



World Food Programme

World Food Programme Regional Market Survey For the Middle East

Food Market and Food Insecurity in
Lebanon, Syria, Jordan, Iraq,
Iran, Yemen and Palestine



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3 October, 2009

EXECUTIVE SUMMARY

Prices of basic staples have witnessed a considerable upward trend since January 2006. Until today, they have more than doubled for rice, maize, soybean and palm oil, ground nuts, and barley. Rising demand and changing consumption patterns in emerging economies, higher energy, transportation and fertilizer costs, the substitution of food for industrial crops, climate change and water scarcity, speculation, and a weakening US dollar are important factors behind this development. Like most other developing countries, the price shock hit the seven ODC countries subject of this study off-guard. Unlike other countries though, the agricultural sector of the ODC countries is generally poorly positioned to make a meaningful contribution to the amelioration of the current crisis.

On average, food requirements exceed the countries' agricultural output, which is a situation that most likely will aggravate in the future. Fast population growth and diminishing productivity due to climate change will mostly account for this development. Nevertheless, the countries have also an agricultural productivity deficit relative to their general level of development that goes beyond geography and demography. These can be attributed to underdeveloped markets like poor transportation and financing infrastructure more than lack of access to physical input factors like use of irrigation systems and fertilizers.

A more in-depth analysis reveals that the general economic framework is affected by a host of adverse geo-politic, geographic, and market-organizational factors. Refugee problems, armed conflicts, and droughts make food security and agricultural development highly erratic. Centralized marketing and procurement practices will become increasingly challenged in the wake of recent price developments. As governments become forced to liberalize production and distribution decisions, the pockets of food-insecurity within societies will widen and the calls for social safety nets become louder.

Widespread negative food price balances in the region have let most countries to develop import trade relationships with partners from outside the Middle East. In case of a sudden deterioration of food security, food aid would also have to be organized from outside the region. The vulnerability profile of the countries make them logistically challenging, especially in the events of armed conflict and a refugee problem.

The countries of this study can be divided into relatively low and high food-insecure economies. Comparatively advanced food markets with minor institutional deficits, such as lack of competition on the retail level, suboptimal transportation and capital market infrastructure, and governmental interference into the marketing process characterize the low food-insecurity countries of Lebanon, Syria, Jordan, and Iran. The high food-insecure countries of Iraq and Palestine even lack the most fundamental prerequisites for market interaction, which are secure property rights and freedom of movement, while widespread poverty and the use of Qat strangles Yemen's development prospects.

A substantial refugee problem is a common theme among many ODC countries. Most studies address the hardship of the refugees while the impact on the regular population seems to be under-researched. The high vulnerability to climate change resulting in periodic droughts and

possibly conflicts over scarce water resources is another common challenge to ODC countries that will require more research.

Immediate supply side adjustments to the food price crisis do often aggravate the current situation. These involve overpricing by retailers, smuggling with expired products, lining pockets by governmental officials, and political charities exploiting the situation. Substitution and income effects increase demand for food items with inferior nutritional value and enforce the reduction of consumption of other essential goods and services.

On the public policy level, short and long term policies must be separated. In the short term, both price policies and social safety net programs are used. Among price policies, tax bans, depletion of buffer stocks, export restrictions, and price controls are widely applied. Regarding social safety nets, school feeding, food stamps, and cash-transfers are the most popular response strategies. Food-for-work programs, which are socially particularly efficient, are not employed. The long run must not be lost out of sight, though. Agrarian reforms, family planning, economic liberalization, decentralization, efficiently sized public sectors, and redistributive social policy may still free substantial productivity gains. Whether they will be enough to keep up with population growth and the reduction of agricultural productivity due to climate change must be questioned, though. Ultimately, food security in the ODC countries will rest more on general economic modernization than a green revolution.

It is estimated that the food price crisis will increase the number of undernourished in the ODC countries by roughly 3.7 million people. Currently, around 20 million of the total population of 157 million is underfed. The study also quantifies the increase of poverty, malnutrition, school drop-outs, food expenditure shares, and food inequality. Poor data quality, however, lends the empirical assessment a strong initial explorative nature.

In summary, the countries of this study will require constant monitoring of geopolitical, climate change, food price, and public policy developments. The high food import dependency of the region calls for logistically challenging food aid mechanisms. Food-for-work programs should be promoted more. Moreover, since food prices are expected to remain at elevated levels, short-term policies will not be sustainable. The development of long term food security policies, as envisioned in WFP' strategic plan for 2008-2011, should complement the traditional concentration on short-term policies and food distribution.

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1. Introduction

1.1. Definition of Project

This study analyzes the food markets of Jordan, Syria, Lebanon, Palestine, Iran, Iraq, and Yemen (ME-ODC Countries). These countries cover the Middle Eastern part of the area covered by the operational activities of the ODC, which also extends to North Africa and the Caucasus. Despite some similarities, such as adverse climatic conditions for agricultural production, the countries are generally very different and confronted with different problems. Each country therefore requires a substantial amount of separate treatment. The objective of the study is to better understand the dynamics of the food markets of these countries, particularly in light of the recent food price inflation. The findings shall help the World Food Program (WFP) to identify appropriate strategies for contingency planning, emergency preparedness, and the formulation of response policies.

1.2. Particular Challenges

As many other economies, the countries of this study are adversely affected by the recent upward trend in food prices. As opposed to other cases, though, the countries of interest in this study are subject to particular challenges that aggravate the current crisis. In the case of Palestine it is the effect of Israeli occupation. In the case of Iraq, it is the aftermath of the US-led invasion. Closely related to the developments in Iraq are the situations in Syria and Jordan, where many Iraqis found refuge. Lebanon still recovers from the July 2006 war between Hezbollah and Israel, which had devastating effects on rural communities and the agricultural sector. Yemen is one of the least developed countries of the world, is confronted with an influx of Somali refugees, and

suffers particularly from the widespread use of Qat as a recreational drug and stimulant. Lastly, Iran is currently one of the biggest receivers of windfall profits from oil exports.

1.3. Specific Questions

Several questions naturally suggest themselves:

- What are the sources of the food price crisis? Although the answer to this question lies in a multitude of factors, a constant monitoring of these determinants is especially important for contingency planning purposes. Section two will discuss these aspects.
- What is the state of agricultural supply? In a study of food markets, it lends itself to start with the supply side. The main objective is to identify ODC countries' agricultural productive capacity from a comparative perspective. By doing so it will be looked at a variety of physical and institutional input factors that are important for agricultural development. Questions of interest are: Is farming short of fertilizers or irrigation? How big is the effect of regional water scarcity? Is there a lack of capital per farmer? Do farmers have access to human capital, transportation infrastructures, and financial capital? These questions will be examined in section three. They are designed to help in the formulation of policies to help the WFP in its objective to "[E]nable development by (a) helping people build assets that benefit them directly; (b) promoting the self-reliance of poor people and communities." (WFP online).
- What are the challenges of food market development beyond what can be derived from readily available data? The comparative perspective of section three is of an introductory nature, which will be complemented in section four by a more in-depth analysis of the various markets. This is necessary given the wide range of different challenges that

prevail among ODC countries. The study of country-specific peculiarities is important for the formulation of emergency preparedness and contingency planning strategies. Section four thus discusses country by country with regards to general economic conditions, the state of food security, and market and trade characteristics.

- How does the current food price crisis affect various economic actors? Demand and supply side adjustments as discussed in textbooks of economics are often very different from the real behavior of economic actors on the ground. This is particularly true for countries that are as unique as the ones of this study. Knowledge about consumer and producer behavior is therefore an integral part of the formulation of response strategies. Following the same objective, another important question addressed in this context is: What policy options are available and have been introduced by ODC Countries to address food price inflation? Section five is subject to these questions, whereas its analysis relies substantially on the content analysis of local newspaper reports.
- How did the food price crisis hit the various countries? The food price crisis goes far beyond the measurement of undernourishment. It also affects malnourishment, poverty, access to food, school enrollment, and food expenditures shares. Section six estimates the response elasticity of various food related and socioeconomic indicators and attempts to quantify the impact in the context of the current food price crisis.

1.4. Data and Methodology

The actuality of the problem underlying this study called for a substantial use of internet sources. Main sources were reports, background papers, and commentaries that are published on the websites of international organizations and nongovernmental organizations. Major sources of

information were the Food and Agriculture Organization (FAO), the World Bank, the International Monetary Fund, the World Food Program (WFP), United Nations High Commissioner for Refugees (UNHCR), Organization for Economic Development (OECD) and ReliefWeb. It was also found that Canada's Agriculture and Agri-food Ministry and the United States Department of Agriculture had valuable information on the ME-ODC economies. Another important source was newspaper articles, which were very helpful for qualitative assessments of the situation on the ground.

A major objective of this study is to obtain a quantitative impression of the food price crisis, which began to unfold itself in 2006. Although official data for the year 2005 and onwards is scarce, many arguments made in this study call for some kind of empirical support and estimation. The absence of accurate and up-to-date time-series data for the countries of this study thus requires working with available panel data as a second-best solution. This constraint should be kept in mind when reading this report and some of its results should be interpreted accordingly as an initial explorative assessment.

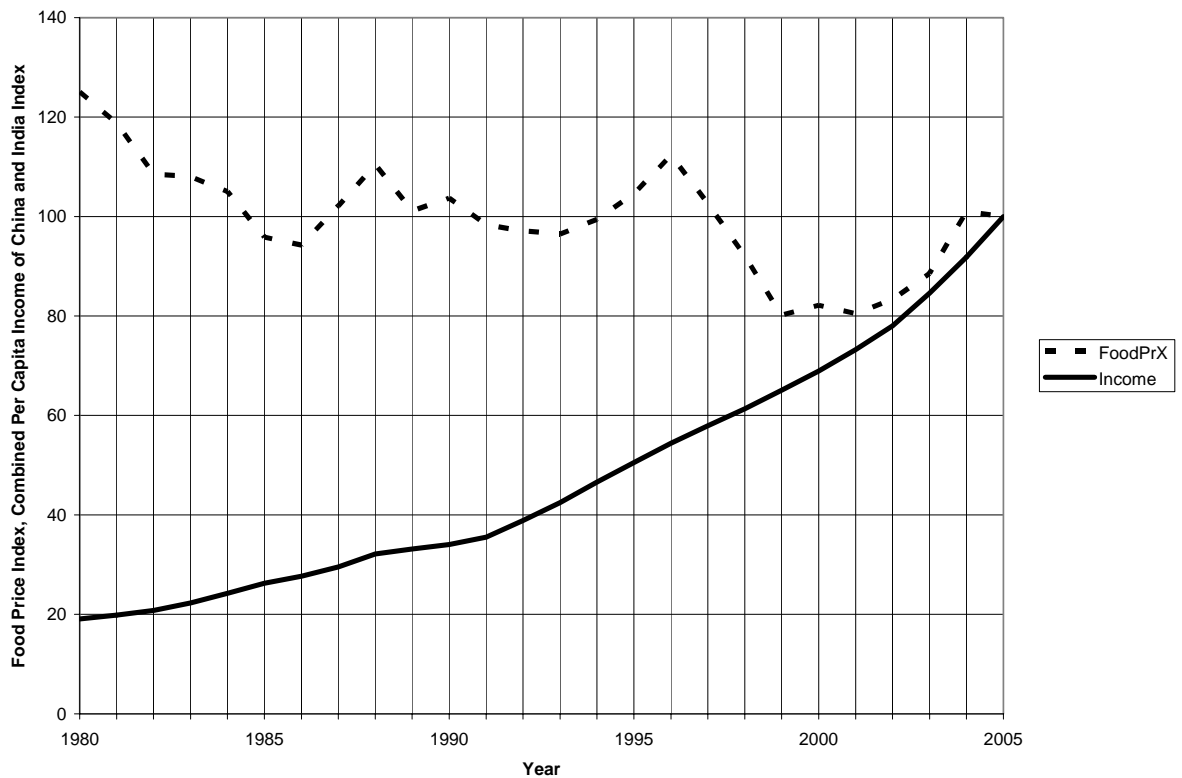
2. The Food Price Crisis – A Brief Overview of Main Arguments

2.1. Rising Demand

Higher food prices are the result of an increase in demand from fast growing emerging economies, dominated by China and India. Both economies have experienced a combined population-weighted real per capita income growth rate of more than seven percent since the year 2000. In 2000 dollars, the two countries' population-weighted per capita income increased

by more than 400% from \$200 in 1980 to over \$1,056 in 2005 (own calculations). Today, both countries furthermore contribute for at least 30% of world growth (Reisen, 2006). But to which extent the rise of emerging economies accounts for rising food prices is difficult to say. If food prices go up as a result of increasing wealth in India and China, then this must be a recent phenomenon as Figure 1 shows.

Figure 1: Population Weighted Per Capita Income of China and India and IMF Food Price Index (2005 = 100)

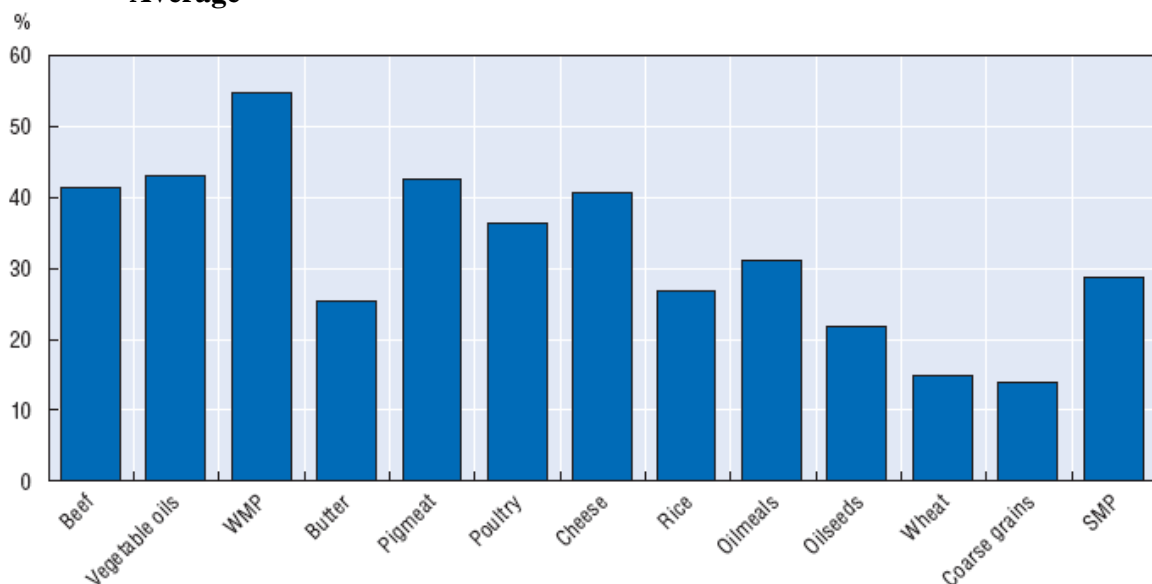


Source: 2007 World Bank Development Indicator Database and International Monetary Fund Commodity Price Statistics, Author's illustration.

2.2. Shift in Consumption Pattern

Increased wealth and urbanization in emerging economies is characterized by a reduction of consumption of basic staples such as grain and rice and consumptive expansion of vegetables, fruit, meat, and fish. Demand for meat, in turn, increases demand for grain as cattle feed. According to Buntrock, G. (2007), farmers now use 200-250 million tons of grains more as cattle feed than they did 20 years ago. In order to produce one kilogram of pork and beef, the required amounts of grain are three and eight kilograms, respectively. According to the OECD-FAO Agricultural Outlook 2008, world import growth of food will be dominated by developing countries and be strongest among whole milk powder, vegetable oils, and meat. Figure 2 provides a graphical summary of the estimated growth of world imports of selected commodities.

Figure 2: Estimated World Import Growth of Selected Commodities over 2005-2007 Average

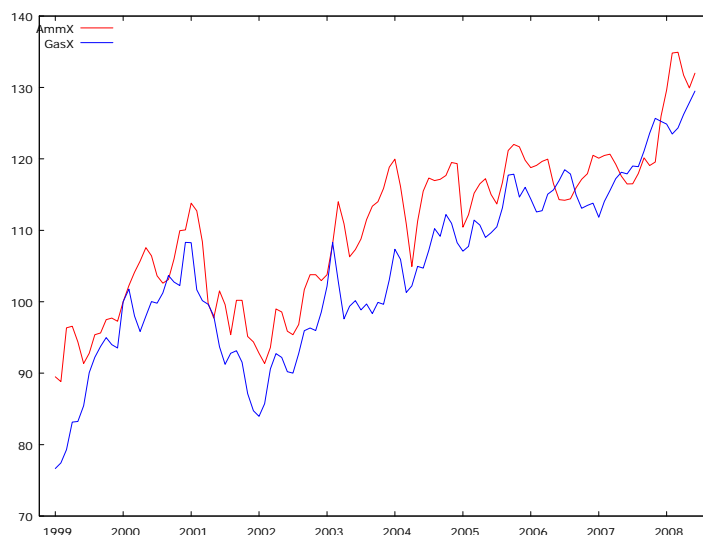


Source: FAO-OECD Agricultural Outlook, p. 23.

2.3. Higher Energy, Transportation, and Fertilizer Costs

Higher energy prices resulting from rising wealth in fast developing emerging economies, geopolitical instability, and a shortage of refineries trigger a vicious cycle for farming communities. As energy prices go up, prices for intermediary goods and input factors in agriculture increase as well. An obvious side effect is higher transportation and market access costs. Another important case in point is the price of fertilizers. Natural gas, as a substitute for oil, is not only linked to the price of oil, but also to the price of nitrogen fertilizer, whose production uses natural gas as an important input factor. It accounts for approximately 90% of all production costs (Finch, 2007). According to author's estimates, a 1% increase in natural gas prices increases ammonia prices by approximately 0.8%. Figure 3 displays the close relationship between natural gas and ammonia prices.

Figure 3: Ammonia (USD/ton) and Gas Prices (Mont Belvieu, TX Propane Spot Price FOB, Cents per Gallon), January 2000=100



Sources: Yara International ASA (<http://www.yara.com/en/about/index.html>) and Energy Information Agency (http://tonto.eia.doe.gov/dnav/pet/pet_pri_spt_s1_d.htm), Author's illustration.

The vicious cycle consists of the following: As fertilizer prices increase, farmers need to substitute it for alternative means. Lower yields are the result, which in turn increase the scarcity problem, put further upward pressure on agricultural prices, and aggravate hunger and poverty. In the developed world, fertilizer costs account for more than 10% of total farming expenses for the cultivation of wheat, corn, and soybeans (Brown et. al., 2008). In developing countries, fertilizer shares of total farming expenses are obviously much higher.

2.4. Biofuel

As energy prices increase, substitution effects towards biofuel take place. According to Braun (2007, p. 7), biofuel production becomes economically efficient when oil prices rise beyond USD 60. Its environmental efficiency is highly controversial, though. Groom et. al. (2007, p. 608) discuss the pros and cons of biofuel and conclude that “certain feedstock production practices can in fact cause great harm to the land, soils, water, and climate.” Figure 4 summarizes some of the authors’ findings regarding the pros and cons of biofuel.

