



# **Governance & Development: Views from G20 Countries**

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**Correlates of Food Insecurity: How can the G 20 help?**

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# Correlates of Food Insecurity: How can the G 20 help?

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## 1. Introduction

Hike in global food prices have been a cause of grave concern in recent years, especially since 2007-08<sup>1</sup>. Compared to recent past, cereal prices have increased the most amongst all food commodities and are expected to remain high particularly in import-dependent developing countries. A recent study shows that the average world market price, relative to 2010 level, of processed rice would rise by 31 per cent in 2020 and by 73 per cent in 2030 (Willenbockel, 2011). The corresponding figures for maize are 33 per cent and 89 per cent, respectively. Further, rise in prices have been accompanied by rising food price volatility. FAO predicts that high and volatile prices are likely to persist in the coming years on account of uncertainties surrounding output production in major food producing countries and a sharp run down of inventories (FAO, 2011). In addition, the food crisis has thrown millions of households into poverty. With more people becoming poorer, higher food prices also mean higher probability of hunger and malnutrition (Ivanic, Martin and Zaman, 2011; HLPE, 2011). It also slows down the progress in achieving the Millennium Development Goals (MDGs). Hike in food prices also affects poverty. To illustrate, a 20 per cent increase in food prices in India would lead to a 5.4 per cent increase in poverty, making 59 million additional Indians poor. Similarly, a 10 per cent rise in prices could push almost 30 million more Indians into extreme poverty (ADB, 2012). Amongst the 'Triple F' crises the world has experienced in recent years, the poor economies have been impacted by *food* crisis the most. While the *fuel* and *financial* crises too impacted these countries, the consequence of rising food crisis has been severe on state of food security in economies of this region.

The issue of food security, in addition to IFAD, FAO and the WFP has also become a part of the G20 discussions in recent years. During such meetings, policy makers need to answer whether enough is being done to avoid a repeat of the 2007-08 food crises. If not, what are the specific aspects that need to be initiated on priority basis? With this backdrop, the present write-up in section 2 discusses the magnitude of hunger and food insecurity across different regions of the world and the extent to which food price hikes are likely to dampen the efforts of nations towards meeting their poverty eradication goals. Thereafter, section 3 identifies the correlates of hunger. Econometric techniques are used to estimate availability, affordability, utilization and stability as correlates of hunger. Finally, based upon our econometric results, section 4 provides policy recommendations for the G20 nations.

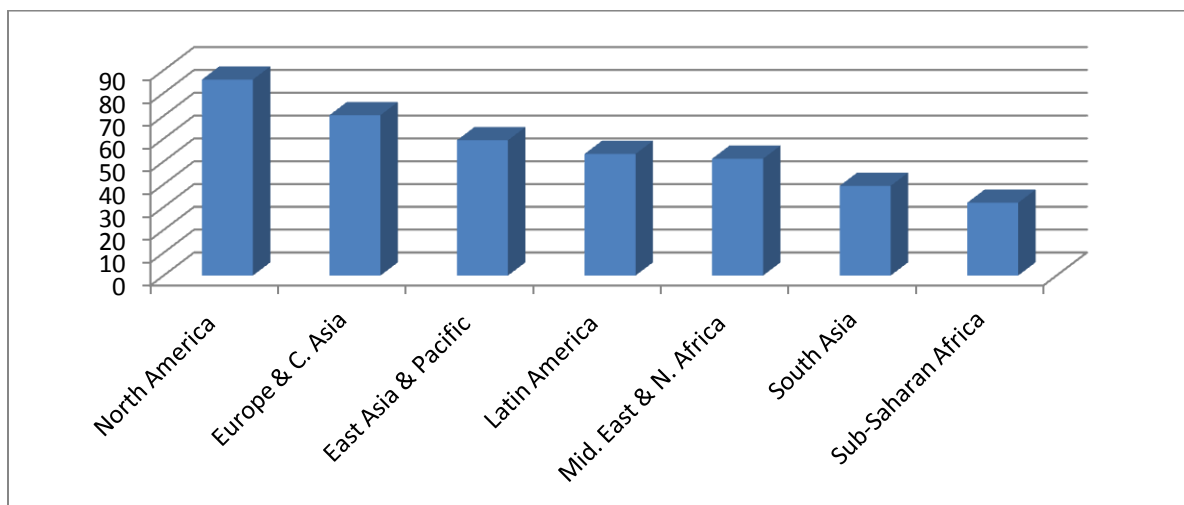
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<sup>1</sup> Not only do global food price hikes cause misery to the poor, but also leads to domestic food inflation (Heady and Fan, 2010; Gulati and Saini, 2013).

