



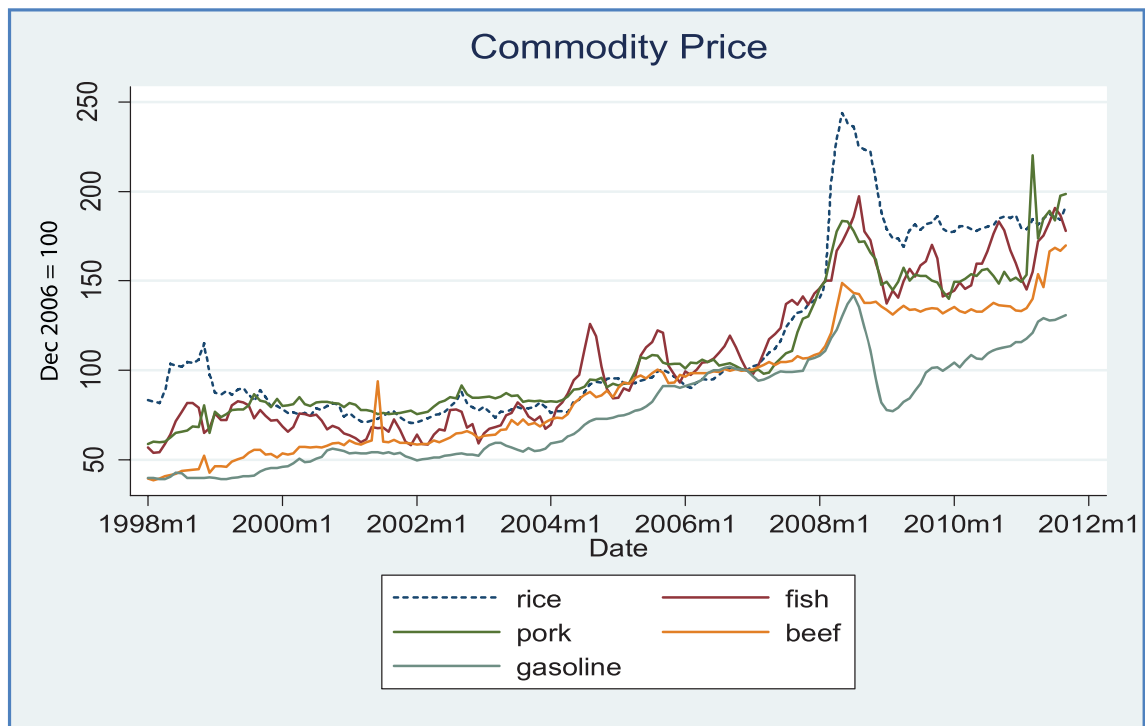
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*The NGO Forum on Cambodia*

ធ្វើការរួមគ្នាដើម្បីការវិវឌ្ឍសេដ្ឋកិច្ច  
*Working Together for Positive Change*

## Rapid Assessment of the Impact of Rising Food Prices on the Poor and Vulnerable and Policy Responses in Cambodia



Research Conducted by:  
Cambodia Development Resource Institute (CDRI)

In Partnership with  
The NGO Forum on Cambodia

Phnom Penh, Cambodia  
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## **Rapid Assessment of the Impact of Rising Food Prices on the Poor and Vulnerable and Policy Responses in Cambodia**

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## List of Acronyms

ADB	Asian Development Bank
AIC	Akaike Information Criterion
ASEAN	Association of Southeast Asian Nations
CDRI	Cambodia Development Resource Institute
CEA	Cambodia Economic Association
CPI	Consumer Price Index
CR	Consumption Ratio
EIC	Economic Institute of Cambodia
FAO	Food and Agriculture Organisation
FDI	Foreign direct investment
GDP	Gross domestic product
HH	Household
HQIC	Hannan-Quinn information criterion
IMF	International Monetary Fund
KHR	Cambodian riel
LDC	Least Developed Countries
NBR	Net Benefit Ratio
NGOF	The NGO Forum on Cambodia
NIS	National Institute of Statistics
NSDP	National Strategic Development Plan
OPEC	Organisation of Petroleum Exporting Countries
PR	Production Ratio
SBIC	Bayesian information criterion
UNICEF	United Nations International Children's Fund
USD	United States Dollar
VAT	Value Added Tax

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# EXECUTIVE SUMMARY

The increase in global food prices in 2008 has led to significantly higher food prices across developing countries. Having peaked in mid-2008, global food prices have fallen but remain volatile, and local food prices are still high in many countries including in Cambodia. The food and non-alcoholic beverages price index in Phnom Penh has continued to increase since March 2009. For this reason, this study attempts to investigate the causes of rising food prices, assess the impact of the recent rise in commodity prices on poor households and vulnerable groups, and update the government policy responses in Cambodia. Specifically, the study will highlight the different key factors behind rising food prices in 2008 and 2011, measure the effect of the food price hikes on poverty, and provide policy options to mitigate the impact of rising food prices on poor households and vulnerable groups.

The study examines the trends of the Consumer Price Index, particularly its main component of food and non-alcoholic beverages, in Cambodia over the past 15 years. It empirically explores how international prices transmit to domestic prices by employing the vector autoregression (VAR) model which is commonly used to investigate the pass-through of external shocks (exchange rate, oil price and import price shocks) into inflation. It is widely acknowledged that rising food prices affect households differently: some households may benefit from higher prices, while others are adversely affected. In this regard, the study adopts Deaton's framework, which postulates that the first order welfare effect of food price changes on households is proportional to the net benefit ratio, to estimate the short-run welfare impact of price changes on household welfare. The ratio is the difference between the consumption and production ratio. The consumption ratio is the share of the value of food purchases and own consumption in total household expenditure. The production ratio is the share of the value of agricultural sales and own production in total household income.

Primary data on commodity prices, exchange rate, and consumer price index used to examine the trends and causes of rising food prices are derived from CDRI, IMF and NIS. To measure the impact of food price shocks on household welfare and poverty, CDRI has conducted a survey of 421 households in eight villages, five of which are located in rural areas.

The study finds that the increased costs of food production, processing and marketing linked to higher energy prices, the use of food crops such as corn for bio-fuel production in the United States and European Union countries, higher consumption of high quality food such as meat and dairy products in the emerging economies, greater demand for animal feed, poor harvests in major agricultural regions, a low stock-to-use ratio, the weakness of the US dollar and speculative behaviour by both government and commercial agents were responsible for the 2008 spike in global food prices. And factors such as demand shocks, adverse weather, smaller stocks and the weakness of the US dollar remained the key drivers of global price increases in 2011. In addition, the new mechanism behind agricultural commodity markets today is likely to be a reduction in elasticity or price responsiveness to demand and supply.

In line with global prices, agricultural prices in Cambodia rose significantly in 2008 and showed an upward trend in 2011. The study notes that the price increases in Cambodia in 2008 were mostly driven by international changes in food and oil prices, domestic demand



pressure (real estate boom) and the weak US dollar. In 2011, international commodity prices, energy prices and the weakness of the US dollar were still the primary causes of domestic food price increases. Although the inflation rate in 2011 was lower than in 2008, food prices remained high—reflecting higher global commodity and oil prices and the weakness of the US dollar. VAR model reconfirms that external factors are part of Cambodia’s food price inflation. However, they account for a small proportion of food price inflation which implies that food price inflation is not entirely due to outside factors beyond the government’s control.

CDRI household survey data suggests that rising food prices are more likely to lead to lower household welfare and higher poverty headcount ratio. The welfare losses are estimated to be 9 percent for rural and 10 percent for urban villages in 2008. Welfare losses due to food price increases between 2009 and 2011 were around 3 percent. The 32 percent rise in food prices in 2007-2008 is estimated to have increased the poverty headcount ratio by 5.8 percentage points. These findings are consistent with ADB (2011), which suggests that the overall poverty headcount in Cambodia would increase by 6.8 percentage points if food prices jump by 30 percent. Our finding has also noted that the poverty headcount ratio in rural households seems to increase faster than in urban households owing to the fact that the magnitude of the impact is determined not only by net food position but also by the patterns of food consumption and production; a rural household that is a net food buyer may be hurt much more than an urban household if its relative expenditure on food consumption is much higher than the urban household’s.

The government of Cambodia has introduced both short- and medium-term policies to address food price shocks. During the 2008 food price crisis, the government reduced the money supply by increasing the reserve requirement, raising minimum capital requirement and imposing a ceiling on real estate lending. Fiscal tightening was enforced by improving revenue collection and restricting unnecessary spending. In early 2009, the reserve requirement for commercial banks was reduced and the credit ceiling on real estate was lifted, but the minimum reserve requirement remained unchanged. For immediate response, the government increased the domestic supply of food, seeds and fertilisers at subsidised prices, restricted rice exports for two months, and provided credit to the Rural Development Bank to increase rice stock. Moreover, the ban on pork imports was lifted to increase the supply of meat in domestic markets. In addition, the government committed to contribute a certain amount of rice per year for three consecutive years to the World Food Programme to support school feeding and food-for-work programmes. Other direct interventions included reducing duties on food imports to zero, suspending some business taxes, increasing allowances and salary for several groups including civil servants, retirees, teachers and garment workers, applying fixed reference price for levying taxes for instance on fuel, and subsidising electricity. No such policies were implemented in 2011 though food prices reached their highest levels. For medium term responses, the government has reduced tariffs on agricultural inputs to zero as an incentive for farmers to increase production and improve agricultural productivity. To accelerate agricultural sector growth, the government launched the “Policy Paper on the Promotion of Paddy Production and Rice Export” in 2010 and made further commitment to upgrade irrigation infrastructure in 2011-12. In early 2011, the “National Social Protection Strategy for the Poor and Vulnerable” was promulgated to strengthen existing social protection and social safety nets.



# 1. INTRODUCTION

Just before the global financial and economic crisis loomed in late 2008, Cambodia, like many other countries, had been experiencing gradual increases in food prices for several years when these suddenly shot up and peaked in mid-2008. At that time, prices of basic foods reached record highs; for instance, the price of rice increased by over 90 percent year-on-year during the second quarter of 2008. The food price spike was accompanied by an escalation of the energy price index, which increased year-on-year by an average 73 percent for the first six months of 2008 (Jalilian *et al.* 2010). The price shock slowly subsided amid the first throes of the crisis, but prices had barely bottomed before they started rising again in the second quarter of 2009. As of May 2011, the food price index had topped its peak of 2008 (June) by just over 4 percent. Such a trend raises serious concern over potential negative impacts on poor and vulnerable Cambodians.