Figure 4: Pros and Cons of Biofuel

CROP	USED TO PRODUCE	GREENHOUSE GAS EMISSIONS* Kilograms of carbon dioxide created per mega joule of energy produced	USE OF RESOURCES DURING GROWING, HARVESTING AND REFINING OF FUEL				PERCENT OF EXISTING U.S. CROP LAND NEEDED TO PRODUCE ENOUGH FUEL TO MEET HALF OF U.S. DEMAND	PROS AND CONS
			WATER	FERTILIZER	PESTICIDE	ENERGY		
Corn	Ethanol	81-85	high	high	high	high	157%-262%	Technology ready and relatively cheap, reduces food supply
Sugar cane	Ethanol	4-12	high	high	med	med	46-57	Technology ready, limited as to where will grow
Switch grass	Ethanol	-24	med-low	low	low	low	60-108	Won't compete with food crops, technology not ready
Wood residue	Ethanol, biodiesel	N/A	med	low	low	low	150-250	Uses timber waste and other debris, technology not fully ready
Soybeans	Biodiesel	49	high	low-med	med	med-low	180-240	Technology ready, reduces food supply
Rapeseed, canola	Biodiesel	37	high	med	med	med-low	30	Technology ready, reduces food supply
Algae	Biodiesel	-183	med	low	low	high	1-2	Potential for huge production levels, technology not ready

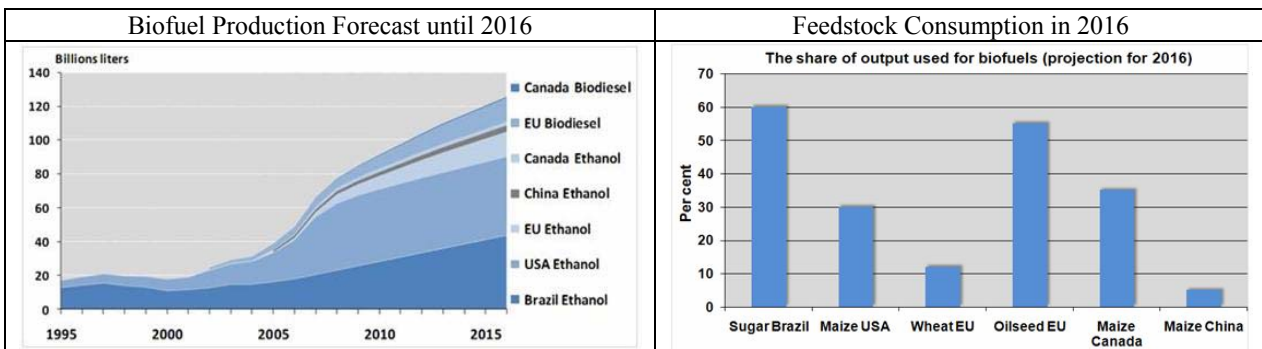
* Emissions produced during the growing, harvesting, refining and burning of fuel. Gasoline is 94, diesel is 83.

Source: Stiffler, L. (2008, online), referencing to Groom et. al. (2007).

Biofuel has been an important contributor to the fact that the demand for cereal consumption has been increasingly greater than its production. Braun (2007, p. 5), quoting FAO studies, reports that while cereal demand for consumption for food and feed increased by 4% and 7%, respectively since 2000, its industrial use has increased by more than 25%. Biofuel is mostly produced from sugar cane, especially in Brazil, maize, generally in the US, and rapeseed, mostly in Germany. As crude oil prices keep on rising, demand for various feed crops for industrial purposes will increase, too. Prices for food crops and biofuel become thus similarly interdependent and cointegrated as prices of fertilizer and natural gas.

The OECD (2008) estimates that biofuel-production will increase from currently 80 billion liters to 120 billion liters in 2016. The share of feedstock used in this production differs from country to country and is the range of 60% of Brazil’s sugar cane production to 5% of China’s maize harvest. The two panels of Figure 5 summarize these OECD estimates.

Figure 5: OECD Biofuel Production and Feedstock Consumption Forecasts



Source: OECD (2008)

The International Food Policy Research Institute simulated the possible effects of the expansion of biofuel production on food prices and food security. Two scenarios were simulated: a

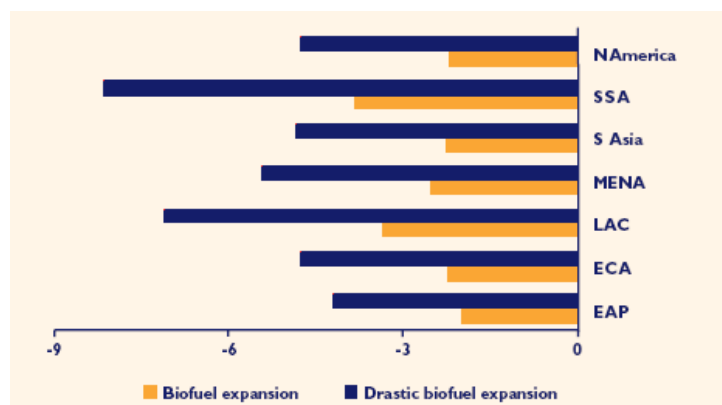
moderate and a drastic expansion of biofuel development. The study concludes that the expansion of biofuel production will have considerable adverse effects on prices and food security (Braun v. J., 2007, pp. 7-8). In the worst case scenario of a drastic biofuel expansion, the prices for certain food crops will increase between 20% and more than 70% while the available amount of calories will decrease between four and nine percent. Figure 6 and 7 summarize the results.

Figure 6: Simulations of Changes of World Prices of Feed Stock Crops and Sugar in 2020

Crop	SCENARIO 1	SCENARIO 2
	Biofuel expansion ^a	Drastic biofuel expansion ^b
Cassava	11.2	26.7
Maize	26.3	71.8
Oilseeds	18.1	44.4
Sugar	11.5	26.6
Wheat	8.3	20.0

Source: Braun v., J. (2007), p. 9.

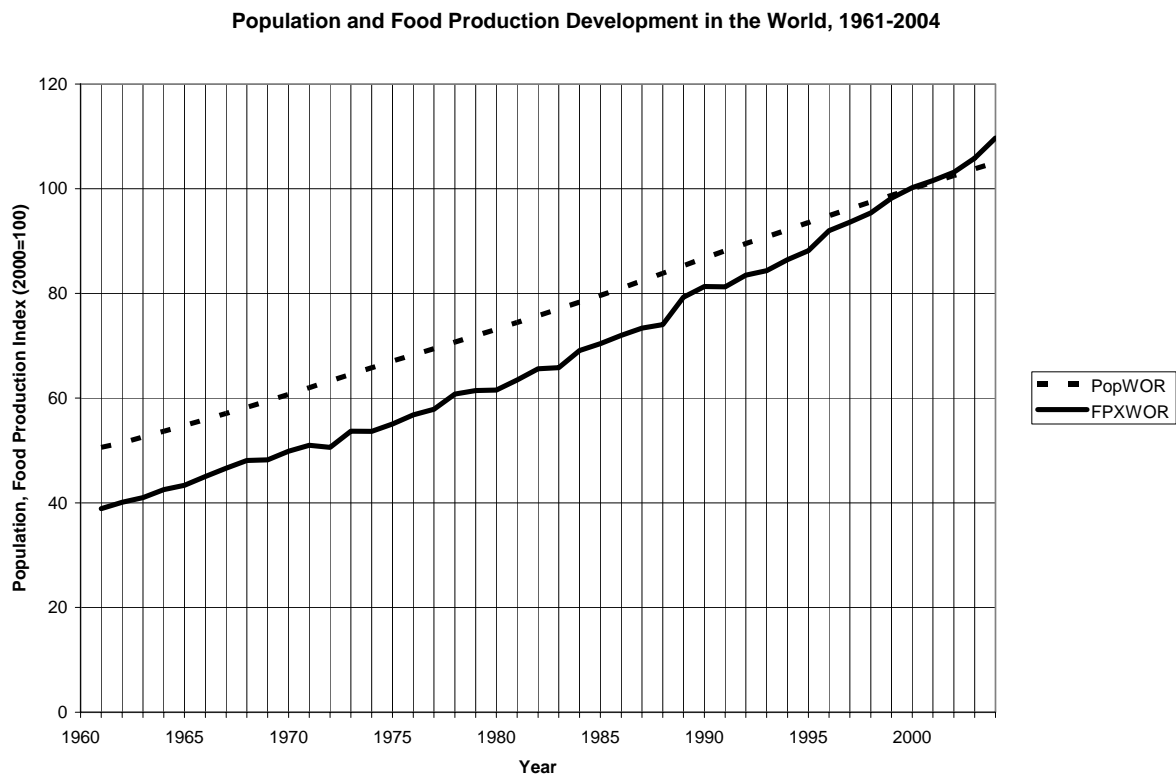
Figure 7: Calorie Availability Changes in 2020



Source: Braun v., J. (2007), p. 8.

There are also voices that argue that the adverse interaction between biofuel and food security is overrated. The main counter-argument is that there is no global shortage in the sense that there would not be enough food available to feed the world. In fact, as Figure 8 shows, food production has always kept up with the world population. Since the 1990s, world food production seems to be even growing at a slightly faster rate than world population.

Figure 8: World Population and World Food Production Index (1961-2004)



Source: 2007 World Bank Development Indicator Database, Author's illustration.

The argument in favor of biofuel continues that the real problem of food insecurity in developing countries is access to food, which is hampered by inefficiencies in agricultural production, deficient transportation infrastructure, lack of access to markets and credit, inequality of

economic opportunities, and poor quality of governance. In short: The problem is much more underdevelopment in general, not biofuel. Accordingly, some political leaders, like in Brazil, which is the world's biggest ethanol producer, even argue that energy crops are a key to escape underdevelopment and to empower farming communities.

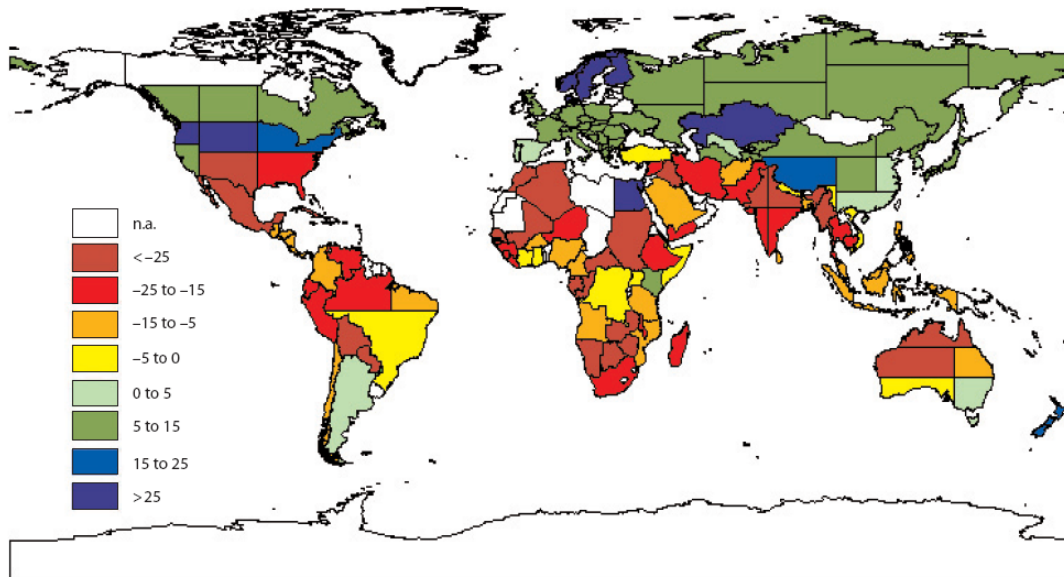
Given the actuality of the biofuel discussion, studies regarding the price effects are mushrooming and often manipulated along political interests. The Guardian, in his July 4, 2008 edition, for example, quotes a "secret" World Bank report, conducted by World Bank economist Don Mitchell that attributes 75% of the food price increase to biofuel while the US government's estimate is only 3%. Another difficult to predict impact of biofuel production is the loss of biodiversity, as tropical deforestation is replaced by mono-cultures with presumably high biofuel returns.

2.5. Climate Change

Simulations predict "agricultural winners and losers" from climate change. Although the impacts of climate change vary from region to region, winners are more likely to occur in the northern hemisphere. Exact predictions are nevertheless difficult to make. Particularly difficult is the assessment of so-called carbon fertilization, which refers to the stimulating effect of carbon dioxide on tree growth. If one takes this effect positively into account, simulations tend to generate less dismal predictions. Cline (2007) has systematically separated these two effects in his study. In the Arab world, where forests are scarce, this distinction is barely important, though. According to Cline's study, the Middle East is located in the region that is most

vulnerable to climate change. According to Cline's findings, agricultural output will decrease by 15-30% by 2080. Figure 9 provides a graphical summary of Clines' predictions.

Figure 9: Agricultural Productivity by 2080 (with carbon fertilization, less pessimistic view)

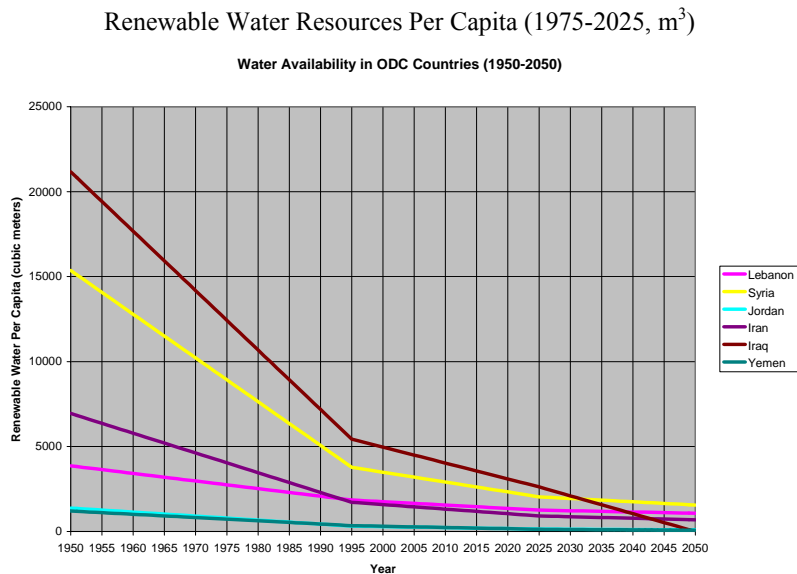


Source: Cline (2007), p. 75.

2.6. Water Scarcity

Water scarcity is another distinct characteristic of the region. Whereas the world average of renewable water resources per capita in 2005 was 8,549 m³, all ODC countries ranged far below this average. In the case of Yemen and Jordan, per capita water consumption already exceeds the natural per capita water supply. With almost 90%, agriculture accounts for the lion share of water consumption. As Figure 10 illustrates, water availability per capita will shrink dramatically by 2050. The biggest challenges to future water management will be population growth, industrial water pollution, agriculture's water thirst, and possibly the containment of armed conflicts over water scarcity.

Figure 10: Water Scarcity



Water withdrawal per capita as a percentage of available renewable water resources 2005						
Lebanon	Syria	Jordan	Iran	Iraq	Yemen	Palestine
33%	84%	129%	56%	63%	186%	NA

Source: Gardner-Outlaw, T., Engleman, R. (1997), India's Ministry of Water Resources (medium forecast) http://www.cwc.nic.in/ISO_DATA_Bank/waterrelated2007/chapter1pdf/TABLE%201.29FINAL.pdf and World Resources Institute (http://earthtrends.wri.org/pdf_library/data_tables/wat2_2005.pdf).

2.7. Declining Food Reserves and Speculation

The increase in demand for food crops in combination with reduced production inevitably leads to declining food stocks. A major food scarcity indicator is the stock-to-use ratio, which measures end-of-period stocks relative to total consumption during the same period. Stock-to-use ratios are widely used predictors of future price developments. They also can be translated into days of remaining consumption. Rathi (2008) has compiled evidence of the relationship between stock-to-use ratios and prices for the world's production of wheat, corn (maize), and rice. Figure 11 displays his findings.

Figure 11: Stock-to Use Ratios and Prices

Figure 11 a: World Wheat Stock-to Use Ratio vs. Price



Figure 11 b: World Corn Stock-to Use Ratio vs. Price

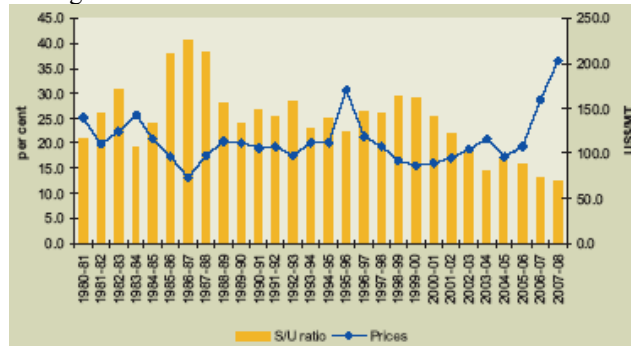
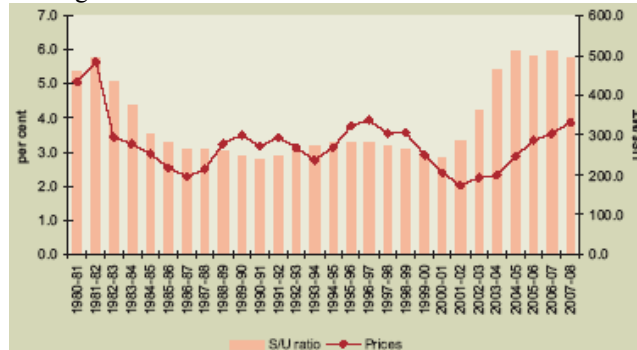


Figure 11 c: World Rice Stock-to Use Ratio vs. Price



Source: Rathi (2008)

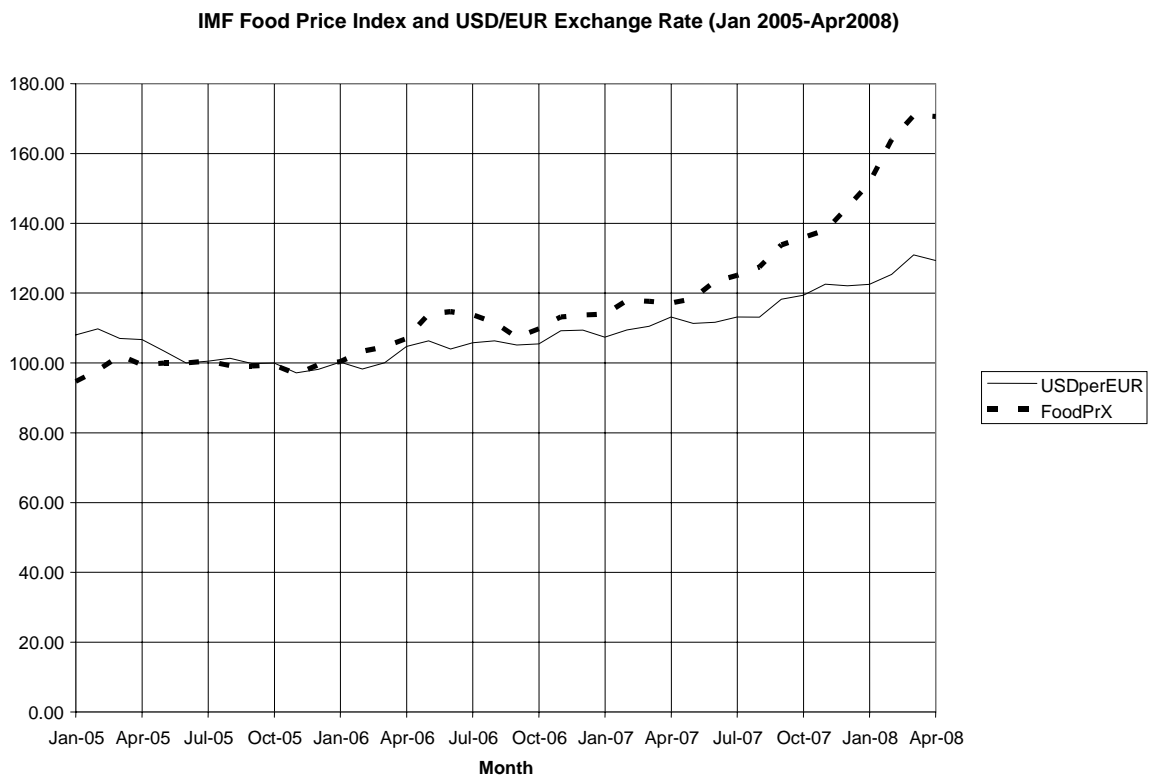
The results show that both world wheat and corn production have experienced a continuous decline in stock-to-use ratios since 2000. During the same time, prices for wheat and corn increased by roughly 250 percent and 100 percent, respectively. Whereas the decrease in stock-to-use ratios has been a trend for these two commodities since the year 2000, price responses occurred mostly after 2005. The behavior of rice is different, with both stock-to-use ratios and

prices having shown an upward trend since 2000. The relationship between falling stock-to-use ratios and rising prices is substantially driven by commodity price speculation.