## 2. Food Security and Global Trends

Food security is defined as the state in which people at all times have physical, social, and economic access to sufficient and nutritious food that meets their dietary needs for a healthy and active life. This encompasses four criteria of food security: availability, access, utilization, and stability. Using this definition adapted from the 1996 World Food Summit, the Global Food Security Index considers the core issues of affordability, availability and utilization. *Affordability* measures the ability of consumers to purchase food, their vulnerability to price shocks, and the presence of programmes and policies to support consumers when shocks occur. *Availability* measures the sufficiency of the national food supply, the risk of supply disruption, national capacity to disseminate food, and research efforts to expand agricultural output. *Utilization as measured by Quality and Safety* is estimated by looking at the variety and nutritional quality of average diets, as well as, the safety of food. As per **Economist Intelligence Units (EIU's) Global Food Security Index (GFSI, 2012)**<sup>2</sup> report, Sub-Saharan Africa and South Asia are the most undernourished, malnourished and food insecure regions in the world (Figure 1).

**Figure 1: Food Security Index in Regions of the World (Score out of 100)**



Source: **The Economists GFSI (2012) Report**

To make matters worse, the food and economic crises are challenging our efforts to achieve the World Food Summit (WFS)<sup>3</sup> and Millennium Development Goals (MDGs)<sup>4</sup> of reducing the

<sup>2</sup> The Global Food Security Index (GFSI) is a comprehensive assessment of the drivers of food security. The index analyses the issue across three internationally designated dimensions: affordability, availability and utilization-the last of which the Economist Intelligence Unit calls “quality and safety”. The three issues of food security are addressed for a set of 105 countries, constructed from 25 unique indicators. Three category scores are calculated from the weighted mean of underlying indicators and scaled from 0-100, where 100 represents most favourable.

<sup>3</sup> World Food Summit goal: halve, between 1990–92 and 2015, the number of undernourished people.

<sup>4</sup> Millennium Development Goal 1, target 1C: halve, between 1990 and 2015, the proportion of people who suffer from hunger.

number and proportion of people who suffer from hunger by half by 2015. Even if the MDG were to be achieved by 2015, some 600 million people in developing countries would still be undernourished. Higher food prices also affect nourishment intake by households. Even temporary reductions in disposable income due to price shocks can lead families to draw down on their capital (both physical and human). For example, sometimes, families sell household assets such as livestock in order to maintain food intake in the face of an economic shock. Alternatively, families may make fewer visits to the doctor, or remove children from school in order to save on school fees. These responses may result in a loss of human capital in the affected households. Such episodes can result in poverty traps, whereby a onetime shock has longer-term effects. In table 1, we report the progress made by different regions in meeting the targets as set under the WFS and the MDGs.

**Table 1: Prevalence of Undernourishment and Progress towards the World Food Summit (WFS) and the Millennium Development Goal (MDG) targets**

Region/ Country	Total Population (2006-08) (Million)	Number of Undernourished (Million)		Change so far (%)	Progress Towards WFS Targets	Proportion of Undernourished (%)		Change so far (%)	Progress Towards MDG Targets
		1990- 02	2006- 08			1990- 02	2006- 08		
Africa	962.9	170.9	223.6	30.8	Decline in Progress	26	23	-11	Progress Insufficient
L. America	528.2	46.7	38.6	-17.2	Progress Insufficient	11	7	-35	Progress Insufficient
Asia	3884.3	607.1	567.8	-6.5	Progress Insufficient	20	15	-27	Progress Insufficient
East Asia	1410.8	215.6	139.4	-35.3	Progress Insufficient	18	10	-44	Target will be met
<b>South Asia</b>	1642.8	267.5	330.1	23.4	Decline in Progress	22	20	-8	Progress Insufficient
<b>India</b>	1164.6	177.0	224.6	26.9	Decline in Progress	20	19	-4	Progress Insufficient

The main highlight of table 1 is that most of the regions fair poorly in terms of meeting their obligations towards the World Food Summit (WFS) and the Millennium Development Goals (MDGs)<sup>5</sup>.

