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**BACKGROUND PAPER**

**FOOD SECURITY IN SOUTH ASIA-  
PROSPECTS FOR REGIONAL  
INTEGRATION**

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# FOOD SECURITY IN SOUTH ASIA- PROSPECTS FOR REGIONAL INTEGRATION

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## **Executive Summary**

Analysis of the supply-demand scenario shows that presently export surplus exists in the region only for rice and to a limited extent for sugar. In wheat, corn, edible oils (except soybean oil) and pulses most of the countries in the region are facing deficits. India and Pakistan are either self-sufficient or possess export surplus in most commodities. Other countries such as Nepal, Maldives, Iran, Bhutan and Afghanistan are facing deficits and rely on imports for most of the major commodities. India's trade engagement within South Asia, relative to Non-South-Asian countries, appears low. Pakistan, Nepal, Bangladesh and Sri Lanka trade relatively more with other South Asian countries. The market integration analysis shows that many commodity markets within the countries are not adequately integrated. In particular, integration of wheat and rice markets is of concern. The retail rice markets are better-integrated than wheat and wheat flour markets.

Given the current & potential supply-demand scenario of food commodities, extent of market integration, levels of poverty and health status in the countries of the region, the following are the potential areas of collaboration in the region from the point of food security – i) collaborative agricultural research particularly on cereals, pulses and edible oilseeds ii) coordination in pricing and trade policies and development of transport infrastructure iii) cooperation on common physical and virtual reserves iv) collaboration on improving health outcomes v) instituting *Early Warning Systems* on natural calamities vi) judicious use of river waters.

## **Introduction**

South Asia has the largest concentration of poverty in the world. Nearly 40 percent of the world's poor earning less than a dollar a day live in the region. South Asia is home to 22 percent of the world's population but only generates less than 2 percent of global income. Most of the South Asian poor populations depend on agriculture for their livelihood. Approximately fifty percent of the labour force is engaged in agriculture in 2010 (WDI, 2012) and the sector accounts for about 20 percent of GDP. Agriculture in the region is dominated by small farmers with an average holding size of less than 2 hectares, who are net buyers of food. It is therefore conceivable that food crises have a deep and lasting impact on the well-being of the peoples in these countries. In this study we attempt to analyze the food security scenario in each of the South Asian countries and the region as a whole. We also assess the scope for regional integration and cooperation to attain food security in the region.

The study is organized as follows. In section 1 we discuss the status of the agricultural sector in the region as agriculture has crucial implications for food and livelihood security. In section 2 we undertake a detailed analysis of the existing and potential supply-demand deficits for major commodities which are important from the point of food security. This is followed by an analysis of the agricultural trade policy and the extent of agricultural trade engagement of each

country with its South Asian neighbours in section 3. In section 4 we analyze the domestic market integration in each country for major food commodities using econometric methods, since domestic market integration is a necessary precondition for the success of external trade liberalization. In section 5 we analyze the demand side aspects such as poverty and also undertake a discussion of the health indicators that are crucial for food absorption. In section 6 the possible areas of cooperation and collaboration among the South Asian countries are delineated. Finally, in section 7 we present the summary and main conclusions of the study.

## I. Economy and Agriculture in South Asia – An Overview

Agriculture is the key to secure food and livelihood security since agriculture is the mainstay of economic activities in the region. Agriculture forms a sizeable share of GDP of various countries in the region and also provides employment to a sizeable proportion of population. Growth of agriculture has implications for overall economic growth in the region as agriculture has strong forward and backward linkages with other sectors. Therefore, we start with a brief analysis of the agriculture sector.

As can be seen from Table 1.1, the share of agriculture in overall GDP is high in Nepal (34%), Afghanistan (31%) and Pakistan (22%). The other countries in the region have a share of less than 20%. Pakistan has the highest agricultural value added per worker (903 USD) and also the only country where the per capita value added in agriculture is higher than the overall GDP per capita. In all other countries the agricultural value added per worker is much less than the overall GDP per capita, showing the relatively poor performance of agriculture. However, it is possible that the growth rates of agricultural value added per worker are higher than the GDP per capita, in which case it is possible for the inter-sectoral disparities to narrow down. Therefore, we have analyzed the CAGR for two periods – for period I from 1990 to 2000 and for period II from 2000 to 2009. The results are summarized in Table 1.1 and Figure 1.1.

As can be seen Figure 1.1, the growth rates of agricultural value added per worker in the second period is substantially lower in most countries. In contrast to this, the growth rate of per capita GDP is much higher in the second period in all the countries, except Nepal, showing the severe stagnation in the agricultural sector in the entire region during the last decade. The stagnation in agriculture led to rising inter-sectoral disparities in the region. From Figure 1.2 (a), it is clear that the percentage of agricultural land to total area is stagnant during the last decade showing that increasing area under agriculture is not an option for increasing production in the region. However, Figure 1.2 (b) shows that the percentage of irrigated land to total agricultural land is also almost stagnant, showing absence of investment (mostly public) in a crucial input like irrigation.

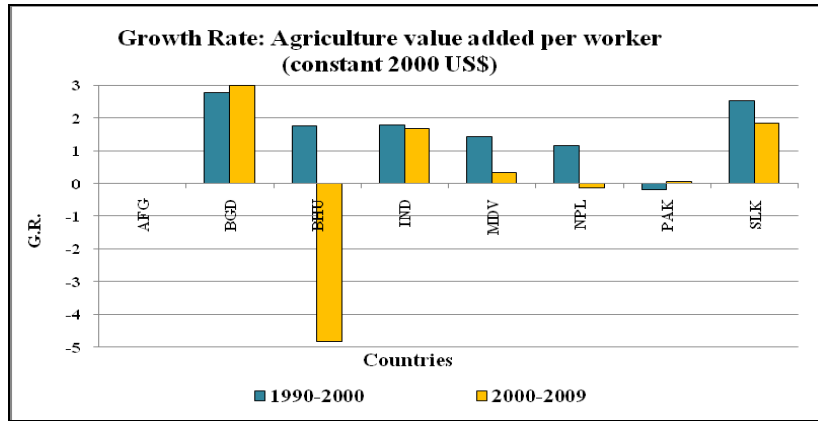
**Table 1.1: Agriculture and Economy in the South Asian Countries**

Country	Agriculture, value added (% of GDP)			Growth Rates					
	1990	2000	2009	GDP (constant 2000 US\$)		Agriculture value added per worker (constant 2000 US\$)		GDP per capita (constant 2000 US\$)	
				1990-2000	2000-2009	1990-2000	2000-2009	1990-2000	2000-2009
AFG		45	31						
BGD	30	26	19	4.81	5.89	2.78	2.98	2.65	4.42
BHU	36	28	19	5.04	8.86	1.75	-4.83	4.99	6.17
IND	29	23	18	5.89	7.89	1.8	1.68	4.02	6.37
MDV	52	41	34	8.51	8.3	1.16	0.34	6.49	6.73

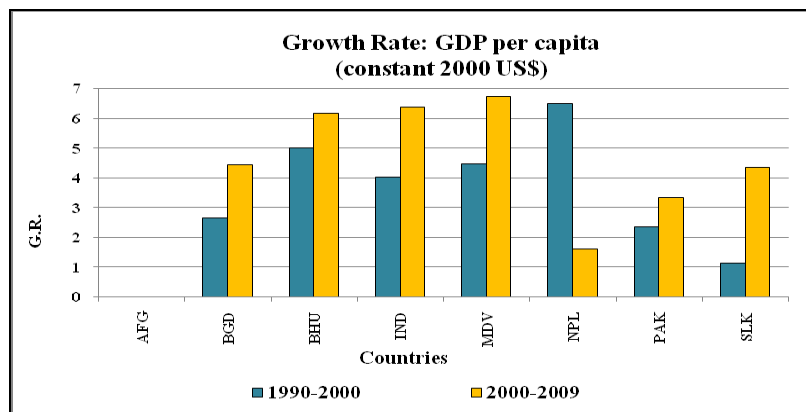
NPL	26	26	22	4.89	3.73	-0.2	-0.12	2.34	1.59
PAK	26	20	13	3.75	5.22	2.51	0.05	1.12	3.33
SLK		9	4	5.25	5.52	1.42	1.85	4.47	4.36

Source: World Development Indicators (WDI), Development Data Group, World Bank

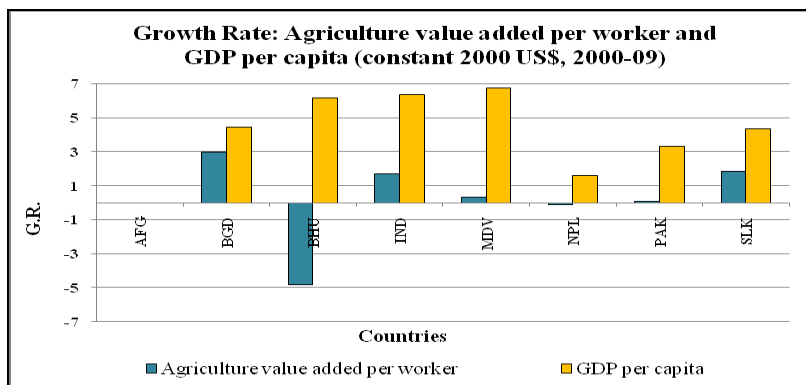
**Figure 1.1: Performance of Agriculture and Economy in South Asia**



Source: World Development Indicators (WDI), Development Data Group, World Bank



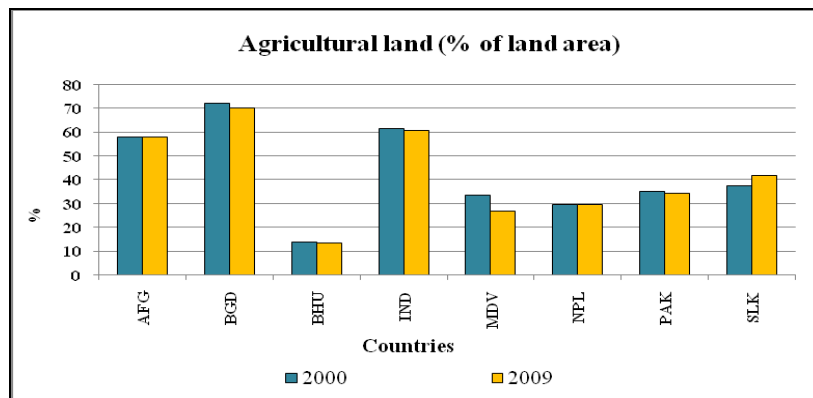
Source: World Development Indicators (WDI), Development Data Group, World Bank



Source: World Development Indicators (WDI), Development Data Group, World Bank

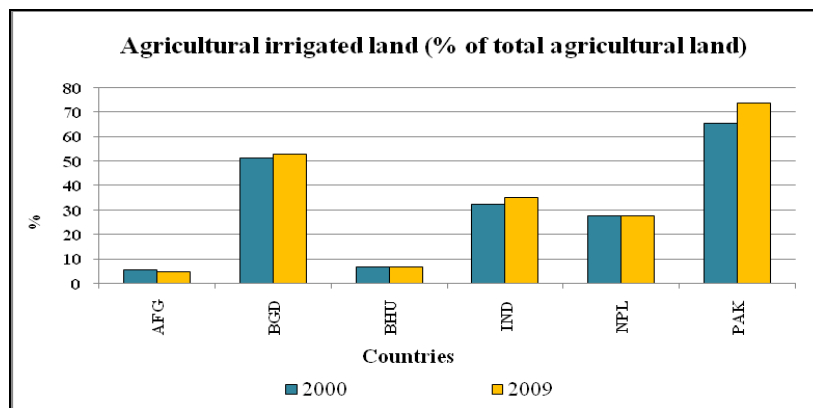
**Figure 1.2: Land under Cultivation Irrigation in South Asia**

(a)



Source: World Development Indicators (WDI), Development Data Group, World Bank

(b)



Source: World Development Indicators (WDI), Development Data Group, World Bank

Note: Agricultural irrigated land data is not available for year 2000 and 2009 in some of the countries. Hence the closest year for which data is available has been considered. For AFG, 2001 is the starting year and 2009 the terminal year; for BNG they are 2004 and 2006; for BHU 2003 and 2007; for IND 2001 and 2009; for NPL 2001 and 2008; for PAK 2001 and 2009

## II. Supply-Demand Deficits and Agricultural Trade in South Asia

In this section we have analyzed the present supply-demand scenario and the future prospects of major commodities that have important implications for food security. The analysis is carried out for each country and the region as a whole. To assess the present supply-demand scenario, indicators like production/consumption ratio, import/consumption ratio, ending stocks/consumption ratio and production instability index are computed for the triennium ending 2009. However, these measures pertain to the one time period and therefore do not completely inform us about the emerging scenario. For example, a country may possess lower production in during 2007-2009 triennium as compared to consumption. In such a case the production/consumption ratio will be less than 100. However, if the production is growing much faster than consumption, this ratio may rapidly increase and may even cross 100 in the near future. To account for these dynamics, we have combined the present supply-demand scenario with the medium term growth rates (from 2001 to 2011) for each commodity to draw conclusions about the potential surplus/deficit in the region.

### INDICATORS OF PRESENT SUPPLY-DEMAND SCENARIO

To assess the present supply-demand scenario we have used the following indicators

i) Production / Consumption Ratio (P/C ratio)

High : >120%  
Medium: 80%-120%  
Low: <80%

ii) Ending Stocks / Consumption Ratio (S/C ratio)

Adequate: >=15% for staple cereals like wheat and rice  
>=10% for other cereals and food stuffs

Inadequate: < 15% for staple cereals like wheat and rice  
< 10% for other cereals and food stuffs

iii) Production Instability Index (PII)

High: >100% more than the South Asian average - more than double  
Medium: 50-100% more than the South Asian average  
Low: <50% more than, equal to or less than the South Asian average

Based on this analysis, the present supply demand scenario and future trends of various commodities are as follows.

**Rice:** Production/Consumption Ratio is high in Pakistan, medium in India, Nepal, Sri Lanka and Bangladesh (Figure 2.1 and Table 2.1). Production/Consumption Ratio is low in Afghanistan and Iran. The ending stocks (Ending stocks/consumption ratio) are adequate in Pakistan, India and Iran but inadequate in Afghanistan, Bangladesh, Nepal and Sri Lanka. The Production Instability Index is high for Afghanistan and Iran, medium for India, Nepal, Pakistan and Sri Lanka. The Production Instability Index is low for Bangladesh.

As for emerging trends, in Afghanistan, the production growth rate is almost equal to that of consumption (Figure 2.1 and Table 2.2). The yield growth rate is stagnant. It appears that Afghanistan is largely self-sufficient in rice with no major deficits. In Bangladesh, the growth

rate of domestic production is greater than domestic consumption and the growth rate of stocks is high. The yield growth rate is also impressive. Therefore, there is some potential for export surpluses in this country. In India, production growth rate much higher as compared to consumption. The growth rate of ending stocks is also quite high. These, combined with positive growth rate of yield, show that there is potential for export surpluses in India. In Iran, the production growth rate is negative and consumption growth rate is positive and the consequent supply-demand gap is met through imports and drawing down the stocks. Imports show a high positive growth rate and ending stocks a high negative growth rate. The growth rates of yield and area are negative (decline). All these trends indicate that major deficits for rice may continue in Iran for some time. In Nepal, the domestic production growth rate is much lower than that of consumption and the resulting supply-demand gap is met mainly through imports. There is no major stockholding in the country and the yield growth is almost stagnant. All these trends indicate that there are major emerging deficits in this country. In Pakistan, the production growth rate is much higher than that of consumption. The import, export and stocks growth rates are also quite high. These combined with high growth rates of area and yield show that there is large potential for exports in Pakistan. In Sri Lanka, the production growth rate is much higher than that of consumption. The stocks growth rates are also high leading to high growth rate in exports. These trends, together with high growth rate of area indicate that there is a definite potential for exports in Sri Lanka.

The broad inference is that there exists some export surplus in Pakistan and India. There is potential for export surplus in Bangladesh and Sri Lanka while Afghanistan and Iran are in dire need of imports.

**Wheat:** The Production/Consumption Ratio is medium in Afghanistan, Bhutan, India, Nepal and Pakistan (Figure 2.1 and Table 2.1). Low in Bangladesh, Sri Lanka and Iran combined with high import / consumption ratios. Ending stocks (Ending stocks/consumption ratio) are adequate in Bangladesh, India, Iran, Pakistan and Sri Lanka. Inadequate in Afghanistan, Nepal and Bhutan. All the major importers such as Bangladesh, Iran and Sri Lanka hold high level of stocks showing predominantly precautionary / transactions motives of stockholding. The Production Instability Index is high for all the countries except India, Nepal and Pakistan.

As for emerging trends, in Afghanistan, the production growth rate much less than that of consumption (Figure 2.1 and Table 2.2). The resulting supply-demand gap is met mainly through imports. The stocks are built mainly because of precautionary motives. The area and yield growth rates are promising. It appears that the major deficits will continue in this country for some time. In Bangladesh, the growth rate of domestic production is very much lower than that of domestic consumption. The supply is augmented through imports. These trends, together with the fact that area growth rate is negative (although the yield growth rate is positive) show that the deficits are likely to continue for some time. Bhutan has no domestic production of wheat and is completely dependent on imports. In India, the production growth rate is slightly higher compared to consumption. The growth rate in imports is high. Although the growth rate in stocks is high, the growth rates of area and yield are not significant. These trends indicate that there is hardly any potential for export surpluses to emerge in India. In Iran, the production growth rate is higher than consumption growth rate. There is a decline in imports and increase in exports. The growth rate of ending stocks is comfortable. These emerging trends indicate that Iran is likely to be self-sufficient in wheat. In Nepal, domestic production growth rate is almost equal to that of consumption. There is no stockholding in the country. The area and yield growth rates are stagnant. The inference is that there are no major deficits presently but may emerge in future. In Pakistan, production growth rate is higher than that of consumption. There is steady growth in stockholding and exports. The growth rates of area and yield are also satisfactory. These trends indicate that there is a definite potential for



wheat exports in Pakistan. In Sri Lanka, there is no wheat production and the country is completely dependent on imports. The stocks are mainly held for precautionary purposes. It appears that the deficits in Sri Lanka are likely to continue for a long time.