2.8. Dollar Depreciation

Since 2007, food and dollar prices have moved very closely together (Figure 12) and a cointegration test confirms that the two variables have developed a long term equilibrium relationship, at least since 2005, with a one index point depreciation of the USD against the Euro triggering a 2.2 index point increase of food prices (own calculations).

Figure 12: Food Price Index and USD/EUR Exchange Rate (Jan 2005=100)



Source: IMF Commodity Price Statistics (<http://www.imf.org/external/data.htm>) and www.oanda.com, Author's illustration.

Commodity prices are traded internationally in US dollar and its depreciation causes sellers to raise prices in order to make up for the depreciation. To this adds that monetary policies between the US and Europe are not coordinated. Inflation fears are of a much greater concern to the European Central Bank than to the FED, which is traditionally equally concerned with price stability and employment. As a result, Europe is more likely to maintain a positive interest rate gap to the US, which may trigger a vicious cycle. As higher interest rates in Europe attract more capital, the dollar will keep on depreciating and send commodity prices even higher. However, exchange rates are highly volatile constructs and their formation depends on many more macroeconomic fundamentals but interest rates.

3. The State of Agricultural Supply in ODC Countries

3.1. Preliminary Remarks

For the purpose of this study, a panel dataset was built. The countries listed go beyond the seven of this study in order to be able to estimate representative empirical relationships from panel evidence and to compensate for data scarcity that characterizes the Arab world. Each country has ideally nine observations, which are consecutive five-year averages beginning with the 1961-1965 and ending with the 2001-2005 observation. Data availability constraints, however, produce many missing observations. This problem is more severe with earlier observations.

Appendix Item 1 about Here [Dataset Description]

3.2. Where do ME-ODC Countries Stand?

According to Saif (2008), agricultural markets in the Arab world perform suboptimally because of limited access to capital and markets, outdated farming practices, lack of human capital, adverse market interventions by public policy, geographic disadvantages, especially water scarcity and arid climates, inefficient energy sectors, limited competitive pressure among producers and retailers, as well as a general neglect of the agricultural sector due to fast urbanization. Many of Saif's claims can be tested empirically.

The standing of the ODC countries in terms of agricultural productivity relative to various socioeconomic fundamentals can be estimated econometrically by making use of a residual analysis. The following equations are estimated:

- Identification of Relative Agricultural Productivity:

$$\text{Cereal Yield}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Water per Capita}_i + b_3 \text{ Year}_i + \varepsilon_i$$

- Relative Use of Fertilizers

$$\text{Fertilizer Use}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Water per Capita}_i + b_3 \text{ Year}_i + \varepsilon_i$$

- Relative Use to Irrigation Systems

$$\text{Irrigation Use}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Water per Capita}_i + b_3 \text{ Year}_i + \varepsilon_i$$

- Relative Endowment of Capital per Agricultural Worker

$$\text{Capital/Worker}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Year}_i + \varepsilon_i$$

- Relative Access to Human Capital

$$\text{Secondary School Enrollment}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Year}_i + \varepsilon_i$$

- Relative access to Transportation Infrastructure

$$\text{Transportation}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Year}_i + \varepsilon_i$$

- Relative access to Credit

$$\text{Domestic Credit}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Year}_i + \varepsilon_i$$

Positive residuals indicate an excess exploitation of the policy parameter, negative residuals a deficiency. Deficiencies are fields that should be addressed by public policy. Table 1 summarizes the results, whereas the countries are classified according to the residual of the most recent observation. The actual regression results are listed in Appendix Item 2.

Appendix Item 2 about Here [Agricultural Productivity Regressions]

All ODC countries reveal an agricultural productivity deficit after controlling for per capita income, water per capita and the observation period. No data was available for Iraq and Palestine, but the particular geopolitical constraints of these two countries make them obvious productivity-deficit countries, too.

Table 1: Relative Agricultural Productivity in ODC Countries

	LBN	SYR	JOR	IRN	IRQ	YEM	PAL
Agricultural Productivity Deficit?	Yes	Yes	Yes	Yes	--	Yes	--
Fertilizer Use Deficit?	No	No	No	No	--	Yes	--
Irrigation Use Deficit?	No	No	No	No	No	No	--
Capital per Farmer Deficit?	No	No	Yes	No	--	No	--
Access to Human capital Deficit?	--	Yes	No	No	Yes	Yes	No
Transportation Infrastructure Deficit?	--	Yes	Yes	No	--	--	--
Access to Credit Deficit?	No	Yes	No	No	--	Yes	--

Source: Author's calculations.

Regarding the tangible input factors fertilizer, irrigation, and capital per farmer, Yemen shows a deficit in fertilizer use and Jordan in capital per worker. No country lacks relative irrigation capacities. However, discussions with WFP-personnel with field work experience at WFP's regional office in Cairo, Egypt, September 21, 2008, revealed that despite the presence of physical capital on the ground, the know-how to operate the technology efficiently is often not given.

Nevertheless, there is no strong statistical support for the conclusion that agricultural development lags behind general economic development. Relative human capital development deficits are more common, which of course, complement practitioners' reports that the availability of agricultural capital is not necessarily a guarantor for their proper use. Educational deficits can be identified for Syria, Iraq, and Yemen. Syria has moreover a deficit in access to credit, together with Yemen, and transportation infrastructure, together with Jordan. From a general perspective, it thus seems that non-tangible input factors such as access to schooling, markets, and credit pose a greater problem to agricultural productivity than tangible factors. The only country that does not appear to have an immediate development deficit in any of the policy fields is Iran. This is also reflected by the fact that Iran's predicted agricultural productivity is closest to the trend line.

Noteworthy is the generally good endowment with capital per agricultural worker, fertilizer use, and irrigation in combination with relative credit scarcity in the case of Yemen and Syria. The amount of private credit available is also always an indicator for an economy's decentralization degree. The more private credit is available, the more decentralized is the economy. Thus, the observation of a relatively high endowment with agricultural technological infrastructure (physical capital, fertilizer use, and irrigation) coinciding with low credit availability hints at a need for structural adjustment and privatization.

Why does transportation infrastructure matter? Suboptimal transportation infrastructure prevents economies of scale in production and conserves inefficient smallholder farming. The problem of an inefficient transportation infrastructure may have several sources: Lack of regional

development, strong center-periphery patterns, adverse business climates preventing the development of a transportation service sector, and the combination of all.

The various deficits can also be assessed quantitatively. Two steps are necessary for this. First, one needs to estimate the response elasticity of agricultural productivity to the various parameters. This can be done by estimating the following equations:

$$\text{Cereal Yield}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Fertilizer Consumption}_i + b_3 \text{ Year}_i + \varepsilon_i$$

$$\text{Cereal Yield}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Capital per Farmer}_i + b_3 \text{ Year}_i + \varepsilon_i$$

$$\text{Cereal Yield}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Secondary Enrollment}_i + b_3 \text{ Year}_i + \varepsilon_i$$

$$\text{Cereal Yield}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Transportation}_i + b_3 \text{ Year}_i + \varepsilon_i$$

$$\text{Cereal Yield}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Domestic Credit}_i + b_3 \text{ Year}_i + \varepsilon_i$$

These equations are estimated as double log regressions except equation three which focuses on human capital. Secondary school enrollment enters the equation on the right hand side non-transformed, thus making the regression coefficient a semi-elasticity. Omitting the coefficients for the constants, per capita income and the observation period, the following response elasticities of cereal yield are obtained

Table 2: Elasticity of Cereal Yield to various Determinants

	A 1% increase of fertilizer consumption	A 1% increase of capital per worker	A 1 percentage point increase of secondary enrollment	A 1% increase of transportation capacity	A 1% increase of domestic credit
increases cereal yield by	0.198%	0.046%	0.009%	0.039%	0.069%
t-stat	21.622	1.076	4.787	4.043	3.247
p-value	0.00	0.23	0.00	0.00	0.00
N	1137	213	270	527	1104
Adj. R ²	58.3	23.9	45.3	44.8	41.3

Source: Author's calculations

Second, these elasticities are then applied to the actual deficits behind Table 1. The results, summarized in Table 3, confirm the impression that improvements in access to capital markets and transportation infrastructure are not only more common among the ODC countries than deficits in direct agricultural technology, the simulation of the correction of these deficits relative to the general level of development also pays a substantial productivity dividend. Better access to capital and markets will stimulate agricultural productivity through greater managerial independence and greater economic incentives.

Table 3: Development Potentials of Credit Markets and Transportation Infrastructure

	SYR (1996-2000)	JOR (1996-2000)	IRN (1996-2000)	YEM (2001-2005)
Cereal Yield Predicted (using income, water & time)	1818	1801	1953	1324
Cereal Yield Real	1382	1639	1949	864
Development Potential	32%	+9%	+0.2%	53%
Development Potential Fertilizer Use				+21.5%
Development Potential Capital per Farmer		+1.1%		
Development Potential Human Capital	+0.04%			0.04%
Development Potential Financial Market Development	11.1%			11.0%
Development Potential Transportation Infrastructure	2.9%	25.2%		

Source: Author's estimates.

4. More in Depth Analysis of ODC Countries

4.1. Overview

The countries of this study show a host of different vulnerabilities. Lebanon, Jordan, Syria, and Iran have low levels of chronic food insecurity and relatively functioning food markets. In the absence of exogenous shocks such as a war, a refugee crisis, or a severe drought, these four countries should have the means to address systemic food insecurity issues within their own resources. Iraq, Palestine, and Yemen, on the other hand, suffer from high levels and chronic food insecurity and relatively underdeveloped markets. In these countries, problems of food insecurity are not limited within small pockets of the society. The size and scope of food insecurity and the nature of exogenous problems in these countries suggest that domestic resources will not suffice to solve problems domestically. In analyzing the ODC countries in more detail, the following aspects will be prioritized: General economic conditions, the state of food security, and market and trade overview.

4.2. Lebanon

4.2.1. General Economic Conditions

In 2005, Lebanon had a per capita income of \$5,672 in year 2000 USD. This corresponds to the 73.2 percentile rank of all countries in the world for which data was available and makes Lebanon the richest country of this study. Lebanon, however, suffers from low investment activity, which affects the agricultural sector as well. Domestic investment averaged 19% of GDP during the 2001-2005 period whereas the income-predicted value is 5% higher. Another

2% of gross capital formation comes from foreign aid. After the civil war, Lebanon experienced fast economic growth, driven by construction. This growth boom, however, has not proved to be sustainable and economic growth has slowed down to around 2%-3% since 2000. Between 1960 and today, Lebanon has experienced fast urbanization. Its rural population decreased from 52.5% to 13.6%. The growth rate of the population is with 1% low.

Historically, Lebanon has never been driven by domestic investment rather than capital imports. These capital imports were the result of Lebanon's particular geopolitical position as the bridge between the West and the Arab world. After the 1958 revolution in Iraq, the unification between Syria and Egypt as the United Arab Republic, and socialist experimenting in Egypt and Syria in the 1960s, huge amounts of money fled into the presumably safe haven of Lebanon. Yet, this money has been more of a curse than a blessing. It led to huge wealth concentration among business elites in Beirut and had little spillover effects into the periphery. Attracted by the increased wealth accumulation, migration from the periphery to Beirut then set in without the city being prepared to respond appropriately. Quickly, a poverty belt and illegal settlements grew around the southern suburbs of Beirut.

Another reason for Lebanon's suboptimal investment climate is of a geopolitical nature, especially the Arab-Israeli conflict. After the 1967 Arab-Israeli war, Lebanon saw itself suddenly confronted with a Palestinian refugee population that accounts for roughly 10% of the total population. The Palestinian problem quickly topped the political agenda, divided the country politically, and made Lebanon vulnerable to external interventions. This conflict culminated into the 1975-1990 civil war. After the war, Lebanon never really recovered economically. Its once

unique geo-strategic position was taken over by Gulf economies, which attract now most of the capital imports in the Arab world. The post civil war reconstruction boom lasted only shortly, prioritized prestigious real estate projects over sustainable economic development, and eventually drove the state into several debt crises that persist until today. In the wake of highly unbalanced economic development, the political power-sharing formula is increasingly challenged by various political factions and keeps the country in a political limbo.

4.2.2. The State of Food Security

The percentage of people undernourished in Lebanon averaged 3% in the 2001-2005 period, corresponding to a 23.5 percentile rank of all countries with available data. Relative to its per capita income, Lebanon's percentage of undernourished is far below the income predicted value, which is 9%.

The 2006 war between Hezbollah and Israel hit the agricultural sector the most and prevented a regular harvest. The Israeli bombardments destroyed livestock, trees, fields, boats, nets, machinery and marketing infrastructure. In the South, cluster bombs and unexploded ordnances made 25% of the cultivated fields temporarily inaccessible. The FAO estimates the total damage to the agricultural sector at \$280 million. Its recovery is still not complete and a variety of international organizations assist farming communities to rebuild their livelihoods, where agriculture accounts for about 70% of household income (FAO Newsroom 2006).

The war put a temporary end to generally low levels of food insecurity. Beginning with the outbreak of hostilities on July 12, 2006, roughly 25% of Lebanon's population became instantly

food insecure. After the war ended on August 14, 2006, however, food markets showed impressive resiliency. The World Food Program's emergency program in Lebanon, after distributing almost 13,000 tons of foods to more than 810,000 people, was already terminated on October 31, 2006 (WFP News Press Release, 2006).

Another sudden food insecurity concern arose in 2007, when armed conflict between the militant group of Fatah-al Islam and the Lebanese broke out in the refugee camp of Nahr al-Bared. Nahr-al Bared hosts more than 32,000 registered refugees, organized in some 5,500 families. According to a WFP (2008) study, only 1,200 families returned to the camp by May 2008. The full restoration of the camp will take at least three years. Despite the physical destruction and emotional hardship that the refugees had suffered, WFP finds that all internally displaced have sufficient access to food. Securing enough food, however, comes at costly coping strategies. There are reports of people skipping meals at least once a week, shifts in diet, reduction of personal hygiene expenses, and sales of personal assets such as personal jewelry and memorabilia. The 14 refugee camps in Lebanon with its more than 200,000 registered refugees should receive constant food security monitoring.

4.2.3. Market and Trade Overview

The value added of agriculture to GDP accounts for roughly 6% of GDP in 2005 (Presidency of the Council of Ministers, p. 13) and employs 8% of the labor force. Lebanon is highly food import dependent, satisfying 70% of its food needs through imports (Agriculture and Agri-food Canada, 2007). Domestic wheat production regularly covers less than 30% of domestic

consumption (FAO Stat). Its food trade deficit as a percentage of GDP stands at 5.6% of GDP and is substantially favored by a highly overvalued exchange rate.

Lebanon's problem is not so much inefficient cultivation of existing arable land, rather than the underdevelopment of agricultural business opportunities. According to Canada's Agriculture and Agri-food ministry and its foreign market information system (online), Lebanon exploits only 55% of its productive areas. It also laments wasteful and inefficient agricultural practices and lack of public and private funding. Thus, although Lebanon as a whole is not short of private credit as shown in section three, its agricultural sector likely is. In 2002, for example, only 0.3% of the public budget and only 2% of bank loans were allocated to agriculture. After the civil war, Lebanon witnessed a classical crowding out of private by public investment. Another problem is the disappearance of high value-added food transformation and processing industries, with the exception being wineries.

In 2006, Lebanon imported food for \$ 1.3 billion. Lebanon's ten major import categories and trading partners in 2006 are summarized in the below Table 4, which shows that the biggest market share accrues to non-neighboring countries. Agriculture and Agri-food Canada estimates that the neighboring countries of Syria, Turkey and Egypt control about 15% of the import market.

Table 4: Lebanon's Top-Ten Agri-Food Imports in 2006

Product	Volume-US\$M	First Two Largest Suppliers
1. Live Bovine Animals	137	Brazil-Germany
2. Cheese	82	Morocco-Egypt
3. Meat	68	Brazil-Paraguay
4. Wheat (Durum)	59	Russia-Turkey
5. Food Preparations	48	Ireland-USA
6. Sugar	47	Greece-Italy
7. Milk (Powder)	42	Netherlands/Czech Republic
8. Maize (Corn)	40	USA-Bulgaria
9. Oil (Soybean)	32	Syria-Egypt
10. Coffee	27	Brazil

Source: Agriculture and Agri-Food Canada.

According to the 2005-2006 FAO Statistical Yearbook, which covers the year 2004, Lebanon's major import partners were the USA, France and Germany. The major import products were cattle, cigarettes and wheat. Lebanon's major export partners are Syria, Saudi Arabia, and the United Arab Emirates and major export products are maize, tobacco, and apples. Table 5 provides an overview of Lebanon's imports of cereals, maize, dry milk, vegetable oil, rice, sugar and wheat from FAO Stat.

Table 5: Lebanon's Major Import Partners of Basic Foods in 2004

	Cereals		Maize		Dry Milk		Vegetable Oil	
	Country	T	Country	t	Country	t	Country	t
First	China	131	USA	273503	Czech Rep.	572	Spain	62
Second	Canada	22	Argentina	36376	Ukraine	450	Malaysia	19
Third	Netherlands	8	Brazil	4359	France	429	Germany,	8
Fourth	Denmark	5	Moldova	3304	Moldova	352	France, UK	4
Fifth			Bulgaria	1175	Slovakia	100	Italy, KSA, India	4
	Rice		Sugar Refined		Wheat			
	Country	t	Country	t	Country	t		
First	Egypt	20	France	54865	Russia	169502		
Second			UK	45066	USA	93879		
Third			Belgium	17300	Australia	87775		
Fourth			Italy	8366	Syria	40000		
Fifth			Netherlands	7724	Argentina	39113		

Source: FAO Stat

4.3. Syria

4.3.1. General Economic Conditions

In 2005, Syria's per capita income was \$1,175 in year 2000 USD, which places it at the 41.0 percentile rank of all countries. Relative to its per capita income, it has a considerable investment activity of around 21% of GDP. For the period between 2001 and 2005, it was five percentage points higher than predicted. Yet, high investment activity led to only suboptimal growth over the same period, which was only 1.4% as opposed to the investment-predicted growth rate of 2.1%. Such an observation is not unusual for countries with big public sectors. Forced by a young population where 60% are 20 years or younger and high unemployment rates, whose range, depending on the source, is estimated between 10% and 25%, Syria has recently embarked on a careful economic reform and liberalization path, which has already translated into an improvement of its growth record. A major challenge will be to maintain this reform momentum. Roughly 50% of Syria's population still lives in rural areas, only down from 61% in the early sixties. Relative to its per capita income, its population growth rate is with 2.5% higher than the income predicted value.

4.3.2. The State of Food Security

According to FAO estimates, Syria's percentage of undernourished lies at 4% and is much below the income-predicted value of 21%. A UNDP estimate for the 2003-2004 period beyond undernourishment concludes that 11.4% of the population have insufficient access to basic food and non-food needs (Al Zoughbi, 2006). Heavy investments in the agricultural sector in recent

years have constantly improved Syria's food trade position, which likely could be balanced by today had Syria not been struck by a severe drought this year. According to the United States Department of Agriculture (2008), wheat production will fall by 38% in 2008/2009 compared to 2007 as rainfall was only 15-30 of the average. The region most hit by the drought is Syria's "breadbasket" in the northeastern provinces, where 75% of total wheat production is located. Wheat is Syria's major grain crop, accounting for 83% of total grain production. As a consequence of the drought Syria needed to import 120,000 tons of wheat this year. This made Syria again a net wheat importer for the first time in 15 years.