### 3. Econometric Analysis

The basic objective of this section is to analyze the correlates of food insecurity. As measures of food insecurity, we consider two dependent variables ( $Y_{it}$ ), viz: prevalence of undernourishment, and depth of food deficit. Depth of food deficit indicates how many calories would be needed to

<sup>5</sup> In Africa, Ghana, Mali and Nigeria achieved these targets by 2008. Within Asia, China, Vietnam and Georgia have already met these targets.

lift the undernourished from their present status, everything else being constant. The correlates of food insecurity analyzed are: average value of food production as a proxy for food availability; per capita GDP (levels or growth), and food inflation (or its volatility) as a measure of economic accessibility; rail and road density as a proxy for physical accessibility to food; access to water as a proxy for food utilization; and food import as a percentage of total merchandise exports as a measure to capture the stability/vulnerability aspect of food insecurity.

Specifically, food insecurity is posited to depend on:

Where:

- $Y_{it}$  represents two aspects of food insecurity, viz. prevalence of under nutrition and depth of food deficit.
- $FoodP_{av}$  is the average value of food production of country  $i$ , in International Dollars divided by the total population.
- $GDP_{pc}$  is the Gross Domestic Product per capita measured in constant 2005 USD. Regressions have been run for both levels of GDP, as well as, its growth rates.
- $\Delta FPI$  is the change in Domestic Food Price Level Index, which is calculated by dividing the Food Purchasing Power Parity (FPPP) by the General PPP, thus providing an index of the price of food in the country relative to the price of the generic consumption basket. It is a measure of food inflation. Additionally, we also run regressions with volatility of food prices as a correlate of food insecurity.
- $RailD$  is a measure of rail lines density and  $RoadD$  is a measure of road density.
- $Water$  refers to the access to an improved water source.
- $Food\ M/Tot\ X$  refers to the value of food imports of a country expressed as a percentage of total merchandise exports.
- 'i' and 't' subscripts represent country and time respectively, and the error term is omitted, and
- All variables are in logarithms.

The data has been sourced primarily from FAO's Food Security Indicators and the World Bank's World Development Indicators. Regressions have been run for countries of South Asia, Sub Saharan Africa, and Latin America. In addition, a pooled regression for the three regions has also been estimated. Regressions have been run on three year averages from 1990-1992 to 2010-12.

Based on our econometric results, following conclusions emerge: In general, prevalence of undernourishment, as well as, depth of food insecurity declines significantly with an increase in agricultural production, increase in GDP per capita, as well as its growth, improvement in rail and road infrastructure, and access to better drinking water. As expected, food inflation and food price volatility have been estimated to have a significant adverse effect on food security. Also, increase in food imports as a percentage of total merchandise exports have a negative impact on

food security, though the effect remains generally non-significant across specifications. Based on these results, few critical policy recommendations have been made.

#### **4. Policy Recommendations: How can the G20 help?**

The G20 put food security on its agenda from late 2010, when France began to plan for its year as the host country. The G20 includes the major agricultural exporters, the biggest commodity traders and commodity exchanges, and includes the big biofuels producers as well, including the US and EU governments that have used mandates and subsidies to encourage bio-fuel production and use. This makes the role of G20 important in issues concerning food security. In preparation for the meeting in France, ten intergovernmental agencies were asked to prepare a report (IO Report) on food price volatility and role of G20. The report made 10 recommendations in three areas (Clapp and Murphy, 2013), viz:

**Smoothing measures** (sought to calm markets so as to avert further price volatility and crisis):

- increase agricultural productivity
- institute an agricultural market transparency and information system

**Coping mechanisms** (sought to mitigate the damage from price volatility):

- exempt food aid from export restrictions
- consider a pilot project for emergency food reserves
- promote risk management tools, such as weather insurance, hedging, etc.
- make financing available to poor countries to maintain imports in times of price volatility
- strengthen policy coordination across international organizations in the face of crisis