This study primarily employs empirical methods to measure the first-order welfare impact<sup>1</sup> of rising food prices on the poor and vulnerable in Cambodia. It also aims to answer some important questions, including the underlying causes of food price increases, and to analyse the government's policy responses. The impacts of high food prices in Cambodia have already been investigated in several studies whose findings suggest various negative implications, including loss of household welfare and health deficit due to reduced quantity and quality of food consumption, the threat of widespread malnutrition among children and increased household debt (see Chan 2009; Tong 2009; UNICEF 2008). As a whole, the food price shock made households vulnerable to poverty traps, thus undermining efforts to alleviate poverty (Chan 2009).

Most of the above impact assessment studies on Cambodia, however base their analysis on descriptive statistics from surveys and some qualitative data. This simple approach is useful but not always sufficient to generate more reliable answers, making it hard for researchers to come up with a useful conclusion. Such studies therefore should be anchored on established theories or literature, of which there is much in academic publications. For assessing the poverty impact of food price increases in particular, it is more useful to provide evidence on the magnitude of the impact than to only address whether or not any impact takes place. Based on previous literature, this paper adopts a method that can provide a better understanding of the impact of food price increases on households in the short-run and the implications for poverty.

Our approach to measuring the impact of rising food prices is to calculate the net benefit ratio (NBR) for each household and determine which households are net food buyers and which food sellers. The NBR is the difference between the consumption ratio (CR) and the production ratio (PR). If NBR is positive (negative), the household is defined as a net seller (net buyer). The proxy used for the production ratio (PR) is the share of the value of agricultural sales and own consumption in total household income, while the proxy used for the consumption ratio (CR) is the share of the value of food purchases and own consumption

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<sup>1</sup> It is called first-order impact since the empirical methods employed do not capture changes in household consumption decisions (which might be the case) amid sudden food price inflation.

in total household expenditure. Net food sellers gain from food price increases, so their welfare is enhanced, while net food buyers suffer welfare loss. This model is not new but rather a conventional one that was developed by Deaton (1989) and has since been widely used by many scholars who examined similar topics (Budd 1993; Barrett & Dorosh 1996; Minot & Goletti 2000; Kytchukova & Diop 2006; Arndt *et al.* 2008; Ivanic & Martin 2008).

However, our method differs slightly from the existing literature in that we use net proceeds instead of gross proceeds from sales in computing NBR. While the previous literature ignores production expenditure, we argue that doing so risks overestimating the NBR, hence overstating the number of net food sellers. One reason for the exclusion of production expenditure is perhaps the assumed minimal amount spent on production where a farmer's own labour cost is not imputed. In Cambodia, however, production expenditure is considerable. Most of the time farmers have to hire labour, rent agricultural tools and buy inputs such as fertilisers, pesticides and even water.

Using 2011 household survey data from eight villages, we show that rises in food prices reduce household welfare and increase poverty. The poorest suffer most from sudden food price hikes as a result of their low food production capacity. As for the causes, we find that not only external factors such as rising international commodity and energy prices and a weak US dollar, but also other internal factors such as exceptionally high domestic demand and inflationary expectations are the drivers behind the domestic food price increases in 2008 and 2011. As for policy, we argue that a strong and effective social safety net and the promotion of agriculture in the longer term are key to both addressing and preventing food price shocks.

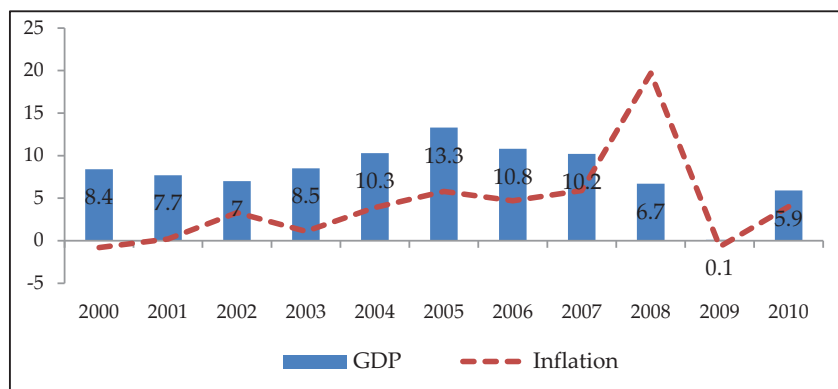
The paper is structured as follows. Section 2 reviews recent Cambodian macroeconomic performance. Section 3 discusses food price trends and underlying causes. Section 4 presents the findings on the impact of food price increases on households and on poverty, while Section 5 discusses the government's policy responses. Section 6 concludes. We leave theoretical discussion and methodology to the appendices.

## 2. RECENT MACRO ECONOMIC PERFORMANCE

Cambodia achieved a remarkable economic growth rate of 9.6 percent during 2000–07, but growth slowed to 6.7 percent in 2008 and stalled at 0.1 percent in 2009. The slowdown of 2008–09 was mainly driven by higher oil and food prices, the collapse of the property market, and the onset of the global financial crisis. A rebound in tourism and garments along with improved agricultural yields due to favourable weather expanded GDP growth to 5.9 percent in 2010. In the first quarter of 2011, GDP growth was projected to reach 6.5–7.0 percent; however, GDP is now expected to grow more slowly than previously forecast. The government in late October revised its growth forecast downwards to 6.0 percent. More recently, the World Bank also downgraded its projections from 6.8 percent to 6.0 percent, mainly due to the extraordinary flooding in September and October and the expected slowdown of European Union countries' and the United States' economies in the second half of the year. The floods damaged about 390,000 hectares of rice seedlings and paddy, or 12 percent of the previous year's cultivated area. The Asian Development Bank (ADB) has not yet revised its projection of 6.8 percent, but the senior country economist at the Cambodia Mission acknowledges that the World Bank's revision is sensible.

Inflation registered a record high of 19.7 percent in 2008, and then slowed to -0.7 percent in 2009 and 4.0 percent in 2010. The high inflation in 2008 was mainly driven by international price increases, particularly for oil and commodities, the depreciation of the US dollar and domestic demand. The government adopted a wide range of policy responses, including tightening monetary policy, releasing stock at subsidised prices, reducing tariffs and customs fees on imports and banning exports, to bring inflation down to single digit figures. The surge in international oil and food prices in the first half of 2011 accelerated annual inflation from 3.3 percent in January to 6.7 percent in September, though still within the forecasted range of 5.5 to 7.5 percent.

**Figure 1: GDP Growth and Inflation Rate**



Source: ADB (2011)

Data from the Ministry of Commerce show that Cambodia's exports rose by 42 percent in the first half of 2011—31 percentage points higher than the same period in 2010. At the same time, garment production rose 37 percent over January–June 2010, reflecting strong demand from Cambodia's main export destinations, the United States and European Union. The garment sector is expected to continue to promote growth because new EU rules of origin

offering better market access for least developed countries (LDCs) such as Cambodia came into effect on 1 January 2011. The new rules allow LDCs to claim that goods are manufactured in their territories even if the primary materials are imported. Nevertheless, the trade deficit is expected to remain substantial owing to the high value of imports. The current account deficit is forecast at 10.7 percent of GDP in 2011 and 10.2 percent in 2012 (ADB 2011).

In January–June 2011, the number of tourist arrivals climbed to 1,385,029, an increase of 13 percent from the same period in 2010 and up 24 percent from the same period in 2009. The largest gains were in arrivals from Asia, particularly Vietnam, South Korea and China. Tourist arrivals in the second half of 2010 amounted to 1,287,133. Tourism, one of the four major drivers of Cambodia's economy, was expected to expand by 6.5 percent in 2011.

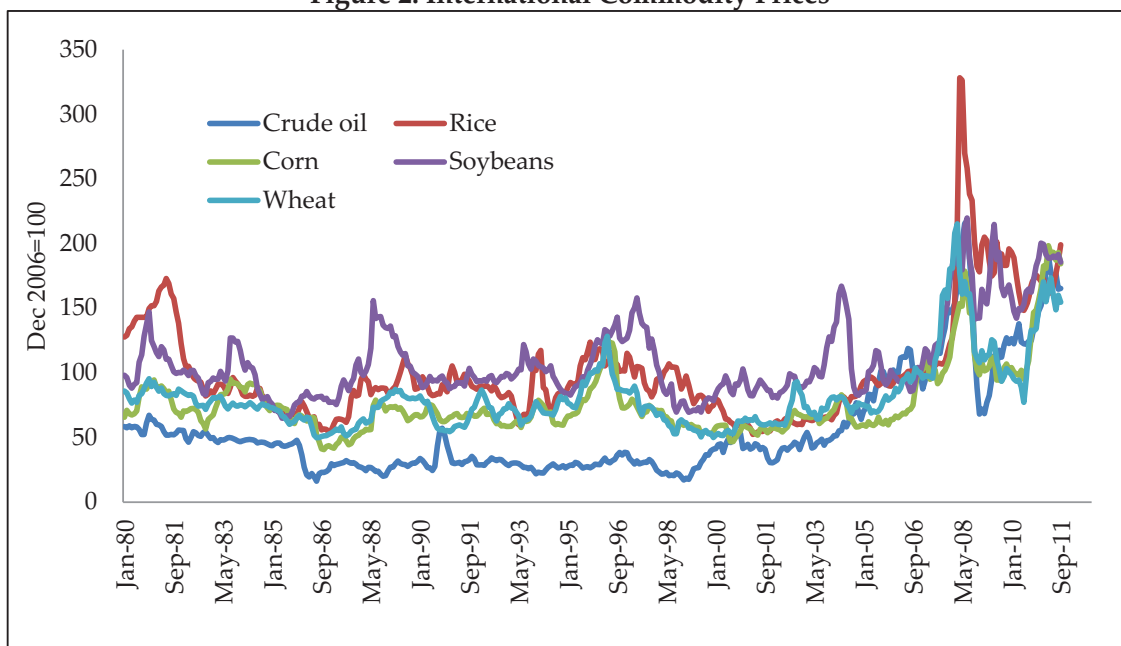
Foreign direct investment (FDI) rose by 51 percent to USD801 million in 2010, from USD530 million in 2009. In addition to creating jobs, FDI usually involves the transfer of technology and managerial skills from more developed to less developed countries. Given the strong potential growth in agriculture and garments, FDI is projected to have increased to USD890 million in 2011 and USD1006 million by 2012-end. Despite Cambodia's investment law being the most favourable in the region, its FDI inflow between 2005 and 2009 accounted for merely 1.2 percent of total FDI inflows to South-East Asia, 0.6 percentage points higher than in Laos, but 10.5 lower than in Vietnam and 15.5 percentage points lower than Thailand.