The biggest problem of food insecurity lies among Iraqi refugees. According to UNHCR statistics (2007), Syria accommodates an estimated 1.5 million Iraqi refugees. An increasing number of Iraqis entering Syria arrive poorly prepared, only relying on their cash possession and social networks. Not all refugees register with the UNHCR. In an emergency response operation, the WFP (2008) found that among those who do register with the UNHCR, approximately 15% carry cash with them that is too little to finance their basic food and non-food needs for more than three months. As basic food prices have recently increased by 25-30% and housing prices roughly doubled, many Iraqi refugees will become food insecure even faster. Another problem is that the refugee problem also increases the vulnerability of Syrians. The influx of refugees drives up prices and reduces real incomes of everyone else. Moreover, many refugees compete illegally on the labor market with Syrians, thus crowding out domestic labor and putting pressure on the development of real wages.

4.3.3. Market and Trade Overview

Syria's economy has a substantial agricultural sector, which contributed 23% percent to GDP in 2005 and employed roughly 30% of the labor force. The agricultural sector is currently undergoing change. According to Agriculture and Agri-Food Canada (2005), a previous neglect of agriculture has been replaced by a proactive agricultural development policy. A priority is the extension of irrigated farm land, which is supposed to increase by 38% in 2015. Between 1990 and 2003, agricultural policy translated into a constant increase of the wheat production to consumption ratio. While in 1990 this ratio was only 95%, Syria grew into a substantial wheat surplus producer country, displaying a production to consumption ratio of more than 180% in 2003.

Although production occurs mostly decentralized, the marketing and distribution process of, for example, wheat is still controlled by the state. From a market theoretical perspective, the separation of the allocation from the distribution decision is clearly a source of inefficiency. Interestingly, though, the 2008 drought may actually oblige government to allow for greater decentralization of marketing decisions. Syria's government has always been the monopoly procurer and marketer of the domestic wheat harvest, which are two positions it could easily finance when world prices of agricultural products were still low. In the wake of rising prices, however, farmers are no longer anymore willing to sell to the government and government may thus be forced to abandon its intermediary position between production and distribution. If it does so, food insecurity is likely to spread.

Agriculture and Agri-food Canada (2005) identifies Syria's major agri-food imports as corn, refined sugar, soybean oilcake, rice, and food preparations. Its major import partners are the USA, Brazil, Argentina, Thailand, and Spain.

Table 6: Syria's Top-Five Agri-Food Imports (2003)

Product	Volume-US\$M	First Two Largest Suppliers
1. Corn	147	United States
2. Refine Sugar	112	Brazil
3. Soybean oilcake	83	Argentina
4. Rice, milled	58	Thailand
5. Food Preparations	55	Spain

Source: Agriculture and Agri-Food Canada.

According to the FAO 2005-2006 Statistical Yearbook, Syria's major exports are sheep, cotton, and wheat. The fact that Syria in 2008 has turned to a net wheat importer, from a net exporter of it in previous years, is on the one hand a positive testimony of Syria's agricultural development process over the last years. But on the other hand it is also evidence of the fact that agriculture in the region is highly vulnerable to climate change. Syria must therefore ask itself what price it is willing to pay for improving its agricultural self-sufficiency in terms of foregone development in other areas of the economy. Table seven provides a glimpse of Syria's major import partners of other basic food commodities.

Table 7: Syria's Major Import Partners of Basic Foods (2004)

	Maize		Dry Milk		Vegetable Oil		Sugar Refined		Wheat	
	Country	Country	Country	Country	Country	t	Country	t	Country	t
First	USA	724831	Belgium	61	Turkey	263	Brazil	218314	Russia	19293
Second	Argentina	127433	France	21			France	50472	Ukraine	13929
Third	Ukraine	2627					Belgium	9100	Bulgaria	10424
Fourth							Spain	4000		
Fifth							Guatemala	3600		

Source: FAO Stat

4.4. Jordan

4.4.1. General Economic Conditions

Jordan's per capita income in 2005 was \$2,086 in year 2000 USD, corresponding to a percentile rank of 54.7. Domestically accumulated investment in the 2001-2005 period was less than 15% of GDP and 4.5 percentage points below the income-predicted trend line. Another 7% of investment activity comes from foreign aid, thus making Jordan highly vulnerable to the whims of international donors. Jordan's per capita income growth rate between 2001 and 2005 was with 3.7% impressively high and also translates into relatively low unemployment, which currently stands at around 13%. A major source of Jordan's recent growth has been demand side driven, most notably by the 2001 Jordan-US Free Trade Agreement and substantial US foreign aid to Jordan. Positively, the export share of manufacturing (% of GDP) has increased noticeably from an average of roughly 14% in the 1996-2000 period to more than 21% in the 2001-2005 period. Jordan has also experienced rapid urbanization since the 1960s with the rural population share having decreased from 47% to 18%. The population growth rate is with 2.5% higher than predicted by its income.

4.4.2. The State of Food Security

Jordan's undernourishment percentage is 6.5% and also far below the income predicted value of 17.5%. Jordan is one of the world's most water scarce countries. According to FAO statistics, renewable water resources per capita in 2005 were only 157 m³ while the world average was

above 8,000 m³. Gardner-Outlaw and Engleman (1997, p. 16 f.) estimate that by 2050 water availability per capita will go down to between 119 m³ and 90 m³.

Canada's Agriculture and Agri-Food Ministry (2007) complains lack of market oversight with potentially adverse effects on food security as farmers sell in local markets products whose pesticide content exceeds regulatory limits. Another threat to food security is the supply of low-quality water for irrigation that contaminates crops. Jordan's 2002-2010 National Strategy for Agricultural Development lists other areas of problems, which relate to animal health, animal care, and animal living conditions and which to resolve would require better monitoring and law enforcement mechanisms.

Iraqi refugees have become a major problem in Jordan, too. With a population of only 5.5 million, Jordan hosts between 500,000 and 750,000 refugees. The problems caused by the influx of Iraqi refugees are in nature identical to those of Syria. Their quantitative dimensions, however, may be more severe simply due to the high number of refugees relative to the total population, which is much greater in Jordan's case.

4.4.3. Market and Trade Overview

Jordan's agricultural sector is small. In 2005, it contributed only 2.8% to GDP and employed around 3.5% of the labor force. Soil quality is generally poor and requires considerable care in terms of nutritional inputs, thus making agricultural production highly capital intensive. It is estimated that in order to make Jordan's agriculture self-sustainable, investments in improved production technology and marketing infrastructure of around \$65 million would be necessary.

From an economic perspective, this seems to be a highly questionable investment as Jordan does not have a comparative cost advantage in agricultural production. Between 1990 and 2003, Jordan's wheat production to consumption ratio had been regularly below 20%, sometimes even falling below 5%. The country's food trade deficit as a percentage of GDP in 2005 stood at 6% of GDP. Jordan's government nevertheless seems to envision a drastic improvement of agricultural self-sufficiency according to Canada's Agriculture and Agri-Food Ministry (2007). Following the consumption pattern change associated with economic modernization and urbanization towards a diet richer in protein, Jordan gives particular attention to live stock development in its 2002-2010 National Strategy for Agricultural Development. Currently, Jordan complains self sufficiency of only 30% for red meat, 53% for milk and dairy products, and 7.7 percent for fish. Jordan's major import partners of basic foods are listed in below Table 8.

Table 8: Jordan's Major Import Partners of Basic Foods (2004)

	Cereals		Maize		Dry Milk		Vegetable Oil	
	Country	T	Country	t	Country	t	Country	T
First	USA	8	USA	319161	New Zealand	5171	UAE	180
Second			Argentina	81738	Belgium	3440	Burkina Faso	37
Third			India	17299	Netherlands	2153	Germany	35
Fourth			Brazil	8685	Australia	1710	USA	8
Fifth			Egypt	255	Poland	1302	Netherlands, KSA, UK	2
	Sugar Refined		Wheat					
	Country	t	Country	t				
First	KSA	88423	KSA	88423				
Second	Thailand	56863	Thailand	56863				
Third	UAE	32723	UAE	32723				
Fourth	Brazil	25155	Brazil	25155				
Fifth	Belgium	5500	Belgium	5500				

Source: FAO Stat

The FAO 2005-2006 Statistical Yearbook lists as Jordan's major import products wheat, palm oil, and barley. Its major import trade partners are the US, Indonesia, and Syria. Jordan's major exports are hydrogenated oils (margarine), tomatoes and cigarettes.

4.5. Iran

4.5.1. General Economic Conditions

Iran's per capita income in 2005 was \$1,943 in year 2000 USD, which puts the country at the 51 percentile rank. Iran has regularly high domestic savings rates in the range between 30% and 35%. For most of the 1980s Iran's growth rate relative to its high investment activity was below the trend line. Whereas suboptimal growth during the 1980s can be attributed to the war with Iraq, below trend-line growth in 1990s had more internal reasons. For the 2001-2005 observation, though, growth accelerated beyond the predicted value. This is most likely the result of the increase of the value added of natural resource exports to GDP, which increased by more than three percent from the 1996-2000 to 2001-2005 observation (own calculations). Most of Iran's current growth is based on rent income rather than capital accumulation. Unemployment rates are estimated between 11% and 15%. Iran's high investment activity is also favored by a relatively low population growth rate. Moreover, Iran has witnessed fast urbanization. Its rural population shrank from 60% in the early sixties to 34% in the 2000s. Iran's rural population share is 17% lower than its income would predict. Population growth is at 1.4% low.

4.5.2. The State of Food Security

For the 2001-2005 observation, the percentage of undernourishment is 4%. This is thirteen percentage points lower than its per capita income predicted value. This generally favorable picture is also confirmed by an official study by Deghan of Iran's Ministry of Jihad-e and Agriculture, which nevertheless finds that due to insufficient distribution channels pockets of malnourishment within the Iranian society still exist. The study also notes that crops account for the lion share of energy and proteins, causing some deficiencies in the supply of certain nutrients, such as calcium and iron.

Iran is a geographically vulnerable market. In the past it has been badly hit by droughts, which some experts claim to follow a seven year cycle. A particularly severe drought occurred in 1999/2000, during which 2.8 million tones of wheat were destroyed, 800,000 animals killed, and 70% of rural water supplies affecting 37 million Iranians disrupted (BBC News, August 3, 2000). According to the United States Department of Agriculture Commodity Intelligence Report (2008), this year has been another drought season. Despite favorable early season conditions, above-normal temperatures and below-average rainfall struck between March and April at a moment that is particularly important for the yield formation prospects. Wheat production is now expected to be 20% less than in 2007. Most of Iran's wheat production occurs in the northwest and is mostly non-irrigated. In the absence of droughts, Iran is generally able to meet its demand for wheat. In 2004, Iran's wheat production to consumption ratio was 114%.

4.5.3. Market and Trade Overview

In 2005, agriculture accounted for 10.4% of GDP and employed 24.9 of the labor force. Over the last years, Iran has made substantial progress in improving its agricultural productivity, having turned from a wheat net importer to a net exporter. Wheat is grown on roughly half of Iran's irrigated land. Available figures indicate that Iran's overall food trade balance has almost closed down in recent years. Its food trade deficit for the 2001-2005 period was less than one percent of GDP. Ninety percent of Iran's population is fed by domestic production. According to Canada's Agriculture and Agri-food Ministry (2007), the biggest challenge on the supply side during this period was storage capacity. The storage capacity shortage was estimated at three million tons and named a major source of waste.

Table 9: Iran's Major Import Partners of Basic Foods (2004)

	Maize		Dry Milk		Vegetable Oil	
	Country	t	Country	t	Country	t
First	UAE	487027	Germany	3929	Italy	140
Second	Brazil	470801	UAE	1262	Kuwait	76
Third	Lebanon	290525	New Zealand	1134	UK	18
Fourth	Germany	247501	Belgium	1090	UAE	13
Fifth	Netherlands	117259	Bahrain	900	Switzerland	10
	Rice		Sugar refined		Wheat	
	Country	t	Country	t	Country	t
First	Pakistan	66	UAE	66322	Russia	84878
Second			South Africa	2280	Canada	69288
Third			Turkey	337	Uzbekistan	61457
Fourth			Belgium	16	UAE	5182
Fifth			India	5	Austria	1491

Source: FAO Stat

According to the FAO 2005-2006 Statistical Yearbook, Iran's major import products are soybean (oil and cake) and maize. The United Arab Emirates, Brazil, and Switzerland were its major

import partners. Its major agri-food exports are pistachios, raisins, and spices. Above Table 9 summarizes Iran's basic food imports.

4.6. Iraq

4.6.1. General Economic Conditions

Lack of reliable data makes the assessment of the general economic conditions of Iraq difficult. There is even no accurate data on Iraq's per capita income, much less on other basic macroeconomic indicators. There is no doubt, though, that Iraq has witnessed a dramatic decline of living standard since the 1980s as a result of the Iran-Iraq war (1980-1988), the first Gulf war (1991), and the US led invasion in Iraq in 2003. Author's calculations and estimates of available and scattered data suggest that Iraq's per capita income in 1980 in year 2000 prices was roughly \$8,000. By the end of the war in 1988, which cost Iraq about \$450 billion and the lives of 800,000, it dropped to around \$750. After the first Gulf war, the UN classified Iraq as a pre-industrial state and estimated the contraction of economic activity at two thirds, thus leaving Iraq with an approximate per capita income of \$250 in 1991. According to the World Bank, it recovered to around \$600 in 2002, the year before the US led invasion. For the year of the invasion, some studies conclude that Iraq's economy contracted by one third, corresponding to a per capita income of \$400 in 2003. Since 2004, Iraq's economy is officially growing again and per capita income in 2005 is estimated at around \$500 (in year 2000 USD). Official estimates in purchasing power parity terms are much higher and reach \$3,400, similar to Indonesia, which, however, may convey an overly optimistic picture of the situation in Iraq.

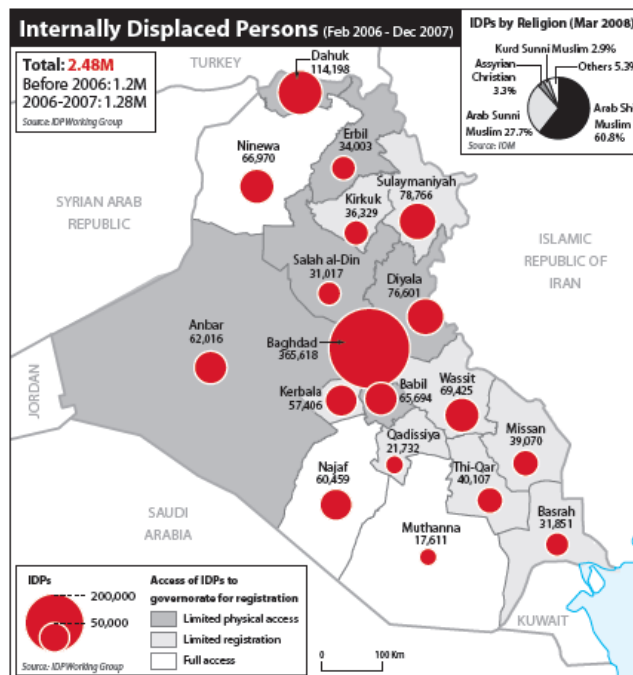
There is no data on investment activity but the situation on the ground suggests that the reconstruction of Iraq is mainly driven by foreign aid and oil revenues. Most of the official redevelopment focus of Iraq is directed on its cash cow oil. But there are signs of life in the shadow of oil, too. The Economist, in its June 12th edition, reported cautiously that “Iraq starts to fix itself.” The article stresses favorably the success of greater troop deployments, increase of oil-revenues, and rising governmental self-confidence in addressing sectarian violence. Private business investment must essentially start from scratch but takes place increasingly. USAID established in Iraq a business registry and reported more than 32,500 entries by December 2006. Iraq, nevertheless, has still a long way to go. Reports on unemployment rates range between 25% and 40% (Brookings Iraq Index).

4.6.2. The State of Food Security

In 2004, the WFP conducted the first major study on food security in Iraq, followed up by a second one in 2005. A peculiarity of Iraq is its substantial reliance on the Public Distribution System (PDS). The PDS was established as part of the oil-for-food program in 1995. It is supposed to guarantee every citizen a certain amount of basic food commodities. The basket of goods had a value of \$15 in 2005. The WFP estimates that in Iraq roughly 4 million people, or 15.4% of the population, are food insecure. Should the PDS be discontinued, an additional 12.3 million Iraqis, or 47% of the total population, would become food insecure. Some studies find that the average daily calorie supply has dropped to 2,000 kcal only. Newborn, children, and elderly are again hit the hardest, especially in rural areas. Sixty-nine percent of the food-insecure live in rural areas, where in turn one third of the Iraqi population lives. Thirty-three percent of the children of food-insecure households show signs of malnutrition.

The PDS is problematic for various reasons. In practice, it has become a quite accurate census of Iraq's demographic profile. In the 2005 election, voters were registered based on PDS information. Prior to the 2003 war, the PDS was Iraq's most efficient institution. According to a 2007 study by Refugee International, a Washington based NGO, the PDS, however, has lost its efficiency due to a number of reasons. Insecurity is the first with reports of, for example, PDS trucks being hijacked by criminal gangs. Because of insufficient infrastructure and interruptions to the free movement of goods, PDS deliveries often reach their destination, if at all, only with substantial delays. If they arrive, their freight is often incomplete. A second problem is administrative inefficiency. PDS rations are only distributed where people are registered. Yet, with more than 2.4 million Iraqi's internally displaced, many of them have no access to the PDS.

Figure 13: Internally Displaced in Iraq



Source: United Nations Office for the Coordination of Humanitarian Affairs

According to Refugee International (2007), the situation is particularly problematic in the predominantly Kurdish provinces in the north, which have become a safe haven for many refugees from various sects. Because PDS registration equals voter registration, Kurdish authorities are reluctant to issue PDS cards to refugees. Refugee International estimates that virtually none of the approximately 150,000 refugees in the Kurdish provinces has access to the PDS. A third problem is corruption in the distribution process.

4.6.3. Market Overview

The US Department of State's "The Future of Iraq Project - Water, Agriculture, and Environment Group" (2005), describes Iraq as a country that has always been dominated by agricultural activity. Although agriculture currently contributes only 6% to GDP, it employs over 25% of the labor force. Iraq's major crops are wheat and barley, which is planted on more than 60% of arable land. The areas most favorable to agricultural production are located in the less arid north east and the valleys of the Euphrates and Tigris rivers. Agricultural productivity has been constantly declining over the 1990s. Cereal yield today is estimated at around 800-1,000 kg/ha. In neighboring Iran, cereal yield is with roughly 2,300 kg more than twice as high.

There are numerous reasons for the decline of agricultural productivity beyond those that are obviously linked to Iraq's security situation. First, the physical capital stock of Iraq's agriculture is mostly of outdated local or Eastern European production, for which spare parts are difficult to get by. Iraq's agricultural sector is moreover short of simple equipment such as drills and sprayers, which prevents the efficient use of fertilizers and pesticides. In fact, insufficient fertilizer use is among the most serious causes for low productivity, although Iraq is richly

endowed with natural resources to develop a fertilizer industry to meet its demand. At the current stage, conservation tillage is thus barely possible. Second, there is a lack of human capital. Most human capital in use was accumulated before the 1980s and agricultural scientists had little contact to international scientific networks. Third, and closely related to the lack of capital, is a high vulnerability to weeds, diseases, and insects.