Overall, it appears that there is not adequate export surplus in the region to meet the import requirements of Bangladesh, Sri Lanka and Iran. Afghanistan also needs stable import supply

**Corn:** The Production/Consumption Ratio is medium for Afghanistan, Bhutan, India, Nepal and Pakistan but is quite low for Iran (Figure 2.1 and Table 2.1). Ending stocks/consumption ratio is adequate for Pakistan and Iran but inadequate for all other countries. Production Instability Index is high for Afghanistan, Bhutan and Iran, medium for India and low for Nepal and Pakistan.

As for emerging trends, in Afghanistan, the supply is keeping pace with demand entirely through domestic production with very little imports (Figure 2.1 and Table 2.2). Major part of the growth in production is through yield increases. The broad inference is that this country is largely showing self-sufficiency in corn. In India, the growth rate of domestic production is higher than that of domestic consumption and the growth rate of stocks is also comfortable. The exports are growing faster than imports. Therefore, there is potential for exports from India. In Iran, the production growth rate very low compared to consumption. The deficit is mainly bridged through imports (imports show high growth rate). There is very little prospect of self-sufficiency with very low growth rate of yield. The broad inference for this country is that there are emerging supply-demand deficits. Imports may be needed for a long time. In Nepal, the production growth rate is only slightly less than consumption. However, the growth rate of imports is high, mainly to build stocks. The growth rate of yield is quite low. The deficits in Nepal may continue for some time. In Pakistan, the domestic production and consumption are in balance. There is a high growth rate of imports, mainly for reexports. The growth rate of yield is high. The inference is that there exists good potential for export surplus in Pakistan. Overall in the South Asian region, the production growth rate is higher than that of consumption. The import and export growth rates are high. The ending stocks not very high

The broad inference is that there exists low exportable surplus of corn in the region, except Pakistan and India. Some potential exists for trade between Pakistan & Iran and India and Nepal.

**Sugar:** For sugar (refined), the Production/Consumption Ratio is medium for India and Pakistan and low for all other countries (Figure 2.1 and Table 2.1). The import/consumption ratio is high for Bangladesh, Iran, Maldives, Nepal and Sri Lanka. Production Instability Index is also high in all countries except Iran. For sugar (centrifugal), the Production/Consumption Ratio is medium for India, Pakistan and Nepal. The ratio is low for Afghanistan, Bangladesh, Iran, Maldives and Sri Lanka. The Ending stocks/consumption ratio is adequate in Bangladesh, India Iran, Maldives, Nepal, Pakistan and Sri Lanka.

As for emerging trends, in Bangladesh, the production growth rate is much lower than that of consumption, indicating large potential deficits in future (Figure 2.1 and Table 2.2). In India, the production growth rate is almost equal to that of consumption. This implies that there could be no large potential deficits or surpluses in India. In Iran, the production growth rate is much higher than that of consumption, pointing to a large potential export surpluses in this country. There is no domestic production in Maldives and the country is completely dependent on imports. In Nepal, the production growth rate is higher than that of consumption, indicating potential export surplus. In Pakistan, the production growth rate is much lower than that of consumption, implying large potential deficits in future. In Sri Lanka, production growth rate is

higher than that of consumption, showing some potential for export. Overall, in South Asia the production growth rate is almost equal to that of consumption showing no large potential deficits or surpluses in the region. At the global level, the production growth rate is higher than that of consumption, indicating some potential for export

Overall, it appears that presently there is export surplus for sugar (refined) only in India. Large potential deficits are emerging in Pakistan. Maldives is totally dependent on imports. In the case of sugar (centrifugal) there is some trade potential from India and Pakistan to Afghanistan, Maldives, Bangladesh and Iran.

**Pulses:** As for emerging trends, in Bangladesh, the production growth rate is much lower than that of consumption showing large potential deficits in future (Table 2.2). In India and Iran, the production growth rate is almost equal to that of consumption indicating no large potential deficits or surpluses in the two countries. In Maldives, the production growth rate is much lower than consumption showing large potential deficits in future. In Nepal, the production growth rate is much lower than that of consumption indicating large potential deficits. In Pakistan, the production growth rate is higher than consumption showing some potential for export surplus. In Sri Lanka, the production growth rate is almost equal to that of consumption, indicating no large potential deficits or surpluses. Overall, in South Asia, the production growth rate is almost equal to that of consumption, showing that there are no large potential deficits or surpluses. At the global level, also the production growth rate is almost equal to that of consumption, showing that there are no large potential deficits or surpluses.

The foregoing analysis indicates that slight potential for exports exists only in Pakistan. All other countries in the region may face deficits or may attain self-sufficiency.

### **Edible Oils**

**Palm Oil:** All the countries are highly dependent on imports. Almost the entire consumption is met through imports (Figure 2.1 and Table 2.1). As for emerging trends, in Afghanistan and Bangladesh, there is no domestic production and the two countries are completely dependent on imports. In India and Iran, production growth rate is much lower than the consumption growth rate (Figure 2.1 and Table 2.2). Imports and stocks are used to meet the production-consumption gap. It appears that these major deficits will continue in these countries. In Sri Lanka, although the production is stagnant, no major deficits are likely to emerge because of a declining trend in consumption.

All the countries are highly dependent on imports. Almost the entire consumption is met through imports. Production/productivity and consumption trends indicate that these deficits are likely to continue for some time.

**Soybean Oil:** The Production/Consumption Ratio is low for all the countries (Figure 2.1 and Table 2.1). The Ending stocks/consumption ratio is adequate in Bangladesh and Iran but inadequate in India and Pakistan. The Production Instability Index is very high in the region in all the countries compared to the world average but is low in Bangladesh and India when compared to the South Asian average. .

As for emerging trends, in Bangladesh, the production growth rate is much higher than that of consumption (Figure 2.1 and Table 2.2). But the growth rate of stocks is negative. Therefore, there is unlikely to be any exportable surplus but no major deficits are anticipated either. The country is likely to remain self-sufficient. In India, the production growth rate is much higher compared to consumption and there is consistent stockholding (steady growth rate). The

inference is that there is potential for export surplus in India. In Iran, the production growth rate is very much higher than that of consumption. These growth trends, together with reduced exports and large growth rate of stocks, show that there is potential for export surplus in Iran. In Pakistan, there is substantial decline in production. There is decline in consumption also but the growth rate is much lower as compared to production indicating that major deficits may emerge in Pakistan. Overall, in South Asia, the production growth rate is much higher than that of consumption. The growth rate of stocks is positive. There is potential for export surplus in the region. At the global level, the production growth rate is almost equal to that of consumption. The growth in trade and stocks is almost stagnant. These trends indicate that the supply and demand are just in balance presently at the global level and deficits are likely to emerge in future.

The broad inference is that there is some exportable surplus in the region. Production/productivity and consumption trends indicate that potential for self-sufficiency or slight export surplus exists in India, Bangladesh and Iran. Major deficits may continue in Pakistan.

**Sunflower Oil:** The Production/Consumption Ratio is medium only in Pakistan (Figure 2.1 and Table 2.1). For all other countries, that is, India and Iran the ratio is very low. The Ending stocks/consumption ratio is adequate in India and Iran but inadequate in Pakistan.

As for emerging trends, in India, the production growth rate is much lower compared to consumption (Figure 2.1 and Table 2.2). Imports and stocks are mainly used to meet the supply-demand gap and also for re-exports. The broad inference is that major deficits may continue in India. In Iran, the production growth rate is much lower compared to consumption. Imports and stocks are used to meet the gap. The stocks are used for precautionary purposes. All these trends indicate that the deficits in Iran may continue for some time. In Pakistan, the production growth rate is almost equal to that of consumption. The growth rate of imports is negative. The stocks are held mainly for transaction purposes. These trends indicate that Pakistan is largely self-sufficient with no major surpluses or deficits. Overall, in the South Asian region, the production growth rate is much lower than that of consumption, which in turn, can lead to large potential deficits. At the global level, the production growth rate is almost equal to that of consumption. These trends indicate that, at the global level, the supply and demand are just in balance. Deficits are likely to emerge in south Asia since export surpluses are not anticipated in the world market. Overall, it appears that there is no exportable surplus in the region. The Production Instability Index is also very high compared to world average. Production/productivity and consumption trends indicate that major deficits may continue in the region for some time.

Overall inference for edible oils: No exportable surplus in the region for any of the major edible oils, except soybean oil. All the countries are highly dependent on imports from the world market. Production instability index is also very high.

**Summary of the Section:** This section has analyzed the present supply-demand deficits, export surpluses and import dependency of the countries in the region based on measures like production-consumption ratio, inventory coverage of consumption and import content of consumption. The potential deficits/surpluses of the countries are assessed by analyzing the medium-term (last ten years) growth trends of production, productivity (yield) and consumption.

1) Commodities: Presently export surplus exists in the region only for rice and to a limited extent for sugar. In wheat, corn, edible oils (except soybean oil) and pulses most of the

countries in the region are facing deficits and very few countries in the region show export surplus – present or potential.

2) Countries: India and Pakistan are either self-sufficient or possess export surplus in most commodities. Nepal, Maldives, Iran, Bhutan and Afghanistan are facing deficits and rely on imports for most of the important commodities. Bangladesh and Sri Lanka show encouraging trends in commodities such as rice and tea.

**Figure 2.1: Ratios and growth rates of major commodities**

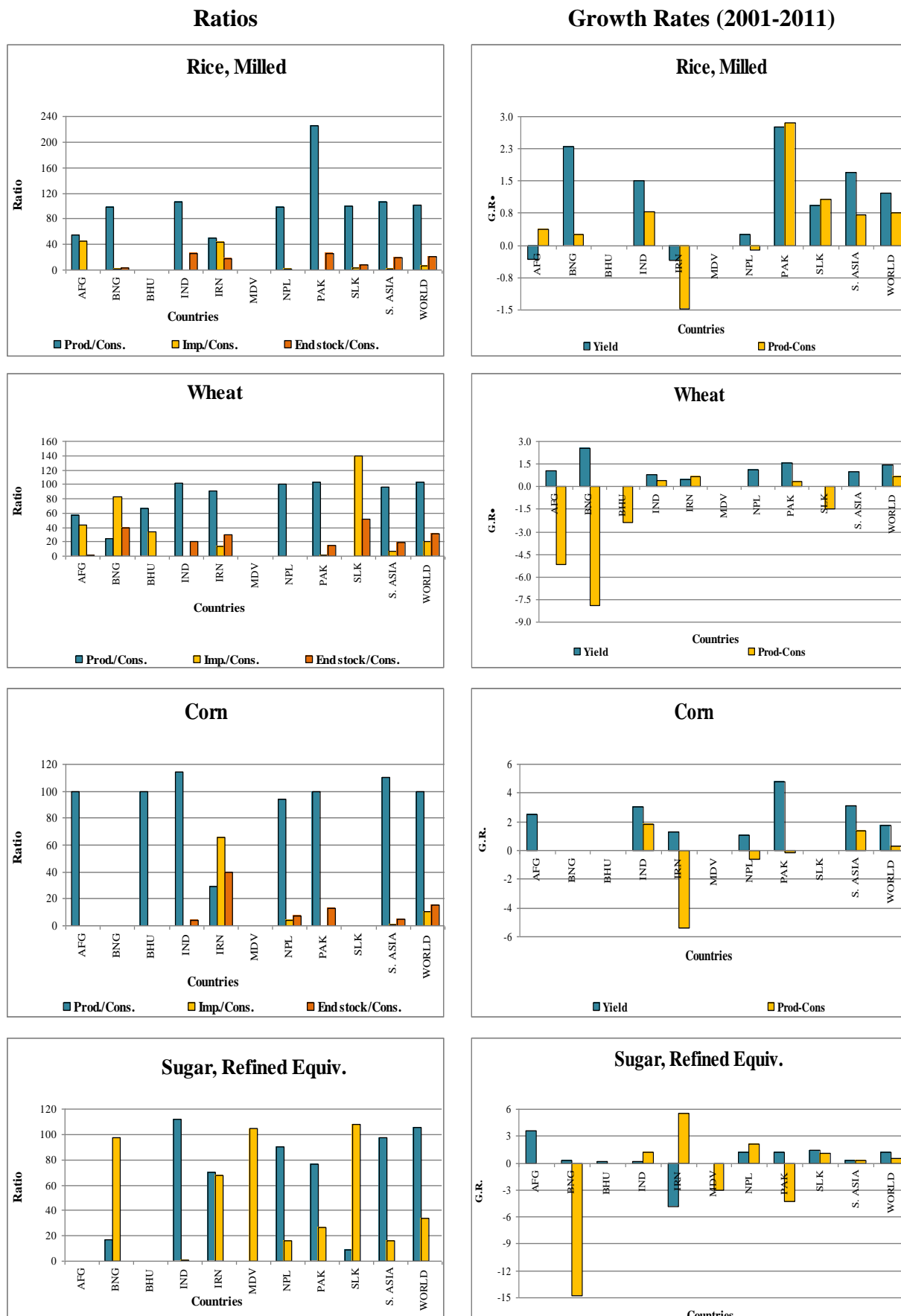
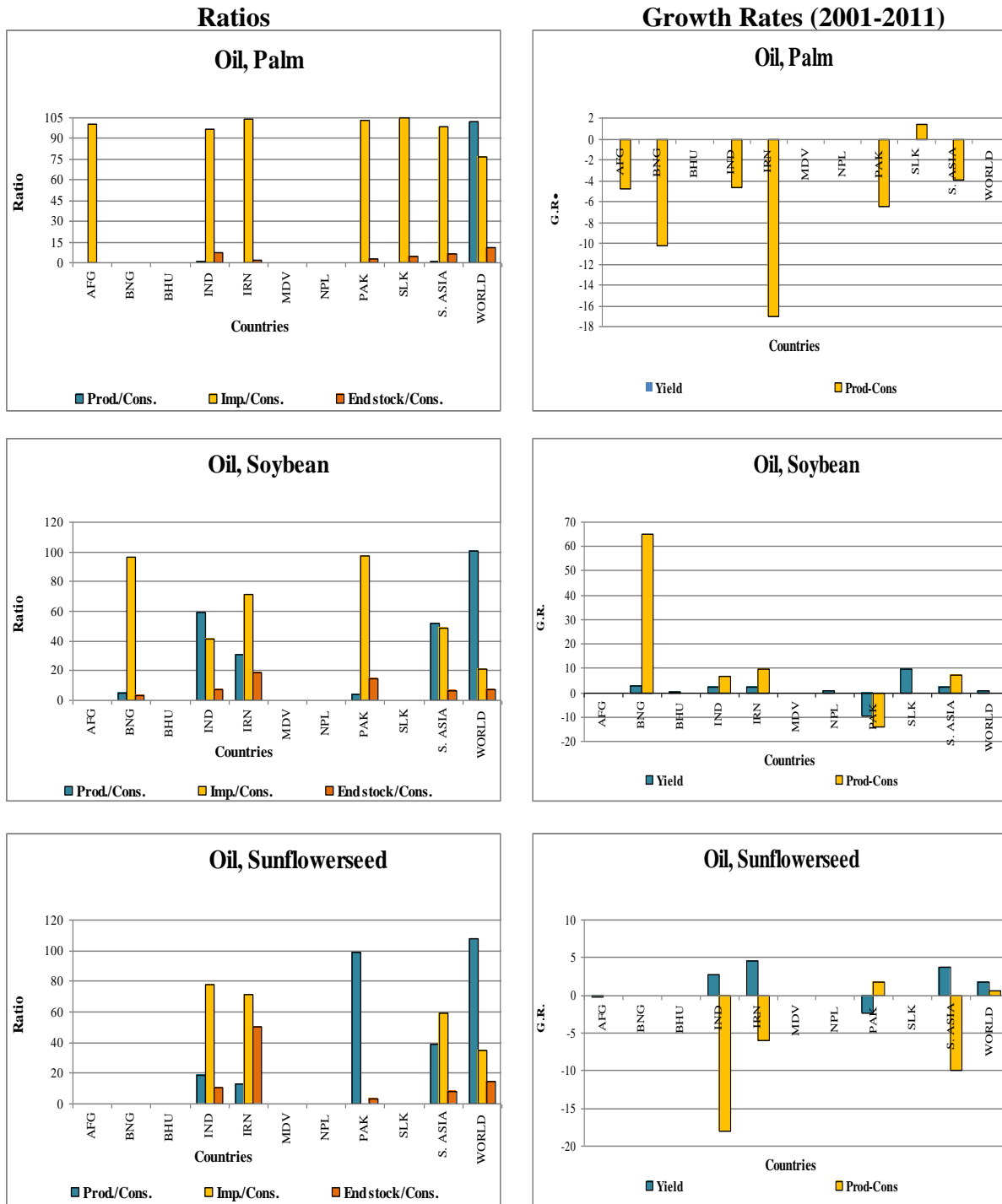


Figure 2.1: Ratios and growth rates of major commodities (cont....)



Data Sources: 1) FAOSTAT, (Food and Agricultural Organisation (FAO), Rome  
 2) Production, Supply and Distribution (PS&D) database of the Economic Research Service, United State Department of Agriculture (ERS-USDA).

### III. Agricultural Trade Policy and Trade Patterns in South Asian Countries

#### 3.1: Agricultural Trade Policy in South Asian Countries

The trade policy in South Asian countries is quite varied. We give an overview of the policy framework in these countries in this section.

**Afghanistan:** Heavily dependent on Pakistan, Iran and Kazhakastan for imports, mainly of wheat flour. Most of the trade is informal because of its porous border with Pakistan.

**Bangladesh:** In Bangladesh, the trade policy regime is significantly more liberal than it was two decades ago. However, there is still a relatively high level of protection in comparison with other countries. Although a significant number of quantitative restrictions have been dismantled and there has been a shift towards greater use of ad valorem tariffs, the average tariff has is still high at 32 percent.