# 3. CAUSES OF HIGHER FOOD PRICES

## 3.1. Global Perspective

The international prices of a wide range of food commodities increased significantly during the first half of 2008. A large number of studies have attempted to identify the causes of the price surge (Abbott *et al.* 2008; Baltzer *et al.* 2008; Schnepf 2008; Trostle 2008; von Braun 2008, Mitchell 2008; Imai *et al.* 2008). Some of them emphasise demand and supply factors, while other explanations address financial markets and exchange rates.

Figure 2: International Commodity Prices



Source: International Monetary Fund, *International Financial Statistics* online (<http://www.imf.org/external/data.htm>, accessed 14 November 2011)

There are at least three demand-side explanations for the 2008 food price hike. First, the growing world population combined with strong income growth in emerging economies, which some analysts argue is associated with dietary change towards higher quality foods such as meat and dairy products, has increased demand for grain (it takes around 7 kg of grain to produce 1 kg of beef). Second, the increasing production of ethanol and bio-fuel requires a large quantity of agricultural commodities as inputs. Third, precautionary actions such as that of the Philippines, which imported its normal annual quantity of rice in just the first four months of 2008, increased world rice prices.

Supply-side explanations include declining stocks of food, slowing productivity, adverse weather, high fuel prices and export restrictions. The global stock-to-use ratios for corn, wheat and rice declined significantly during 2005–08 compared to 1990–2000, even below the FAO (1983) benchmark of 17–18 percent of total consumption. Low stocks might have

triggered speculative demand on commodity futures markets and contributed to spikes in food prices. The yield growth rate of rice, wheat and corn has been on a falling trend for the last two decades and has lagged behind the rate of population growth. Apart from the decline in productivity growth, drought-related harvest failures in Australia, the United States, Russia and Ukraine and flooding in South Asia also hampered agricultural production. Oil prices have a large impact on the costs of agricultural products because the energy used in agricultural production is mostly oil-related. The most common agricultural inputs, i.e. fertilisers and other agro-chemicals, also rely heavily on oil for their production. In addition, higher oil prices made ethanol and bio-fuel production more attractive. In response to higher food prices, some major grain exporting countries imposed trade barriers and export restrictions. India, Vietnam, Egypt and Cambodia restricted rice exports to control the domestic price. Consequently, world prices escalated further due to the supply shortfall.

The rapid depreciation of the US dollar against the euro, about 35 percent from January 2002 to June 2008, also contributed to food price increases. The depreciation of the dollar has been shown to increase dollar-denominated commodity prices with elasticity between 0.5 and 1.0 (Gilbert 1989). Given an elasticity of 0.75, the increase in food prices due to the decline of the dollar would have been about 20 percent (Mitchell 2008). Low interest rates, especially in the United States, create an upward pressure on prices for a wide range of commodities (Frankel 1984), simultaneously increasing the demand for storable commodities and firms' desire to add such stocks to their inventories, and encouraging speculators to shift out of Treasury bills into commodity contracts. These explanations have both strengths and weaknesses, as summarised in Table 1.

International agricultural prices rose again in 2011, some commodities equalling or exceeding peaks of 2008. As shown in Figure 2, corn prices exceeded the peak of June 2008. Soybeans nearly returned to the 2008 peak. The price of rice had fallen by 55 percent in June 2010 from its peak of April 2008, but was still higher than in the previous two decades and started to edge up again in 2011. Wheat prices dropped remarkably after hitting a record high in March 2008; however, they have risen sharply since mid-2010. Abbott *et al.* (2011) note that factors such as demand shocks, adverse weather, smaller stocks and depreciation of the US dollar were still the key drivers of the price increases in 2011. They add that an additional mechanism in agricultural commodity markets today is a reduction in elasticity or price responsiveness to demand and supply. The main sources of this reduction are tightness of land supply and more limited reallocation possibilities, bio-fuel policy constraints, higher livestock prices contributing to persistent feed demands, depleted stocks creating price incentives to store grain and trade policies that isolate national markets.



**Table 1: Strengths and Weaknesses of Explanations for the Rise in Agricultural Commodity Prices**

<b>Factor</b>	<b>Mechanism</b>	<b>Strength</b>	<b>Weakness</b>
Rising world demand	Increased demand as direct consumption and as animal feed	Population growth outpaces production growth; emerging economies can afford higher quality food	No critical weaknesses
Ethanol/bio-fuel demand	Increased use of limited agricultural products	Consumed 25 percent of US corn crop in 2007; two-thirds of global corn exports are from the US	Strong for corn, but substitute effects could account for rises in other products
Oil prices	Increased agricultural inputs, processing and marketing costs	Large component of food production and transport costs, especially in wheat and corn production	No critical weaknesses
Productivity slowdown	Supply shortfall	Production and yield growth of rice, wheat and corn has slowed over the last 20 years	Productivity has slowed but it is not clear that demand exceeds supply over this period
Export restrictions	Tighten world supply; precautionary action	Rice prices surged dramatically after India, Vietnam, Egypt and Cambodia imposed export restrictions	The biggest rice exporter (Thailand) did not impose restrictions
Weather shocks	Lower worldwide production	Australian wheat production was 50-60 percent below the trend growth rates in 2005 and 2006; there were also poor harvests in the US, Russia and Ukraine	Explains only wheat prices
Decline of stocks	Increased demand or reduced production	Stocks of all major cereals declined prior to the price surge	Lower price with higher stocks and just-in-time inventory systems may have led to lower stocks
Financial market speculation	Increased short-run price volatility	Increased financial market activity coincided with the rise in prices	There is not yet clear evidence of a causal link between futures and spot prices
Low interest rates	Increased market price of commodities	Low interest rates shift investors from Treasury bills to commodity contracts	Inventories of gold and oil are high, but stocks of staples are low; there is no reason that futures markets are affecting spot prices
Depreciation of US dollar	Most commodity prices are quoted in US dollars	US dollar and commodity prices are highly correlated	No critical weaknesses

Source: Heady and Fan (2008)

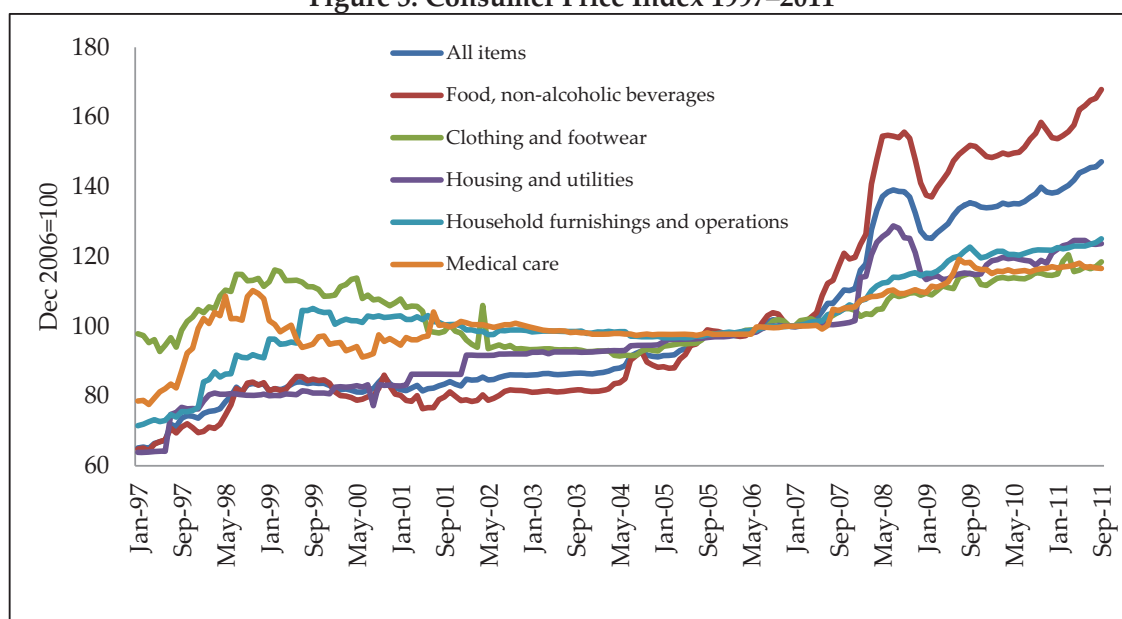
## 3.2. Cambodian Perspective

### 3.2.1. Descriptive Statistics

A few studies have attempted to address the causes of recent inflation in Cambodia. Ginting and Bird (2009) use the econometric error-correction model to test for price transmission from Thailand and Vietnam into Cambodia. They conclude that the transmission of inflation from these trading partners is important in explaining inflation in Cambodia—mainly through prices of food, which constitute more tradable goods. In addition, they note that demand and domestic factors such as the growth in narrow money also play a role. Similarly, So (2008) and Jalilian (2009) highlight that the increase of prices in Cambodia is mostly driven by international changes in food and oil prices because a small open economy always absorbs most or all of the changes in international prices. In this section, we review and extend the evidence on this issue.

The consumer price index indicates a remarkable food price rise since mid-2007. Figure 3 represents the consumer price index (CPI) for the capital city, Phnom Penh. Food and non-alcoholic beverages account for 50 percent of the consumption basket or CPI weights, housing and utilities for 24 percent. The price of food and non-alcoholic beverages, which registered lower than other items over 1997–2007, went up considerably from June 2007 to September 2008. Almost at the same time, the price of housing and utilities also rose significantly, mainly due to the real estate boom supported by the influx of capital. However, the rate of growth in food and non-alcoholic beverage prices was the most rapid, reaching its month-on-month record high of 48.6 percent in May 2008.