4.7. Yemen

4.7.1. General Economic Conditions

Yemen's 2005 per capita income was \$530 in year 2000 USD, which places it at the 25th percentile rank. Its investment share during the 2001-2005 period averaged 21% and is more than twice the income-predicted value. Its growth performance relative to its investment activity is dismal. Between 2001 and 2005, per capita incomes essentially remained unchanged. From a growth theoretical perspective, Yemen's extremely high population growth rate of more than three percent is a substantial factor behind stagnating per capita incomes. Given the fact that Yemen's average fertility rate between 2001 and 2005 period was six, its investment rate is not only considerable relative to per capita income, but also relative to population growth. Yemen is furthermore a highly rural society with a rural population share of 72%.

Yemen is confronted with a host of challenges. Domestically it has been regularly challenged by political instability. Reunified in 1990, domestic problems relate to the conflict between the pro Western government and the rising influence of al-Islah, an Islamist political party. The wide use of the recreational drug Qat comes at a high social cost. This social cost is less in terms of

adverse socioeconomic consequences such as drug-related crime, reduced individual productivity, or rising divorce numbers. Rather it is the high opportunity cost of foregone production of other goods which are environmentally more sustainable and add more value to agricultural production. The use of Qat is an indicator of a high (present) time preference rate, which is far too high to stimulate individual investment and foregone consumption, which are necessary for the accumulation of capital and the initiation of economic development. Governmental oil revenues are the major source of investment activity.

Geopolitically, Yemen is not embedded in an environment that is favorable to economic development and investment into a regional division of labor either. Across the Bab-el Mandeb strait, a possibly vital hub for regional trade, the three countries Sudan, Somalia, and Ethiopia rank first, third, and eighteenth of Foreign Policy's 2007 Failed State Index. Historical border disputes with Saudi Arabia have just been settled in 2000. Disputes with Saudi Arabia escalated in 1991 when Saudi Arabia expelled 800,000 Yemenites and stopped its financial aid as a retaliation measure against Yemen's decision not to support the first Gulf war against Iraq. The subsequent economic shock split the government about the political course of the country that eventually led to eight weeks of civil war in 1994.

A byproduct of the conflicts at the horn of Africa, especially in Somalia and Ethiopia, is a constant influx of refugees into Yemen. The flight into Yemen is dangerous and many refugees who flee by boat do not survive the journey. Many refugees see Yemen only as a passage to the Gulf States, but most remain stranded. Somalis are granted automatically refugee status while Ethiopians need to register with the UNHCR. The exact number of refugees in Yemen is

unknown and subject to wild guesses ranging from 200,000-250,000 according to the UNHCR to more than one million according to Yemen's government. The WFP targets more than 33,000 Somali refugees in Yemen.

The various political, socioeconomic and geopolitical factors have made Yemen one of the poorest countries in the world, putting poverty reduction on top of its development agenda. For this, diversifying the economy will be necessary. Currently, more than one third of GDP stems from exports of natural resources. Unfortunately, though, oil industries are often geographically insulated and have very little forward and backward linkages to other sectors of the economy. They are moreover poor job creators. Transforming oil revenues into sustainable development and socio-economic modernization will have to assume priority. This is even more so when taking into account the demographic pressures in Yemen, where almost half of the population has not yet reached the age of 15.

4.7.2. Food Security

More than one third of Yemen's population is undernourished. For the 2001-2005 period, the number was 37.5%. Relative to per capita income, this is roughly ten percentage points above the trend line. Food security is particularly challenged by low levels of water resources. Yemen's average available water per capita supply is 198 m³ while individual water withdrawal is already 368 m³. By 2025, available water supply will be only 105 m³. Agriculture uses 93% of water resources, whereas the growth of Qat alone accounts for 40% of it. If Qat cultivation continues at its current rate, the Sana'a water basin will be depleted by 2015 with dependent agricultural activity, family incomes, and jobs being destroyed for good. Yemen's food trade deficit with the

rest of the world for the period between 2001 and 2005 was 6.6% of GDP. Financing this deficit consumes roughly 50% of Yemen's oil revenues. In 2003, Yemen produced less than 5% of the wheat it consumed.

A June 2008 WFP study, published in August 2008, conducted a comprehensive food security analysis of Yemen. The malnutrition indicators and undernourishment are with a total prevalence rate of 44%, 10%, and 37%, respectively fall into the high concern categories according to WHO standards. The study moreover finds that 43% are food insecure. Eighteen percent are severely food-insecure.

4.7.3. Market Overview

The share of agriculture to GDP in 2005 stood at 14% of GDP. Employment in agriculture is estimated at 54% for 1999 (2007 WDI). Agricultural markets face enormous challenges in the near future. One is desertification, which eats up continuously scarce arable land. According to the Yemeni Ministry of Agriculture and Irrigation, 95% of Yemen's arable land is threatened by desertification. Another problem is again Qat. In addition to crowding out alternative crops and draining the country's water supply, it has become a major source for rising prices of other basic food commodities. In Yemen, there is a strong political support for investing into domestic agriculture and to seek protection from international markets, which may be a questionable strategy.

According to FAO's 2005-2006 Statistical Yearbook, Yemen's major import categories are wheat, chicken meat, and cow milk powder. Its major import partners are Brazil, UAE, and

India. Yemen's major exports are cigarettes, coffee, and bananas. A more detailed list of Yemen's imports of basic foods is given in the below Table 10.

Table 10: Yemen's Major Import Partners of Basic Foods (2004)

	Cereals		Maize		Dry Milk		Vegetable Oil	
	Country	t	Country	t	Country	t	Country	t
First	China	131	USA	273503	Czech Rep.	572	Spain	62
Second	Canada	22	Argentina	36376	Ukraine	450	Malaysia	19
Third	Netherlands	8	Brazil	4359	France	429	Germany	8
Fourth	Denmark	5	Moldova	3304	Moldova	352	France	4
Fifth			Bulgaria	1175	Slovakia	100	UK	4
	Rice		Sugar Refined		Wheat			
	Country	t	Country	t	Country	t		
First	Egypt	20	France	54865	Russia	169502		
Second			UK	45066	USA	93879		
Third			Belgium	17300	Australia	87775		
Fourth			Italy	8366	Syria	40000		
Fifth			Netherlands	7724	Argentina	39113		

Source: FAO Stat

4.8. Palestine

4.8.1. General Economic Conditions

Since the second Palestinian uprising in September 2000 and the intensification of Israeli interventions in the Palestinian territories, a short period of modest economic growth came to an abrupt end. Since 1999 per capita income has shrank by more than one third from \$1,532 to \$1,041 in year 2000 USD. Domestic investment peaked at almost 31% in 1999. Since then, the destruction of the existing capital stock is only prevented by massive aid. Although gross capital formation rates are still positive, aid cannot permanently replace the loss of private investment activity and the entrepreneurial spirits embedded in it. Aid is much more efficient in maintaining public investments. Remittances, aid, and public salaries, substantially financed by aid, are today

the major source of income and demand. Although demand is still surprisingly strong, the signs of a crumbling economy intensify. Unemployment has increased from ten percent in 1999 to 29% in Gaza and 19% in the West Bank. The June 2007 take-over by Hamas and Israel's response with more closures and controls over the in- and outflow of goods has transformed Gaza into an essentially autarkic economy, with the only booming activity being smuggling. It is estimated by the World Bank that since 1999 95% of industrial activity has been choked off. Demographically, the rural population share is with 28.4% low while population growth is with 3.3% high.

4.8.2. Food Security

The economic downslide has severe consequences on food security for both Gaza and the West Bank, whereas the situation in Gaza is more desperate. Estimates for 2004 suggest an undernourishment percentage of 16% for all occupied Palestinian territories. This corresponds to a four percentage point increase since 1999. Recent developments have made the situation even worse. According to a July 2008 WFP study, food insecurity in Palestine has captured on average 38% of the population with strong differences between Gaza and the West bank, where the numbers stand at 56% and 25%, respectively.

Gaza has to deal with unique food security problems, which are the result of closures and the slow collapse of domestic infrastructure. Closures do not only prevent access to needed food imports, they also affect medication and fuel supplies. Certain people depend on medication for proper food utilization. Frequent power cuts and water scarcity add hygienic problems to proper food utilization. Even worse, lack of fuel prevents the correct operation of sewage treatment that

is necessary to prevent hazardous waste from contaminating ecological resources. Between January and May 2008, the lack of fuel has led Gaza to discharge 60 million liters of partially and non-treated sewage into the Mediterranean. These toxics are likely to re-enter the food chain with yet unknown consequences for public health.

4.8.3. Market Overview

Technically, speaking of an agricultural market overview in Palestine is a false labeling as both Gaza and the West Bank lack the basic fundamentals for market interaction, most notably secure property rights and the free movement of goods. The Gaza strip and the West Bank have very different characteristics. One of the most obvious is population density. Population density in the Gaza Strip, which is among the highest in the world, is estimated at around 4,118 per km². Agriculture's value added to GDP in Palestine is estimated at around 8%. Due to the various exogenous shocks, which the Palestinian economy is exposed to, the absolute output of the agricultural sector shows a dramatic downward trend. Estimates suggest that 12%-18% of the Palestinian labor force is employed in agriculture. As opposed to modern and free markets, the structure of Palestine's agriculture is closer to a medieval feudal system, where Palestinians are in effect tenants. Regular Israeli incursions have led to the razing of fields and trees that lead to the displacement of people and the desertification of land. Closures prevent the import of essential agricultural equipment such as fertilizers and spare parts necessary to maintain agriculture's capital stock. Moreover, closures prevent agricultural products meant for exports from leaving the economy and often cause them to perish on the spot. Some figures suggest that the annual value added of agriculture could be \$200-\$300 million higher in the absence of Israeli disruptions. The total damage to Palestine's agricultural sector since 2000 is estimated at more

than \$1.5 billion. Agriculture's contribution to GDP is around 8% and it employs roughly 12% of the labor force.

The West Bank is much less densely populated. It is estimated that on average 446 people share on square kilometer. The West Bank faces similar problems like Gaza, although the nature of the problem relates less to closures rather than the restriction of the internal free movement of goods and people as a result of checkpoints. Illegal settlements are often associated with the redirection of transportation routes and additional checkpoints, which strangulates any economic activity on the ground and undermines directly the economy's ability to develop economies of scale.

4.9. Summary

The above discussion has revealed that although the seven ODC countries show more differences than similarities, there are nevertheless some common themes, too. Obviously, it is important to distinguish between low systemic food-insecure countries and high or chronically food insecure ones. Lebanon, Syria, Jordan, and Iran fall into the first category. Iraq, Yemen, and Palestine fall into the second. The difference between low and high food insecure countries is relevant for contingency planning. Countries with low food-insecurity can be expected to play a much greater role in establishing food security for the most vulnerable than high food-insecurity countries. The following Table 11 summarizes some key observations for the seven ME-ODC countries. Some of the listed particular challenges are clearly specific to individual countries, for example the problem of unexploded ordnances in South Lebanon, while others are of a more universal nature, such as insufficient market monitoring and governmental interference.

Table 11: Agriculture and Food Security among ME-ODC Countries – Stylized Facts

		LBN	SYR	JOR	IRN	IRQ	YEM	PAL
General Economic Conditions	GDP per capita	5672	1175	2086	1943	500	530	1041
	Investment	19%	21%	15%	30%	NA	21%	NA
	Unemployment	20%	20%	13%	15%	25%-40%	34%	29% (Gaza) 19% (West Bank)
	Growth	2%-3%	1.40%	3.70%	4%	NA	0%	-5%
	Urbanization	86%	50%	82%	66%	68%	26%	72%
	Population Growth	1%	2.50%	2.50%	1.40%	3%	3%	3.30%
Agriculture	Agriculture/GDP	6%	23%	2.80%	10%	6%	14%	8%
	Agriculture Employment	8%	30%	3.50%	24.90%	25%	54%	12%-18%
	Challenges	No policy priority, currency overvaluation, credit access, UXOs	Droughts, gov't interference	Gov't monitoring, pesticide overuse, animal health, water scarcity	Droughts, storage capacity	Capital stock, human capital	Droughts, Qat, water scarcity	Israeli closures, incursions, razing of farm land
Food Security	Under-nourishment	3%	4%	6.50%	4%	15%	38%	16%
	Food Trade Deficit	5.60%	0.80%	5.90%	1%	NA	6.60%	NA
	Wheat production consumption ratio	15%-30%	90%-180%	2%-11%	70%-120%	NA	5%-10%	3%-14%
	Challenges	Civil strife, armed conflict	Refugees	Refugees	Reaching vulnerable	Civil strife, PDS	Qat, refugees	Interruption of movement of goods due to closures

Source: Author's illustration.

A striking common theme is the problem of refugees, either in combination with the situation in Iraq, the Horn of Africa, or the Arab-Israeli conflict. All countries are confronted with a substantial sub-population, about which information is generally scarce. When looking at these refugee sub-populations, the focus is generally on the refugees. It is important, though, not to lose sight of the problem and hardship that refugees create for regular citizens, too. If refugees are a source of rising prices, then in the shadow of the refugee problem also regular citizens will suffer. This aspect seems to be under-researched.

A final common aspect is the political attitude towards agricultural development. All countries of this study seem to envision some kind of food self-sufficiency in the long run. Geographic and demographic constraints, however, suggest that this is a highly risky undertaking as it may redirect scarce resources into a dead end. Rather than working on food self-sufficiency goals, countries may have to accept permanent food trade deficits as a reality that they can barely escape. ODC countries should ask themselves, which sectors of the economy they need to cultivate in order to finance food imports. Ultimately, only successful economic development will safeguard food insecurity.

5. Food Crisis, Market Dynamics, and Policy Options

5.1. Introduction

Lebanon, Jordan, Syria and Iran are low systemic food-insecure countries while Iraq, Yemen, and Palestine are high or chronic food-insecure countries. Although both types of countries are in need of external support, the nature of support should be different. Support to low systemic food insecurity countries can be limited to institutional reforms strengthening allocation and distribution efficiencies of the market place. Institutional support to high-food-insecurity countries is even more important, but also needs to be complemented by direct aid in order to avoid major humanitarian crises. In order to identify appropriate strategies for contingency planning, information is crucial about the nature of the various local markets, crisis response strategies of the economic actors, and available policy options.

5.2. How Efficient are Markets?

The efficiency of food markets depends on many parameters. Supply may be affected by disasters, natural resources, and climate. Similarly, demand is affected by socioeconomic factors like income inequality, unemployment, and poverty. The interaction between demand and supply depends heavily on governmental interventions, such as price controls and trade policies. Given the host of factors that may influence the efficiency of food markets, there are no readily available food market efficiency indicators. However, it may be approached indirectly, the basic idea being that food market efficiency should drive down the food expenditure share, for which estimates are available from the Economic Research Service of the United States Department of

Agriculture. Unfortunately, the USDA data are snapshots from 1996. They can be assumed though, to be relatively constant over time.

In order to get an idea of food market efficiency, again use is made of a residual analysis. The following equation is estimated.

$$\text{Food Expenditure Share}_i = \beta_0 + \beta_1 \text{Income}_i + \beta_2 \text{Cereal Yield}_i + \beta_3 \text{Water per Capita}_i + \beta_4 \text{Food Trade Balance}_i + e_i$$

This equation estimates the food expenditure share as a function of the general level of economic development as well as control factors for the strength of agricultural sector. Positive residuals can then be taken as indicators for distributional problems, such as the lack of competition on the retail sector because of market entry barriers due to market power or poor infrastructure. Similarly, negative residuals hint at greater food market efficiency. The predicted, real, and residual values associated with the regression are summarized in the following Table 11. The complete regression results are given in Appendix Item 3.

Appendix Item 3 about Here [Determinants of Food Expenditure Shares]

Table 12: Relative Food Share Expenditures as an Indicator for Market Efficiency

	LBN	SYR	JOR	IRN	IRQ	YEM	PAL
Food Budget Share	39.3	47.9	37.7	32.5	NA	61.1	58
Predicted	31.2	42.6	42.1	40.0	NA	56.3	NA
Residual	8.1	5.3	-4.4	-7.5	NA	4.8	NA

Source: Author's calculations.

The results show that, after controlling for supply side or allocation characteristics, Lebanon, Syria, and Yemen have food shares that are higher than predicted, suggesting that distribution inefficiencies make the availability of food more expensive, thus driving up the food price shares. Jordan and Iran have food expenditure shares below predicted values, which may be taken, at first sight, as a positive signal. The causes for positive and negative residuals, of course, still need to be explored in more depth. For contingency planning, however, it is sufficient to notice at the moment that households in countries with positive residuals will have much less resources available to accommodate a food price shock.

5.3. How do Suppliers React to Rising Food Prices?

5.3.1. Supply Adjustment in Theory

A normal microeconomic reaction to rising prices is that producers make abnormal profits in the short run that attract market entry in the long run. This market entry will then drive down again prices. Many countries will respond to abnormal profits with the development of new arable land and investment in agricultural capital. Technological progress leading to more productive crops will also be stimulated. The nature of the current food price crisis is therefore also part of the long run solution. However, until those long-run adjustment mechanisms set in, other, less optimistic, adjustment mechanisms can also be observed. These mechanisms relate to the abusive exploitation of the food price crisis. Two of them are of an economic nature, smuggling and hoarding, and one is of a political one, welfare programs sponsored by special interest groups.

5.3.2. Smuggling

There are abundant reports of smuggling of agricultural products from low income to higher income countries and from food subsidizing economies to more liberalized ones. Flour smuggling, for example, is reported from Syria to Lebanon, Egypt to Gaza, and Yemen to Saudi Arabia. In Lebanon, the Shebaa farm donkeys are literally famous for their orientation skills in the mountainous area between Lebanon and Syria. Other articles write about tunnels being built for smuggling purposes, especially between Gaza and Egypt and Syria and Lebanon. Of course, one could argue by referring to free trade theory that smuggling is welfare enhancing as the winners of free trade, i.e. the smugglers, win more than what the losers lose. However, the problem with this rational is that the losers from smuggling, i.e. the consumers in the relatively poorer countries, cannot be analyzed within the standard tool kit of microeconomic welfare analysis. The rise in poverty and food insecurity goes far beyond the standard analysis of consumer and producer surplus and stretches deep into the realm of market failure and social costs. Smuggling puts individual people's life and social stability at stake.

Another dimension of smuggling is trade with expired products. Yemen seems to be particularly hit by this practice. Alone in 2008, Yemen destroyed at least 42 tons of expired food. Yemen may just be the tip of the iceberg, though. One should therefore take realistically into account that there is a great possibility for trade with expired products to remain undetected in many other places with severe consequences for public health.

5.3.3. Hoarding

As prices go up, retailers have an incentive to limit the supply even more. Many local newspapers report that retailers tend to buy larger amounts of agricultural products than what they put on their shelves in order to increase their profits. This practice is favored by the fact that many retailers in developing countries have a strong bargaining position vis-à-vis farmers, which are often smallholders. In addition, consumers are poorly organized, too. The retail sector, on the other hand, is equipped with much greater market power, which it can abuse at the expense of consumers. As demand for food is universally inelastic, a 1% increase in price reduces demand for food products by less than 1%, which is why retailers increase their revenues with every percentage increase in price. The percentage increase in total revenue following a percentage increase in price can be approximated by the following formula:

$$\text{Percentage Increase in Revenue} = (1 + \text{Percentage Price Increase}) \times (1 - \varepsilon) - 1$$

where ε is the price elasticity of demand. Applying this formula to the countries of this study, whose price elasticities are very similar, suggests that a 1% price increase increases retail sectors' total revenues by around 0.6% (Table 12). Unfortunately, data for Iraq and Yemen was unavailable. There are concerns that retailers take advantage of their bargaining power especially during the holy month of Ramadan.

Table 13: Marginal Increases of Total Revenues to 1% Increases of Price

	LBN	SYR	JOR	IRN	YEM
Food Price Elasticity	0.392	0.392	0.388	0.385	0.332
Percentage increase in Total Revenues to 1% increase in Price	0.604	0.604	0.608	0.611	0.665

Source: Author's calculations.