Bangladesh's agricultural trade policy is often perceived as one of increasing openness to imports, but with significant anti-export bias. In reality however, trade policy has been actively used both on the side of imports for management of the staple grains and the side of exports in promotion of the exports of locally produced value added products. On the export side, the policy has been relatively consistent. On the import side, the focus is to minimize the potential negative impacts of trade on food security and as a result the interventions have been more ad-hoc in nature. In practice, both exportables and importables have therefore been subject to the use of instruments associated with trade promotion and trade restriction respectively.

Cereal trade faces relatively low tariffs in general, but supplementary duties are significantly used when cheaper imports flow in from major exporters like India. Bangladesh is a net importer of rice and wheat. After allowing private sector in 1993 to import foodgrains, private sector played a major role in the commercial imports of foodgrains, particularly after the floods in 1998 and 2004. Despite zero or very low import tariffs, Bangladesh has been facing problems in imports of rice and edible oils mainly because of the restrictions on exports by India and Argentina respectively. Cereal trade also faces export restrictions, for example with wheat where export bans are relatively longstanding, and rice where they have been temporarily used since 2007 to manage domestic prices in conjunction with the management of food reserves. The intervention in grains trade has increased significantly after the food rice crisis in 2008, reflecting a change from the strategy of self reliance that has been in place since the early 1990s to one of self sufficiency. Support to certain exportables also appears to have had positive effects in terms of improving producer incomes, in addition to their contribution to foreign exchange earnings.

**Bhutan:** Bhutan farmers have traditionally practised subsistence agriculture leading to self-sufficiency in food for a long time. However, with economic growth and population increases, imports are becoming a necessity. India is the main trading partner for Bhutan and is the main source of food imports. Bhutan imposes no tariffs or any other form of non-tariff restrictions on food imports from India. India also exempted Bhutan from rice export restrictions in 2008.

**India:** Since independence, India has virtually banned imports of all agricultural products except basic foodstuffs like cereals, pulses and vegetable oils. After the introduction of economic reforms in 1991-92, the import policy was gradually liberalised, but the restrictions on basic foodstuffs took longer to be phased out. Among the items that were restricted in the pre-reform era, edible oils (other than coconut oil) were the first to be liberalised in 1994. After

1994, edible oil imports were determined mainly by tariffs. It was not until March 2002 that restrictions were phased out on milk and milk products and on cereals.

In the early sixties, imports, mainly of wheat from the USA under the food aid programmes, constituted a big chunk of domestic supplies, accounting for as much as 42 per cent. After the government decision to go in for self-sufficiency, import dependence rapidly declined. Except in period 1974-76 and to some extent in 1983, when large imports were made, the contribution of imports to domestic availability was in no year more than three per cent. In the case of rice, import dependence was very low right from the outset. Imports, as a percentage of domestic availability were never in excess of three per cent even in the early Sixties, at the peak of India's import dependence for food grains. Since then imports have tapered off to negligible quantities. But reliance on imports has been a feature of India's edible oil economy. In the late seventies imports increased and remained in the range of 36-47 per cent during the period 1976-87. With the tightening of import restrictions in the following years import dependence came down to four per cent in 1993. After liberalisation in 1994, it rose steadily so as to exceed 50 per cent since 2000. This was despite the fact that in case of soybean oil there had been a substantial increase in domestic production.

**Maldives:** Maldives is highly dependent on food imports but is a major exporter of marine products, mainly to Thailand, UK, Sri Lanka, Japan, France and Pakistan.

**Nepal:** Nepal followed a protectionist, import substituting regime between 1956 and 1986, but the trade regime has since been much more liberal. Nepal is now a relatively more open economy in the South Asian region with low average tariff rates, ranging from 10-15 per cent and virtually no quantitative restrictions. The applied agricultural tariffs are way below the WTO bound rates. Nepal also does not provide any explicit export subsidies. The country is a net importer of cereals, particularly rice from India, through formal and informal channels.

The liberal trade policy regime adopted since the 1980's focused primarily on addressing the bias against exports, reducing distortions in domestic markets and procedural and institutional reforms. The 1992 trade policy continued the same thrust. However, the choice of policy instruments and pace of liberalization are constrained by both formal and informal trade relations with India. As a result, even the liberal trade policy could not produce the desired results in terms of agricultural development, export growth and diversification and poverty reduction. The recent policy thrust recognizes that export development is essential to sustained broad-based economic growth and poverty reduction in light of the small domestic market. Although the policy recognizes the need to establish increased linkages of the export sector with other sectors of the economy, it did not support explicitly the import competing sectors.

The following issues remain important for trade policy in Nepal - trade relations with India on agriculture products; the need for tariff rationalization for primary agriculture products vis-à-vis processed agriculture products and other industrial products; the need for support measures in agricultural products, in particular the products identified by the 2009 trade policy for thrust areas; the role of exchange rate regime in promoting agricultural exports; the role of international trade in ensuring food security.

**Pakistan:** Pakistan is one of the pioneering members of the WTO and is an active member of various groups and alliances. Pakistan has begun deregulation and liberalization of agriculture in the 1980s – mainly under the advice of the International Financial Institutions (IFI). Many non-tariff barriers have been removed and the list of negative import items has been greatly reduced. Pakistan has entered into Free Trade Agreements (FTA) with China, Malaysia and Sri Lanka. Pakistan is a party to two agreements for regional trade liberalization including the

South Asian Association for Regional Cooperation (SAARC) with India, Bangladesh, Sri Lanka, Bhutan, Nepal and the Maldives. Textiles dominate Pakistan's exports. Other major exports include rice, seafood and products. Major agricultural imports include edible oils, cotton, sugar, pulses, tea, milk and milk products, and dry fruits.

**Sri Lanka:** Sri Lanka has two distinct agricultural sub-sectors: i) a traditional export crop sector dominated by tea but also including rubber, coconut, spices, and more recently some non-traditional products like fruits and vegetables ii) an import-competing food sector dominated by rice but including many other crops, livestock and dairy products. Trade and price policy regimes have been historically very different for the two sub-sectors, which continue to this day.

The taxation of traditional exports has fallen from over 40 percent during the 1960s and 70s to about 20 percent in the 1980s and 1990s (Bandara and Jayasuriya 2009). In contrast, importables generally enjoyed positive protection, ranging at modest levels for rice to high levels for products like chillies, onions and potatoes, but also for some other food products in recent years. The trade and pricing policies are aimed at protecting farmers, containing retail prices and encouraging value addition. The use of one instrument (mainly price) for such varied objectives affects different stakeholders in different ways.

Wheat flour, sugar and pulses are the major imports followed by milk, fruits, onions and potatoes. Despite few measures to liberalize agricultural trade, the sector remains highly protected. The bound tariff rates on agricultural products are in the range of 100-300 per cent although the applied tariffs are much lower. There are also quantitative restrictions (QR) and other non-tariff barriers for some agricultural products.

The trade policy regime for rice has been guided principally by considerations of domestic market price, raising tariffs when prices are lower and waiving duties during shortages. Sri Lanka is a relatively high-cost rice producer in Asia and so the rice sector would face stiff competition from lower-priced imports if trade is fully liberalized. Price stability – especially avoiding the extremes of low and high prices – will remain the primary goal and this implies that trade policy will continue to be used for price stabilization as in the recent years.

Wheat flour is considered an essential commodity in Sri Lanka and is second important staple after rice. There is no domestic production of wheat in the country and all the consumption requirements are fully met through imports. Trade and pricing policies on wheat, apart from implications for wheat consumption, also have important implications for rice (Dayaratna-Banda et al. 2008). Particularly, the reductions in wheat tariffs have been found to have suppressing effects on the farm gate prices of rice. It is largely for this impact on rice that wheat policy becomes important in Sri Lanka. This close cross-price effect was also observed in 2000 when the government introduced consumption subsidy in the form of reduced price of wheat flour. Because of the effect, the subsidy was quickly withdrawn in 2001. The government's long term objective is to reduce the consumption of wheat to be replaced by domestic rice. According to some reports the wheat imports have fallen significantly, from around 120000 tonnes a month about five years ago to around 80 000 tonnes per month in recent months (FAO, 2011). National food security experts have welcomed this. The Government of Sri Lanka (GoSL) continues to intervene actively on a range of food products with a variety of trade and pricing policies.



### 3.2: Agricultural Trade Engagement of Countries within the South Asian Region

In this section, the trade engagement of a country with other South Asian neighbours is assessed. The top ten exports and imports of each country are identified and the share of South Asian countries in the total exports and imports is computed. The results are as follows (Table 3.1 and Table 3.2).

It can be seen from Table 3.1 that Nepal, Sri Lanka, Pakistan and Bangladesh source their imports from their South Asian neighbours whereas on the side of exports, it is again Nepal, Pakistan and Bangladesh that export most to the countries in the region. India's engagement, in terms of percentage share of other South Asian countries, is low although in absolute terms it could be much higher than other countries. It needs to be noted that India is the major trading partner for almost all the countries on the import side and for most of the countries on the export side.

In **India**, the share of imports from other countries in South Asia is very low. However, the share of exports to South Asia is high in dry onions (58%), cotton (24%), maize (21%), rice (19%), soybean cake (16%) and tea (14%). In **Pakistan**, the share of imports from South Asia is high in onions (100% - India 73%, Afghanistan 24%, Iran 3%), soybean cake (99% - India), chick peas (31% - India 23%, Iran 7%), cotton lint (28% - India 26%) and tea (12% - India 5%, Bangladesh 4%, Sri Lanka %). The share of exports to South Asia is high in hydrogenated oil (99% - Afghanistan), potatoes (97% - Sri Lanka 37%, Iran 33%, Afghanistan 27%), wheat (89% - Afghanistan 34%, India 33%, Bangladesh 19%), dates (88% - India 86%), cotton lint (40% - Bangladesh 36%, India 5%), rice broken (36% - Afghanistan 25%, Iran 8%) and rice milled (17% - Iran 10%, Afghanistan 5%). In **Bangladesh**, the share of imports from South Asia is high in soybean cake (99%-India), dry onions (100%-India), maize (73%-India), lentils (38%-India), cotton (21% - India and Pakistan). The share of exports to South Asia is high in tea (82% - Iran 71%, Afghanistan 11%), nuts (76% - India), jute (61% - Pakistan 36%, India 25%), cotton waste (17% - India).

In **Sri Lanka**, the share of imports from South Asia is high in onions (100% - India 94%, Pakistan 6%), chillies and peppers (97% - India 96%), soybean cake (84% - India), sugar refined (32% - India), fatty acids (30% - India) and lentils (16% - India 11%, Nepal 5%). The share of exports to South Asia is high in food wastes (100% - India 97%) and nut dry (36%-India 18%, Pakistan 17%). In **Nepal**, the share of imports from South Asia is high in soybean cake (100% - India), jute (100% - India), tobacco unmanufactured (100% - India), rice milled (81% - India), food prep nes (40% - India), rapeseed (29% - India) and fatty acids (17% - India). The share of exports to South Asia is high in ginger (100% - India), nutmeg, mace and cardamoms (100% - India), nuts (100% - India), orange juice (100% - India), food prep nes (99% - India), fruit juice nes (100% - India), wheat (96% - Bangladesh), tea (95% - India), macaroni (74% - India 70%, Bhutan 4%) and lentils (65% - Bangladesh). In **Maldives**, the share of imports from South Asia is high in rice milled (89% - India 65%, Pakistan 20%, Sri Lanka 4%), wheat flour (56% - India 45%, Sri Lanka 11%) and chocolate prsnes (55% - Sri Lanka 47%, India 7%). In **Iran**, the share of imports from South Asia is high in tea (86% - Sri Lanka 57%, India 29%) and rice milled (38% - Pakistan). The share of exports to South Asia is high in apple juice (74% - Afghanistan), fruit juice (24% - Afghanistan), dates (20% - Pakistan 13%, India 4%, Afghanistan 3%) and soybean oil (15% - Afghanistan).

**Table 3.1: Exports and Imports in South Asian Region**

Exports and Imports in South Asian Region										
Country	Imports				Exports				Major Trading Partners	
	No of Products with share (out of top 10 products)				No of Products with share(out of top 10 products)				Imports	Exports
	<25%	25%-50%	50%-75%	>75%	<25%	25%-50%	50%-75%	>75%		
BANGLADESH	6	1	1	2	7		1	2	India	India
INDIA	10				9		1			Bangladesh, Pakistan, Iran
IRAN	8	1		1	9		1		-	Afghanistan
MALDIVES	7		2	1						
NEPAL	4	2		4			2	8	India	India
PAKISTAN	6	2		2	4	2		4	India, Iran	Afghanistan, Iran
SRI LANKA	5	2		3	8	1		1	India	India

Sources: Author's calculations based on data from FAOSTAT, (Food and Agricultural Organisation (FAO), Rome

**Summary of the section:** Having assessed the existing and potential surpluses and deficits in the previous section, the agricultural trade policy and scope for intra-regional trade is analyzed in this section. The share of other South Asian countries in the top ten export/import commodities for each country has been analyzed. The results show that Pakistan, Nepal and Bangladesh export the most to other South Asian countries. On the side of imports also, these three countries alongwith Sri Lanka source their imports from within the region. India's engagement, in terms of other countries' share in India's imports or exports, appears very low as compared to Pakistan, Nepal, Bangladesh or Sri Lanka.

## IV. Domestic Market Integration in the Countries of South Asia

The issue of agricultural market integration is central to many contemporary debates on trade liberalization and price policy in the developing countries. One of the main arguments against agricultural trade liberalization is that the markets in these countries are not sufficiently integrated. Although there have been advances in the methodology of market integration analysis, majority of the earlier studies in the developing countries have used less-advanced methods like the bivariate correlation coefficients or methods that remove the common integrating factor from the analysis such as cointegration. The present exercise attempts to address this shortcoming by using a methodology that retains the common integrating factor (if any) and analyzes the extent (number of markets integrated) of integration among major markets for most of the important commodities in a country. The main objective of the study is to assess the *potential* role of market in mitigating adverse effects of supply shocks in the South Asian countries.

At the conceptual level, there are essentially two strands of thought in market integration literature. In the first, mainly in the macroeconomics and international economics literature, market integration implies tradability i.e. transfer of excess demand from one market to another through actual or potential physical flows. Positive trade flows are sufficient to demonstrate that markets are integrated and prices need not equilibrate across markets. It is clear that this concept implies a Pareto inefficient distribution (Barrett 2001). For this reason, we have adopted the Enke-Samuelson-Takayama-Judge (ESTJ) spatial equilibrium model (Enke 1951; Samuelson 1952; Takayama and Judge 1971) as the theoretical framework in this exercise. In this framework, the dispersion of price in two locations for an otherwise identical good is bound from the above by cost of arbitrage when trade is unrestricted and, from below when trade quotas exist.

We have used the Gonzalo-Granger (G-G) model to econometrically assess the extent of market integration. The technical details of the method are provided in the appendix at the end. To follow the analysis and discussion of the results, understanding the technical details is not necessary. In this model, a market is said to be integrated if there exists a *single common factor* (single linear combination of a subset of prices). This implies that if  $n$  markets are integrated there are  $n-1$  cointegrating vectors. The empirical estimation of the model is also relatively simple. We can estimate the standard VECM model and then use those estimates to determine the number of common factors and also identify the specific markets influencing price formation (Gonzalez and Helfand 2001; Gonzalo-Granger 1995). For details see Gonzalo-Granger 1995, Gonzalez-Helfand 2001 or Sekhar 2012). Standard VECM model of prices for each commodity has been estimated after controlling for general movements in prices and seasonality of agricultural prices.

We have used the following vector error-correction (VECM) model for each commodity -

$$\Delta p_t = \gamma \alpha' p_{t-1} + \sum_{i=1}^{\infty} \Gamma_i \Delta p_{t-i} + WPI_t + MD_t + \varepsilon_t$$

where  $\Delta = I - L$  with  $L$  being the lag operator and  $p_t$  is a vector of prices at  $n$  markets (of order  $n \times 1$ ).  $\alpha =$  cointegrating vectors,  $\gamma =$  Weights (speed of adjustment) of the cointegrating equations,  $\Gamma_i$  is the vector of short-run coefficients and  $\varepsilon$  is the error term. We have also included two exogenous variables i.e. wholesale (or retail) price index ( $WPI_t$ ) of the commodity and monthly dummies ( $MD_t$ ) to control for the general price movements in the commodity and seasonal fluctuations in market prices respectively. All the variables are tested for order of integration and found to be  $I(1)$ .

We start with an appropriately large number ( $n_1$ ) markets out of a total number of  $n$  markets such that  $n_1 < n$ . We then test for the number of cointegrating vectors in this set of markets. If the number of cointegrating vectors is  $n_1 - 1$ , then we add one more market to the set and again test for the number of cointegrating vectors. If the number of cointegrating vectors is still  $n_1 - 1$  (instead of  $n_1$ ) then we drop the newly included market and try another market. This process is continued till we have the largest set (say  $n_2$ ) of integrated markets. If all the  $n$  markets are integrated, then  $n_2 = n$ .

Starting with different sets of markets will provide different answers to the question as to how many markets are integrated. We start with a set of  $n_1$  important markets in each country based on data availability. Obviously this leads to some degree of arbitrariness. To address the potential problems with this initial selection, we have experimented with different orders. The results (the no of cointegrating vectors) have remained largely invariant to the order of initial selection. However, the econometric problems with such sequential selection are one potential area for future research.

The results of market integration are presented in tables 4.1 (retail prices) and 4.2 (wholesale prices). The results show that many commodity markets within each country are not adequately integrated. In particular, integration of domestic wheat and rice markets are of concern. Domestic market integration is a necessary pre-condition for border reforms. Across countries, retail rice markets are better-integrated as compared to wheat and wheat flour markets.