**Structural/regulatory reforms** (sought to effect changes in the rules and norms governing markets in a way that would reduce both volatility itself and vulnerability to volatility for the world's poorest countries):

- coordinate regulation of commodity futures markets
- rebalance global trade policies by reducing agricultural subsidies in rich countries and providing more policy space for poor countries
- remove subsidies/mandates for biofuels

In order to understand and recommend an appropriate role of the G20 in respect of food security, we address aspects that have been dealt by the G20, though not necessarily successfully.

- **Increasing Agricultural Productivity:** Although the IO promoted the idea of increased investment, the G20 was careful not to commit any new funding, and instead pressed the need for enhanced private-sector investment to fill the funding gap. However, moving ahead with more firm financial and R&D commitments in this direction is surely desirable.
- **Agricultural Market Smoothing:** G20 introduced the Agricultural Market Information System (AMIS), to gather and disseminate more information on physical commodity

production and market transactions to reduce market uncertainty. However, there is no clarity on how AMIS would work with the private sector, particularly the four global grain traders that control an estimated 75 per cent or more of the international cereal trade (ADM, Bunge, Cargill and Louise Dreyfus). With public stocks now eliminated in most countries, it is these traders that hold such stocks and know the most about what grain will be available when and from where (Murphy et al., 2012).

- **Mandate on Bio-fuels:** Bio-fuels were only mentioned in the Action Plan as something that required further study and no concrete action was recommended, despite the growing weight of evidence that biofuels demand was a significant factor in high and volatile prices (Abbott et al, 2011). This is an area that certainly needs more concerted action by the G20.
- **Maintaining Adequate Stocks:** The report also included a discussion on developing policy and rules to coordinate international grain reserves. However, no specific recommendation was made regarding the same. If adopted, such a measure would be both a smoothing and a structural measure.

Unfortunately, it is often argued that the G20 has shied away from tackling the broader structural economic dimensions of the food crisis with bold regulatory reforms, and instead has pressed for initiatives that smooth markets by increasing food production and encouraging information flows, and that create mechanisms to cope with volatility such as assistance and risk management. In other words it focuses narrowly on production, information and mechanisms to cope with price volatility rather than the broader economic and regulatory measures that affect food distribution. Relevance of two of these crucial policies, viz. an appropriate bio-fuel policy and desirability of maintaining adequate stock to use ratio are discussed next.

#### *Policy Concerns for G20 to Address Price Shocks and Food Security*

Many observers feel that oil price hike, low interest rates, excess global liquidity, income expansion in China and India, and hike in bio-fuel demand have been the main reasons for food price hikes. However, Wright (2011) negates most of these factors, and concludes that two events were primarily responsible for price hikes and volatility. First, is the mandate related to bio-fuels and the second is the low grain stock to use ratio (SUR) in the years of price spikes. According to him, the most obvious large exogenous shock to grain markets in recent years has been the *surge in bio-fuels demand*; diversion of oilseeds into biodiesel in Europe, the United States, and elsewhere and conversion of corn into ethanol in the United States. The diversion of corn and soybeans to biofuel is now very substantial (more than 30% for corn and 20% for soy) and is likely to continue to increase under the current policies using subsidies and mandates. These higher mandates and subsidies are likely to have more serious implications for supplies of corn for feed and food, relative to equivalent yield drops due to transitory, weather- or disease-related shocks. This is one area where the G20 has a role to play.

Next is the role of grain stocks as a determinant of food price spikes and the learning for the G20. Bobenrieth, Wright and Zeng (2012) observe that price spikes tend to occur when world