5.3.4. Charity based Supply

Humanitarian crises, such as triggered by the current food price inflation, are always heydays for charities. Hamas, Hezbollah, and the Muslim Brotherhood have a long tradition and experience in providing social safety nets that most Arab states fail to provide through their public administration. But it is not only charities competing with the state. In Lebanon, for example, Saudi-funded Sunni Muslim Charities compete with Hezbollah in protecting their followers from rising food. Many charities seem to be even thankful for the food price crisis. Especially in Jordan, where the Islamic Action Front assists 32,000 families with food baskets and financial aid, the political capitalization is particularly strong. Many observers see the cocktail of food price inflation, the absence of public social safety nets, and politically motivated charities filling the void as a substantial threat to political stability of many Arab regimes (Daragahi, 2008).

5.4. How do Consumers react to Rising Food Prices?

5.4.1. Demand Adjustment in Theory

The theoretical analysis of households responding to rising food prices is regularly discussed in text books of economics. The standard case is that higher prices lead to a negative substitution and income effect, both of which lead to a reduction of consumption. Obviously, negative

substitution and income effects can be more easily accommodated by middle and upper income classes than by lower income households. It is easier for middle-income households to substitute dining-out for cooking at home but it is almost impossible for a housewife who needs to bake bread for her family to substitute flour for anything else. In this latter case, a household will have to focus all its purchasing power on the most essential commodities and cut down consumption of everything else, including such items as personal hygiene and preventive medical checkups of parents and children. In extreme cases, some households will cut consumption of everything else and allocate all resources on the purchase of basic staples, so that they actually end up buying more after prices went up. This case is known in the literature as the so-called Giffen case. It also explains hoarding.

5.4.2. A Snapshot of the Food Price Rises in ODC Countries

Since the beginning of the food price crisis in 2006, local newspaper reports have frequently given numerical examples of how prices have changed. Obtaining a clear and complete picture, though, is still difficult as different articles quote different figures and refer to different time spans, geographical areas, and commodities. Nevertheless, by drawing on local newspaper articles, the following Table 13 provides a snapshot of recent price increases. The numbers show without exception high double-digit inflation rates for food commodities in 2008. There is also clear evidence for food price inflation slowly trickling down to general inflation.

Table 14: Snapshot of Food Price and General Inflation as Reported in Local Newspapers

	Lebanon	Syria	Jordan	Iran	Iraq	Yemen	Palestine
Basic Commodities (Olive oil, eggs, meat etc.)	20%-30% (over one year)	60%- 100% (over one year)	10%- 30% (over one year)	45% (over one year)	13.6 (over one year)	230% (over past two years) 55% for WFP purchases (over one year)	70% -100% since 2006; 21% since 2007; Gaza Strip 5%- 10% higher
Inflation 2008	10%-15%	10-15%	10%- 15%	25%	15%	18% overall 23% for food (2008 only)	12.5%

Source: Author's calculations.

5.4.3. Substitution Effects

There are various substitution effects as a result of rising prices on the demand side. Syrian papers, for example, report substitution effects of white meat, olive oil and fruits for red meat, wheat, potatoes and other basic staples. Of course, such substitution effects are not limited to Syria but reflect universal adjustment strategies. Other newspaper articles suggest that many vulnerable households become in essence vegetarian and lack crucial micronutrients, especially protein. If such substitution effects are permanent, the health status of the household members is put at risk. Particularly vulnerable are pregnant women, newborn, toddlers, and the elderly. Yet, there are even less obvious substitution effects, such as the substitution of civil security responsibilities for extra income. A case in point is Jordan, where reports have surfaced that members of security forces sold weapons and ammunition in order to be able to feed their families. Again, the food crisis has not only a humanitarian and public health dimension. It also undermines political stability and security.

5.5. Recommended Short and Long Term Policies to Fight Food Price Inflation

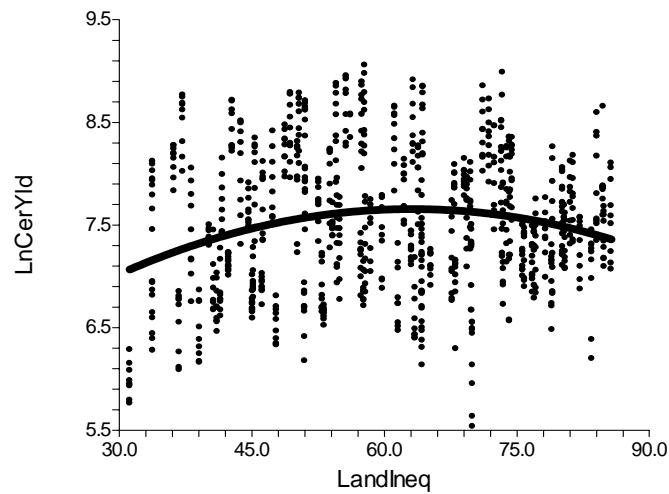
5.5.1. What Government Should Do in Theory

Inflation causes social costs, but so does fighting inflation. A problem with inflation is that it strikes fast but it cannot be fought quickly. Theoretical and historical evidence notwithstanding, many governments believe that living with inflation, or managing it, would lead to lower social costs than determined anti-inflationary policies. The textbook theory to contain inflation is simple: Increase supply or decrease demand. Most of the policies to expand supply focus on improving the allocation efficiency of markets. Policies to increase agricultural supply may involve agrarian reforms, the development of financial markets, improvements of market access infrastructure, and research and development. On the demand side, family planning, fiscal austerity, and restrictive monetary policy are standard recipes, which, however, often neglect the political constraints on the ground. Additionally, most of these policies are subject to considerable time lags. The question thus is: What works in the moment of the crisis? As opposed to medium-to long term policies, short-term policies are in nature built around the redistribution of income. They entail safety net programs and taxation policies.

5.5.2. Agrarian Reforms

Land inequality is an important factor for productive efficiency. In order to illustrate this, Figure 14 provides some cross-sectional evidence for the inversely u-shaped relationship between land inequality and cereal yield.

Figure 14: Land Inequality vs. Cereal Yield



Source: Author's illustration with data from Frankema, E. (2006), *The Colonial Origins of Inequality: Exploring the Causes and Consequences of Land Distribution*, Groningen Growth and Development Centre, Research memorandum, July 2006 <http://ggdc.eldoc.ub.rug.nl/FILES/root/WorkPap/2006/GD-81/GD81.pdf> and 2007 WDI, Author's illustration.

Simply spoken, land titles should neither be defined too small so that they prevent economies of scale nor too large so that they become a source of market power and social inequality. In case of doubt, however, defining smaller land titles may be preferable to larger ones as it is easier for smallholders to organize themselves in efficient cooperatives to realize economies of scale than to force monopolists to become more efficient.

According to Figure 14, the optimum land inequality value would be 63.1. The dataset, on which Figure 14 is based, contains data only for Syria, Jordan, Iran, and Iraq. These countries' values all exceed the optimal value of 63.1. The values for Syria, Jordan, Iran, and Iraq are 64.3, 64.3, 67.7, and 82.0, respectively. This suggests that land inequality was particularly a problem in Iraq. In rebuilding Iraq, the issue of land inequality should therefore be a factor to be considered as well. The regression results underlying Figure 14 are given in Appendix Item 4.

Appendix Item 4 about Here [Cereal Yield vs. Land Inequality]

In addition to land inequality, many developing countries suffer from unclear property rights on factor land. Common practices are tenancies, which have adverse incentives for investment. A prerequisite for agricultural efficiency is that the economic incentives associated with land ownership are maximized. This calls for secure, tradable, mortgageable, and transparent land titles.

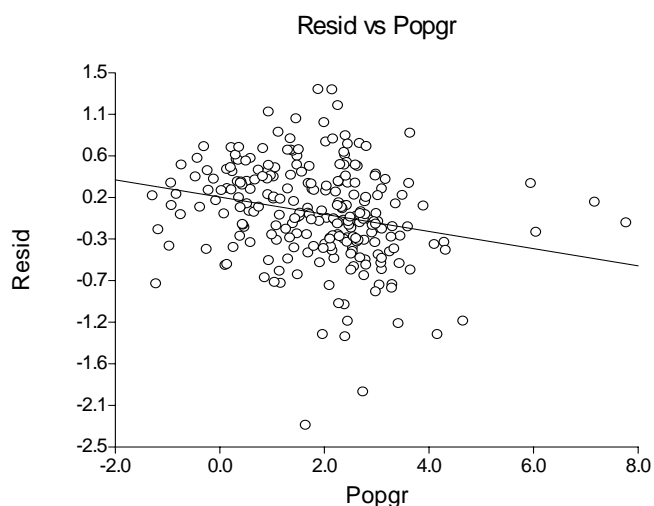
5.5.3. Family Planning

Socioeconomic vulnerabilities are accelerated by fast population growth. High fertility rates drain families' income and prevent savings and capital accumulation. Family planning, despite potential cultural concerns, should be a public policy issue in countries like Yemen, and to a lesser extent Syria, Jordan, and Palestine. Only Lebanon and Iran have low population growth rates. There may be even opportunities to combine food aid with awareness creation for the advantages of family planning. In order to illustrate the power of family planning, the residuals of the regression of agricultural productivity

$$\text{Cereal Yield}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Water per Capita}_i + b_3 \text{ Year}_i + \varepsilon_i$$

were regressed against population growth. The scatter plot of Fig. 15 shows the results, which lend strong support to the idea that low fertility rates free up resources that can be used to increase factor land's productivity.

Figure 15: Residual Agricultural Productivity and Population Growth Rate



Source: Author's illustration.

A numerical example, using the case of Yemen, may be illustrative in this regard. If Yemen succeeded in reducing its fertility rate from six to two, cereal yield, after controlling for per capita income, water resources and time, would be predicted to increase from roughly 865 kg/ha to 1774, which is an increase of one hundred percent. Appendix Item 6 documents the regression result underlying this simulation.

Appendix Item 5 about Here [Cereal Yield vs. Fertility]

5.5.4. Income Redistribution

Inequality is a major reason for socioeconomic vulnerabilities. A shock to two countries, one being equal and the other unequal but both having the same per capita income, will strike the

more unequal country much more. In order to illustrate this, the following double-log regression was estimated

$$\text{Undernourishment}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Cereal Yld}_i + b_3 \text{ Water per Capita}_i + b_4 \text{ Income Inequality}_i + b_5 \text{ Year}_i + \varepsilon_i$$

with the following results:

Table 15: Undernourishment and Income Inequality

DV=Undernourishment (Ln)	Coefficient	t-Stat	P-Value
Intercept	16.526	2.348	0.02
Per Capita Income (Ln)	-0.432	-11.339	0.00
Cereal Yield (Ln)	-0.200	-2.28	0.02
Water per Capita (Ln)	0.043	1.773	0.08
Inequality (Ln)	1.662	4.314	0.00
Year	-0.008	-2.124	0.03

Source: Author's calculations.

The results show that the statistical significance of inequality is very high. A look at the socio-economic significance, however, is more instructive. Consider again the case of Yemen, which has an Estimated Household Income Inequality indicator, which reads similar to a Gini-coefficient, of 42.8. Its level of undernourishment is 37.5. Then, a policy that would, for example, reduce inequality by 10% to 38.5, would reduce undernourishment by 16.6% to 31.3%. Assuming a population of 22 million, an income redistributing policy of the just described kind could provide food security to more than 1.3 million Yemenites.

Income redistributing policies, of course, can occur in many ways. It may range from direct income transfers to people deprived of basic needs to public investments to promote social upward mobility.

5.5.5. Building Transportation Infrastructure

The very nature of agricultural products, which is that they are perishable products, makes the agricultural sector dependent on efficient market coordination. The state plays an important role in this regard, mostly by providing the necessary transportation infrastructure. In section three, deficits in transportation infrastructure have been identified already for Syria and Jordan.

5.5.6. Building Financial Infrastructure

Similar to transportation infrastructure, financial markets are an important complement to agricultural market efficiency. In many developing countries, banks are often unwilling or unable to lend to the agricultural sector. In the case of Lebanon, for example, post civil war reconstruction has driven out private access to credit. Lebanese banks simply did not have an incentive to provide loans to the agricultural sector. In other societies, such as Yemen, tribal traditions are associated with unclear property rights that prevent credit markets from developing. Another reason is simply state control over the banking sector, which did not necessarily give priority to agricultural development.

5.5.7. Short Term Response Policies

Short term response policies can be social safety nets or market intervention policies. According to the World Bank (2008), short term safety net programs entail cash transfers, food-for-work programs, and food aid distributions. Price manipulation policies comprise the reduction or abolishment of import tariffs and VAT, subsidies, buffer stock depletion, export bans, and price ceilings.

The various policies can be assessed in light of different efficiency criteria:

- Does the policy reach the targeted group? Is the policy incentive compatible?
- Does the policy have cross-national spill-over effects?
- Is the policy easy to implement?
- Is the policy easy to manage?

Table 15, which is taken from the World Bank, summarizes these policies.

Table 16: Short Term Response Policies

	TARGETED TO VULNERABLE GROUPS	PRESERVES INCENTIVES (E.G. LABOR / PRODUCTION)	COSTS LIMITED WITHIN NATIONAL BORDERS	EASY TO IMPLEMENT /INTRODUCE	LIMITED MANAGEMENT /GOVERNANCE CONCERNS
SAFETY NET PROGRAMS					
Cash transfers (targeted / conditional)	√	√	√		√
Food for work	√	√	√		
Food aid	√		√	√	
Feeding / nutrition programs		√	√		
POLICIES TO REDUCE DOMESTIC FOOD PRICES					
Reducing import tariffs and VAT		√	√	√	√
Targeted consumer subsidies / rations	√	√	√		
Using buffer stocks to increase supply		√		√	
Generalized consumer subsidies			√	√	
Export bans / restrictions				√	
Producer price controls					

Source: Worldbank (2008), Rising Food Prices: Policy options and World Bank Response, Background Note, http://siteresources.worldbank.org/NEWS/Resources/risingfoodprices_backgroundnote_apr08.pdf.

5.6. Response Policies in Practice

The acuteness of the food price crisis has led to a dominance of short term polices. These include price controls, export restrictions, use of buffer stocks, and tax reductions. The countries make also use of targeted social assistance programs, such as cash transfers, food stamps, and school feeding programs.

5.6.1. Tax Reductions

Tax reductions of food grains are reported from all ODC countries, except for Yemen. From a microeconomic perspective, reducing taxes on food grains is an efficient policy in the sense that it does not interfere with allocation efficiency. It is also easy to implement and to manage. Neither does it affect other countries. An important question, however, is how long a country can finance such a policy without sacrificing other essential services of the state. To some extent, it is a wasteful policy as it also subsidizes higher income households.

5.6.2. Use of Buffer Stocks

These policies are pursued only by Yemen, Syria, and Iraq. Using buffer stocks to stabilize supply, when used economy wide, is similarly problematic like tax reductions. Food grain stocks are better used for targeted social assistance, such as a school-feeding programs or assistance to expecting women. There are also newspaper reports of corruption in association with the use of buffer stocks. Subsidized flour rations earmarked for bakeries are sold on the black market by either governmental officials or the bakeries and do not reach consumers.

5.6.3. Export Bans

Export bans are used by Yemen, Syria, and Iraq. Although these are politically comprehensible measures, they are in essence “beggar-thy-neighbor” policies. The more countries reduce their exports, the higher will be world prices, which will aggravate the situation of food-import dependent countries. Food export bans are also harmful to farmers in the export-restricting

country as it deprives them of valuable profits that can be used for the modernization of the agricultural capital stock. Export bans thus work like a tax on the farmers that are used to subsidize the rest of the society, including the non-vulnerable.

5.6.4. Cash Transfers

All countries except Lebanon make use of governmental cash transfers. However, even in the case of Lebanon, cash transfers occur by political parties and charities. In the case of Lebanon, this is particularly problematic as it undermines the already weak of government even more. Other than that, cash transfers score high in terms of targeting efficiency and incentive compatibility, unless it would be financed through loose monetary policy. For cash transfers to be efficient, government must be equipped with fiscal and administrative capacity, which is generally not the case. The food price crisis is therefore at least an opportunity to introduce slowly more efficient public administrations and progressive taxations.

5.6.5. Food-for-Work Programs

Food-for-work programs provide excellent opportunities to combine targeting efficiency with social benefits. None of the ODC countries, however, makes use of such programs, which is most likely due to inefficient public administrations and possibly ethical considerations. Of course, large scale food-for-work programs may also have negative side effects, especially if they lead to crowding out on the labor market. Ideally, food-for-work programs are a substitute for wage increases. This is especially an option for the public sector. Similar to food-for-work programs, food-for-family-planning-awareness-creation programs may also be taken into

consideration. At least in the medium to long run, lower fertility rates will be necessary to escape food-insecurity traps.

5.6.6. Food Stamps

Food stamps rank high on targeting efficiency, but are often costly in public-administrative terms. According to the World Bank, Syria, Palestine, and Iraq make use of food stamps.

5.6.7. School Feeding

Lebanon, Syria, Jordan, and Palestine make use of school feeding programs. School feeding programs are also efficient in terms of targeting vulnerable and generating positive social spillover effects. They pay a high public health dividend and prevent poverty-determined early school drop-outs.

6. Assessment of the Social Cost of the 2006-2008 Food Price Crisis

6.1. Methodology

In order to get an idea of the socioeconomic impacts of the food price crisis, one can estimate the food price inflation elasticity of various food security related indicators. To do this, the food security indicators are regressed on per capita income and food price inflation, using simple pooled OLS double log regressions. The 2005 World Bank Development Indicator Database reports an annual food price index for the period between 1980 and 2005. This index was then

transformed into a food price inflation indicator, for which five-year average inflation rates were calculated. The maximum range covers five consecutive periods from 1981-1985 to 2001-2005, with the last observation only covering the period from 2001 to 2003.

In running the regressions, multicollinearity is a problem on the right hand side of the equations with per capita income dominating the regression results. Two models are therefore always run, one only with food price inflation (Model I) and one with both food price inflation and per capita income (Model II). Table 16 summarizes the results (omitting the intercept).

Table 17: Food Price Elasticity of Undernourishment (Pooled OLS double log regression)

Elasticity of	Model I			Model II			
	Food Inflation	N	Adj. R ²	Food Inflation	Per capita income	N	Adj. R ²
Undernourishment	0.13***	466	3.7	-0.04	-0.56***	451	63.6
Real income (2000 USD)	-0.29***	623	9.9	-0.04	1.00*** (lagged income)	610	99.9
Food Expenditure Shares	0.10***	434	9.8	-0.00	-0.31***	424	78.5
Food Inequality	0.01***	510	2.7	-0.009**	-0.08***	495	59.8
One Dollar Poverty	-0.05	247	0.0	-0.02	-0.84***	246	48.2
Two Dollar Poverty	-0.08	247	1.0	-0.04	-0.80***	246	48.6
Malnutrition Weight to Age	-0.07	255	1.0	-0.1***	-0.56***	249	45.2
Malnutrition Height to Age	0.02	233	0.0	-0.01	-0.52***	228	49.3
Primary School Enrolment	-0.01	325	0.0	0.03***	0.11***	316	36.9
Secondary School Enrolment	-0.09***	244	3.5	-0.02	0.33***	235	53.9

*** = significant at 1% level; **=significant at 5% level.

Source: Author's calculations.

6.2. Discussion of Results

The results show that the bilateral effect of food inflation is significant on undernourishment, real per capita income, food expenditure shares, and food inequality. Model II, however, shows

that these relationships are not necessarily statistically robust when per capita income is added on the right hand side of the equation. This, however, is a statistical phenomenon that obviously shall not prevent one from concluding that food price inflation exercises severe adverse effects on a society's food security. Moreover, since per capita income is affected by food price inflation and per capita income is such a dominant explanatory variable for food security variables, there are also strong indirect effects.