Figure 3: Consumer Price Index 1997–2011

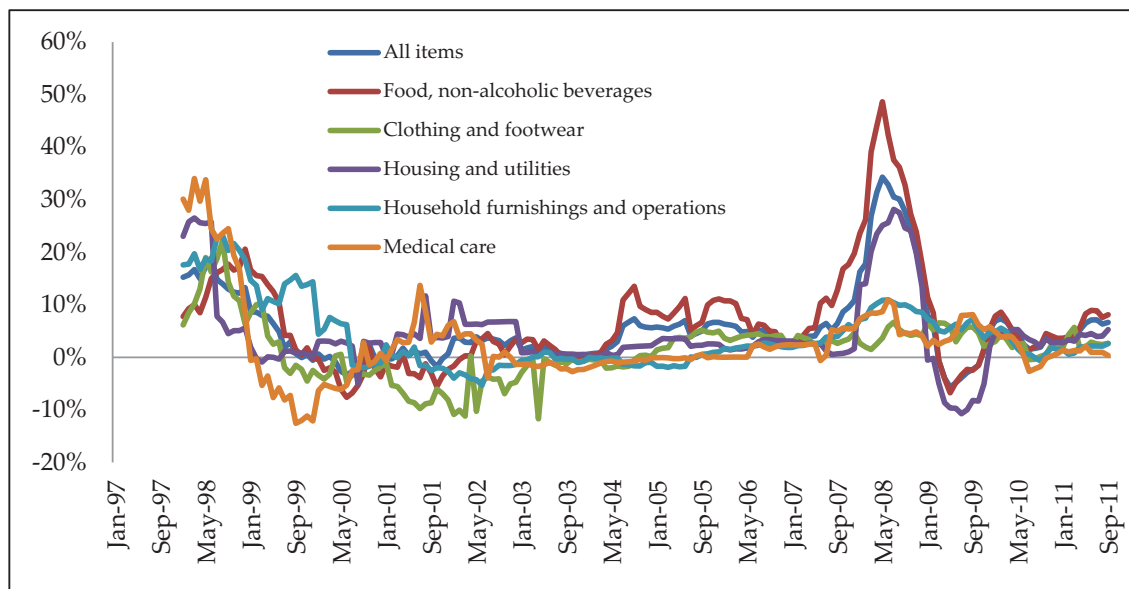


Source: National Institute of Statistics (1997–2011)

The food and non-alcoholic beverages price index has continued to increase and has reached its highest level since the inception of the index in 1997, but its growth rate has been relatively stable compared to 2004–06 (Figure 4). It is worth noting that food and non-alcoholic beverage prices started to accelerate again in the four months to September 2011—an average of 8.4 percent per month, or 4.2 percentage points higher than in January to April

2011. The food and non-alcoholic beverages price index is much higher than the overall price index, indicating that food price rises are the primary cause of recent inflation.

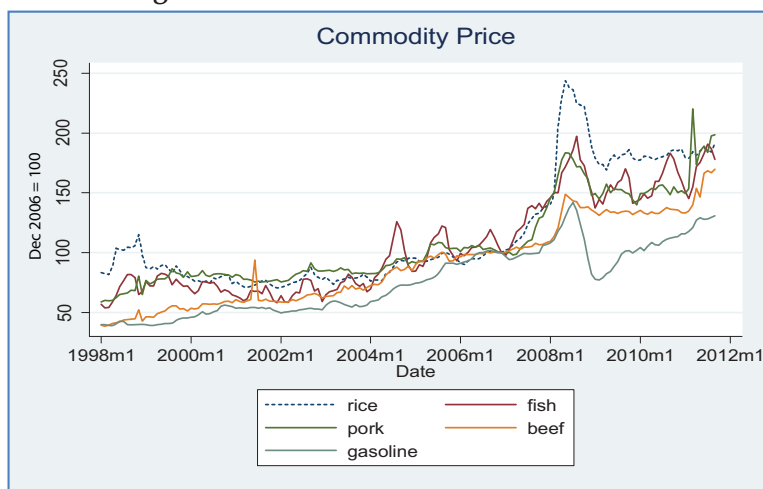
**Figure 4: Monthly Inflation, 1998-2011**



Source: National Institute of Statistics (1997-2011)

Figure 5 shows that most tracked commodity prices moved slowly upwards from 1998 to the end of 2006. In early 2007, the prices of rice, fish and pork started a steady rise. About a year later, the prices of beef and gasoline also picked up. By mid-2008, all commodity prices reached record highs. The change in gasoline price is best explained by the oil price increase in the world market (Figure 6a). The ADB (2008) notes that the international oil price rise was largely driven by greater demand from China, India and the oil-producing countries of the Middle East. The reasons for difficulty in supply keeping up with demand are complex, but are likely due to domestic political constraints within the Organisation of Petroleum Exporting Countries (OPEC) and the inability of non-OPEC countries to raise their production to meet the unexpected increase in short-term demand.

**Figure 5: Nominal Food Price Movement**

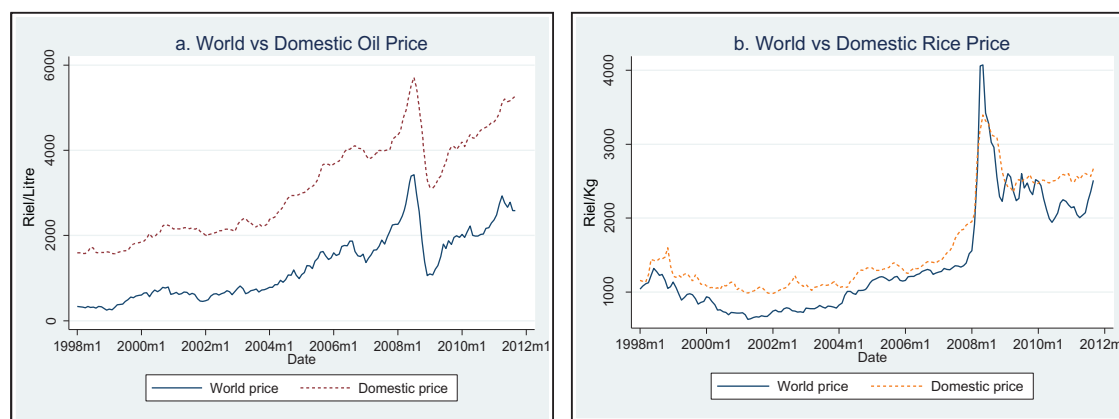


Source: CDRI Commodity Price Survey (1998-2012)

The cause of higher prices varies with individual commodities, but significantly higher oil prices and the growth of food demand combined with dietary transition towards higher quality food and the use of food grains to produce ethanol as a fuel across the globe have been the main drivers in Cambodia. As shown in Figure 6a, world rice prices are highly likely to be transmitted immediately into the Cambodian domestic market. Similar findings have been recorded in other rice exporting countries such as Thailand and Vietnam (Timmer 2008).<sup>2</sup> At the same time, Figure 6b also indicates that the change in the international price of rice was not completely transmitted to the domestic market, especially in 2010–11. Domestic rice prices move with less volatility than the international price—implying that Cambodian consumers and producers are not getting full price signals from international markets during these periods. Hence, the potential benefits to consumers of lower rice prices may be restricted and so also may be supply response.

Another factor that should play an important role in the domestic rice price increase is oil prices. However, the Cambodia Socio-economic Surveys in 2007 and 2009 revealed that direct expenditure on electricity, oil and diesel fuel on rice production accounted for only 4.3 percent of total costs. Farmers spent the most on chemical fertilisers (34.4 percent), hired draught power (tractors/animals) including human labour for ploughing and harrowing (19.5 percent), and seeds/seedlings (13.4 percent). There is evidence that oil prices affect the price of fertilisers and other agro-chemical inputs (Figure 7a). Nonetheless, a closer inspection of the data suggests that this explanation is not as convincing as it first appears. The price of fertilisers grew at an annual rate of 105 percent per month in 2008—almost five times more than gasoline prices. This poses the question of whether oil prices or other factors such as speculation or the depreciation of the US dollar are the main drivers of fertiliser prices.<sup>3</sup> Taking the rising cost of fertilisers, transport and other oil-related farm production/processing into account, oil prices are likely to have increased the rice price in 2008 and kept it high in 2010-2011.

**Figure 6: World vs. Domestic Prices**



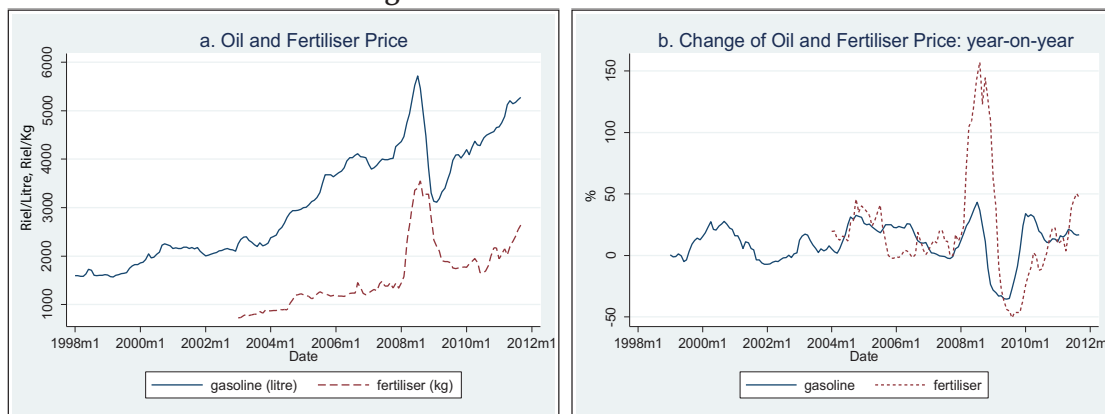
Source: CDRI Commodity Price Survey; International Monetary Fund, *International Financial Statistics* online (<http://www.imf.org/external/data.htm> (accessed 14 November 2011))

<sup>2</sup> Price transmission into Vietnam is incomplete because of government efforts to insulate domestic prices from world prices (Timmer 2008).

<sup>3</sup> It is commonly noted that the decline of the US dollar contributes to food commodity price increases (Mitchell 2008; Abbott *et al.* 2008; Gilbert 1989).

The combination of structural factors, i.e. production-consumption imbalance, export restrictions and precautionary rice purchases, are fundamental in explaining the rise in international rice prices in recent years—particularly in the first half of 2008. For Cambodia, however, structural factors are unlikely to influence the domestic rice price. The country has been self-sufficient in paddy production since 1995, and the surplus has expanded significantly over the last six years—an average of 4 million tonnes, equivalent to 2.5 million tonnes of milled rice given the conversion rate of 0.63 (Figure 8).

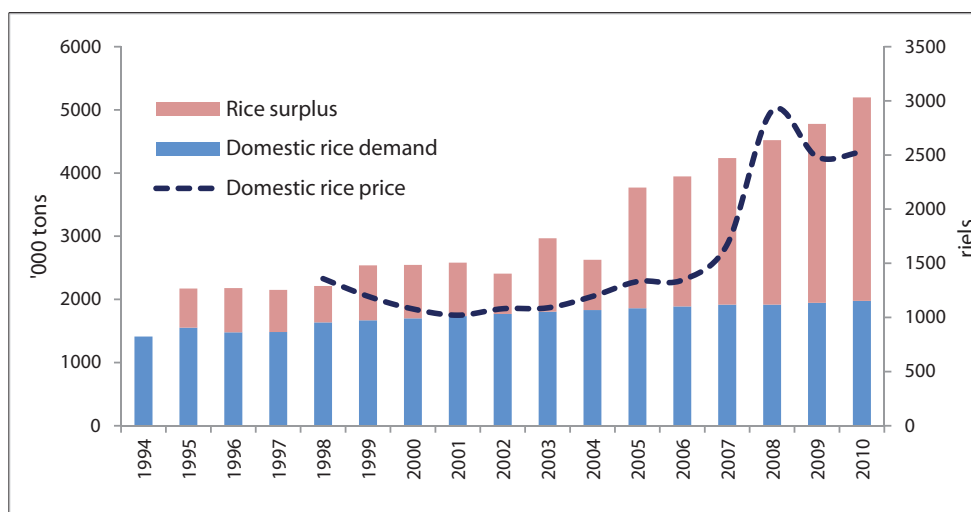
Figure 7: Oil and Fertiliser Prices



Source: CDRI Commodity Price Survey (1998-2012)

Cambodia resumed exporting rice in 1995, but data from the Customs and Excise Department suggest that only 1.3 percent of surplus paddy was exported as milled rice between 2000 and 2010. The bulk of the remaining surplus was informally transported to Thailand and Vietnam for milling and re-export (Hing *et al.* 2007; Sin 2009). This evidence confirms the finding by Ginting and Bird (2009) that price developments in Cambodia, which has open borders with Thailand and Vietnam, could be expected to be heavily influenced by international commodity price movements.