**Table 4.1: DOMESTIC MARKET INTEGRATION IN SOUTH ASIA**  
(Retail Prices)

Country	Crops	Total number of Markets	Number of integrated markets	Number of non-integrated markets
Afghanistan	Bread	4	3	1
	Wheat flour	4	4	0
	Wheat	4	2	2
Bangladesh	Rice	2	2	0
	Wheat	2	0	2
India	Chickpea	4	4	0
	Onions	3	3	0
	Rice	4	2	2
	Sugar	4	4	0
	Wheat	4	3	1
Pakistan	Rice, basmati	5	3	2
	Rice, irrigated	5	3	2
	Wheat flour	5	2	3
	Wheat	4	2	2
	Flour + wheat	9	7	2
Sri Lanka	Rice and wheat	2	2	0

Sources: Author's analysis

**Table 4.2: DOMESTIC MARKET INTEGRATION IN SOUTH ASIA**  
(Wholesale Prices)

Country	Crops	Total number of Markets	Number of integrated markets	Number of non-integrated markets
Bangladesh	Rice	2	2	0
	Wheat	2	2	0
India	Rice	4	2	2
	Wheat	4	4	0
	Sugar	4	4	0

Sources: Author's analysis

## V. ECONOMIC ACCESS, CONSUMPTION AND ABSORPTION

Food security essentially has four components – availability, stability, access and absorption. We have discussed the aspects related to the first two components i.e. availability and stability in section 2. Here we discuss the general scenario as regards economic access (income levels, poverty etc) and absorption capacity of food in the South Asian countries.

**5.1 Poverty:** Although physical availability of food is ensured at the national level, this may not directly translate into households' economic access to food. Economic access is determined by the level of income of a household. Therefore, it is imperative to look at the poverty trends to understand the extent of economic access (Table 5.1). The poverty headcount ratio (percentage of population below the national official poverty line), as per the latest survey<sup>1</sup>, is very high in Bangladesh (44%), Afghanistan (36%) and Nepal (31%). These countries are followed by India (27%), Bhutan (23%), Pakistan (22%) and Sri Lanka (15%). Pakistan has relatively lower level of poverty and the growth rate of decline poverty is also the highest (-10% per annum). Bhutan (-8%), and Sri Lanka (-8%) also show relatively faster decline in poverty as compared to Bangladesh (-4%) and Nepal (-4%). One worrying trend is that the largest country in the region India showed the lowest level of decline in poverty – only about 2% per annum between 1994 and 2005.

**5.2 Dietary Patterns and Consumption:** During the last two decades (1990-92 to 2006-08), the food availability in all the south Asian countries except Bangladesh, has grown at almost the same rate as that population (Table 5.2). As a result, the food availability per capita has remained almost stagnant, growth rate ranging from 0.2% to 0.5%. This indicates that none of the countries possesses adequate export surpluses to meet the region's requirements. The prevalence of undernourishment in total population (%) in South Asia is very high in 2006-2008 (20%) as compared to the world average of 13% (Table 5.3). South Asia is only marginally better than Sub-Saharan Africa, where 27% of the population is undernourished. Two important countries in the region – Pakistan and Bangladesh show relatively higher prevalence of undernourishment. In these two countries more than a quarter of the population is undernourished. However, Bangladesh is showing rapid decline in the undernourishment levels from 38% in 1990-92 to 26% in 2006-08, an annual decline of -2%. But no such improvement is visible in Pakistan where the undernourishment is almost stagnant at 25% during the same period.

Table 5.4 shows that the consumption of energy, protein and fat in South Asia is way below the world average and only marginally higher than Sub-Saharan Africa (Table 5.4 & Table 5.5). More worrying is the fact that the growth rate of increase in consumption is much lower compared to Sub-Saharan Africa for calories and proteins, showing that it is possible for South Asian consumption to fall below that of Sub-Saharan Africa in the near future. In the region, Bangladesh and Sri Lanka have shown impressive growth rates in increasing the consumption above the minimum requirements. The two major countries of the region – India and Pakistan show a very sluggish growth in energy consumption. In protein consumption also, these major countries show very sluggish, almost stagnant growth while Bangladesh and Sri Lanka show better growth rates.

Turning to sources of nutrients (Table 5.6), in almost all the major countries, 50 per cent or more of the dietary energy is drawn from cereals (excluding beer). This shows that cereal production is crucial to meet the region's dietary requirement. Similarly the major source of

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<sup>1</sup> The year of last survey is different in different countries – 2004 in Nepal; 2005 in Bangladesh, India; 2006 in Pakistan; 2007 in Bhutan and Sri Lanka and 2008 in Afghanistan;

protein in majority of the countries is pulses. But when we look closely at the food consumption patterns in these countries, the cereal consumption per capita per day (gms/person/day) has either remained stagnant or declined in all the countries, except Sri Lanka (Table 5.7). This is indeed serious for the calorie adequacy of the relatively poor populations of the region. Similar is the situation with pulses with consumption either remaining stagnant or declining, except in Nepal and Sri Lanka (Table 5.7).

**5.3 Absorption:** Equally important as consumption, is the capacity to absorb the food consumed. The absorption capacity of the food depends crucially on the health status of the population. Therefore, in this section, we focus on the basic indicators of health in the South Asian countries.

The life expectancy at birth in 2009 is very low in Afghanistan (44 years) and quite high in Sri Lanka (74 years) and, Iran and Maldives (72 years). All other countries are in the range of 64 to 67 years (Table 5.8). The growth rate of life expectancy is also the lowest in Afghanistan (0.4%) per annum. Such poor state of life expectancy in Afghanistan could be due to the long-drawn disruption of political and social structures in the country due to the war spanning almost three decades.

The infant mortality rate per 1000 live births (IMR) in the year 2009 is highest (134) in Afghanistan and lowest in Sri Lanka (13) and Maldives (11). Two large countries in the region – India and Pakistan have large IMR of about 50 and 71 respectively reflecting the poor health status in the region (Table 5.9). Even the rate of decline of IMR is quite low in these countries – 3% and 2% per annum respectively. As compared to this, Maldives (-10%), Bhutan and Nepal (-5% each) and Iran (-4%) have shown impressive decline in IMR. Understandably, Afghanistan shows the lowest rate of decline in the region – about 1%.

Child mortality rate per 1000 live births (CMR) also shows almost similar pattern (Table 5.9). Afghanistan shows the highest CMR and lowest rate of decline (-1%). Maldives (-11%), Nepal (-6%), Bangladesh (-5%) and Iran (-4%) are the countries showing good improvement, as in the case of IMR. Again the two large countries – India and Pakistan show relatively high CMR (66 and 87 respectively) and also much slower rate of decline of the same (-3% and -2% respectively).

**Summary of the section:** The per capita food availability is almost stagnant in all the countries of the region, with the exception of Bangladesh. The food production has just kept pace with the population growth. The levels of undernourishment in the region are way above the world average levels and marginally better than the Sub-Saharan Africa. Also, consumption of energy, protein and fat in the region is way below the world average and only marginally higher than Sub-Saharan Africa. The growth rate of increase in consumption is much lower compared to Sub-Saharan Africa for calories and proteins, indicating that it is possible for South Asian consumption to fall below that of Sub-Saharan Africa in the near future. All the health indicators - IMR, CMR and life expectancy and their rate of improvement are very poor in Afghanistan. India and Pakistan – two of the region's major countries have also shown poor performance as regards health indicators. Sri Lanka, Bangladesh, Maldives and Iran have in general performed better in terms of health indicators. As regards poverty, one worrying feature is that the rate of decline in India is relatively much slower compared to other countries in the region.

## **VI. Scope for Regional Cooperation and Integration**

Alleviation of poverty and attaining food security are important policy objectives of all the countries in the region. The paths followed in achieving these objectives are also broadly similar across countries, making it possible to identify areas of possible collaboration. The geographical proximity can also be a facilitating factor in such coordination. The promising areas of collaborative action, from the point of food security, are the following:

- 1) Collaborative agricultural research particularly on cereals, pulses and edible oilseeds
- 2) Coordination in devising pricing and trade policies to reap benefits of gains from trade
- 3) Establishing common physical reserves for emergency relief and virtual reserves to ward off speculative attacks in commodity markets.
- 4) Coordination and collaboration on improving health outcomes – IMR, CMR and undernourishment. Learning from success stories from other countries
- 5) Instituting *Early Warning Systems* on natural calamities.
- 6) Judicious use of river waters.

### **Collaborative agricultural research**

Our results show that the region does not possess adequate surplus particularly in wheat, edible oils and pulses. The production and productivity trends in the medium term (2001-2011) are not encouraging vis-à-vis consumption. Therefore, it is extremely important for these countries to rapidly increase domestic production. As the scope for area increases is limited (Figure 1.2a), the production increases have to come through improvements in yield. The countries' research systems need to collaborate to develop appropriate technology for the region. The National Agricultural Research Systems (NARS) in some of these countries, such as India, Pakistan and Sri Lanka are fairly well developed. The cropping patterns in these countries are dominated by rice and wheat for which generic research would be useful. The contiguous regions on two sides of the border between India, Pakistan and Bangladesh have similar agro-climatic-ecological conditions and collaborative efforts on crops and practices appropriate for these regions can benefit all the countries. Also, some of the countries in the region, such as India, have made significant advances in biotechnology, tissue culture, plant genetics etc. Other countries in the region can benefit from these advances.

### **Coordination in price and trade policies**

Our results show that domestic market integration is low in most of the countries, particularly in rice and wheat markets. There is a need to liberalize the domestic trade policy framework and improve transport infrastructure to ensure better integration of domestic markets in each country, which is a prerequisite for external (border) liberalization. Also, major countries like India, whose trade engagement with other South Asian neighbours is low at present, need to engage in more agricultural trade within the region. The borders between India, Bangladesh and Nepal are porous and therefore any effort to isolate the agricultural economies of these countries will only lead to distortions. These countries cannot pursue input or output price policies disregarding their implications across borders. A mechanism for regular consultation on price policies may need to be devised. As for trade policy, these countries can mutually benefit by promoting preferential trade.

## **Establishing a common buffer stock**

Research has shown that stocks have a crucial bearing on prices in the short run (Johnson 1975, Sekhar 2008). Efforts were made to evolve a regional reserve in South Asia for two staple cereals to withstand sharp spikes in world prices. In pursuance of the decision taken in the 14th SAARC Summit held in New Delhi in 2007, SAARC countries have established a SAARC Food Bank. The Food Bank will supplement national efforts to provide food security to the people of the region. As per this agreement, SAARC Food Bank shall have a reserve of foodgrains to be maintained by each member state consisting of either wheat or rice, or a combination of both as assessed share of the country. Initially the stocks held under the Food Bank were 243000 tons. India has been making the highest contribution to the food bank with 153200 tons (62% of the total reserve) whereas Pakistan and Bangladesh are contributing 40,000 tons each (17% each). Nepal and Sri Lanka contribute 4,000 tons each (2%), followed by Afghanistan with 1,420 tons (0.6%), Bhutan and the Maldives with 180 tons each (less than 0.1%). Keeping in view the rising population and threat of natural disasters, SAARC countries have agreed to double the food reserve in SAARC Food Bank. The third meeting of the SAARC Food Board decided to increase existing stock of 243,000 tons to 486,000 tons across the SAARC region. India's share of quantum of reserves has correspondingly been doubled from the existing 1,53,200 to 3,06,400 MTs

However, it needs to be noted here that despite several attempts in different parts of the world to institute regional food security programmes, only few have been successful. The ASEAN Emergency Food Reserves arrangement is relatively successful but this success can be ascribed to two important conditions: increasing political cohesion and economic coordination among the member countries; and much greater complementarity in the food economy of ASEAN. There is a major food surplus country (Thailand) and a major food importing country (Malaysia). These conditions provide a strong ground for regional cooperation (Vyas, 1990). In South Asia both these conditions are more or less absent. In the absence of any country with adequate food surpluses in the region, such an arrangement may be difficult to sustain. A second problem is the paucity of resources for grains procurement and storage. Notwithstanding these obstacles, attempts need to be made to develop regional reserves. There is increasing evidence that speculative attacks were also partly responsible for the food crisis witnessed in 2008. To avert such attacks, South Asia may also evolve a mechanism of information sharing on market situation and also a small fund to serve as virtual reserves to avert such attacks (IFPRI, 2008)

## **Collaboration in Improving Health Status**

As our foregoing analysis has shown, the health and food consumption indicators in the South Asian region are way below the world average and are only marginally better than the Sub-Saharan Africa region. There is an urgent need to improve these outcomes. Even within the region, there is a lot of heterogeneity with countries like Sri Lanka, Bangladesh and Maldives showing much faster improvement than other large countries like India and Pakistan. A collaborative effort is needed to improve the health status, which alongwith its intrinsic importance, is also important for better absorption of the food consumed. India and Pakistan may benefit by exploring the possibility of replicating some of the successful practices followed in countries like Sri Lanka and Bangladesh.



### **Early warning systems**

South Asia is a disaster-prone region. Large parts of the region are subject to floods and droughts. Deforestation, leading to soil and water erosion, has further aggravated the impact of natural disasters. An early warning system, developed and managed through regional cooperation, will go a long way in coping with the disasters.

### **River water utilization**

Efficient and sustainable use of natural resources is of paramount importance in this resource-poor region. Proper and judicious use of river waters is the most important in this context. Major rivers in the region flow across national borders. The countries in the region – whether located at the headreach or tailend of the river, should be able to make the best use of these waters, which is possible only if the countries can work collaboratively on this important issue. There are some encouraging examples, such as, the Indo-Pak treaty on the Sindh river system and agreement on use of Ganga waters at Farraka, which can be emulated. There should be regular consultation and exchange of information among the water regulatory bodies of different countries.

## VII. Summary and Conclusions

The economies of the region are predominantly driven by agriculture. The performance of agriculture vis-à-vis rest of the economy is quite poor in the last decade. The growth rate of per worker value added in agriculture is much lower in the last decade as compared to the previous decade in most of the countries, whereas the growth rate of per capita GDP is much higher in the last decade than the decade before. The prospects for increasing agricultural production through area expansion also look bleak in these countries. The percentage of area under cultivation is almost stagnant during the last two decades showing lack of scope for area expansion. The declining investment in agriculture, particularly the public investment, is reflected in almost stagnant percentage of area under irrigation.

The analysis of the present and potential supply-demand deficits, trade scenario in the region and domestic market integration of important commodities shows the following results. Presently export surplus exists in the region only for rice and to a limited extent for sugar. In wheat, corn, edible oils (except soybean oil) and pulses most of the countries in the region are facing deficits and very few countries in the region show export surplus – present or potential. India and Pakistan are either just self-sufficient or possess slight export surplus in most commodities. Nepal, Maldives, Iran, Bhutan and Afghanistan are facing deficits and rely on imports for most of the important commodities. Bangladesh and Sri Lanka show encouraging trends in commodities such as rice and tea. Pakistan, Nepal and Bangladesh export the most to other South Asian countries. On the side of imports also, these three countries alongwith Sri Lanka source their imports from within the region. India's engagement, in terms of other countries' share in India's imports or exports, appears very low as compared to Pakistan, Nepal, Bangladesh or Sri Lanka. Results of market integration show that integration of important cereal markets – rice and wheat is a cause for concern in most of the countries. Relatively, the rice markets (retail) are better-integrated as compared to wheat markets.

The per capita food availability is almost stagnant in the region as the growth rate of food production is just equal to that of the population growth. The levels of undernourishment are much higher and the consumption of calories, protein and fat in the region are much lower than the world average and only marginally better than the Sub-Saharan Africa. The growth rate of consumption is much below compared to Sub-Saharan Africa for calories and proteins, which is a cause for concern. India and Pakistan have shown poor performance in reducing infant mortality rate (IMR), child mortality rate (CMR) and increasing life expectancy, which is a cause for concern. Sri Lanka, Bangladesh, Maldives and Iran have in general performed better in terms of health indicators. As regards poverty, one worrying feature is that the rate of decline in India is relatively much slower compared to other countries in the region.

Given the current & potential supply-demand scenario of food commodities, extent of market integration, levels of poverty and health status in the countries of the region, the following are the potential areas of collaboration in the region from the point of food security.

- 1) Collaborative agricultural research particularly on cereals, pulses and edible oilseeds to increase production in the region

- 2) Coordination in devising pricing and trade policies to reap benefits of gains from trade. Collaboration on improving transport and other infrastructure to enhance domestic market integration
- 3) Further cooperation and constant consultation on common physical reserves for emergency relief and virtual reserves to ward off speculative attacks in commodity markets.
- 4) Coordination and collaboration on improving health outcomes – IMR, CMR and undernourishment. Learning from success stories from other countries
- 5) Instituting *Early Warning Systems* on natural calamities.
- 6) Judicious use of river waters.