The indirect effect of food inflation is always very close to the bilateral effect. Take, for example, the case of undernourishment. The bilateral effect of a one percent increase of food price inflation increases undernourishment by 0.13 percent. The indirect effect through real income is 0.16 percent (-0.29×-0.56). It is therefore possible to estimate all elasticities using this indirect approach. The following Figure 16 summarizes this approach.

Figure 16: Estimated Food Inflation Elasticities

Source: Author's illustration

6.3. Application of Results to ODC Countries

Between the 2001-2005 observation and 2008, the IMF food price indicator rose from 90.6 to 172.2 in April 2008, or an increase by 90%. Assuming a 100% increase as a reference model is thus not farfetched. Table 17 summarizes the results of applying the elasticities to the various ODC countries.

The results suggest that the population of undernourished people increased by an estimated 3.7 million people over the last five years that can be only attributed to the food price crisis. The population of the ODC countries account for roughly 2.3 percent of the world population. The UN estimates that the food price crisis increases undernourishment worldwide by more than 100 million. Assuming a world population of 6.7 billion, a linear extrapolation from the ODC countries to the world would predict the victims of the “Silent Tsunami,” as the food price crisis has become known, too, at 157,000 million. Since this number likely overshoots the real number, one can conclude in reverse causation that the ODC countries are hit over-proportionally by the food price crisis.

Table 18 predicts also socioeconomic costs in other areas. Unfortunately, due to data constraints, they cannot be easily aggregated. This deficit notwithstanding, available figures and estimates indicate that the food price crisis drives people into poverty, increases malnourishment, and reduces school enrollment, although more on the secondary level. Although the impact on food inequality seems to be statistically negligible, this may be a data artifact. Similarly, the increase of food expenditure shares likely underestimate real effects on the ground.

Table 18: Estimation of Socioeconomic Impacts of Food Price Crisis on ODC Countries

		Lebanon	Syria	Jordan	Iran	Iraq	Yemen	Palestine
	Population 2008 in Million	3.69	20.59	5.94	71.35	28.3	23.06	4.14
	Percentage Pop growth over 5 years	5.54	13.53	13.61	7.45	9.2	16.93	22.98
Under-nourishment	Percentage 2001-2005	3.00	4.00	6.50	4.00	15.0 (est.)	37.50	16.00
	Percentage 2008	3.48	4.64	7.54	4.64	17.4	38.66	18.56
	Population 2001-2005	105,000	725,440	339,690	2,656,200	4,000,000 (est.)	7,395,375	538,560
	Population 2008	128,577	955,344	447,664	3,310,732	4,910,485	8,914,996	768,292
	Absolute Increase	23,577	229,904	107,974	654,532	910,485	1,519,621	229,732
One Dollar Poverty	Percentage 2001-2005			2.00	2.00		15.70	
	Percentage 2008			2.48	2.48		19.47	
	Population 2001-2005			104,520	1,328,100		3,096,197	
	Population 2008			147,312	1,769,480		4,489,782	
	Absolute Increase			42,792	441,380		1,393,585	
Two Dollar Poverty	Percentage 2001-2005			6.95	7.31		45.24	
	Percentage 2008			8.55	8.99		55.65	
	Population 2001-2005			363,207	4,854,205		8,921,780	
	Population 2008			507,870	6,414,365		12,832,890	
	Absolute Increase			144,663	1,560,160		4,511,110	
Primary Enrolment	Percentage 2001-2005	93.7	94.45	92.39	87.28		72.02	89.60
	Percentage 2008	90.89	91.62	89.62	84.66		69.86	86.91
	Population 2001-2005	440,324	2,221,464	673,375	4,920,363		1,970,359	501,127
	Population 2008	449,750	2,446,404	742,085	5,128,225		2,234,269	597,784
	Absolute Decrease	9,426	224,940	68,710	207,862		263,910	96,656

Table 17: **Estimation of Socioeconomic Impacts of Food Price Crisis on ODC Countries (Contd.)**

		Lebanon	Syria	Jordan	Iran	Iraq	Yemen	Palestine
Secondary Enrolment	Percentage 2001-2005		50.08	81.83	77.53		32.74	85.87
	Percentage 2008		45.07	73.65	69.78		29.47	77.28
	Population 2001-2005		1,232,468	556,051	6,196,034		721,224	406,999
	Population 2008		1,259,132	568,579	5,992,132		758,903	450,458
	Absolute Decrease		26,664	12,528	-203,902		37,679	43,459
Malnutrition Height to Age	Percentage 2001-2005	11.00		8.50	15.40		53.10	9.90
	Percentage 2008	12.65		9.77	17.71		61.06	11.38
	Population 2001-2005	46,991		56,361	740,400		1,272,730	64,321
	Population 2008	56,901		73,599	914,894		1,709,510	90,927
	Absolute Increase	9,910		17,238	174,494		436,779	26,606
Malnutrition Weight to Age	Percentage 2001-2005	3.90		4.40	10.90		45.60	4.90
	Percentage 2008	4.52		5.10	12.64		46.76	5.68
	Population 2001-2005	16,663		29,175	524,049		1,092,107	31,835
	Population 2008	20,331		38,419	652,979		1,309,150	45,383
	Absolute Increase	3,668		9,244	128,930		217,043	13,548
Food Inequality	Value 2001-2005	13.90	14.80	14.10	15.30		15.80	12.80
	Value 2008	14.18	15.09	14.38	15.61		16.12	13.06
Food Expenditures Share	Value 2001-2005	39.33	47.92	37.67	32.55		61.13	
	Value 2008	42.87	52.23	41.06	33.64		66.63	

Source: Author's calculation.

A summary of major socioeconomic, agricultural performance, and access to market and credit indicators are compiled in Appendix Item 6.

Appendix Item 6 about Here [Compilation of Major Indicators for ODC Countries]

6.4. Final Word of Caution

Like every statistical analysis, the results of this study are substantially influenced by the quality of the data. The quality of data regarding food security is unfortunately rather poor. For example, the 2005 World Bank Development Indicator Database still listed national food indices, which were discontinued shortly after and therefore shortly before they would have been needed the most. How does data quality affect the results of this study? It is believed that they lead to rather conservative estimates. Either way, future research is indispensable and this study should be thus interpreted as an explorative one.

7. Concluding Policy Recommendations

The above analysis was conducted with the objective to obtain a better understanding of the food markets of the seven ME-ODC countries. The results shall help in the formulation of strategies for contingency planning, emergency preparedness, and crisis response policies.

7.1. Contingency Planning

Contingency planning revolves mostly around geopolitical vulnerabilities. Widespread problems are refugees and internally displaced people. This is particularly true for Iraq, Syria, Jordan, Yemen, and Lebanon. Iraq hosts four million internally displaced people and many of them are not reached by the public distribution system, either because of insecurity, leakages, or administrative inefficiencies. Syria and Jordan host together another estimated 2-2.5 million Iraqi refugees. Yemen is mostly confronted with Somali and Ethiopian refugees. Their exact number

is not known and estimates range from 200 thousand to more than a million. Lastly, Lebanon has more than 200,000 registered refugees. Another geopolitical hotspot is Palestine, where the economic situation has deteriorated dramatically since 2006, especially in Gaza. Although Iran is also regularly in the cross lines of geopolitics, most of it is still rhetoric and has not yet affected the lives of the people on the ground.

Droughts are another common risk to sudden increases of food insecurity. In the case of the ME-ODC countries, droughts are, paradoxically, the more problematic the greater is the share of domestic production to consumption. In recent history, especially Syria, Iran, and Yemen have proven vulnerable to droughts.

The third communality is the exposure to the recent food price crisis, which has been a particular emphasis of this study. Preliminary estimates with available data suggest that the food price crisis will account for at least 3.7 million additional undernourished people in the ME-ODC region, although this estimate is likely too conservative in light of given data availability constraints. Another problem is that all estimates are based on the assumption that everything else is held constant. A major concern in the context of the food price crisis, however, is whether most states' food subsidy schemes will remain in place or need to be abandoned. If they become abandoned, food insecurity will spread more rapidly.

For contingency planning purposes, the ME-ODC countries require thus constant monitoring on various fronts: Geopolitics (IDPs, refugees, armed conflict), droughts, and prices (direct effects

and indirect effects on subsidy systems). The WFP Vulnerability Analysis and Mapping system is an excellent initiative in this regard.

7.2. Emergency Preparedness

Emergency preparedness is foremost a logistic problem: Where to make the purchase and how to get it delivered on the ground. As the analysis of the seven ME-ODC countries has shown, their trade and vulnerability profile makes them uniquely challenging from a logistic perspective. In the presence of a food crisis, food will have to be purchased most likely outside the Middle East.

Yet, emergency preparedness also refers to the following questions:

- What are the country-specific ME-ODC emergency preparedness strategies?
- What are the WFP's emergency preparedness strategies?
- To which extent, are the strategies of ME-ODC and WFP compatible?

A basic principle of economic policy, which emergency planning and administration is part of, is the principle of subsidiarity. It implies that every country should apply an emergency preparedness strategy for itself while the role of a supranational organization should be to complement domestic emergency relief efforts only after domestic efforts are exhausted. A constant dialog with vulnerable countries is therefore necessary. This is also correctly incorporated in the WFP Strategic Plan where it says: "WFP's partnerships with national governments will be implemented in a manner consistent with the widely-recognized principles

of ownership, alignment, harmonization, management for results and mutual accountability.” (p. 10).

The presence of a global fire-brigade, such as the WFP, implies a moral hazard. Some countries may neglect their precautionary responsibilities and hope to free ride on the international community. Especially a country like Yemen, where buffer stocks cannot be accumulated because a substantial amount of arable land is used for the cultivation of QAT, which is then consumed as a recreational drug, puts the principle of subsidiarity ad absurdum. It is important to create public policy awareness for that food security policy must begin on the national level. In this regard, the WFP can serve as a platform for dialog and exchange where different countries can learn from each other and develop best practices in food security policy. Policy-oriented research at the WFP should support and accompany this dialog.

7.3. Crisis Response Policies

Short and long term policies must be distinguished. Short-term policies work on prices and quantities. They involve slashing taxes, export bans, buffer stock interventions, price controls, and subsidies. Other short term policies address social safety nets. Cash transfers, school feeding programs, food stamps, and work for food programs fall under this category.

As most pundits predict food prices to remain high, many of the crisis response strategies cannot be financed forever, as they were conceptualized as short-term policies. In fact, it can be questioned whether many of the existing subsidy systems will prevail or if governments will have to scrap them.

Among short-term-policies, food-for-work programs are barely utilized in the ME-ODC countries. Food-for-work programs, however, would be an excellent opportunity for most ME-ODC countries. This is because unemployment is generally high and crowding-out effects are not to be expected. Another advantage of food-for-work programs is that they create economic activity on the supply side while all other social-safety-nets try to conserve economic activity, only trying to halt a decrease in demand.

To “reduce hunger and chronic undernourishment“ that concerns at least 19 million people in the ME-ODC countries and to “strengthen capacities of countries to reduce hunger,” as envisioned in WFP’s 2008-2011 Strategic Plan (p. 3), is barely possible without developing a long term food security policy vision. Short-term crisis response strategies should not be detached from long-term crisis prevention scenarios. This study has shown that there are many opportunities for the integration of long-term food security concerns within such a framework. Examples are family planning, infrastructure projects, and redistributive policies.

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9. Appendix

Appendix Item 1: Data Description

	Variable Name	Description	Source
Socioeconomic Fundamentals	ycap	GDP per capita (constant 2000 US\$)	2007 WDI
	PopMill	Population in Millions	
	RurPop	Rural population (% of total population)	
	AgriEmp	Employment in agriculture (% of total employment)	
	PopGr	Population growth (annual %)	
	Fert	Fertility rate, total (births per woman)	
	NetGCF	Gross capital formation without aid (% of GDP)	
	OneDolPov	Poverty headcount ratio at \$1 a day (PPP)	
	TwoDolPov	Poverty headcount ratio at \$2 a day (PPP)	
	SecEnr	School enrollment, secondary (% net)	
	EHI	Estimated Household Income Inequality Indicator	University of Texas Estimated Household Income Inequality Data Project
	FoodGini	Gini coefficient of dietary energy consumption	FAO
	MalNut5H	Malnutrition prevalence, height for age (% of children under 5)	2007 WDI
	MalNut5W	Malnutrition prevalence, weight for age (% of children under 5)	
	UnderNour	Prevalence of undernourishment (% of population)	
	FoodExpShr	Expenditures on food (% of income)	US Department of Agriculture
	FoodPrElast	Price Elasticity of Food Demand	Frankema (2006)
LandIneq	“Frankema Gini”	2005 World Bank Development Indicator Database	
FoodPrInfl	Food Price Inflation		
Agricultural Performance	Irrigated	Irrigated land (% of cropland)	2007 WDI
	CerealYld	Cereal yield (kg per hectare)	
	FertCons	Fertilizer consumption (100 grams per hectare of arable land)	
	WaterCap	Renewable Water Resources per Capita	India’s Ministry of Water Resources
	FoodTB	Food Trade Balance (% of GDP)	Own calculations using 2007 WDI
	AgriCapWrk	Capital Stock in Agriculture in 1000 (1995\$ per worker,000)	FAO (2006)
Access to Market and Capital	RoadTran	Roads, goods transported (million ton-km)	2007 WDI
	RailTran	Railways, goods transported (million ton-km)	
	Trans	RoadTran + RailTran	
	DomCred	Domestic credit to private sector (% of GDP)	

Appendix Item 2: Agricultural Productivity Regressions

- Identification of Relative Agricultural Productivity:

$$\text{Cereal Yield}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Water per Capita}_i + b_3 \text{ Year}_i + \varepsilon_i$$

DV = Cereal Yield (Ln)	Coefficient	Std. Error	T-Stat	P-Value
Intercept	-21.783	5.336	-4.082	0.00
Lnnyconst (Ln)	0.273	0.021	13.097	0.00
WaterCap (Ln)	0.041	0.019	2.182	0.03
Year	0.014	0.003	5.071	0.00
N	250			
Adjusted R ²	43.8			

- Relative Use of Fertilizers

$$\text{Fertilizer Use}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Water per Capita}_i + b_3 \text{ Year}_i + \varepsilon_i$$

DV=Fertilizer Consumption (Ln)	Coefficient	Std. Error	T-Stat	P-Value
Intercept	-26.525	14.882	-1.782	0.08
lnnyconst	0.842	0.058	14.606	0.00
LnWaterCap	-0.09	0.052	-1.737	0.08
Year	0.014	0.007	1.818	0.07
N	250			
Adjusted R ²	47.1			

- Relative Use to Irrigation Systems

$$\text{Irrigation Use}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Water per Capita}_i + b_3 \text{ Year}_i + \varepsilon_i$$

DV=Irrigation Use (Ln)	Coefficient	Std. Error	T-Stat	P-Value
Intercept	-27.058	17.412	-1.554	0.12
lnnyconst	0.233	0.069	3.384	0.00
LnWaterCap	-0.192	0.065	-2.968	0.00
Year	0.014	0.009	1.664	0.10
N	240			
Adjusted R ²	8.9			

- Relative Endowment of Capital per Agricultural Worker

$$\text{Agricultural Capital per Worker}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Year}_i + \varepsilon_i$$

DV=AgriCapWrk (Ln)	Coefficient	Std. Error	T-Stat	P-Value
Intercept	4.472	24.843	0.18	0.86
lnyconst	0.609	0.052	11.651	0.00
Year	-0.004	0.012	-0.291	0.77
N	216			
Adj. R ²	38.5			

- Relative Access to Human Capital

$$\text{Secondary School Enrollment}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Year}_i + \varepsilon_i$$

DV = Secondary Enrollment	Coefficient	Std. Error	T-Stat	P-Value
Intercept	-2566.78	559.899	-4.584	0.00
lnyconst	13.387	0.637	21.017	0.00
Year	1.26	0.28	4.509	0.00
N	296			
Adj. R ²	60.2			

- Relative access to Transportation Infrastructure

$$\text{Transportation}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Year}_i + \varepsilon_i$$

DV = Transportation	Coefficient	Std. Error	T-Stat	P-Value
Intercept	-18.981	21.21	-0.895	0.37
lnyconst	0.786	0.06	13.055	0.00
Year	0.011	0.011	1.013	0.31
N	23.8			
Adj. R ²	542			

- Relative access to Credit

$$\text{Domestic Credit}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Year}_i + \varepsilon_i$$

DV = Domestic Credit	Coefficient	Std. Error	T-Stat	P-Value
ntercept	-18.989	3.442	-5.517	0.00
lnyconst	0.406	0.014	29.057	0.00
Year	0.01	0.002	5.56	0.00
N	1187			
Adj. R ²	43.0			

Appendix Item 3: Regression Results Food Expenditure Shares

$$\text{Food Expenditure Share}_i = \beta_0 + \beta_1 \text{Income}_i + \beta_2 \text{Cereal Yield}_i + \beta_3 \text{Water per Capita}_i + \beta_4 \text{Food Trade Balance}_i + e_i$$

DV = Food Expenditures Share	Coefficient	Std. Error	t-stat	P-Value
Intercept	98.825	8.78	11.256	0.00
FoodTB	-0.676	0.119	-5.666	0.00
LnCerYld	1.98	1.239	1.598	0.11
LnWaterCap	0.42	0.426	0.987	0.33
Inyconst	-10.601	0.513	-20.682	0.00
N	157			
Adj. R ²	81.6			

Appendix Item 4: Cereal Yield vs. Land Inequality

$$\text{Cereal Yield}_i = \beta_0 + \beta_1 \text{Land Inequality}_i + \beta_2 \text{Land Inequality}_i^2 + e_i$$

DV = Cereal Yield (Ln)	Coefficient	Std. Error	t-Stat	p-Value
Intercept	5.353	0.382	14.005	0.00
Land Inequality	0.073	0.013	5.511	0.00
Land Inequality Squared	-0.001	0.000	-5.271	0.00

Appendix Item 5: Cereal Yield vs. Fertility

$$\text{Cereal Yield}_i = b_0 + b_1 \text{ Per Capita Income}_i + b_2 \text{ Water per Capita}_i + b_3 \text{ Fertility}_i + b_4 \text{ Year}_i + \varepsilon_i$$

DV = Cereal Yield (Ln)	Coefficient	Std. Error	t-Stat	p-Value
Intercept	6.266	6.136	1.021	0.31
Fertility	-0.173	0.023	-7.417	0.00
LnWaterCap	0.021	0.017	1.21	0.23
lnyconst	0.125	0.028	4.532	0.00
Year	0.000	0.003	0.144	0.89

Appendix Item 6: Compilation of Socioeconomic Indicators of ODC Countries

Lebanon

Indicator	61-65	66-70	71-75	76-80	81-85	86-90	91-95	96-2k	01-05
Per Capita Income (\$2000)	..	..	..	..	..	3245.8	4388.0	4926.2	5416.9
Population in Million	2.1	2.3	2.6	2.7	2.8	2.7	3.0	3.3	3.5
Rural Population Share	52.5	43.9	36.0	29.0	22.9	18.4	15.9	14.5	13.6
Employment in Agriculture	..	..	..	..	..	..	..	..	..
Population Growth Rate	2.7	2.0	2.3	0.1	0.7	-0.4	2.9	1.3	1.0
Fertility Rate	5.7	5.2	4.8	4.2	3.7	3.2	2.9	2.6	2.3
Investment (free of aid)	..	..	..	..	..	8.9	27.2	25.9	18.9
One Dollar Poverty	..	..	..	..	..	..	..	..	..
Two Dollar Poverty	..	..	..	..	..	..	..	..	..
Secondary School Enrollment	..	..	..	..	..	..	..	..	..
Estimated Household Income Inequality	..	..	..	..	..	..	..	..	..
Food Gini	..	..	..	..	..	..	..	13.9	..
Malnutrition (Height to Age)	..	..	..	..	..	..	..	12.2	11.0
Malnutrition (Weight to Age)	..	..	..	..	..	..	..	3.0	3.9
Undernourishment	..	..	21.0	..	9.0	..	2.5	3.0	3.0
Food Expenditure Share	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3
Food Price Elasticity	..	..	..	..	..	..	..	-0.4	..
Land Inequality	..	..	..	..	..	..	..	..	..
Food Price Inflation	..	..	..	..	..	..	..	..	..
Irrigation	17.6	21.6	24.4	27.1	28.8	28.3	30.3	33.6	33.2
Cereal Yield	1035.7	924.0	1167.3	1154.4	1234.8	1800.8	2183.2	2030.1	2502.1
Fertilizer Consumption	929.9	1278.1	1931.8	1466.4	2040.1	1211.5	1908.2	3186.8	2882.3
Renewable Water per Capital	..	..	1735.0	..	..	..	..	1463.0	..
Food Trade Balance (% GDP0	..	..	..	..	..	..	..	-7.4	-5.6
Agricultural Capital per Worker (thousands, \$1995)	..	..	..	..	..	..	20.0	..	33.0
Roads, goods transported (million ton - km)	..	..	..	..	..	..	..	..	..
Railways, goods transported (million ton - km)	..	..	..	..	..	..	..	..	..
Transport	..	..	..	..	..	..	..	..	..
Domestic credit to private sector (% of GDP)	..	..	..	..	..	66.5	49.8	75.4	81.0

Appendix Item 6: Compilation of Socioeconomic Indicators of ODC Countries (Contd.)