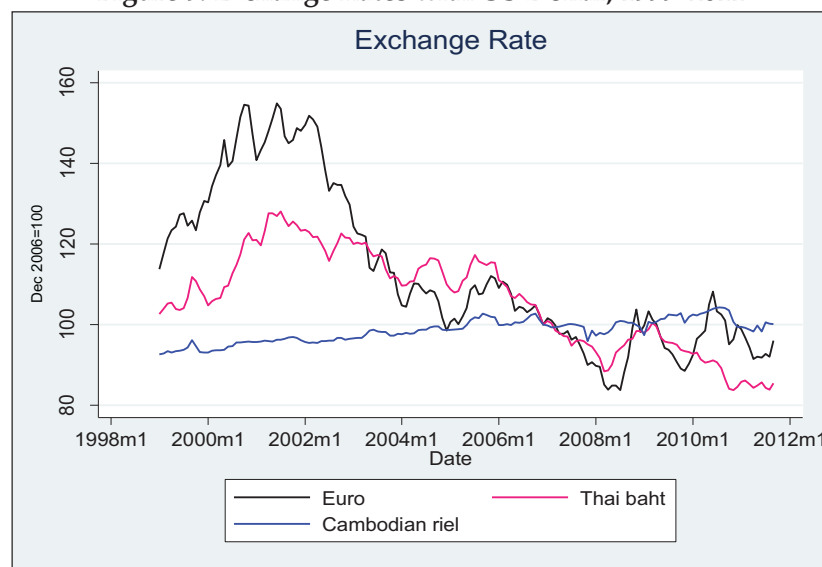
Figure 8: Rice Production, Consumption and Prices, 1994–2010



Source: NIS (1994-2010: Rice Production), CDRI (1998-2010: Rice Price)

The exchange rate between the US dollar and the Cambodian riel has remained stable over the past 10 years—the riel depreciating only 7 percent from January 2000 to September 2011. The growing dollarisation of the Cambodian economy underlines the small depreciation of the riel. Measured as the ratio of foreign currency deposits to broad money, dollarisation rose to 80 percent in January 2010—about 20 percentage points higher than in the late 1990s (Duma 2011).<sup>4</sup> Given this fact, it is likely that the exchange rates of other major currencies—euro, Thai baht and/or Vietnamese dong—against the US dollar are more appropriate for examining the effect of exchange rates on the Cambodian economy than the exchange rate of Cambodia’s trading partners against the riel. The US dollar was weakest in mid-2008, trading at nearly USD1.60 per euro. The dollar strengthened in late 2008 as the financial and economic crisis spread worldwide, and it has fluctuated sharply against the euro since June 2010. In September 2011, the US dollar cost 1.37 per euro, remaining weak relative to its historical standard though not as weak as in mid-2008. The depreciation of the dollar means that dollar-denominated commodity prices are cheaper for those countries whose currencies have appreciated relative to the dollar.

**Figure 9: Exchange Rates with US Dollar, 1999–2011**



Source: Euro and Thai baht (IMF), International Financial Statistics online (<http://www.imf.org/external/data.htm> (accessed 14 November 2011), Cambodian riel (1998-2010: CDRI)

### 3.2.2. Econometric Results

To complement the above descriptive analysis, an econometric approach is taken to identify the sources of food inflation and examine the extent to which the oil and food price shocks have been transmitted to Cambodian prices. We use vector autoregression (VAR) modelling to investigate the transmission mechanisms (see Appendix C). The estimated VAR coefficients are used to simulate impulse response functions that illustrate the impact over time of a temporary shock to one variable on the others by allowing for the changes in the lagged variables to feed back to the shocked variable, and its forecast error variance decomposition helps assess the importance of external shocks in explaining food price inflation over the sample period.

<sup>4</sup> Dollarisation in Laos declined from 80 percent in the early 2000s to less than 50 percent in the late 2000s, but remained at around 30 percent in Mongolia and 20 percent in Vietnam (Duma 2011).

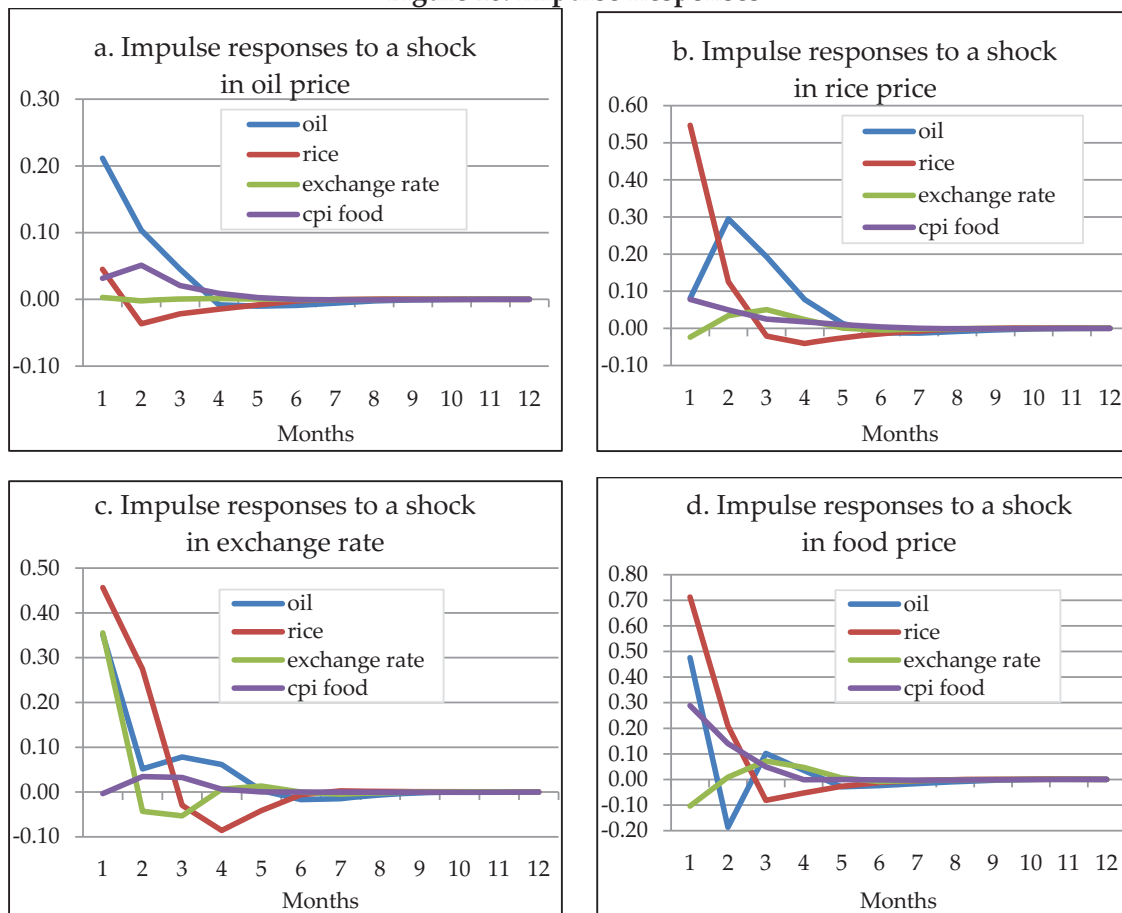
### 3.2.2.1. Impulse Response Functions

An oil price shock has a positive effect on rice prices and food price inflation. The impact on rice price turns to negative after two months and converges back to zero after six months. Food price inflation shows a faster and much larger response to oil price shock, peaking in the two months following the shock before declining slowly to the baseline. The shock lasts for about five to six months.

A rice price shock leads to an increase in oil price and food price inflation, with the maximum effects occurring in the second and the first months of the shock, respectively. The transmission of rice price to food price inflation seems to be lower than to oil price inflation.

An exchange rate shock, i.e. a depreciation of the US dollar, appears to have a positive impact on the oil price in the first month, which then recedes to its original level between the fifth and sixth months. The impact of exchange rate shock on the rice price turns to negative after three months and converges back to zero after six months. Food price inflation increases in the second month after the exchange rate shock and returns to its initial level in four months, suggesting that the exchange rate shock has a relatively smaller effect on food price inflation than on oil and rice prices.

**Figure 10: Impulse Responses**



### 3.2.2.2. Forecast Error Variance Decomposition

The results of the variance decomposition for all variables are reported in Table 2. Given that the main focus of the study is to examine the impact of international oil and food price increases on food inflation, we are particularly interested in the proportion of food inflation that is explained by shocks to oil and food prices. As expected, the direct effect of food inflation on itself is very high—accounting for 94 percent of food inflation in the initial period. This percentage declines as the forecast horizon increases. The contribution of international oil prices to food inflation is less than 1 percent, while that of international food prices amounted to 3 percent. The depreciation of the US dollar against the euro also explains a very small proportion of food inflation. It is worth noting that exchange rates can explain the international oil price shock by 3 percent and food price shock by 5–6 percent. These results seem to be consistent with those of impulse responses, which suggest that external factors—international oil and food prices and exchange rates—had only a modest effect on domestic food price fluctuations during the study period. However, these factors could have been significant contributors to recent food inflation had the shocks to those factors been large and/or persistent.