# **TABLES**

## SECTION 2

**Table 2.1: Agriculture Supply-demand deficits**

Rice, Milled:						
Country	Period	Ratios			Instability	
		Impo/Cons	Prod/Cons	End st/Cons	PROD	YIELD
Afghanistan	1988-90		100		18.4	15.7
	1998-00	37	63		18.1	15.5
	2009-11	44.6	55.4			
Bangladesh	1988-90	0.9	99.1	3.2	4.8	4.2
	1998-00	5.1	96.4	4.1	4.8	4.1
	2009-11	2.2	98.1	3.5		
India	1988-90	0.3	104	19.3	10.1	6.9
	1998-00	0.04	108.7	22.8	10	6.8
	2009-11		106.2	25.3		
Iran	1988-90	39.3	57.6	19.3	14.8	9.2
	1998-00	37.5	55.2	85.1	14.6	9
	2009-11	44.1	50.7	17.9		
Nepal	1988-90	0.04	100		13.3	10.5
	1998-00	0.5	99.5		13.1	10.3
	2009-11	1.6	98.4			
Pakistan	1988-90		150.2	57.6	12.5	5.9
	1998-00		187.8	23.3	12.3	5.8
	2009-11	0.8	224.7	25.7		
Sri Lanka	1988-90	12.1	88.7	14.4	11.4	6.1
	1998-00	6.5	94.6	16.7	11.2	6
	2009-11	3.1	100.4	8.4		
South Asia	1988-90	0.6	103.8	16.6	7.3	5
	1998-00	1.3	107.3	18.2	7.2	4.9
	2009-11	0.9	106.1	18.8		
World	1988-90	3.3	102.6	35.8	2.4	1.6
	1998-00	5.7	102	35.9	2.4	1.5
	2009-11	6.7	101.2	21.7		

Wheat:						
Country	Period	Ratios			Instability	
		Impo/Cons	Prod/Cons	End st/Cons	PROD	YIELD
Afghanistan	1988-90	0.2	99.8		26.5	20.6
	1998-00	12.4	87.6		26.1	20.3
	2009-11	42.9	57.5	1.2		
Bangladesh	1988-90	61.8	37.6	18.3	17.2	11.9
	1998-00	48.9	54	13.8	16.9	11.7
	2009-11	82.2	24	39		
Bhutan	1988-90		100		19.9	9.7
	1998-00		100		19.6	9.5
	2009-11	33.3	66.7			
India	1988-90	1.5	100.3	8.1	6.9	5.3
	1998-00	2	107.1	22.3	6.8	5.2
	2009-11	0.2	102.2	20.6		
Iran	1988-90	37.3	64.1	28	20.4	13
	1998-00	35.1	63.5	28.9	20.1	12.8
	2009-11	13.8	90.3	30.5		
Nepal	1988-90	0.4	99.6		7.5	5.5
	1998-00	1.2	98.8		7.4	5.4
	2009-11	0.3	99.7			
Pakistan	1988-90	11.1	89.5	19.6	8.5	7.9
	1998-00	8.5	92.6	17.1	8.3	7.8
	2009-11	0.7	103.3	14.6		
Sri Lanka	1988-90	104.3		20.3		
	1998-00	100.1		11.6		
	2009-11	140		51.3		
South Asia	1988-90	6.7	94.7	10.8	5.8	4.6
	1998-00	6.2	100.5	19.9	5.7	4.6
	2009-11	6.4	96.6	19		
World	1988-90	18.8	101.5	27.9	5.2	3.8
	1998-00	17.7	101.1	36.1	5.1	3.8
	2009-11	20.3	102.6	30.9		

Corn:						
Country	Period	Ratios			Instability	
		Impo/Cons	Prod/Cons	End st/Cons	PROD	YIELD
Afghanistan	1988-90		100		29.5	33.3
	1998-00		100		29.1	32.8
	2009-11		100			
Bhutan	1988-90		100		40.7	9.1
	1998-00	4.3	95.7		40	9
	2009-11		100			
India	1988-90	0.7	99.8	3.7	15	12.6
	1998-00	1.4	100.2	5.1	14.7	12.4
	2009-11	0.1	114	3.7		
Iran	1988-90	93.8	7	2.8	61.2	30
	1998-00	56.3	48.7	37.3	60.2	29.5
	2009-11	65.9	29.4	39.9		
Nepal	1988-90		100		6.4	5.2
	1998-00		100		6.3	5.1
	2009-11	4.3	94.4	7.6		
Pakistan	1988-90		100		8.2	6.9
	1998-00	0.02	99.2	18.6	8	6.8
	2009-11	0.3	100	12.9		
South Asia	1988-90	0.6	99.9	2.8	11.3	9.5
	1998-00	1.1	100.1	6	11.1	9.4
	2009-11	0.5	110.3	5.2		
World	1988-90	14.2	96	30	9.5	7.5
	1998-00	11.9	100.9	31.3	9.3	7.4
	2009-11	10.9	99.5	15.7		

Sugar, Refined Equiv:						
Country	Period	Ratios			Instability	
		Impo/Cons	Prod/Cons	End st/Cons	PROD	YIELD
Bangladesh	1988-90	43.6	56			
	1998-00	60.9	50.9			
	2009-11*	97.8	17.3			
India	1988-90	0.5	99.7		20.1	
	1998-00	4.1	96.6		19.7	
	2009-11*	1.2	111.9			
Iran	1988-90	41.8	45.4		13.3	
	1998-00	59.9	50.3		13	
	2009-11*	67.5	69.7			
Maldivs	1988-90	89.2				
	1998-00	83.7				
	2009-11*	104.4				
Nepal	1988-90	46.5	51.1		25.9	
	1998-00	38.1	72.4		25.4	
	2009-11*	16.2	90.4			
Pakistan	1988-90	8.6	92.5		19.4	
	1998-00	11.9	107.5		19.1	
	2009-11*	26.3	76.7			
Sri Lanka	1988-90	92.2	15.5		22.2	
	1998-00	92.9	11.3		21.8	
	2009-11*	107.7	9			
South Asia	1988-90	8.9	90.3		16.5	
	1998-00	12.3	91.9		16.2	
	2009-11*	15.8	97.6			
World	1988-90	27.2	100.7		4.2	
	1998-00	30	104.9		4.2	
	2009-11*	34	105.4			

Note: \* indicate- for Sugar, Refined Equiv- 2005-07 years data is taken

Sugar, Centrifugal:						
Country	Period	Ratios			Instability	
		Impo/Cons	Prod/Cons	End st/Cons	PROD	YIELD
Afghanistan	1988-90	83.6	9.8	47.5	10.1	
	1998-00	97.6		12.6	9.8	
	2009-11	91.2		5.3		
Bangladesh	1988-90	37	72	36.4	35.6	
	1998-00	85.9	14.4	6.8	35.1	
	2009-11	93.6	6	21.9		
India	1988-90	0.2	103.4	20.6	22.4	
	1998-00	2.9	111.5	57.7	22.1	
	2009-11	4	106.5	25.5		
Iran	1988-90	52.6	46	15.5	23.9	
	1998-00	52.9	44.4	14.2	23.5	
	2009-11	61	40.2	19.1		
Maldivs	1988-90	105.6		11.1		
	1998-00	100		12.5		
	2009-11	100		12.5		
Nepal	1988-90	33	69.6	13.4	14.8	
	1998-00	14.8	85.8	8.3	14.5	
	2009-11	6.7	100	80.7		
Pakistan	1988-90	12.1	88.5	12.6	19.9	
	1998-00	16.2	88.3	13.4	19.5	
	2009-11	12.5	91.4	18.5		
Sri Lanka	1988-90	89.9	8.1	13.3	22.4	
	1998-00	99	3.2	19.9	22	
	2009-11	97.8	5.5	22.6		
South Asia	1988-90	5.8	97.2	19.6	19.6	
	1998-00	11.1	100.8	47.5	19.3	
	2009-11	12.2	96.6	24.5		
World	1988-90	27.8	102.2	19.9	5.1	
	1998-00	29.9	103.8	29.1	5	
	2009-11	32.2	102.4	18.8		

Oil, Palm:						
Country	Period	Ratios			Instability	
		Impo/Cons	Prod/Cons	End st/Cons	PROD	YIELD
Afghanistan	1988-90	100				
	1998-00	100				
	2009-11	100				
Bangladesh	1988-90	83		36.7		
	1998-00	101.5		10.7		
	2009-11	101.4		6.1		
India	1988-90	88.4	0	10.1	20.7	
	1998-00	102.9	1.3	16	20.2	
	2009-11	96.4	0.7	7.4		
Iran	1988-90	100				
	1998-00	100				
	2009-11	103.8		2.2		
Pakistan	1988-90	101.9		9.1		
	1998-00	99		6.6		
	2009-11	102.8		2.4		
Sri Lanka	1988-90	109		9		
	1998-00	98		9.9		
	2009-11	105		5		
South Asia	1988-90	95.7		11.3	20.7	
	1998-00	101.8	0.9	13.3	20.2	
	2009-11	98.3	0.5	6.2		
World	1988-90	73.8	101.8	15.1	5	
	1998-00	66.4	104.8	14.6	4.9	
	2009-11	76.8	102.2	11.1		

Oil, Soybean:						
Country	Period	Ratios			Instability	
		Impo/Cons	Prod/Cons	End st/Cons	PROD	YIELD
Bangladesh	1988-90	107.7		39.8	27	
	1998-00	103.3		16.3	25.2	
	2009-11	96.6	4.9	3.4		
India	1988-90	6.7	80.7	1.7	24	
	1998-00	55.5	46.8	1.9	23.6	
	2009-11	41	59	6.9		
Iran	1988-90	96.9	3.1		42.9	
	1998-00	90	10.9	8.6	42.2	
	2009-11	71	30.8	18.3		
Pakistan	1988-90	99.3		6.2	101.7	
	1998-00	94.3	4.6	3.5	98.5	
	2009-11	97.1	4.3	14.3		
South Asia	1988-90	61.9	34.2	11.6	23.9	
	1998-00	68.7	33.4	4.8	23.5	
	2009-11	48.6	51.6	6.6		
World	1988-90	23	100.7	11.8	4.3	
	1998-00	26.9	100.7	11.2	4.2	
	2009-11	21.5	100.6	7.2		

Oil, Sunflower seed:						
Country	Period	Ratios			Instability	
		Impo/Cons	Prod/Cons	End st/Cons	PROD	YIELD
India	1988-90		96.8		32.9	
	1998-00	58.4	45.3	12.4	32.4	
	2009-11	77.9	18.9	10.2		
Iran	1988-90	100			19.3	
	1998-00	95.8	10.6		18.5	
	2009-11	71.1	12.9	50.6		
Pakistan	1988-90		100		39	
	1998-00	29.7	70.3	4.1	38.4	
	2009-11		99	3.3		
South Asia	1988-90		97		29.3	
	1998-00	56.2	47.2	11.8	28.8	
	2009-11	58.8	38.6	8.5		
World	1988-90	36	97.2	12.9	8	
	1998-00	28.8	103.8	9.9	7.9	
	2009-11	35.1	107.5	14.4		

Data Sources: 1) FAOSTAT, (Food and Agricultural Organisation (FAO), Rome  
2) Production, Supply and Distribution (PS&D) database of the Economic Research Service,  
United State Department of Agriculture (ERS-USDA)



**Table 2.2: Growth rates**

Rice, Milled:											
Country	Growth Rate	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Domestic Consumption	Ending Stocks	Total Distribution	Yield
AFG	1980-1990	-3.25	0	-4.45	-38.56	-4.82	0	-4.82	0	-4.82	-1.24
AFG	1991-2000	-2.37	0	-0.24	17.44	4.42	0	4.42	0	4.42	2.2
AFG	2001-2011	4.36	0	3.75	3.55	3.36	0	3.36	0	3.36	-0.32
AFG	1980-2011	-0.83	0	0.23	30.53	2.84	0	2.84	0	2.84	1.04
BNG	1980-1990	-0.03	3.38	2.56	-7.11	2.57	-19.58	2.56	4.72	2.57	2.59
BNG	1991-2000	0.56	3.1	3.3	47.46	3.78	0	3.58	10.8	3.78	2.73
BNG	2001-2011	1.06	4.74	3.4	0.35	3.39	0	3.15	14.24	3.39	2.31
BNG	1980-2011	0.37	2.67	3.06	6.96	3.11	-3.13	3.11	3.13	3.11	2.68
IND	1980-1990	0.53	8.75	3.76	-20.13	4.33	0.52	3.4	11.85	4.33	3.19
IND	1991-2000	0.78	-0.61	1.87	-5.8	1.55	13.9	0.74	4	1.55	1.06
IND	2001-2011	0.38	1.17	1.89	-4.26	1.61	-4.67	1.1	6.36	1.61	1.51
IND	1980-2011	0.31	3.45	2.03	-23.18	2.21	11.08	1.81	3.62	2.21	1.71
Iran	1980-1990	1.34	-0.86	2.31	1.43	1.55	0	2.94	-3.91	1.55	0.95
Iran	1991-2000	-0.36	23.82	-0.24	-2.53	6.15	0	2.78	12.14	6.15	0.14
Iran	2001-2011	-0.89	-8.64	-1.28	4.19	-1.66	0	0.21	-8.34	-1.66	-0.35
Iran	1980-2011	0.81	3.2	1.8	2.58	2.45	0	2.4	2.4	2.45	0.98
NPL	1980-1990	1.35	0	4.47	-30.61	4.4	-43.35	4.67	0	4.4	3.08
NPL	1991-2000	2.01	0	3.82	10.27	3.84	0	3.84	0	3.84	1.74
NPL	2001-2011	0.18	0	0.45	19.07	0.56	0	0.56	0	0.56	0.26
NPL	1980-2011	0.66	0	2.13	13.71	2.21	-7.37	2.24	0	2.21	1.45
PAK	1980-1990	0.73	17.25	-0.24	0	2.28	-0.9	-0.17	15.81	2.28	-0.99
PAK	1991-2000	2.22	-13.02	5.36	0	2.62	8.5	2.16	-9.08	2.62	3.07
PAK	2001-2011	1.59	9.47	4.4	50.19	4.95	7.76	1.53	9.93	4.95	2.76
PAK	1980-2011	1.1	0.13	2.47	6.71	2.17	4.81	0.95	-0.45	2.17	1.35
SLK	1980-1990	-0.67	2.28	0.63	1.2	0.89	0	1.08	-0.08	0.89	1.2
SLK	1991-2000	-0.06	-1.71	1.5	-10.59	0.56	-8.67	0.81	-0.96	0.56	1.58
SLK	2001-2011	2.96	-1.47	3.92	0.95	3.26	76.52	2.85	12.88	3.26	0.93
SLK	1980-2011	0.88	-4.78	1.58	-4.87	0.83	10.17	1.25	-4.53	0.83	0.68
S.ASIA	1980-1990	0.42	8.65	3.3	-0.2	3.83	-1.22	3.09	11.18	3.83	2.87
S.ASIA	1991-2000	0.81	-1.06	2.29	15.15	1.99	10.64	1.41	3.54	1.99	1.45
S.ASIA	2001-2011	0.6	1.47	2.32	2.66	2.09	0.17	1.61	6.71	2.09	1.71
S.ASIA	1980-2011	0.37	3.09	2.24	3.39	2.35	7.23	2.07	3.23	2.35	1.87
WORLD	1980-1990	0.25	10.3	2.48	0.27	3.91	0.58	2.36	10.42	3.91	2.29
WORLD	1991-2000	0.66	1.04	1.76	7.2	1.76	6.69	1.44	1.98	1.76	1.16
WORLD	2001-2011	0.71	-3.37	1.94	1.9	0.85	2.06	1.18	-0.64	0.85	1.23
WORLD	1980-2011	0.33	1.02	1.53	4.46	1.55	4.3	1.62	0.69	1.55	1.26

Wheat:											
Country	Growth Rate	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Domestic Consumption	Ending Stocks	Total Distribution	Yield
AFG	1980-1990	-4.11	0	-5.32	-52.99	-6.75	0	-6.75	0	-6.75	-1.28
AFG	1991-2000	2.58	0	2.66	37.22	4.92	0	4.92	0	4.92	0.05
AFG	2001-2011	2.45	80.89	3.55	20.21	8.88	0	8.74	120.4	8.88	1.06
AFG	1980-2011	0.19	8.29	0.66	18.27	2.58	0	2.57	12.25	2.58	0.47
BNG	1980-1990	0.69	1.16	-1.33	2.71	0.93	0	0.99	1.33	0.93	-2.01
BNG	1991-2000	3.91	-2.07	7.51	1.72	3.79	0	4.08	1.19	3.79	3.43
BNG	2001-2011	-6.58	5.15	-4.21	8.7	4.6	0	3.67	7.15	4.6	2.52
BNG	1980-2011	-0.87	2.14	-0.13	2.1	1.57	0	1.29	2.65	1.57	0.74
BHU	1980-1990	-2.33	0	-6.7	0	-6.7	0	-6.7	0	-6.7	-4.47
BHU	1991-2000	11.44	0	19.78	0	19.77	0	19.77	0	19.77	7.53
BHU	2001-2011	0	0	0	25.17	2.38	0	2.38	0	2.38	0
BHU	1980-2011	2.09	0	4.41	20.75	5.87	0	5.87	0	5.87	2.27
IND	1980-1990	0.57	-4.15	4.24	-19.93	3.22	34.4	4.25	-5.24	3.22	3.63
IND	1991-2000	1.7	11.2	3.54	21.48	4.24	-20.05	2.42	19.46	4.24	1.82
IND	2001-2011	1.42	-3.42	2.21	20.6	1.21	-36.43	1.8	4.47	1.21	0.78
IND	1980-2011	0.78	1.2	2.7	-4.21	2.46	7.62	2.55	1.68	2.46	1.9
Iran	1980-1990	0.66	14.19	1.88	10.95	5.7	0	4.3	12.69	5.7	1.21
Iran	1991-2000	-3.53	4.3	-1.02	9.05	2.75	35.91	2.61	3.24	2.75	2.62
Iran	2001-2011	1.06	2.27	1.51	-1.75	1.47	106.05	0.82	3.04	1.47	0.45
Iran	1980-2011	0.09	4.81	2.93	-3.25	2.66	30.52	2.36	4.03	2.66	2.83
NPL	1980-1990	4.49	0	5.22	-32.62	4.71	0	4.71	0	4.71	0.7
NPL	1991-2000	2.44	0	4.5	60.4	4.61	0	4.61	0	4.61	1.97
NPL	2001-2011	0.23	0	1.36	-27.56	1.32	0	1.32	0	1.32	1.14
NPL	1980-2011	1.49	0	3.58	-4.61	3.49	0	3.49	0	3.49	2.05
PAK	1980-1990	1.05	13.09	2.64	15.87	4.66	-33.93	3.9	10.07	4.66	1.56
PAK	1991-2000	0.61	0.89	3.22	-16.89	2.33	-9.9	2.53	1.02	2.33	2.6
PAK	2001-2011	1.28	4.04	2.89	0.53	3.04	6.79	2.56	6.23	3.04	1.6
PAK	1980-2011	0.71	1.92	2.66	-2.94	2.42	35.3	2.41	1.45	2.42	1.94
SLK	1980-1990	0	3.59	0	3.63	3.68	0	3.1	6.17	3.68	0
SLK	1991-2000	0	-8.69	0	1.19	-0.43	-22.89	0.76	-6.5	-0.43	0
SLK	2001-2011	0	18.53	0	3.62	6.25	64.43	1.5	12.28	6.25	0
SLK	1980-2011	0	5.87	0	2.62	3.41	36.97	1.73	6.06	3.41	0
S.ASIA	1980-1990	0.46	0.96	3.41	0.24	3.1	27.29	3.6	-0.63	3.1	2.94
S.ASIA	1991-2000	1.56	6.65	3.55	0.81	3.78	-14.02	2.57	12.08	3.78	1.96
S.ASIA	2001-2011	1.3	-1.61	2.29	10.96	1.97	-12.68	2.27	3.93	1.97	0.98
S.ASIA	1980-2011	0.72	1.67	2.59	2.24	2.44	15.84	2.47	1.89	2.44	1.85
WORLD	1980-1990	-0.63	3.12	2.26	0.88	2.27	0.9	2.32	3.07	2.27	2.92
WORLD	1991-2000	-0.08	2.29	1.06	-0.3	1.17	-0.22	0.87	2.86	1.17	1.15
WORLD	2001-2011	0.57	-0.57	2.02	3.26	1.66	3.28	1.34	1.74	1.66	1.43
WORLD	1980-2011	-0.21	0.82	1.17	1.01	1.09	0.99	1.19	0.8	1.09	1.39