Syria

Indicator	61-65	66-70	71-75	76-80	81-85	86-90	91-95	96-2k	01-05
Per Capita Income (\$2000)	540.6	531.6	707.2	938.2	1006.3	882.9	1031.3	1122.6	1142.7
Population in Million	5.1	6.0	7.1	8.4	10.1	12.0	14.0	16.0	18.1
Rural Population Share	61.3	58.0	55.6	53.9	52.6	51.5	50.6	50.0	49.6
Employment in Agriculture	..	..	..	..	..	..	..	..	30.3
Population Growth Rate	3.1	3.3	3.3	3.5	3.8	3.4	2.8	2.6	2.5
Fertility Rate	7.6	7.6	7.5	7.4	6.9	5.7	4.4	3.8	3.4
Investment (free of aid)	12.5	13.5	14.4	20.5	19.8	14.4	21.5	19.4	20.6
One Dollar Poverty	..	..	..	..	..	..	..	..	..
Two Dollar Poverty	..	..	..	..	..	..	..	..	..
Secondary School Enrollment	..	..	..	..	..	..	42.7	36.1	50.1
Estimated Household Income Inequality	48.7	48.3	45.8	45.6	44.3	39.9	44.0	46.3	41.5
Food Gini	14.8	..	..	..	..	..	..	..	..
Malnutrition (Height to Age)	..	..	..	..	..	..	23.7	18.8	..
Malnutrition (Weight to Age)	..	..	..	..	..	..	12.5	6.9	..
Undernourishment	..	..	16.0	..	3.0	..	5.0	4.0	4.0
Food Expenditure Share	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9
Food Price Elasticity	..	..	..	..	..	..	..	-0.4	..
Land Inequality	64.3	64.3	64.3	64.3	64.3	64.3	64.3	64.3	64.3
Food Price Inflation	..	..	..	..	12.7	36.3	9.2	-0.1	2.6
Irrigation	8.9	8.4	9.6	9.5	10.5	11.9	17.7	21.6	24.0
Cereal Yield	816.2	703.1	801.4	944.2	924.4	947.8	1352.9	1381.8	1923.1
Fertilizer Consumption	24.3	49.1	97.7	205.4	358.5	551.5	678.6	764.4	674.3
Renewable Water per Capital	..	..	6014.0	..	..	..	..	2774.0	..
Food Trade Balance (% GDP)	..	..	-5.2	-3.9	-4.0	-2.3	-2.5	-1.6	-0.8
Agricultural Capital per Worker (thousands, \$1995)	..	..	..	..	..	..	14.0	..	14.0
Roads, goods transported (million ton - km)	..	..	..	..	..	..	..	..	..
Railways, goods transported (million ton - km)	..	..	..	577.0	874.2	1421.8	1183.0	1531.0	1961.0
Transport	..	..	..	577.0	874.2	1421.8	1183.0	1531.0	1961.0
Domestic credit to private sector (% of GDP)	19.8	11.6	5.7	5.3	7.4	7.3	10.1	9.2	9.3

Appendix Item 6: Compilation of Socioeconomic Indicators of ODC Countries (Contd.)

Jordan

Indicator	61-65	66-70	71-75	76-80	81-85	86-90	91-95	96-2k	01-05
Per Capita Income (\$2000)	..	..	1118.3	1587.7	2005.5	1897.1	1637.8	1713.4	1917.8
Population in Million	1.0	1.4	1.7	2.0	2.5	3.0	3.9	4.6	5.2
Rural Population Share	47.1	44.7	43.0	41.0	36.3	30.2	24.1	20.4	18.5
Employment in Agriculture	..	..	..	..	..	..	..	4.9	3.9
Population Growth Rate	5.8	5.8	3.7	3.7	3.9	3.6	5.6	3.0	2.4
Fertility Rate	8.0	7.9	7.8	7.2	6.5	5.7	4.9	4.1	3.4
Investment (free of aid)	..	..	..	8.5	17.1	13.9	20.0	18.0	14.7
One Dollar Poverty	..	..	..	..	..	2.0	2.0	2.0	2.0
Two Dollar Poverty	..	..	..	..	..	2.0	10.6	7.4	7.0
Secondary School Enrollment	..	..	..	..	..	..	..	79.2	81.8
Estimated Household Income Inequality	48.5	48.3	47.8	49.0	47.8	48.9	46.3	46.6	46.8
Food Gini	..	..	..	..	..	..	14.1	..	..
Malnutrition (Height to Age)	..	..	..	..	..	15.8	..	7.8	8.5
Malnutrition (Weight to Age)	..	..	17.4	..	..	6.4	6.4	5.1	4.4
Undernourishment	..	..	19.0	..	6.0	..	4.0	7.0	6.5
Food Expenditure Share	37.7	37.7	37.7	37.7	37.7	37.7	37.7	37.7	37.7
Food Price Elasticity	..	..	..	..	..	..	..	-0.4	..
Land Inequality	64.3	64.3	64.3	64.3	64.3	64.3	64.3	64.3	64.3
Food Price Inflation	..	..	..	..	3.9	9.4	4.8	3.2	0.8
Irrigation	10.6	10.8	10.9	11.0	13.7	18.5	24.4	27.4	27.3
Cereal Yield	664.2	547.6	645.2	461.7	587.8	936.3	1273.9	1639.8	1344.3
Fertilizer Consumption	113.8	117.5	137.3	340.3	511.8	645.7	795.9	1175.2	1440.7
Renewable Water per Capital	..	..	338.0	..	..	..	..	132.0	..
Food Trade Balance (% GDP)	-5.4	-5.6	-8.6	-8.4	-7.7	-8.0	-8.6	-7.3	-5.9
Agricultural Capital per Worker (thousands, \$1995)	..	..	..	..	..	..	8.0	..	5.0
Roads, goods transported (million ton - km)	..	..	..	..	..	..	..	..	..
Railways, goods transported (million ton - km)	..	..	..	355.0	662.4	686.6	741.1	622.0	689.3
Transport	..	..	..	355.0	662.4	686.6	741.1	622.0	689.3
Domestic credit to private sector (% of GDP)	14.8	23.2	26.2	43.9	59.5	71.6	70.0	76.6	76.3

Appendix Item 6: Compilation of Socioeconomic Indicators of ODC Countries (Contd.)

Iran

Indicator	61-65	66-70	71-75	76-80	81-85	86-90	91-95	96-2k	01-05
Per Capita Income (\$2000)	980.8	1247.2	1828.5	1919.5	1471.8	1219.9	1425.4	1530.3	1800.4
Population in Million	23.4	26.9	31.2	36.6	43.7	51.8	57.1	61.8	66.4
Rural Population Share	64.3	60.4	56.1	51.9	48.1	44.9	41.4	37.4	34.2
Employment in Agriculture	..	..	..	..	..	26.4	23.8	23.0	24.9
Population Growth Rate	2.7	2.8	3.1	3.3	3.7	2.9	1.6	1.5	1.4
Fertility Rate	7.0	6.7	6.4	6.5	6.3	5.2	3.8	2.4	2.1
Investment (free of aid)	27.0	29.1	24.2	25.0	24.0	22.9	28.2	33.3	34.6
One Dollar Poverty	..	..	..	..	..	2.0	2.0	2.0	..
Two Dollar Poverty	..	..	..	..	..	12.1	7.8	7.3	..
Secondary School Enrollment	..	..	..	..	..	..	..	..	77.5
Estimated Household Income Inequality	47.9	48.8	46.8	46.1	37.6	36.5	41.2	43.2	43.2
Food Gini	..	..	..	..	..	15.3	..	..	..
Malnutrition (Height to Age)	..	..	..	..	..	..	18.9	15.4	..
Malnutrition (Weight to Age)	..	..	..	..	..	..	15.7	10.9	..
Undernourishment	..	..	30.0	..	7.0	..	4.0	3.0	4.0
Food Expenditure Share	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5
Food Price Elasticity	..	..	..	..	..	..	..	-0.4	..
Land Inequality	67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7
Food Price Inflation	..	..	..	..	15.8	17.4	33.0	19.0	13.5
Irrigation	31.3	32.4	34.3	35.9	39.8	42.3	38.3	41.2	42.7
Cereal Yield	864.6	881.5	925.1	1173.2	1147.0	1306.5	1693.8	1949.3	2288.0
Fertilizer Consumption	16.6	50.9	169.3	299.8	619.9	692.8	633.7	774.4	864.9
Renewable Water per Capital	..	..	4124.0	..	..	..	..	2031.0	..
Food Trade Balance (% GDP)	-1.5	-0.5	-1.7	-2.3	..	..	..	-1.8	-1.0
Agricultural Capital per Worker (thousands, \$1995)	..	..	..	..	..	..	9.0	..	8.0
Roads, goods transported (million ton - km)	..	..	..	..	..	..	..	..	..
Railways, goods transported (million ton - km)	..	..	..	..	6735.0	8198.4	9479.4	14220.3	18452.3
Transport	..	..	..	..	6735.0	8198.4	9479.4	14220.3	18452.3
Domestic credit to private sector (% of GDP)	20.8	24.9	25.6	36.8	33.6	34.0	28.7	26.0	36.0

Appendix Item 6: Compilation of Socioeconomic Indicators of ODC Countries (Contd.)

Iraq

Indicator	61-65	66-70	71-75	76-80	81-85	86-90	91-95	96-2k	01-05
Per Capita Income (\$2000)	..	..	..	..	..	..	..	907.7	..
Population in Million	8.1	9.5	11.2	13.2	15.4	17.6	20.3	23.3	..
Rural Population Share	52.4	46.0	40.7	36.1	32.5	30.7	30.8	31.8	32.7
Employment in Agriculture	..	..	..	..	..	..	..	..	..
Population Growth Rate	3.2	3.3	3.4	3.3	2.9	2.6	3.1	3.0	..
Fertility Rate	7.3	7.2	7.2	6.7	6.3	6.0	5.6	5.4	..
Investment (free of aid)	..	..	..	..	..	..	..	..	..
One Dollar Poverty	..	..	..	..	..	..	..	..	..
Two Dollar Poverty	..	..	..	..	..	..	..	..	..
Secondary School Enrollment	..	..	..	..	..	..	..	30.4	36.7
Estimated Household Income Inequality	45.7	45.2	44.0	42.1	41.0	42.1	46.3	47.4	47.4
Food Gini	..	..	14.3	..	..	..	..	..	..
Malnutrition (Height to Age)	..	..	..	..	..	..	21.8	22.1	..
Malnutrition (Weight to Age)	..	..	..	..	..	..	11.9	19.4	..
Undernourishment	..	..	..	..	..	..	..	..	..
Food Expenditure Share	..	..	..	..	..	..	..	..	..
Food Price Elasticity	..	..	..	..	..	..	..	..	..
Land Inequality	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
Food Price Inflation	..	..	..	..	..	..	..	..	..
Irrigation	27.1	28.7	29.6	31.4	32.0	43.5	63.3	63.0	58.6
Cereal Yield	..	..	..	..	..	..	..	..	..
Fertilizer Consumption	5.3	24.4	55.2	134.7	221.0	406.8	538.8	706.2	1111.4
Renewable Water per Capital	..	..	6844.0	..	..	..	..	3263.0	..
Food Trade Balance (% GDP)	-2.2	..	12.5	12.1	..	..	..	..	..
Agricultural Capital per Worker (thousands, \$1995)	..	..	..	..	..	..	..	..	..
Roads, goods transported (million ton - km)	..	..	..	..	..	..	..	..	..
Railways, goods transported (million ton - km)	..	..	..	..	..	..	..	..	1682.0
Transport	..	..	..	..	..	..	..	..	1682.0
Domestic credit to private sector (% of GDP)	14.8	12.4	8.2	5.6	..	..	..	..	..

Appendix Item 6: Compilation of Socioeconomic Indicators of ODC Countries (Contd.)

Iraq

Indicator	61-65	66-70	71-75	76-80	81-85	86-90	91-95	96-2k	01-05
Per Capita Income (\$2000)	..	..	..	..	..	..	..	907.7	..
Population in Million	8.1	9.5	11.2	13.2	15.4	17.6	20.3	23.3	..
Rural Population Share	52.4	46.0	40.7	36.1	32.5	30.7	30.8	31.8	32.7
Employment in Agriculture	..	..	..	..	..	..	..	..	..
Population Growth Rate	3.2	3.3	3.4	3.3	2.9	2.6	3.1	3.0	..
Fertility Rate	7.3	7.2	7.2	6.7	6.3	6.0	5.6	5.4	..
Investment (free of aid)	..	..	..	..	..	..	..	..	..
One Dollar Poverty	..	..	..	..	..	..	..	..	..
Two Dollar Poverty	..	..	..	..	..	..	..	..	..
Secondary School Enrollment	..	..	..	..	..	..	..	30.4	36.7
Estimated Household Income Inequality	45.7	45.2	44.0	42.1	41.0	42.1	46.3	47.4	47.4
Food Gini	..	..	14.3	..	..	..	..	..	..
Malnutrition (Height to Age)	..	..	..	..	..	..	21.8	22.1	..
Malnutrition (Weight to Age)	..	..	..	..	..	..	11.9	19.4	..
Undernourishment	..	..	..	..	..	..	..	..	..
Food Expenditure Share	..	..	..	..	..	..	..	..	..
Food Price Elasticity	..	..	..	..	..	..	..	..	..
Land Inequality	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
Food Price Inflation	..	..	..	..	..	..	..	..	..
Irrigation	27.1	28.7	29.6	31.4	32.0	43.5	63.3	63.0	58.6
Cereal Yield	..	..	..	..	..	..	..	..	..
Fertilizer Consumption	5.3	24.4	55.2	134.7	221.0	406.8	538.8	706.2	1111.4
Renewable Water per Capital	..	..	6844.0	..	..	..	..	3263.0	..
Food Trade Balance (% GDP)	-2.2	..	12.5	12.1	..	..	..	..	..
Agricultural Capital per Worker (thousands, \$1995)	..	..	..	..	..	..	..	..	..
Roads, goods transported (million ton - km)	..	..	..	..	..	..	..	..	..
Railways, goods transported (million ton - km)	..	..	..	..	..	..	..	..	1682.0
Transport	..	..	..	..	..	..	..	..	1682.0
Domestic credit to private sector (% of GDP)	14.8	12.4	8.2	5.6	..	..	..	..	..

Appendix Item 6: Compilation of Socioeconomic Indicators of ODC Countries (Contd.)

Yemen

Indicator	61-65	66-70	71-75	76-80	81-85	86-90	91-95	96-2k	01-05
Per Capita Income (\$2000)	..	..	..	..	..	455.8	454.6	511.8	534.3
Population in Million	5.6	6.1	6.7	7.7	9.2	11.2	13.9	16.9	19.7
Rural Population Share	89.8	87.6	85.8	84.2	82.4	80.1	77.4	75.3	73.5
Employment in Agriculture	..	..	..	..	..	..	..	54.1	..
Population Growth Rate	2.1	1.7	1.9	3.2	3.9	3.9	4.6	3.3	3.1
Fertility Rate	8.4	8.4	8.5	8.6	8.6	8.1	7.4	6.7	6.0
Investment (free of aid)	..	..	..	..	..	6.3	15.4	19.9	20.2
One Dollar Poverty	..	..	..	..	..	..	3.4	15.7	..
Two Dollar Poverty	..	..	..	..	..	..	19.9	45.2	..
Secondary School Enrollment	..	..	..	..	..	..	..	32.7	..
Estimated Household Income Inequality	48.3	49.4	54.8	48.9	43.1	42.9	42.9	42.9	42.9
Food Gini	..	..	..	..	..	..	15.8	..	..
Malnutrition (Height to Age)	..	..	..	57.7	33.7	..	44.1	48.2	53.1
Malnutrition (Weight to Age)	..	..	..	55.7	30.4	..	34.5	42.1	45.6
Undernourishment	..	..	54.0	..	39.0	..	34.0	36.0	37.5
Food Expenditure Share	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1
Food Price Elasticity	..	..	..	..	..	..	..	-0.3	..
Land Inequality	..	..	..	..	..	..	..	..	..
Food Price Inflation	..	..	..	..	..	..	..	..	..
Irrigation	16.1	17.7	19.0	19.4	20.4	21.1	26.7	28.9	31.4
Cereal Yield	776.9	791.2	847.1	935.4	727.6	905.5	1023.2	1022.0	864.8
Fertilizer Consumption	..	1.1	14.5	63.1	114.2	117.7	90.8	95.5	93.3
Renewable Water per Capital	..	..	586.0	..	..	..	..	226.0	..
Food Trade Balance (% GDP)	..	..	..	..	..	..	-9.7	-9.8	-6.6
Agricultural Capital per Worker (thousands, \$1995)	..	..	..	..	..	..	3.0	..	3.0
Roads, goods transported (million ton - km)	..	..	..	..	..	..	..	..	..
Railways, goods transported (million ton - km)	..	..	..	..	..	..	..	..	..
Transport	..	..	..	..	..	..	..	..	..
Domestic credit to private sector (% of GDP)	..	..	..	..	..	6.1	5.1	4.5	6.9

Appendix Item 6: Compilation of Socioeconomic Indicators of ODC Countries (Contd.)

Palestine

Indicator	61-65	66-70	71-75	76-80	81-85	86-90	91-95	96-2k	01-05
Per Capita Income (\$2000)	1274.4	1400.9	1031.0
Population in Million	2.0	2.2	2.7	3.4
Rural Population Share	53.1	47.9	42.5	38.7	35.9	33.2	30.6	28.9	28.4
Employment in Agriculture	13.2	14.5
Population Growth Rate	3.9	4.3	4.0
Fertility Rate	6.1	5.3	4.8
Investment (free of aid)	20.1	21.6	-9.4
One Dollar Poverty
Two Dollar Poverty
Secondary School Enrollment	76.8	85.9
Estimated Household Income Inequality
Food Gini	12.8	..
Malnutrition (Height to Age)	7.3	9.9
Malnutrition (Weight to Age)	4.1	4.9
Undernourishment	12.0	16.0
Food Expenditure Share
Food Price Elasticity
Land Inequality
Food Price Inflation
Irrigation
Cereal Yield
Fertilizer Consumption
Renewable Water per Capital
Food Trade Balance (% GDP0)
Agricultural Capital per Worker (thousands, \$1995)
Roads, goods transported (million ton - km)
Railways, goods transported (million ton - km)
Transport
Domestic credit to private sector (% of GDP)