**Table 2: Variance Decomposition**

	Forecast horizon (months)	1	2	3	4	5	6	7	8	9	10	11	12
Variance decomposition of oil	oil	1.00	0.97	0.95	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
	rice	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	exchange rate	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	food price	0.02	0.05	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Variance decomposition of rice	oil	0.00	0.01	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	rice	1.00	0.93	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
	exchange rate	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
	food price	0.04	0.11	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Variance decomposition of exchange rate	oil	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	rice	0.00	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
	exchange rate	0.92	0.92	0.91	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
	food price	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Variance decomposition of food price	oil	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	rice	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	exchange rate	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	food price	0.94	0.84	0.77	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

Source: Authors' calculation



# 4. IMPACT OF FOOD PRICE INCREASES ON HOUSEHOLDS

## 4.1. Summary Statistics

In this section, we use data from the 2011 household survey collected by CDRI to describe social and economic characteristics of households in the eight villages in the sample, with the main focus on patterns of food production (including sales) and consumption (including purchases). Throughout the analysis, we classify food into rice and other food, the latter including non-rice crops, livestock, poultry and fish and fresh-water animals. We separate rice from the other food items because rice is the major staple food, constituting some 30 percent of total food expenditure and, more importantly, contributing over 60 percent of total daily caloric intake (Johansson & Bäcklund 2005).

First, we summarise basic village characteristics, including main economic activities. Data was gathered directly through interviews with village chiefs. As shown in Table 3, the sample comprises 421 households in eight villages, five of which are rural; on average 52 households per village were interviewed during the survey. To ensure that each village had equal probability of being selected, we calculated sampling weights, which are simply the inverses of the probability of selection. Population weights were also computed in estimating the poverty headcount and are applied throughout the analysis in this paper. In Table 3, all rural villages depend on rice production as one of their main livelihoods; Ta Kream recorded the highest rice productivity among the sample villages with a surplus, while the other rural villages face rice shortages for one to four months a year. Urban villagers in Kien Khleang and Prek Ta Tan are mostly traders, public servants and manufacturing workers. Urban villagers in Koh Vien are exceptional rice producers, with huge productivity of around 3-4 tonnes per hectare (higher than rural Ta Kream); the village is reportedly self-sufficient in rice. All this initial information is very important because it is used to verify data collected in the survey. We show that data is consistent.

Table 4 provides summary statistics of the main variables. The mean household size of about five members is consistent with the national average. Household heads are middle-aged with five years education on average. Over 70 percent of households in the rural villages own farmland, each of which possesses on average less than one hectare. This confirms the previous findings (e.g. Tong 2010). About 68 percent of households in the rural villages are rice producers; Chambak Haer has the lowest proportion with only 46 percent, compared to over 70 percent for the rest. Despite Koh Vien being an urban village, most households own farmland (98 percent) and are rice producers (94 percent), while residents of the other two urban villages own minimal farmland and are not rice producers. Koh Vien has the highest rice productivity, followed by Prateah Lang and Ta Kream.

**Table 3: Village Characteristics**

No	Province	Village	Area type	Population (HHs)	Sample HHs	Primary occupation
1	Battambang	Ta Kream	Rural	311	51	Wet and dry season rice farming with surplus. Wet season rice productivity is about 2.5 tonnes per ha and dry season rice about 3 tonnes per ha. Total wet season farmland is 555 ha; total dry season farmland is 105 ha.
2	Kompong Chhnang	Banh Chhkoul	Rural	169	52	Wet season rice farming and potting. About 90 percent of households are potters. Wet season rice productivity is 1.5 to 2 tonnes per ha; 60 percent of households are short of rice for 2-3 months. Total wet season farmland is 162 ha.
3	Kompong Thom	Phteah Veal	Rural	284	54	Wet season rice, fishing and crop farming. Rice productivity is 2 tonnes per ha. Around 70 percent of households are short of rice for 3 to 4 months. Total wet season farmland is 168 ha.
4	Phnom Penh	Prateah Lang	Rural	370	52	Wet and dry season rice farming and garment work. Wet season rice productivity is 2 tonnes per ha and dry season 3 tonnes per ha; 30 percent of households are short of rice for 1-3 months. Total wet season farmland is 180 ha.
5	Siem Reap	Chambak Haer	Rural	466	52	Trading, wet season rice farming and construction. Rice productivity is about 1.5 to 2 tonnes per ha; 40 percent of households are rice producers with 2-3 months' shortage.
6	Battambang	Prek Ta Tan	Urban	211	52	Trading, civil servants and construction. Rice farming is minimal.
7	Kompong Speu	Koh Vien	Urban	172	52	Wet season rice farming (twice a year), trading, civil servants and private company employees. Productivity is about 3 to 4 tonnes per ha. Rice is sufficient. Total wet farmland is 113 ha.
8	Phnom Penh	Kien Khleang	Urban	799	56	Trading, government and private company staff. No rice farming.

Source: Based on data provided by village offices

The mean value of rice production per rural household is about 2 million riels (about USD500) per year. However, this figure is misleading because value of rice production in Ta Kream is huge (over 6 million riels), more than eight times as much as the other four rural villages' average (0.8 million riels). The mean value of rice production in urban Koh Vien is

also high, about the same as the rural average. Ta Kream and Koh Vien also record high value of other food production, 8.7 and 6.4 million riels per year, respectively. From these statistics, one can infer that Ta Kream and Koh Vien by and large have rice sufficiency.

The share of rice consumption in total food expenditure is higher in rural areas—32 percent, compared to around 22 percent in urban areas. The highest share is found in Banh Chhkoul (about 40 percent) and the lowest in urban Kien Khleang and Prek Ta Tan. This indicates that urban villages spend more on non-rice food. Table 4 also reports the mean household expenditure per capita per year, which is used as a proxy for living standards (Deaton 1989). The average total expenditure per capita in urban areas is 50 percent higher than in rural areas. From this total consumption data, Kien Khleang is the richest, followed by Prek Ta Tan and Prateah Lang, while Phteah Veal is the poorest.

**Table 4: Summary Data**

	All	Rural Ta Kream	Rural Banh Chhkoul	Rural Phteah Veal	Rural Prateah Lang	Rural Chambak Haer	Urban Prek Ta Tan	Urban Koh Vien	Urban Kien Khleang
Number of sample HHs	421	51	52	54	52	52	52	52	56
HH characteristics									
HH size	5.2	5.0	4.8	5.5	5.4	5.5	5.5	5.0	5.0
Age of HH head	50.2	43.9	47.7	48.0	49.8	46.9	58.0	51.0	55.6
Education of HH head (years)	5.3	5.1	5.4	3.1	6.9	5.1	5.1	5.6	6.1
Food production (average per HH per year)									
HH with farmland (%)	54.6	76.5	82.7	75.9	75.0	53.8	34.6	98.1	19.6
Average farmland size (ha)	0.9	2.0	0.6	0.7	0.5	0.8	2.5	0.6	0.9
Rice producer (%)	44.0	76.5	73.1	74.1	73.1	46.2	3.8	94.2	0.0
Rice productivity (tonnes per ha)	2.2	2.3	1.7	1.7	2.5	1.4	1.8	3.9	0.0
Rice production ('0000 riels)	126.7	665.2	94.3	86.1	110.7	52.4	9.4	219.8	0.0
Other food production ('0000 riels)	295.7	878.3	310.4	297.1	321.8	217.5	116.2	647.2	58.1
Total food production ('0000 riels)	422.4	1543.5	404.7	383.2	432.5	269.9	125.6	867.0	58.1
Food expenditure (average per HH per year)									
Rice ('0000 riels)	158.2	174.3	195.3	153.9	160.4	179.0	140.6	174.0	133.0
Other food ('0000 riels)	480.0	385.2	296.2	278.9	490.3	401.9	514.7	380.9	680.2
All ('0000 riels)	638.2	559.5	491.5	432.8	650.7	580.9	655.3	554.9	813.9
Food expenditure per capita									
('0000 riels per year)	130.8	115.3	112.7	82.5	130.7	111.1	123.5	118.1	173.9
Total expenditure per capita									
('0000 riels per year)	321.2	246.3	216.0	157.3	268.7	243.0	272.0	235.8	531.8

**Table 5: Consumption per Capita by Decile**

Decile	Consumption per capita per year in '0000 riels
1	83.8
2	125.1
3	152.5
4	179.0
5	203.4
6	237.6
7	271.3
8	317.7
9	412.5
10	779.7

Table 6 presents means of food sales and purchases by households in a year. These data are used to calculate production and consumption ratios and net benefit ratio (NBR) to determine net food buyers and sellers. Food sales are divided into two types: gross proceeds from sales and net proceeds from sales. As we explain in the methodology section of the appendix, net proceeds from sales are the value of food sales minus production expenditure per quantity of food sales. Net proceeds from sales provide a better estimate for computing NBR. In the following analysis we provide the results using both gross and net proceeds from sales and note the substantial differences.

**Table 6: Food Sales and Purchases\***

Village	Area type	Gross proceeds from Sales			Net proceeds from Sales			Purchases		
		Rice	Other food	All	Rice	Other food	All	Rice	Other food	All
Ta Kream	Rural	456.6	136.5	593.2	246.3	97.2	343.5	41.9	286.6	328.5
Banh Chhkoul	Rural	34.9	24.5	59.5	21.2	23.6	44.9	85.4	291.0	376.4
Phateah Veal	Rural	22.7	86.3	109.1	8.7	43.1	51.8	72.9	236.3	309.2
Prateah Lang	Rural	22.1	77.4	99.6	9.6	55.2	64.9	57.9	437.5	495.4
Chambak Haer	Rural	7.2	50.3	57.5	3.7	38.7	42.4	112.9	326.2	439.1
Prek Ta Tan	Urban	1.3	98.0	99.4	0.1	69.6	69.6	126.0	474.1	600.1
Koh Vien	Urban	97.2	123.9	221.1	63.6	93.5	157.1	16.1	316.5	332.6
Kien Khleang	Urban	0.0	12.5	12.5	0.0	10.0	10.1	127.7	654.6	782.3
All		65.8	62.9	128.8	35.6	44.5	80.0	91.2	430.2	521.4

\* average per household per year in '0000 riels

Gross proceeds from rice sales in rural villages except Ta Kream are small, only 0.2 million riels per year per household, compared to the highest, about 4.5 million riels, in Ta Kream.

Lower sales indicate insufficient rice for households in those villages. And this is true for rural villages such as Chambak Haer and Phteah Veal. Among the rice producers in those villages, almost 80 percent face rice shortages of up to almost six months (Table 7). While Ta Kream ranks top in rice sales, more than 35 percent of rice producers there still have to buy rice for about two months. These households should keep rice for consumption rather than selling it, though there are cases where rice has to be sold to cope with unexpected shocks such as sickness. Urban Koh Vien comes second after Ta Kream in terms of gross proceeds from rice sales, about 1 million riels on average per household per year. Koh Vien and Ta Kream also score high in other food sales, while the other villages (except Banh Chhkoul) whose gross proceeds from rice sales are low have higher non-rice food sales.