Corn:											
Country	Growth Rate	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Domestic Consumption	Ending Stocks	Total Distribution	Yield
AFG	1980-1990	-6.41	0	-6.23	0	-6.23	0	-6.23	0	-6.23	0.2
AFG	1991-2000	-7.83	0	-9.74	0	-9.74	0	-9.74	0	-9.74	-2.07
AFG	2001-2011	1.27	0	3.82	0	3.82	0	3.82	0	3.82	2.51
AFG	1980-2011	-4.34	0	-3.82	2.33	-3.82	0	-3.82	0	-3.82	0.54
BHU	1980-1990	1.23	0	7.2	0	7.2	0	7.2	0	7.2	5.9
BHU	1991-2000	-1.02	0	-1.87	25.2	-1.31	0	-1.31	0	-1.31	-0.83
BHU	2001-2011	0	0	0	0	0	0	0	0	0	0
BHU	1980-2011	1.31	0	2.51	0.68	2.52	0	2.52	0	2.52	1.2
IND	1980-1990	-0.09	-10.08	2.32	15.25	2.1	-31.8	2.53	-9.18	2.1	2.44
IND	1991-2000	1.06	18.87	3.6	135.92	4.12	3.86	3.51	28.77	4.12	2.51
IND	2001-2011	2.79	0	5.96	50.48	5.64	52.34	4.17	3.48	5.64	3.07
IND	1980-2011	1.34	3.29	3.76	15.11	3.71	33.39	3.25	3.93	3.71	2.39
Iran	1980-1990	-12.18	-9.36	-1.75	7.78	6.43	0	8.11	-14.33	6.43	11.87
Iran	1991-2000	19.78	47.92	25.7	2.44	12.71	0	8.9	41.34	12.71	4.94
Iran	2001-2011	1.46	13.53	2.79	9.99	8.84	0	8.19	10.39	8.84	1.31
Iran	1980-2011	10.55	18.83	17.28	6.86	10.17	0	8.89	18.17	10.17	6.08
NPL	1980-1990	5.61	0	5.6	-21.95	5.58	-37.95	5.78	0	5.58	-0.04
NPL	1991-2000	2.53	0	3.47	0	3.47	0	3.47	0	3.47	0.91
NPL	2001-2011	0.32	198.24	1.4	67.17	3.03	8.73	1.98	177.59	3.03	1.06
NPL	1980-2011	1.79	24.95	3.04	25.05	3.35	-4.21	3.14	28.34	3.35	1.23
PAK	1980-1990	1.54	0	2.68	0	2.68	0	2.68	0	2.68	1.13
PAK	1991-2000	1.93	274.08	5.26	17.75	8.08	0	5.13	259.01	8.08	3.26
PAK	2001-2011	1.31	3.78	6.19	15.91	5.89	39.81	6.32	2.12	5.89	4.82
PAK	1980-2011	1.1	53.27	4.36	26.83	5.18	7.09	4.35	53.02	5.18	3.23
S.ASIA	1980-1990	0.2	-10.08	2.14	2.63	1.98	-37.14	2.31	-9.18	1.98	1.93
S.ASIA	1991-2000	1.07	30.36	3.4	136.57	4.13	3.86	3.33	38.09	4.13	2.32
S.ASIA	2001-2011	2.36	2.97	5.54	39.36	5.4	52.77	4.21	3.74	5.4	3.11
S.ASIA	1980-2011	1.16	6.98	3.48	24.72	3.58	32.01	3.1	7.51	3.58	2.29
WORLD	1980-1990	-0.09	4.56	1.16	-1.26	1.65	-1.08	1.5	3.55	1.65	1.26
WORLD	1991-2000	0.61	3.56	2.43	1.96	2.61	2.22	2.42	3.44	2.61	1.8
WORLD	2001-2011	2.13	-0.91	3.93	2.68	3.04	2.76	3.6	0.28	3.04	1.77
WORLD	1980-2011	0.81	0.13	2.45	1.32	1.92	1.41	2.49	-0.09	1.92	1.62

Sugar, Refined Equiv:											
Country	Growth Rate	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Domestic Consumption	Ending Stocks	Total Distribution	Yield
BNG	1980-1990			1.19	22.35		10.58	9.11			
BNG	1991-2000			-6.09	23.65		0	1.55			
BNG	2001-2007			0.59	20.82		127.43	15.33			
BNG	1980-2007			0.09	13.99		9.49	5.67			
IND	1980-1990			7.14	9.18		-26.34	7.57			
IND	1991-2000			4.32	82.78		-14.78	4.72			
IND	2001-2007			0.77	-2.25		8	-0.46			
IND	1980-2007			5.18	8.64		10.66	4.76			
Iran	1980-1990			-0.47	-0.39		113.01	3.09			
Iran	1991-2000			0.23	5.91		87.05	1.72			
Iran	2001-2007			8.03	14.02		75.12	2.45			
Iran	1980-2007			2.65	2.57		56.32	2.39			
MDV	1980-1990				5.6			6.89			
MDV	1991-2000				-4.07			-1.63			
MDV	2001-2007				0.64			3.03			
MDV	1980-2007				3.48			3.2			
NPL	1980-1990			5.76	29.86		16.78	14.28			
NPL	1991-2000			5.27	9.53		205.33	5.59			
NPL	2001-2007			3.53	-4.82		265.51	1.39			
NPL	1980-2007			8.27	1.78		14.87	6.39			
PAK	1980-1990			9.63	44.74		41.27	12.19			
PAK	1991-2000			4.34	-1.79		52.51	4.1			
PAK	2001-2007			-1.13	32.14		16.64	3.13			
PAK	1980-2007			5.61	19.68		21.16	5.94			
SLK	1980-1990			10.43	5.69		130.31	4.51			
SLK	1991-2000			-0.31	7.69		0.89	4.5			
SLK	2001-2007			-1.61	1.2		75.73	-2.73			
SLK	1980-2007			3.17	3.84		15.07	3.24			
S.ASIA	1980-1990			6.84	5.37		-20.35	7.48			
S.ASIA	1991-2000			4.04	9.99		12.82	4.35			
S.ASIA	2001-2007			0.89	14.48		12.32	0.61			
S.ASIA	1980-2007			5.04	4.38		13.69	4.67			
WORLD	1980-1990			1.86	0.4		0.37	2.07			
WORLD	1991-2000			2.42	3.63		4.33	2.19			
WORLD	2001-2007			2.18	4.37		4.66	1.63			
WORLD	1980-2007			2.06	2.36		2.76	1.91			

Sugar, Centrifugal:											
Country	Growth Rate	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Domestic Consumption	Ending Stocks	Total Distribution	Yield
AFG	1979-1990		-5.36	-1.55	3.08	-1.2	0	3.29	-7.11	-1.2	
AFG	1991-2000		-18.88	-55.19	-8.69	-10.94	0	-9.29	-20.65	-10.94	
AFG	2001-2011		5.81	0	14.26	11.37	0	15.95	0.51	11.37	
AFG	1979-2011		-8.78	-21.57	-0.68	-2.88	0	-1.28	-8.88	-2.88	
BNG	1979-1990		3.83	3.14	-5.64	4.57	0	4.07	6.12	4.57	
BNG	1991-2000		-5.23	-7.24	111.91	16.27	0	18.24	0.9	16.27	
BNG	2001-2011		20.49	-8.3	7.12	6.96	0	5.49	17.51	6.96	
BNG	1979-2011		5.13	-1.15	19.61	7.12	0	7.58	5.48	7.12	
IND	1979-1990		2.81	6.76	-18.75	5.55	-16.24	6.48	5.45	5.55	
IND	1991-2000		11.5	4.63	52.2	6.24	-11.38	3.75	12.81	6.24	
IND	2001-2011		-6.76	3.54	-20.41	0.87	10.77	2.57	-5.13	0.87	
IND	1979-2011		5.89	4.33	3.13	4.64	8.78	4.18	5.76	4.64	
Iran	1979-1990		3	8.66	-0.36	2.95	0	2.88	3.17	2.95	
Iran	1991-2000		8.25	-0.28	3.05	2.32	0	2.07	4.15	2.32	
Iran	2001-2011		16.04	-2.97	5.81	3.96	132.4	2.48	5.78	3.96	
Iran	1979-2011		4.61	3.93	2.29	3.37	20.75	2.79	4.28	3.37	
MDV	1979-1990		-9	0	3.1	2.19	0	1.89	9.89	2.19	
MDV	1991-2000		0	0	0.73	0.64	0	0.73	0	0.64	
MDV	2001-2011		0	0	0	0	0	0	0	0	
MDV	1979-2011		9.43	0	2.01	2.27	0	1.92	10.42	2.27	
NPL	1979-1990		-8.19	8.77	26.8	6.95	0	10.76	-2.09	6.95	
NPL	1991-2000		-1.58	6.42	-4.22	3.77	0	4.06	0.67	3.77	
NPL	2001-2011		26.55	1.67	-3.6	6.68	78.59	1.89	18.09	6.68	
NPL	1979-2011		9.94	7.81	3.99	7.6	19.34	6.37	11.27	7.6	
PAK	1979-1990		13.17	9.35	51.93	9.95	8.02	11.19	5.87	9.95	
PAK	1991-2000		2.58	1.54	21.05	3.56	10.75	3.69	-0.8	3.56	
PAK	2001-2011		3.57	1.19	86.66	1.89	51.83	2.34	0.28	1.89	
PAK	1979-2011		5.87	4.67	8.86	4.79	22.84	4.82	4.84	4.79	
SLK	1979-1990		-1.04	1.08	6.86	4.88	0	7.25	-4.91	4.88	
SLK	1991-2000		4.83	-3.51	3.48	3.3	0	3.36	3.81	3.3	
SLK	2001-2011		-5.66	-0.59	5.01	3.41	0	4.13	-1.96	3.41	
SLK	1979-2011		2.43	2.75	4.32	3.94	0	4.18	2.76	3.94	
S.ASIA	1979-1990		2.77	7	8.38	5.96	-14.4	7.05	4.45	5.96	
S.ASIA	1991-2000		10.33	4.09	14.52	5.97	-3.05	4.06	11.37	5.97	
S.ASIA	2001-2011		-5.41	3.09	8.65	1.28	10.13	2.72	-4.21	1.28	
S.ASIA	1979-2011		5.63	4.34	6.26	4.68	9.44	4.34	5.47	4.68	
WORLD	1979-1990		-0.49	2.12	0.13	1.32	0.82	1.84	-0.25	1.32	
WORLD	1991-2000		5.68	1.99	3.29	2.78	3.63	1.66	6.43	2.78	
WORLD	2001-2011		-2.61	1.7	2.44	1.2	2.32	1.72	-2.64	1.2	
WORLD	1979-2011		1.78	1.93	2.05	1.93	2.35	1.84	1.76	1.93	

Total Pulses:											
Country	Growth Rate	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Domestic Consumption	Ending Stocks	Total Distribution	Yield
BNG	1980-1990			-0.96	76.15		-43.32	1.01			
BNG	1991-2000			-3.11	11.55		0	-0.33			
BNG	2001-2007			-5.29	1.5		-28.48	-1.35			
BNG	1980-2007			-2.43	29.11		-4.04	0.93			
IND	1980-1990			2.5	27.22		30.05	3.1			
IND	1991-2000			0.96	-0.54		27.48	0.8			
IND	2001-2007			2.94	3.48		8.64	2.93			
IND	1980-2007			0.82	10.15		23.03	1.27			
Iran	1980-1990			2.27	-6.06		156.72	3.31			
Iran	1991-2000			-2.2	-13.2		15.14	1.62			
Iran	2001-2007			2.22	86.01		-30.77	2.82			
Iran	1980-2007			3.83	-5.12		57.65	3.52			
MDV	1980-1990			4.17	4.24			3.56			
MDV	1991-2000			5.09	10.05			-14.05			
MDV	2001-2007			-3.67	11.56			10.34			
MDV	1980-2007			2.18	-5.69			-5.2			
NPL	1980-1990			1.51	42.53		11.86	1.48			
NPL	1991-2000			3.48	2.9		3.68	3.83			
NPL	2001-2007			0.54	-0.78		-31.9	3.82			
NPL	1980-2007			2.6	10.56		2.97	2.83			
PAK	1980-1990			3.84	30.5		36.51	4.6			
PAK	1991-2000			2.09	7.42		-9.45	3.04			
PAK	2001-2007			6.69	3.7		5.6	5.03			
PAK	1980-2007			0.88	12.77		7.26	2.07			
SLK	1980-1990			-1.39	8.91		-6.38	1.57			
SLK	1991-2000			-8.6	9.7		0.82	3.79			
SLK	2001-2007			-1.52	-0.82		44.68	-1.42			
SLK	1980-2007			-4.52	9.86		-8.53	4.03			
S.ASIA	1980-1990			2.41	24.01		17.94	3.1			
S.ASIA	1991-2000			0.8	4.03		13.64	0.99			
S.ASIA	2001-2007			2.92	3.29		-2.73	2.91			
S.ASIA	1980-2007			0.83	10.38		12.35	1.4			
WORLD	1980-1990			3.63	9.12		10.51	3.33			
WORLD	1991-2000			0.46	1.31		1.88	0.57			
WORLD	2001-2007			1.23	3.18		3.59	1.15			
WORLD	1980-2007			1.04	4.67		4.66	1.07			

Oil, Palm:											
Country	Growth Rate	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Domestic Consumption	Ending Stocks	Total Distribution	Yield
AFG	1984-1990		0	0	23.11	23.11	0	23.11	0	23.11	
AFG	1991-2000		0	0	6.42	6.42	0	6.42	0	6.42	
AFG	2001-2011		0	0	4.8	4.8	0	4.8	0	4.8	
AFG	1984-2011		0	0	9.22	9.22	0	9.22	0	9.22	
BNG	1980-1990		17.42	0	-0.38	3.98	0	4.14	3.17	3.98	
BNG	1991-2000		-9.24	0	3.93	3.01	0	4.68	-6.49	3.01	
BNG	2001-2011		2.24	0	10.21	9.77	6.27	10.22	3.38	9.77	
BNG	1980-2011		0.7	0	9.32	7.93	5.54	9.58	0.01	7.93	
IND	1980-1990		13.16	0	-2.02	-0.24	0	-0.16	-21.74	-0.24	
IND	1991-2000		141.79	30.61	61.16	62.22	0	59.35	221.21	62.22	
IND	2001-2011		11.13	4.22	9.19	9.39	-17.49	8.89	15.9	9.39	
IND	1980-2011		7.59	34.57	11.27	11.07	4.91	11.28	9.21	11.07	
Iran	1986-1990		0	0	-26.67	-26.67	0	-26.67	0	-26.67	
Iran	1991-2000		0	0	13.54	13.54	0	13.54	0	13.54	
Iran	2001-2011		37.11	0	17.46	17.96	77.44	17.01	43.89	17.96	
Iran	1986-2011		18.13	0	13.52	13.71	34.16	13.3	22.66	13.71	
PAK	1980-1990		10.04	0	10.48	10.68	0	10.65	10.01	10.68	
PAK	1991-2000		2.7	0	2.15	2.19	0	2.26	2	2.19	
PAK	2001-2011		-0.98	0	6.47	6.15	68.39	6.5	7.99	6.15	
PAK	1980-2011		-0.27	0	6.75	6.48	31.63	6.59	-0.56	6.48	
SLK	1980-1990		0	0	20.77	20.77	0	19.71	24.31	20.77	
SLK	1991-2000		0.34	0	6.65	5.78	0	7.41	-4.52	5.78	
SLK	2001-2011		-13.86	0	-2.13	-1.82	22.58	-1.36	-17.21	-1.82	
SLK	1980-2011		23.29	0	11.25	11.92	20.9	11.29	21.81	11.92	
S.ASIA	1980-1990		14.13	0	4.85	5.91	0	5.91	5.66	5.91	
S.ASIA	1991-2000		22.89	30.61	19.73	20.11	0	19.61	24.47	20.11	
S.ASIA	2001-2011		10.11	4.22	8.3	8.34	46.4	8.16	11.44	8.34	
S.ASIA	1980-2011		5.13	34.57	9.29	9.01	33.43	9.33	4.36	9.01	
WORLD	1980-1990		13.48	8.39	9.88	9.3	9.39	8.85	12.25	9.3	
WORLD	1991-2000		8.71	7.88	6.41	7.39	6.09	7.95	10.52	7.39	
WORLD	2001-2011		6.41	7.16	8.29	7.55	8.12	7.23	6.54	7.55	
WORLD	1980-2011		7.16	7.93	8.15	7.96	8.14	7.96	7.04	7.96	