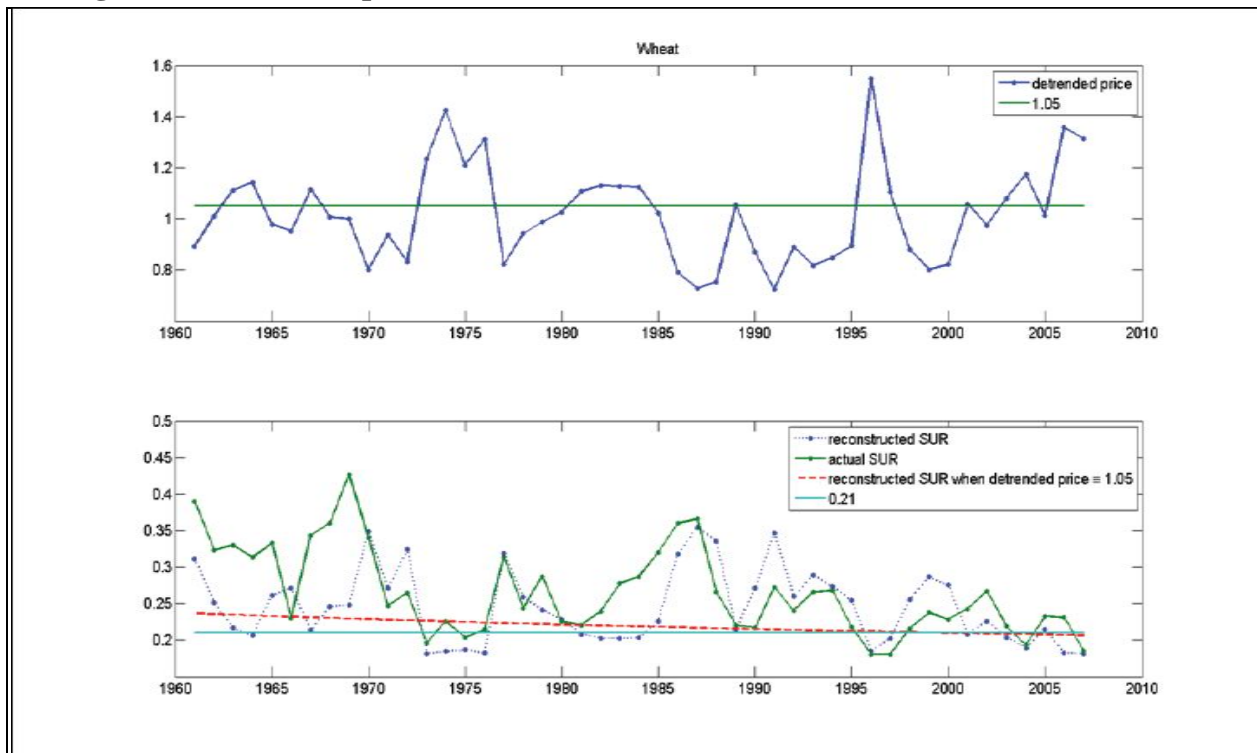


stock-to-use ratios are low and recommends that for the markets to function effectively, a virtually irreducible minimum amount of grain must be held in the system to transport, market, and process grains. Table 2 provides the correlation matrix between de-trended real price (excluding China) and stock to use ratio from 1961 to 2007 for wheat, rice, maize and calories. The results clearly indicate a negative relation between the two, indicating that periods of low stock-to-use ratio coexist with periods of high prices. Same relationship is illustrated in Figure 2.

**Table 2: Correlation matrix between de-trended real price (excluding China) and Stock-to-Use Ratio (1961-2007)**

	Wheat de-trended real price	Maize de-trended real price	Rice de-trended real price	Calories de-trended real price
Wheat excluding-China stock to use ratio	-0.4018	-0.4413	-0.3438	-0.4344
Maize excluding-China stock to use ratio	-0.3971	-0.5034	-0.4356	-0.5156
Rice excluding-China stock to use ratio	-0.2286	-0.2048	-0.1731	-0.2136
Calories excluding-China stock to use ratio	-0.4996	-0.5723	-0.4729	-0.5792

**Figure 2: De-trended price versus Stock to Use Ratio (SUR) for Wheat (1961-2007)**



Source: Bobenrieth, Wright and Zeng (2012)

In light of these results, we recommend that the G20 should focus on the structural and regulatory aspects of food security, while continuing with its effort on smoothing and coping mechanisms. Its mandate on bio-fuel policy and subsidies, and policies to maintain an optimal stock to use ratio of grains needs to be prioritized and worked upon at the earliest.

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