On average, the difference between gross proceeds from sales and net proceeds from sales is about 38 percent, reflecting the substantial expenditure households incur during food production. For rice, the total production expenditure is up to 40 percent of gross production, while that of other food is about 28 percent. As expected, rice purchases are high in urban areas such as Kien Khleang and Prek Ta Tan; urban households also purchase more of other food.

**Table 7: Rice Shortages**

Village	Area type	% HHs facing rice shortages	% Rice producer HHs	% Rice producer HHs facing rice shortages	No. of months of rice shortage
Ta Kream	Rural	51.0	76.5	35.9	2.3
Banh Chhkoul	Rural	75.0	73.1	65.8	5.2
Phteah Veal	Rural	87.0	74.1	82.5	5.3
Prateah Lang	Rural	63.4	73.1	50.0	4.6
Chambak Haer	Rural	88.4	46.2	75.0	5.9
Prek Ta Tan	Urban	96.1	3.8	0.0	12
Koh Vien	Urban	28.8	94.2	24.5	3.3
Kien Khleang	Urban	100.0	0.0	-	12.0
All		80.2	44.0	55.1	4.8

#### 4.2. Net Benefit Ratio: Net Rice Sellers and Buyers

Table 8 presents the mean NBR for rice of each village in the sample. A positive NBR means a household is a net rice seller since the sales volume is bigger than the amount purchased. We provide two scenarios: NBR using gross proceeds from sales and NBR using net proceeds from sales. As expected, in both scenarios, households in rural Ta Kream and urban Koh Vien are both net rice sellers, the former recording a NBR about three and a half times larger than the latter. A high NBR suggests food production above consumption, which is the case for the aforementioned villages. The rest of the villages are net food buyers. The mean NBR for rural villages except Ta Kream is -7.8 percent for the first scenario and -8.6 percent for the second. Chambak Haer has the lowest NBR in the group, which is consistent with the result in Table 7 that the shortage of rice in this village lasts up to about six months (the highest among rural villages). A low NBR, on the other hand, can also be due to large rice consumption. In urban areas, despite the fact that Kien Khleang has no rice producers at

all, its NBR is higher than that in Prek Ta Tan. This is due to different patterns of rice consumption: Prek Ta Tan consumes more rice than Kien Khleang (Table 4).

**Table 8: Net Benefit Ratio—Rice (%)**

Village	Area type	NBR <sup>1</sup>	NBR <sup>2</sup>	PR <sup>1</sup>	PR <sup>2</sup>	CR	Category
Ta Kream	Rural	14.5	30.9	20.0	36.4	5.5	Net rice seller
Banh Chhkoul	Rural	-9.8	-9.1	1.1	1.8	10.9	Net rice buyer
Phteah Veal	Rural	-9.6	-8.2	1.0	2.4	10.6	Net rice buyer
Prateah Lang	Rural	-4.0	-3.1	0.9	1.8	4.9	Net rice buyer
Chambak Haer	Rural	-11.2	-11.0	0.3	0.5	11.5	Net rice buyer
Prek Ta Tan	Urban	-11.3	-11.1	0.0	0.2	11.3	Net rice buyer
Koh Vien	Urban	4.2	7.4	6.2	9.4	2.0	Net rice seller
Kien Khleang	Urban	-6.3	-6.3	0.0	0.0	6.3	Net rice buyer

<sup>1</sup> mean figures calculated using net proceeds from sales of rice

<sup>2</sup> mean figures calculated using gross proceeds from sales of rice

Note: production ratio (PR), consumption ratio (CR)

Accounting for production expenditure in the calculation of net proceeds from sales matters when estimating the percentage of net rice sellers and buyers in each village. Fewer net sellers and more net buyers are observed. The results are shown in Table 9. As expected, a high number of net sellers is found in Ta Kream, 74 percent, and Koh Vien, 69 percent. The rural mean of net rice sellers excluding Ta Kream is around 17 percent; the figure is smaller, around 13 percent, if production expenditure is included. Chambak Haer has the lowest share of net rice sellers, followed by Banh Chhkoul and Phteah Veal. This is consistent with Chambak Haer having a lower share of rice producers and longer period of rice shortage than the other rural villages. The case is similar for Banh Chhkoul and Phteah Veal, which rank after Chambak Haer in months of rice shortage.

**Table 9: Net Rice Sellers and Buyers, by Village (%)**

Village	Area type	Net rice buyer (%)		Self-sufficient (%)		Net rice seller (%)	
		1	2	1	2	1	2
Ta Kream	Rural	23.5	23.5	2.0	2.0	74.5	74.5
Banh Chhkoul	Rural	75.0	75.0	9.6	9.6	15.4	15.4
Phteah Veal	Rural	83.3	79.6	3.7	3.7	13.0	16.7
Prateah Lang	Rural	63.5	57.7	15.3	15.4	21.2	26.9
Chambak Haer	Rural	88.4	86.5	5.8	5.8	5.8	7.7
Prek Ta Tan	Urban	96.2	96.2	1.9	1.9	1.9	1.9
Koh Vien	Urban	23.1	23.1	7.7	7.7	69.2	69.2
Kien Khleang	Urban	100.0	100.0	0.0	0.0	0.0	0.0
All		76.4	74.9	4.8	4.8	18.8	20.3

1: mean figures calculated using net proceeds from sales of rice

2: mean figures calculated using gross proceeds from sales of rice

This study is interested in all food, not just rice. That means in estimating the NBR we need to account for all food sales, including all food crops, livestock, poultry and fish. For food purchases, we include all kinds of food bought for consumption. These, of course, are not limited to the sorts of food the household produces and sells. Logically, if food sales cannot

cover food purchases, the household is a net food buyer. Some households are net rice sellers but perhaps not net food sellers if the proceeds from selling rice cannot compensate for other food expenditure. We discuss the results from the survey data below. We also show that accounting for production expenditure in gross proceeds from sales changes the results. Table 10 provides the details.

The NBR for Ta Kream, a net rice seller, is reduced from 16 percent using gross proceeds from sales to -2.6 percent if net proceeds from sales are used. Hence, Ta Kream is a net food buyer in the second case. This simply means that profits from food sales in Ta Kream (after deduction of production costs) could not cover the total food expenditure the village incurred during the year, though the margin is small. The rest of the villages are net food buyers. The rural mean NBR excluding Ta Kream is -32 percent for the second case and -35 percent for the first case. In urban villages, the figures are slightly above those of rural villages if Koh Vien is excluded. We should bear in mind that households with a low NBR face higher welfare losses than households with a higher NBR.

**Table 10: Net Benefit Ratio— Food (%)**

Village	Area type	NBR <sup>1</sup>	NBR <sup>2</sup>	PR <sup>1</sup>	PR <sup>2</sup>	CR	Category
Ta Kream	Rural	-2.6	16.2	27.0	45.8	29.6	Net food seller/buyer <sup>a</sup>
Banh Chhkoul	Rural	-39.9	-39.1	3.6	4.4	43.5	Net food buyer
Phteah Veal	Rural	-32.7	-25.9	6.6	13.4	39.3	Net food buyer
Prateah Lang	Rural	-34.3	-32.2	4.6	6.8	39.0	Net food buyer
Chambak Haer	Rural	-34.1	-32.7	3.4	4.8	37.5	Net food buyer
Prek Ta Tan	Urban	-39.7	-37.7	4.4	6.4	44.1	Net food buyer
Koh Vien	Urban	-18.5	-13.3	13.7	18.9	32.2	Net food buyer
Kien Khleang	Urban	-33.9	-33.8	0.6	0.7	34.5	Net food buyer

<sup>1</sup> mean figures calculated using net proceeds from sales of food

<sup>2</sup> mean figures calculated using gross proceeds from sales of food

<sup>a</sup> Net food buyer if net proceeds from sales are used to compute PR and NBR

The share of net food sellers and buyers in the village helps to determine the number of households that gain or suffer from food price increases. Net food sellers only gain from price hikes if the price of food they produce rises; for instance, in our case, net food sellers will not gain if the price of oil and fats increases. Although Ta Kream becomes a net food buyer when net proceeds rather than gross proceeds from sales are used to calculate NBR, the proportion of net food sellers in the village is high compared to the rest (Table 11). Those households gain from the rising prices of such foods as rice. The remaining rural villages have fewer than 10 percent net food selling households on average.

**Table 11: Net Food Sellers and Buyers, by Village (%)**

Village	Area type	Net food buyer (%)		Net food seller (%)	
		1	2	1	2
Ta Kream	Rural	58.8	35.3	41.2	64.7
Banh Chhkoul	Rural	94.2	94.2	5.8	5.8
Phteah Veal	Rural	87.0	85.2	13.0	14.8
Prateah Lang	Rural	92.3	90.4	7.7	9.6
Chambak Haer	Rural	100.0	94.2	0.0	5.8
Prek Ta Tan	Urban	96.2	92.3	3.8	7.7
Koh Vien	Urban	88.5	80.8	11.5	19.2
Kien Khleang	Urban	100.0	100.0	0.0	0.0
All		91.7	86.9	8.3	13.1

1: mean figures calculated using net proceeds from sales of food

2: mean figures calculated using gross proceeds from sales of food

### 4.3. Welfare Effects:<sup>5</sup> Price Simulations

In this section, we conduct simulations of the effects of food price changes on household welfare. We use only the NBR, estimated using net proceeds from sales, in computing welfare changes. Price rises are actual and decomposed into two periods: average year-on-year inflation between 2007 and 2008, and average year-on-year inflation between 2009 and 2011 (from January to September). We discuss the results separately for rice and overall food including rice.

Rice price inflation was high during the food crisis. The year-on-year average of rice inflation between 2007 and 2008 is estimated to have been around 73 percent. The figure for 2009 to 2011 (first nine months) is only 3 percent. A high rice price is good news for net rice sellers but bad news for net rice buyers. As presented in Table 12, keeping other food prices fixed, Ta Kream benefits from the high price of rice, generating welfare gains of over 10 percent during the crisis but less than 1 percent when the price rise drops to 3 percent in 2009. Koh Vien also benefits from welfare gains of around 3 percent during the crisis but a marginal 0.12 percent between 2009 and 2011. For net rice buyers, the welfare loss depends on their pattern of rice consumption. Households whose share of rice consumption to total food consumption is high suffer more than households with a smaller share. A case in point is the comparison between rural Chambak Haer and urban Kien Khleang. Although there are no rice producers in Kien Khleang, on average the village's welfare loss is much smaller than Chambak Haer's. This is not surprising because the share of rice to total consumption in Chambak Haer is almost twice that in Kien Khleang (Table 4). Welfare loss during the food crisis in 2008 is estimated to be around 3 percent for rural villages and more than 6 percent for urban villages (Koh Vien excluded). The overall welfare loss is 3.5 percent during the food crisis and a mere 0.1 percent in recent rice price increases.