Oil, Soybean:											
Country	Growth Rate	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Domestic Consumption	Ending Stocks	Total Distribution	Yield
BNG	1980-1990		20.77	0	24.15	24.55	0	24.19	26.26	24.55	
BNG	1991-2000		-4.49	0	7.28	5.14	0	6.04	1.64	5.14	
BNG	2001-2011		-20.83	65.23	0.29	-0.68	0	0.34	-15.73	-0.68	
BNG	1980-2011		2.37	25.62	7.36	6.85	0	7.9	1.3	6.85	
IND	1980-1990		-25.38	18.59	-29.4	-5.95	0	-5.14	-45.04	-5.95	
IND	1991-2000		-37.2	8.16	50.21	18.16	38.27	18.54	-18.21	18.16	
IND	2001-2011		6.9	9.37	-3.98	2.66	-11.21	2.53	6.33	2.66	
IND	1980-2011		1.33	10.65	7.3	6.63	21.9	7.2	3.56	6.63	
Iran	1980-1990		0	-5.57	3.82	3.39	0	3.39	0	3.39	
Iran	1991-2000		178.07	25.61	6.21	8.92	113.01	7.82	87.24	8.92	
Iran	2001-2011		45.41	5.55	-8.31	-3.66	-9.66	-4.23	2.71	-3.66	
Iran	1980-2011		40.73	11.51	1.9	3.95	26.99	3.17	41.25	3.95	
PAK	1980-1990		-0.6	2.76	2.31	2.25	0	2.54	-1.41	2.25	
PAK	1991-2000		-4.22	22.94	1.75	2.07	0	2.73	-6.16	2.07	
PAK	2001-2011		-13.29	-23.93	-6.97	-8.88	0	-9.7	-8.92	-8.88	
PAK	1980-2011		-8.84	15.47	-7.2	-6.82	0	-6.78	-8.35	-6.82	
S.ASIA	1980-1990		6.06	18.6	-4.74	0.34	0	0.22	1.93	0.34	
S.ASIA	1991-2000		-6.02	8.36	16.92	12.19	38.27	13.04	2.52	12.19	
S.ASIA	2001-2011		1.92	9.04	-3.24	1.74	-11.21	1.77	2.05	1.74	
S.ASIA	1980-2011		0.26	10.75	3.54	4.86	21.9	5.42	0.11	4.86	
WORLD	1980-1990		2.77	2.44	0.04	2.03	0.6	2.31	2.87	2.03	
WORLD	1991-2000		2.62	5.32	9.25	5.73	8.7	5.59	1.56	5.73	
WORLD	2001-2011		0.62	3.79	0.99	3.07	0.59	3.97	0.02	3.07	
WORLD	1980-2011		2.88	4.38	4.29	4.25	4.34	4.39	2.69	4.25	



Oil, Sunflowerseed:											
Country	Growth Rate	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Domestic Consumption	Ending Stocks	Total Distribution	Yield
IND	1980-1990		17.75	20.93	0.69	21.2	0	21.04	11.51	21.2	
IND	1991-2000		111.54	-0.38	230.73	12.5	0	10.81	165.87	12.5	
IND	2001-2011		74.93	-12.13	59.23	7.41	68.39	5.89	162.69	7.41	
IND	1980-2011		18.71	5.11	37.76	9.17	8.77	8.86	21.08	9.17	
Iran	1980-1990		0	0	0.94	0.94	0	0.94	0	0.94	
Iran	1991-2000		0	112.8	13.69	15.22	67.16	14.47	0	15.22	
Iran	2001-2011		147.46	10.89	14.23	20.69	-17.43	16.86	150.68	20.69	
Iran	1980-2011		20.62	34.98	4.65	6.72	17.06	5.33	24.35	6.72	
PAK	1981-1990		0	20.49	0	20.49	0	20.49	0	20.49	
PAK	1991-2000		85.96	12	138.91	18.63	0	17.94	81.4	18.63	
PAK	2001-2011		23.96	21.4	-31.27	19.85	0	19.68	24.74	19.85	
PAK	1981-2011		25.75	17.47	4.29	17.9	0	17.7	26.19	17.9	
S.ASIA	1980-1990		17.75	21.32	0.69	21.54	0	21.38	11.51	21.54	
S.ASIA	1991-2000		165.2	0.55	233	12.89	0	11.27	187.46	12.89	
S.ASIA	2001-2011		39.57	-1.86	48.86	9.37	68.39	8.12	67.88	9.37	
S.ASIA	1980-2011		30.54	7.77	38.2	10.28	8.77	9.99	31.41	10.28	
WORLD	1980-1990		18.14	5.62	11.78	7.55	8.48	6.34	20.15	7.55	
WORLD	1991-2000		-1.96	2.01	3.05	1.89	4.73	1.35	-0.51	1.89	
WORLD	2001-2011		13	5.73	10.27	7.12	10.62	5.14	15.27	7.12	
WORLD	1980-2011		4.41	2.64	2.66	2.72	3.6	2.3	4.35	2.72	

Data Sources: 1) FAOSTAT, (Food and Agricultural Organisation (FAO), Rome

2) Production, Supply and Distribution (PS&D) database of the Economic Research Service, United State Department of Agriculture (ERS-USDA)

## SECTION 3

**Table 3.2: Imports and Exports of Major Commodities to other South Asian Countries**  
(value in % to total vale of exports)

<b>Bangladesh: Import of important commodities from south asian countries (value in %)</b>							
items	Afghanistan	Bangladesh	India	Iran	Pakistan	Sri Lanka	Share of S.Asia
Cake of Soybeans			99.2				99.2
Cotton lint	0.04	0.04	16.8	0.7	3.1	0.001	20.7
Lentils			37.4		0.8		38.2
Maize			73.3				73.3
Onions, dry			99.8				99.8
Palm oil							0.0
Peas, dry			0.1				0.1
Soybean oil							0.0
Sugar Raw Centrifugal			5.2				5.2
Wheat			10.3		1.5		11.7

<b>Bangladesh: Export of important commodities to south asian countries (value in %)</b>						
items	Afghanistan	India	Iran	Pakistan	Sri Lanka	Share of S.Asia
Breakfast Cereals				0.2		0.2
Cotton Waste		17.1				17.1
Jute		24.5	0.3	35.7	0.01	60.5
Nuts, nes		75.8				75.8
Pastry		1.3			7.0	8.3
Rice Milled				0.4	0.3	0.7
Sesame seed						0.0
Tea	7.9	2.6		71.1		81.6
Tobacco, unmanufactured				7.6		7.6
Vegetables fresh nes				0.03		0.03

<b>India: Import of important commodities from south asian countries (value in %)</b>								
items	Afghanistan	Bangladesh	Bhutan	Iran	Nepal	Pakistan	Sri Lanka	Share of S.Asia
Beans, dry	1.1			0.5	0.01	1.3	0.01	2.9
Cashew nuts, with shell		0.004					0.004	0.01
Palm oil		0.03	0.8				0.1	1.0
Peas, dry						0.05		0.05
Pulses, nes					0.1	1.0	0.002	1.1
Rubber Nat Dry		0.3			0.01		7.9	8.2
Soybean oil	0.02	0.3			0.001			0.3
Sugar Raw Centrifugal								
Sugar Refined						1.6		1.6
Sunflower oil								

<b>India: Export of important commodities to south asian countries (value in %)</b>									
items	Afghanistan	Bangladesh	Bhutan	Iran	Maldives	Nepal	Pakistan	Sri Lanka	Share of S.Asia
Buffalo meat	0.4	0.002		2.4	0.1	0.001	1.2	0.002	4.0
Cake of Soybeans		6.0	0.01	1.2		0.7	5.7	2.5	16.1
Cashew Nuts Shelled	0.01	0.003		0.3	0.01	0.2	0.1	0.02	0.6
Cotton lint		9.1		0.0001	0.0002	0.3	14.8	0.01	24.2
Maize		13.1	0.005	2.1	0.0005	1.1	1.8	2.8	20.9
Oil of Castor Beans	0.03	0.01	0.005	0.3		0.01	0.01	0.04	0.4
Onions, dry		40.4		0.3	0.3	1.7	5.5	9.4	57.5
Rice Milled	0.002	10.5	0.1	6.5	0.3	1.2	0.01	0.5	19.2
Tea	1.4	0.1	0.02	7.2	0.001	0.1	2.7	2.6	14.1
Tobacco, unmanufactured	0.1	0.5		0.5	0.01	2.3	0.02	0.2	3.7

<b>Iran: Import of important commodities from south asian countries (value in %)</b>				
items	India	Pakistan	Sri Lanka	Share of S.Asia
	Value	Value	Value	Value
Cake of Soybeans				
Cigarettes	0.04			0.04
Maize		0.02		0.02
Meat-CattleBoneless(Beef&Veal)				
Palm oil				
Rice Milled	0.8	36.7		37.5
Soybean oil				
Soybeans				
Tea	28.5		57.4	85.9
Wheat	0.01			0.01

<b>Iran: Export of important commodities to south asian countries (value in %)</b>							
items	Afghanistan	Bangladesh	India	Maldives	Pakistan	Sri Lanka	Share of S.Asia
	Value	Value	Value	Value	Value	Value	Value
Apple juice, single strength	74.1				0.4		74.5
Cucumbers and gherkins	0.1				0.04		0.2
Dates	3.4	0.003	3.6	0.1	13.4	0.01	20.4
Fruit Juice Nes	23.8						23.8
Infant Food	3.6						3.6
Pistachios	0.3	0.03	1.3		2.6		4.3
Raisins	0.1	0.02	0.04		3.7	0.04	3.9
Soybean oil	14.2				0.4		14.6
Spices, nes	0.04		3.0		0.1		3.2
Wheat							0.0

<b>Maldives: Import of important commodities from south asian countries (value in %)</b>						
items	Bangladesh	India	Iran	Pakistan	Sri Lanka	Share of S.Asia
Beverage Non-Alc	0.8	7.8			3.7	12.3
Chicken meat		1.1			3.0	4.1
Chocolate Prsnes		7.4	0.1	0.3	47.2	55.0
Cigarettes	0.1	0.1			0.9	1.0
Flour of Wheat		44.9			11.2	56.0
Food Prep Nes		8.3		0.4	8.3	17.0
Milk Whole Dried		2.5			11.1	13.6
Pastry		2.7		0.5	10.5	13.7
Rice Milled		64.6		20.5	3.6	88.7
Wine		5.7			1.7	7.4

**Maldives: No Export of important commodities to south asian countries**

<b>Nepal: Import of important commodities from south asian countries (value in %)</b>				
items	Bangladesh	India	Iran	Share of S.Asia
	Value	Value	Value	Value
Arecanuts		0.3		0.3
Cake of Soybeans		100.0		100.0
Fatty Acids		16.8		16.8
Food Prep Nes		40.3	0.2	40.4
Jute	0.6	99.4		100.0
Palm oil		1.1		1.1
Rapeseed		29.4		29.4
Rice Milled		81.1		81.1
Soybean oil		2.5		2.5
Tobacco, unmanufactured		99.7		99.7

<b>Nepal: Export of important commodities to south asian countries</b>						
items	Bangladesh	Bhutan	India	Pakistan	Sri Lanka	Share of S.Asia
	Value	Value	Value	Value	Value	Value
Food Prep Nes	0.1	0.4	98.5			99.1
Fruit Juice Nes			99.0			99.0
Ginger			100.0			100.0
Lentils	60.3		2.0		2.4	64.7
Macaroni		3.8	70.4			74.2
Nutmeg, mace and cardamoms	0.1		97.6	1.8		99.5
Nuts, nes			100.0			100.0
Orange juice, single strength			99.8			99.8
Tea			94.4	0.2		94.5
Wheat	96.3					96.3

<b>Pakistan: Import of important commodities from south asian countries (value in %)</b>								
items	Afghanistan	Bangladesh	India	Iran	Maldives	Nepal	Sri Lanka	Share of S.Asia
Arecanuts		0.03	0.1					0.1
Cake of Soybeans			98.9				0.004	98.9
Chick peas	0.4		23.1	7.2	0.1		0.2	30.9
Cotton lint	1.4		26.5	0.5				28.4
Onions (inc. shallots), green	24.1		73.3	2.8				100.1
Palm oil	0.3	0.01		0.01		0.02		0.4
Rapeseed			0.002					0.002
Soybean oil								
Tea	0.01	4.2	4.8	0.02	0.01	0.3	2.5	11.8
Wheat				4.1				4.1

<b>Pakistan: Export of important commodities to south asian countries</b>								
items	Afghanistan	Bangladesh	India	Iran	Maldives	Nepal	Sri Lanka	Share of S.Asia
Cattle meat	1.3		0.01					1.3
Cotton lint	0.01	35.7	4.6				0.03	40.4
Dates	0.1	1.2	86.0	0.1	0.01	0.4	0.1	87.9
Molasses	0.4		29.8	0.2				30.3
Oil Hydrogenated	98.9			0.2				99.1
Potatoes	27.1	0.04	0.02	33.0			36.8	97.0
Rice Broken	24.5	0.5		7.7	0.01		3.7	36.4
Rice Milled	4.8	0.2	0.04	11.0	0.1	0.01	0.8	17.0
Tangerines, mandarins, clem.	10.6	0.4	0.004	22.9	0.02		2.2	36.2
Wheat	34.2	18.9	33.3				3.0	89.4

<b>Sri Lanka: Import of important commodities from south asian countries (value in %)</b>								
items	Afghanistan	Bangladesh	India	Iran	Maldives	Nepal	Pakistan	Share of S.Asia
Cake of Soybeans			83.7					83.7
Chillies and peppers, dry			96.0				1.1	97.1
Fatty Acids			29.3		0.7			30.1
Lentils	0.3		10.5	0.1		5.2		16.1
Milk Whole Dried			0.9					0.9
Onions, dry	0.02		94.2				5.5	99.7
Palm oil			4.9				0.001	4.9
Sugar Refined		0.04	31.8				0.2	32.0
Tobacco, unmanufactured		0.6	1.2				1.8	3.6
Wheat			1.0					1.0

<b>Sri Lanka: Export of important commodities to south asian countries</b>								
items	Afghanistan	Bangladesh	India	Iran	Maldives	Nepal	Pakistan	Share of S.Asia
Cinnamon (canella)			1.8		0.02	0.001	0.01	1.8
Coconuts Desiccated	0.1	0.7	0.7	3.0	0.01	0.1	5.6	10.1
Fibre Crops Nes			0.1	0.5	0.01	0.02	0.7	1.3
Flour of Wheat			0.2		2.1			2.3
Food Prep Nes		0.2	1.9	0.01	11.4		0.02	13.6
Food Wastes		0.9	97.3		1.3			99.6
Prepared Nuts (Exc.Groundnuts)			2.2		1.6			3.7
Rubber Nat Dry		0.6	18.3	0.1	0.4		16.7	36.1
Tea	0.04	0.003	0.2	10.3	0.1		0.5	11.1
Tobacco, unmanufactured				1.0				1.0

Data Sources: FAOSTAT, (Food and Agricultural Organisation (FAO), Rome

## SECTION 5

**Table 5.1: Poverty headcount and Share of population in Percentage**

Poverty headcount, (share of population) (Percent)																							
Country		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	GR. RATE
AFG	national																33		42	36			3
	rural																36.2		45	37.5			
	urban																21.1		27	29			
BNG	national			56.6				50.1				48.9					40						-4
	rural			58.7				54.5				52.3					43.8						
	urban			42.7				27.8				35.2					28.4						
BHU	national														31.7				23.2				-8
	rural														38.3				30.9				
	urban														4.2				1.7				
IND	national					36											27.5						-2
	rural					37.3											28.3						
	urban					32.4											25.7						
NPL	national							41.8								30.9							-4
	rural							43.3								34.6							
	urban							21.6								9.6							
PAK	national										30.6			34.5			23.9	22.3					-10
	rural										34.7			39.3			28.1	27					
	urban										20.9			22.7			14.9	13.1					
SLK	national		26.1					28.8						22.7					15.2				-8
	rural		29.5					30.9						24.7					15.7				
	urban		16.3					14						7.9					6.7				

Data Sources: FAOSTAT, (Food and Agricultural Organisation (FAO), Rome)

**Table 5.2: Average annual rate of change in Percentage for food and population**

Average annual rate of change (%)													
		From 1990-92 to 1995-97			From 1995-97 to 2000-02			From 2000-02 to 2006-08			From 1990-92 to 2006-08		
	Country	Food per person	Food	Population	Food per person	Food	Population	Food per person	Food	Population	Food per person	Food	Population
16	Bangladesh	-0.3	1.7	2	2.3	4.1	1.9	0.8	2.4	1.6	0.9	2.7	1.8
100	India	0.3	2.2	2	-0.4	1.3	1.8	0.7	2.2	1.6	0.2	1.9	1.7
102	Iran	0.5	2.2	1.7	0.1	1.5	1.4	-0.1	1	1.1	0.2	1.6	1.4
132	Maldives	0.3	2.9	2.6	0.9	2.7	1.7	0	1.4	1.4	0.4	2.3	1.9
149	Nepal	0.3	2.7	2.5	0.4	2.8	2.4	0.6	2.6	2.1	0.4	2.7	2.3
165	Pakistan	1.2	3.6	2.4	-0.6	1.9	2.5	0	2.3	2.2	0.2	2.6	2.4
38	Sri Lanka	0.7	1.6	1	1	1.6	0.6	0.1	0.9	0.8	0.5	1.3	0.8

Food per person = Food – Population, Data Sources: FAOSTAT, (Food and Agricultural Organisation (FAO), Rome)

**Table 5.3: Prevalence of Undernourishment**

<b>Undernourishment: Prevalence of undernourishment in total population (%)</b>					
Country	1990-1992	1995-1997	2000-2002	2006-2008	GR. RATE
Bangladesh	38	41	30	26	-2.34
India	20	17	20	19	-0.32
Iran					
Maldives	9	9	8	10	0.66
Nepal	21	20	18	17	-1.31
Pakistan	25	20	24	25	0
Sri Lanka	28	25	20	20	-2.08
<i>Southern Asia</i>	22	20	21	20	-0.59
<i>Sub-Saharan Africa</i>	31	31	29	27	-0.86
World	16	14	14	13	-1.29

Data Sources: FAOSTAT, (Food and Agricultural Organisation (FAO), Rome

**Table 5.4: Food consumption- Dietary Energy Consumption, Minimum Dietary Energy Requirement, Gap in Dietary Energy Consumption**

