.366)
R^2	0.24	0.24

Source: World Bank (2007).
t tests in parentheses, below coefficients: *significant at 1 percent level; **significant at 5 percent level.

Differently from being a worry this absence of statistical significance can be a hope to the less developed countries, which may go on producing without a significant and costly investment in machinery. On the contrary, they can adopt the less costly best practice of the small farmers in the developed world at the same time as they can augment agricultural production without increase significantly the rural exodus. The recent increase in food prices can be a good incentive to increase the agricultural investment in low and middle-income countries.

4. Conclusion

The analysis of the evolution of land under cereal production, other production inputs and the cereal yields shows that the dismal prophecies spurred by the recent increase in the food prices could prove justly as incorrect as in the past. The bulk of increase in the capacity to feed a growing population came from increases in cereal yields rather than from the fruits of a rising pressure over land.

In fact, more population means not only more open mouths but also persons equipped with arms and brains. So, more people can mean more ideas about the possible combination of the existent resources. And, as is stressed by Romer (2003) ideas are more important than physical resources in boosting economic growth.

Obviously, with more population and the need of more goods to satisfy its wants we'll have increasingly problems. But it is possible to argue that new ideas will prevail over the effects of the extra resource use. New technology could help ease the resource crisis, as well as some constraints might disappear with greater global cooperation. Where some countries face scarcity, others have plentiful supplies of resources. New seed varieties and better irrigation techniques could open up arid regions to crop growing, as well as some technological advances can be used for land and water desalination or for generating and spreading electricity at more efficient ways.

Of course, price incentives play an important role. The analysis of past problems proves that with the adequate incentives, economic forces stimulated solutions. Scarcity of resource led to higher prices, and higher prices eventually led to innovation. So, while higher cereal prices are clearly a trouble to poor consumers, they also present an opportunity to encourage cereal production and enhance the contribution of agriculture to medium and long run growth. For example, higher prices weaken the rationale for import tariffs, and make easy the implementation of politically difficult trade reforms.

Higher cereal prices can also help to turn around the last couple decades' tendency for decreasing investment in the agricultural sector, by government and private sector, both in

developed and, moreover, in developing countries. This refocus is necessary to promote agricultural productivity, which must be stimulated by investments in research and extension in high-income countries and supported in development of rural financial markets and diffusion of best practices in the low and middle-income countries, progressively providing to the latter, especially in Africa, conditions similar to the existing in the rural areas of the high income countries.

In the past, the now developed world demonstrated a large capacity to adjust to the resource limitations. Indeed, the true lesson of Thomas Malthus, is not that the world is condemned, but that preservation of human life requires analysis and consequent action. A more attention directed to agriculture is key to reducing poverty and hunger in developing countries and is an essential element in dealing with the current, and possibly the future, food price crises.

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