<b>Food consumption</b>					
<b>Dietary Energy Consumption (kcal/person/day)</b>					
Country	1990-92	1995-97	2000-02	2006-08	GR. RATE
Bangladesh	1960	1930	2170	2270	0.92
India	2290	2320	2260	2360	0.19
Iran	2970	3040	3060	3050	0.17
Maldives	2400	2430	2550	2550	0.38
Nepal	2190	2210	2260	2340	0.41
Pakistan	2210	2340	2270	2280	0.2
Sri Lanka	2170	2250	2360	2370	0.55
<i>Southern Asia</i>	2270	2300	2290	2360	0.24
<i>Sub-Saharan Africa</i>	2120	2150	2200	2270	0.43
WORLD	2610	2680	2720	2790	0.42
<b>Minimum Dietary Energy Requirement (kcal/person/day)</b>					
Country	1990-92	1995-97	2000-02	2006-08	GR. RATE
Bangladesh	1690	1720	1740	1770	0.29
India	1740	1750	1760	1780	0.14
Iran	1700	1750	1810	1830	0.46
Maldives	1660	1690	1750	1800	0.51
Nepal	1690	1690	1700	1730	0.15
Pakistan	1690	1700	1720	1740	0.18
Sri Lanka	1770	1790	1810	1800	0.11
<b>Gap in Dietary Energy Consumption (kcal/person/day)</b>					
Country	1990-92	1995-97	2000-02	2006-08	GR. RATE
Bangladesh	270	210	430	500	3.93
India	550	570	500	580	0.33
Iran	1270	1290	1250	1220	-0.25
Maldives	740	740	800	750	0.08
Nepal	500	520	560	610	1.25
Pakistan	520	640	550	540	0.24
Sri Lanka	400	460	550	570	2.24

Data Sources: FAOSTAT, (Food and Agricultural Organisation (FAO), Rome

**Table 5.5: Dietary Protein and Fat Consumption**

<b>Dietary Protein Consumption (g/person/day)</b>					
Country	1990-92	1995-97	2000-02	2005-07	GR. RATE
Bangladesh	42	42	47	49	0.97
India	56	56	55	56	0
Maldives	80	88	105	110	2.01
Nepal	55	56	57	60	0.55
Pakistan	56	60	59	57	0.11
Sri Lanka	48	51	54	55	0.85
<i>Southern Asia</i>	55	56	56	57	0.22
<i>Sub-Saharan Africa</i>	52	52	54	56	0.46
WORLD	76	80	82	85	0.7
<b>Dietary Fat Consumption (g/person/day)</b>					
Country	1990-92	1995-97	2000-02	2005-07	GR. RATE
Bangladesh	18	21	25	29	3.03
India	40	45	45	48	1.15
Iran (Islamic Republic of)	63	64	62	67	0.39
Maldives	46	51	62	69	2.57
Nepal	35	35	37	40	0.84
Pakistan	56	63	63	67	1.13
Sri Lanka	42	43	44	47	0.71
<i>Southern Asia</i>	41	46	45	49	1.12
<i>Sub-Saharan Africa</i>	43	45	46	48	0.69
WORLD	67	72	74	79	1.04

Data Sources: FAOSTAT, (Food and Agricultural Organisation (FAO), Rome)

**Table 5.6: Food Consumption Pattern of Main Food Groups in South Asian Countries**

Food Consumption Pattern of Main Food Groups					
Share in total Dietary Energy Consumption (percent)					
Country name	Food groups	1990-92	1995-97	2000-02	2005-07
Bangladesh	Cereals - Excluding Beer	84	82	82	78
	Vegetable Oils	4	6	6	7
	Sugar & Sweeteners	3	3	3	4
	Starchy Roots	1	1	2	3
India	Cereals - Excluding Beer	64	61	60	60
	Vegetable Oils	7	8	8	9
	Sugar & Sweeteners	9	9	10	8
	Pulses	5	5	5	5
	Milk - Excluding Butter	4	5	4	4
	Animal Fats	1	2	2	3
	Fruits - Excluding Wine	2	2	2	2
Iran	Cereals - Excluding Beer	60	58	58	53
	Sugar & Sweeteners	9	9	8	9
	Fruits - Excluding Wine	5	7	7	8
	Vegetable Oils	9	8	7	7
	Meat	3	4	4	5
	Vegetables	3	3	3	4
	Starchy Roots	3	3	3	4
	Milk - Excluding Butter	3	3	3	3
Maldives	Cereals - Excluding Beer	46	42	40	35
	Fish, Seafood	9	12	15	14
	Sugar & Sweeteners	17	16	13	13
	Milk - Excluding Butter	3	4	5	7
	Vegetable Oils	7	6	7	7
	Fruits - Excluding Wine	2	4	4	5
	Vegetables	2	3	4	4
	Meat	1	2	2	3
	Treenuts	1	2	2	3
Nepal	Cereals - Excluding Beer	74	73	71	69
	Vegetable Oils	6	6	6	7
	Starchy Roots	3	3	4	5
	Milk - Excluding Butter	3	3	3	4
	Pulses	3	3	3	3
	Spices	1	2	2	2
	Vegetables	1	1	2	2
Pakistan	Cereals - Excluding Beer	55	51	51	47
	Milk - Excluding Butter	9	10	11	12
	Sugar & Sweeteners	12	12	12	12
	Vegetable Oils	10	10	10	11
	Animal Fats	4	4	4	5
	Pulses	3	3	3	3
	Meat	2	2	2	3
Sri Lanka	Cereals - Excluding Beer	56	55	53	56
	Oilcrops	13	12	11	11
	Sugar & Sweeteners	11	11	13	11
	Vegetable Oils	3	2	3	4
	Pulses	3	3	3	3
	Milk - Excluding Butter	3	3	2	3
	Starchy Roots	4	3	3	2

Data Sources: FAOSTAT, (Food and Agricultural Organisation (FAO), Rome)



**Table 5.7: Food Consumption- Quantities**

Food consumption							
Quantities (g/person/day)							
Country	Food groups	1990-92	1995-97	2000-02	2005-07	%Change	GR. RATE
Bangladesh	Cereals - Excluding Beer	460	445	495	490	7	0
	Sugar & Sweeteners	19	19	18	24	26	2
	Pulses	14	11	12	11	-21	-2
	Vegetable Oils	10	12	15	17	70	4
	Vegetables	31	29	32	49	58	3
	Fruits - Excluding Wine	29	28	27	53	83	4
	Meat	7	8	8	10	43	2
	Milk - Excluding Butter	36	37	38	44	22	1
	Eggs	2	3	3	4	100	5
	Fish, Seafood	20	24	33	40	100	5
India	Cereals - Excluding Beer	440	427	407	414	-6	0
	Sugar & Sweeteners	58	62	64	51	-12	-1
	Pulses	35	35	31	32	-9	-1
	Vegetable Oils	18	21	21	22	22	1
	Vegetables	143	149	176	171	20	1
	Fruits - Excluding Wine	78	94	97	116	49	3
	Meat	11	10	10	9	-18	-1
	Milk - Excluding Butter	145	161	169	184	27	2
	Eggs	3	4	5	5	67	3
	Fish, Seafood	11	12	13	14	27	2
Iran	Cereals - Excluding Beer	546	538	553	509	-7	0
	Sugar & Sweeteners	73	77	72	76	4	0
	Pulses	17	19	18	19	12	1
	Vegetable Oils	30	29	24	26	-13	-1
	Vegetables	388	371	418	520	34	2
	Fruits - Excluding Wine	307	394	425	441	44	2
	Meat	56	64	67	86	54	3
	Milk - Excluding Butter	164	144	161	175	7	0
	Eggs	14	18	18	22	57	3
	Fish, Seafood	12	14	13	19	58	3
Maldives	Cereals - Excluding Beer	394	338	335	309	-22	-2
	Sugar & Sweeteners	112	108	93	101	-10	-1
	Pulses	22	4	5	9	-59	-6
	Vegetable Oils	19	16	20	21	11	1
	Vegetables	261	344	377	394	51	3
	Fruits - Excluding Wine	119	218	250	348	192	7
	Meat	19	30	40	61	221	8
	Milk - Excluding Butter	98	133	180	232	137	6
	Eggs	11	17	20	27	145	6
	Fish, Seafood	298	410	513	491	65	3
Nepal	Cereals - Excluding Beer	474	473	469	471	-1	0
	Sugar & Sweeteners	10	11	13	13	30	2
	Pulses	19	20	22	24	26	2
	Vegetable Oils	14	14	16	18	29	2
	Vegetables	130	147	166	207	59	3
	Fruits - Excluding Wine	103	99	94	105	2	0
	Meat	26	26	26	27	4	0
	Milk - Excluding Butter	103	101	105	111	8	0
	Eggs	2	2	3	3	50	3
	Fish, Seafood	2	3	4	4	100	5
Pakistan	Cereals - Excluding Beer	383	402	382	352	-8	-1
	Sugar & Sweeteners	73	79	74	76	4	0
	Pulses	19	20	17	18	-5	0
	Vegetable Oils	26	28	27	30	15	1
	Vegetables	73	85	81	83	14	1
	Fruits - Excluding Wine	86	102	86	98	14	1
	Meat	32	34	32	35	9	1
	Milk - Excluding Butter	305	381	404	427	40	2
	Eggs	4	5	6	6	50	3
	Fish, Seafood	6	6	6	5	-17	-1
Sri Lanka	Cereals - Excluding Beer	377	391	391	416	10	1
	Sugar & Sweeteners	62	65	86	71	15	1
	Pulses	17	18	21	20	18	1
	Vegetable Oils	7	6	8	10	43	2
	Vegetables	84	84	85	102	21	1
	Fruits - Excluding Wine	98	111	106	77	-21	-2
	Meat	10	14	17	18	80	4
	Milk - Excluding Butter	83	90	90	96	16	1
	Eggs	6	6	6	6	0	0
	Fish, Seafood	46	54	61	52	13	1

Data Sources: FAOSTAT, (Food and Agricultural Organisation (FAO), Rome

**Table 5.8: Health- Life expectancy at birth**

Health							
Life expectancy at birth (years)							
Country name		1990	1995	2000	2005	2009	GR.RATE
Afghanistan	total	41	42	42	43	44	0.37
	male	41	42	42	43	44	
	female	41	42	42	43	44	
Bangladesh	total	54	58	61	65	67	1.14
	male	53	57	60	64	66	
	female	55	58	62	66	68	
Bhutan	total	53	57	61	65	67	1.24
	male	51	55	60	63	65	
	female	54	58	63	67	68	
India	total	58	60	61	63	64	0.52
	male	58	59	60	61	63	
	female	58	60	62	64	66	
Iran	total	65	67	69	71	72	0.54
	male	64	66	68	69	70	
	female	66	68	70	72	73	
Maldives	total	60	62	66	70	72	0.96
	male	61	61	65	69	70	
	female	60	63	67	71	74	
Nepal	total	54	57	62	65	67	1.14
	male	54	57	61	65	66	
	female	54	58	62	66	68	
Pakistan	total	61	62	64	66	67	0.5
	male	60	62	64	65	67	
	female	61	63	64	66	67	
Sri Lanka	total	70	70	71	74	74	0.29
	male	66	66	67	70	71	
	female	73	73	75	78	78	

Data Sources: FAOSTAT, (Food and Agricultural Organisation (FAO), Rome

**Table 5.9: Health- Infant Mortality and Child Mortality**

Infant Mortality						
Infant mortality rate (0-1 year) (per 1,000 live births)						
Country name	1990	1995	2000	2005	2009	GR.RATE
Afghanistan	167	157	148	140	134	-1
Bangladesh	102	84	66	51	41	-5
Bhutan	91	79	68	59	52	-3
India	84	77	68	57	50	-3
Iran	55	47	38	31	26	-4
Maldives	80	60	43	20	11	-10
Nepal	99	83	63	48	39	-5
Pakistan	101	94	85	76	71	-2
Sri Lanka	23	21	17	15	13	-3
Child Mortality						
Under-five mortality rate (per 1,000 live births)						
Country name	1990	1995	2000	2005	2009	GR.RATE
Afghanistan	250	235	222	208	199	-1
Bangladesh	148	119	90	66	52	-5
Bhutan	148	125	106	90	79	-3
India	118	107	93	77	66	-3
Iran	73	60	48	37	31	-4
Maldives	113	80	53	24	13	-11
Nepal	142	117	85	62	48	-6
Pakistan	130	121	108	96	87	-2
Sri Lanka	28	25	21	17	15	-3

Data Sources: FAOSTAT, (Food and Agricultural Organisation (FAO), Rome

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## APPENDIX

### Testing for Extent of Market Integration

The G-G model is basically in the framework of factor analysis and can be easily derived by estimating a standard Vector Error Correction Model (VECM).

Let  $X_t$  be a vector of  $P$  prices of order  $(P \times 1)$  and each element of  $X_t$  be  $I(1)$  with mean 0. Let the elements of  $X_t$  be cointegrated with rank  $r$ . In other words, there exists a matrix  $\alpha_{p \times r}$  of rank  $r$  such that  $\alpha' X_t$  is  $I(0)$ . There are two features of  $X_t$ .

i)  $X_t$  has an error-correction (VECM) representation of the following form -

$$\Delta X_t = \gamma_{p \times r} \alpha'_{r \times p} X_{t-1} + \sum_{i=1}^{\infty} \Gamma_i \Delta X_{t-i} + \varepsilon_t \text{ where } \Delta = I - L \text{ with } L \text{ being the lag operator.}$$

where  $\gamma_{p \times r}$  is a matrix of the weights (speed of adjustment) of the cointegrating equations,  $\alpha_{p \times r}$  is the matrix of cointegrating vectors and  $\Gamma_i$  is the vector of short-run coefficients.  $\varepsilon$  is the error term.

This is the standard feature that finds application in most of the literature on market integration. We have made use of the second feature in this study, which is the following.

ii) The elements of  $X_t$  can be expressed in terms of a *smaller* number  $(p-r)$  of  $I(1)$  variables, called the common factors and denoted by  $f_t$ , plus some stationary  $I(0)$  components.

$$X_{t \times p \times 1} = A_{1 \times p \times k} f_{t \times k \times 1} + \tilde{X}_{t \times p \times 1} \text{ where } k = p-r.$$

This is similar to standard factor analysis. In factor analysis the main objective is to estimate the loading matrix  $A_1$  and the number of common factors  $k$ . In the VECM representation above, these two are already known.  $A_1$  is any basis of the null space of the cointegrating vector  $\alpha$  such that  $\alpha' A_1 = 0$  and  $k$  is equal to  $p-r$  where  $r$  is the cointegrating rank. The goal of the G-G methodology is to estimate  $f_t$ . The standard restrictions used in factor analysis are not adequate in this case since the data are non-stationary. The following additional conditions are imposed to identify  $f_t$ .

a)  $f_t$  is a linear combination of elements of  $X_t$

b)  $A_1 f_t$  and  $\tilde{X}_t$  are the permanent and transitory components respectively of  $X_t$ . According to this condition the only shocks that can affect the long-run forecast of  $X_t$  are those coming from  $u_{pt}$  i.e. the error term of the permanent component  $A_1 f_t$ . From these conditions, after substantial manipulation, one can obtain  $f_{t \times k \times 1} = \gamma'_{L \times k \times p} X_{t \times p \times 1}$  such that  $\gamma'_L \gamma = 0$  and  $k=p-r$

The  $f_t$  s are the linear combinations of  $X_t$  that have the common feature of not containing the levels of the error-correction term  $z_{t-1}$  in them. Once  $f_t$  s are identified, inverting the matrix  $(\gamma_L, \alpha)'$  we obtain the permanent-transitory decomposition of  $X_t$ .

$$X_{t_{p \times 1}} = A_1 \gamma'_{L_{k \times p}} X_{t_{p \times 1}} + A_2 \alpha'_{r \times p} X_{t_{p \times 1}}$$

where  $A_1 = \alpha_{L_{p \times k}} (\gamma'_{L_{k \times p}} \alpha_{L_{p \times k}})^{-1}$ ,  $A_2 = \gamma_{p \times r} (\alpha'_{r \times p} \gamma_{p \times r})^{-1}$

Therefore the decomposition of  $X_t$  into permanent and transitory components is complete

$$X_{t_{p \times 1}} = \left[ A_1 \gamma'_{L_{k \times p}} f_{t_{k \times 1}} \right] + \left[ A_2 \gamma_{p \times r} z_{t_{r \times 1}} \right]$$

in which the first term is the permanent component and the second is the transitory component.

$$f_{t_{k \times 1}} = \gamma'_{L_{k \times p}} X_{t_{p \times 1}} = I(1) \text{ Common Factor}$$

$$z_{t_{r \times 1}} = \alpha'_{r \times p} X_{t_{p \times 1}} = I(0) \text{ Stationary Component}$$

$\gamma_{p \times r}$  = Weights (speed of adjustment) of the cointegrating equations

$\gamma_{L_{p \times k}}$  = Orthogonal matrices of  $\gamma$

$\alpha_{p \times r}$  = Cointegrating vectors

$\alpha_{L_{p \times k}}$  = Orthogonal matrices of  $\alpha$

p= order of  $X_t$  (number of elements in vector  $X_t$ ), r= number of cointegrating vectors, k=p-r

As may be seen, the order of  $f_t$  is  $k \times 1$  where  $k=p-r$ . Therefore, if  $r = p-1$  which means that there are  $p-1$  cointegrating relations among  $p$  variables, then there is a single common factor among the  $p$  variables i.e.  $k=1$  and  $f_t$  is a single element vector. In case of integrated markets, we expect to find a single common factor (of prices) driving the entire system. It needs to be noted here that a 'single factor' does not imply a 'single market' but a 'single linear combination' of a subset of markets of  $X_t$ . *Therefore for a set of  $n$  markets to be integrated, we should have  $n-1$  cointegrating vectors. We make use of this property to identify the set of integrated markets in this study.* Gonzalez-Rivera and Helfand (2001), and Jha et. al (2005) used this model to assess the rice market integration in Brazil and India respectively.

We start with an appropriately large number ( $n_1$ ) markets out of a total number of  $n$  markets such that  $n_1 < n$ . We then test for the number of cointegrating vectors in this set of markets. If the number of cointegrating vectors is  $n_1-1$ , then we add one more market to the set and again test for the number of cointegrating vectors. If the number of cointegrating vectors is still  $n_1-1$  (instead of  $n_1$ ) then we drop the newly included market and try another market. This process is continued till we have the largest set (say  $n_2$ ) of integrated markets. If all the  $n$  markets are integrated, then  $n_2=n$ .

Starting with different sets of markets will provide different answers to the question as to how many markets are integrated. We start with a set of  $n_1$  important markets in each country based on data availability. Obviously this leads to some degree of arbitrariness. To address the potential problems with this initial selection, we have experimented with

different orders. The results (the no of cointegrating vectors) have remained largely invariant to the order of initial selection. However, the econometric problems with such sequential selection are one potential area for future research.