<sup>5</sup>While the meaning of welfare is broad, we restrict the term to refer to the well-being of a household measured by the change in real income as defined by Deaton (1989).



**Table 12: Welfare Effect by Village and Consumption Decile (Rice)**

Welfare effect by village			Welfare effect by consumption decile		
Village	Change in welfare (%)		Decile	Change in welfare (%)	
	$\Delta p = 73\%$ (2007-2008)	$\Delta p = 3\%$ (2009-2011)		$\Delta p = 73\%$ (2007-2008)	$\Delta p = 3\%$ (2009-2011)
Ta Kream	10.5	0.4	1	-12.9	-0.5
Banh Chhkoul	-7.1	-0.3	2	-6.9	-0.3
Phteah Veal	-7.0	-0.3	3	-4.9	-0.2
Phum Prateah Lang	-3.0	-0.1	4	-2.0	-0.1
Chambak Haer	-8.2	-0.3	5	-2.9	-0.1
Prek Ta Tan	-8.3	-0.3	6	-2.8	-0.1
Koh Vien	2.9	0.12	7	0.1	0.002
Phum Kien	-4.7	-0.2	8	-1.9	-0.1
All	-3.5	-0.1	9	-2.3	-0.1
			10	-1.8	-0.1

Note:  $\Delta p$  means the change of price

None of the villages gain from overall food price inflation. Welfare losses, in general, are higher than those due only to rice price increases. Ta Kream is least affected, followed by Koh Vien. Food price inflation was 32 percent during the crisis (average year-on-year increase between 2006 and 2008) and around 10 percent between 2009 and 2011 (January to September). The welfare losses are estimated to have been around 9 percent for rural and 10 percent for urban villages during the food crisis. Welfare losses due to price increases between 2009 and September 2011 were less at around 3 percent.

The poorest 10 percent are hit hardest by food price increases, but the effects on other groups are quite uneven. The richest 30 percent suffer almost the same magnitude of loss as the middle group and the poorest 20 and 30 percent. Again, the impact of food price changes on welfare depends on the patterns of household food production and consumption. If a household is not a food producer, rising food prices will affect it substantially. This is also true if a household's food consumption is well beyond its food production capacity.

**Table 13: Welfare Effect by Village and Consumption Decile (Overall food)**

Welfare effect by village			Welfare effect by consumption decile		
Village	Change in welfare (%)		Decile	Change in welfare (%)	
	$\Delta p = 32\%$ (2007-2008)	$\Delta p = 10\%$ (2009-2011)		$\Delta p = 32\%$ (2007-2008)	$\Delta p = 10\%$ (2009-2011)
Ta Kream	-0.8	-0.3	1	-12.5	-4.0
Banh Chhkoul	-12.8	-4.0	2	-11.2	-3.5
Phteah Veal	-10.5	-3.2	3	-11.3	-3.5
Prateah Lang	-10.9	-3.4	4	-7.2	-2.2
Chambak Haer	-10.9	-3.4	5	-11.4	-3.6
Prek Ta Tan	-12.7	-4.0	6	-9.7	-3.0
Koh Vien	-5.9	-1.8	7	-6.9	-2.1
Kien Khleang	-10.8	-3.4	8	-10.6	-3.3
All	-9.7	-3.0	9	-9.3	-3.0
			10	-7.9	-2.5

Note:  $\Delta p$  means the change of price

#### 4.4. Effects on Poverty

We have now arrived at a point where we can discuss the implications of rising food prices for poverty in Cambodia in the short run. It is also the most important finding in this paper. The effects on poverty depend solely on household NBR and the change in welfare. The simplest way to characterise the effects is to observe total household consumption before and after the simulated food price increases. As mentioned in the methodology section, we use real income (welfare) changes due to food price increases to compute new consumption and then estimate the poverty effects. We discuss the impact in two scenarios. We observe first the change in poverty headcount of the three lowest consumption deciles, and second the change in poverty headcount using the national poverty line. The national poverty line is taken from World Bank (2009) with an inflation adjustment (Table 14).

**Table 14: Overall Poverty Line (riels per person per day)**

Area	2007	2011
Urban	2704	3744
Rural	2367	3277

CPI 2007 (January -September) = 103.3 and CPI 2011 (January -September) =143.0

The poverty impact estimates are presented in Table 15. During the food price rise in 2008, the number of poor households within the lowest 30 percent of consumption increases by 7 percentage points. The change is smaller, some 1.1 percentage points, during the recent food price upsurge (2009–11). The change in poverty headcount is quite revealing, an almost 6 percentage point increase during 2008.

**Table 15: Change in Poverty with Increase in Overall Food Price**

Area	Change in number of poor in lowest 30% of consumption (percentage points)		Poverty headcount (%)		
	$\Delta p = 32\%$ (2007-2008)	$\Delta p = 10\%$ (2009-2011)	Before price simulation	After price simulation ( $\Delta p = 32\%$ )	Change in poverty (percentage points)
Urban	+ 6.2	+ 1.2	6.3	9.8	+ 3.5
Rural	+ 6.7	+ 1.0	19.2	25.2	+ 6.0
All	+ 7.0	+ 1.1	15.6	21.4	+ 5.8

Note:  $\Delta p$  means the change of price

These findings are consistent with ADB (2011), which suggests that the overall poverty headcount in Cambodia would increase by 6.8 percentage points if food prices jump 30 percent. Our findings (Table 16) are also consistent with Ivanic and Martin (2008), who conclude that a 10 percent increase in rice price would raise the national poverty rate by 0.5 percentage points. Nonetheless, while Ivanic and Martin (2008) find that the increases in urban poverty are higher than those in rural areas, the preceding results suggest the opposite: rural households suffer more than urban households. To reiterate, the magnitude of the impact is determined not only by the fact that poor urban households are mostly net food buyers but also by their patterns of food consumption and production; a poor rural household that is also a net food buyer may be hurt much more than an urban household if its relative expenditure on food consumption is much higher than the urban household's.

**Table 16: Change in Poverty with Change in Rice Price**

Area	Poverty headcount (%)		
	Before price simulation	After price simulation ( $\Delta p = 73\%$ )	Change in poverty (percentage point)
Urban	6.3	8.0	+ 1.7
Rural	19.2	23.5	+ 4.3
All	15.6	18.6	+ 3.0

Note:  $\Delta p$  means the change of price

# 5. GOVERNMENT POLICY RESPONSES

This section reviews policy responses to food price hikes during the second and third quarters of 2008 and the recent upward trend in food prices in 2011. We first discuss the policy responses of the Cambodian government, followed by those implemented by other countries in ASEAN. We then propose some policy options.

## 5.1. Cambodia

Cambodia, like other countries in the region, introduced various direct and indirect measures to reduce adverse impacts on the economy during the food crisis in 2008. The government also established a price monitoring group to closely monitor the issue. Hay (forthcoming) and IFAD (2011) provide a complete picture of government intervention, which we summarise and discuss the impacts of. Macro and micro interventions were initiated not only to address food price hikes specifically but also to fight inflation in general. Macro attempts to slow aggregate demand were directed through monetary, exchange rate and fiscal policies, while micro responses more specifically addressed soaring food prices.

The government's monetary policy during the food price increases was to reduce the money supply by both increasing the reserve requirement for commercial banks from 8 percent to 16 percent, raising minimum capital requirement from 50 billion riels (USD13 million) to 150 billion riels (USD36.5 million), and for specialised banks from 10 billion (USD2.5 million) to 30 billion riels (USD7.5 million) and imposing a 15 percent cap on real estate lending in late 2008. The latter measure aimed to slow the rapid domestic demand growth induced by the real estate boom that had taken place for several years before the crisis. In early 2009, the reserve requirement for commercial banks was reduced from 16 to 12 percent and the credit ceiling on real estate was lifted, but the minimum reserve requirement remained unchanged.<sup>6</sup> In addition, external factors like rising prices of production inputs and other imported commodities also put upward pressure on prices, including food prices. Hence, a stable exchange rate regime is very important to control inflation (IFAD 2011). The government intervened by increasing international reserves, enabling it to maintain the exchange rate at a stable KHR4000 to USD1. Fiscal tightening was enforced by improving revenue collection and restricting unnecessary spending. Between 2007 and 2008, the country ran a current budget surplus amid the slowdown in prices.

In terms of immediate micro responses, the government intervened to increase the domestic supply of food, particularly rice, to ensure food sufficiency and to slow rising food prices. During the surge in rice prices, which reached a record high, the government restricted rice exports (two-month export ban from 27 March to 30 May 2008) and, through Green Trade, sold 300 tonnes of rice at KHR1800 per kg, well below the market price of KHR2500.<sup>7</sup> To increase stocks, the government also provided USD12 million in credits to the Rural

<sup>6</sup> It seems that the decrease in reserve requirement for commercial banks is part of the government stimulus package in response to the global financial crisis.

<sup>7</sup> In response to the flood which damaged 390,000 hectares of rice fields in September and October 2011, the Phnom Penh Municipality in collaboration with the Rural Development Bank released 120 tonnes of rice (at below market price) to stabilise rice prices in Phnom Penh city.

Development Bank to purchase rice. Moreover, the ban on pork imports was lifted to increase the supply of meat in domestic markets. The government provided high-yielding seeds to small farmers and sold seeds and fertilisers at subsidised prices to selected farmers. In addition, the government committed to contribute 2000 tonnes of rice per year for three consecutive years (i.e. 2008, 2009 and 2010) to the World Food Programme to support school feeding and food-for-work programmes. In response to the food price increase in 2008, the government decided to contribute an additional 1000 tonnes, making an overall 2008 contribution of 3000 tonnes.<sup>8</sup> With support from ADB-financed Emergency Food Assistance, food was distributed to roughly 342,000 beneficiaries in 220 communes in eight provinces surrounding the Tonle Sap Lake in 2008.<sup>9</sup> Other direct interventions included reducing duties on food imports to zero, suspending some business taxes, increasing allowances and salary for several groups including civil servants, retirees, teachers and garment workers, applying fixed reference price for levying taxes for instance on fuel, and subsidising electricity.

**Table 17: Cambodia's Policy Responses to 2008 Food Crisis**

Short-term (immediate) responses	Medium-term responses
<ul style="list-style-type: none"> <li>• Temporary ban on rice exports</li> <li>• Released 300 tonnes of rice to the market at below market price</li> <li>• Released USD12 million credits to Rural Development Bank to increase rice stocks</li> <li>• Zero tariff on agricultural inputs</li> <li>• Removed ban on pork imports</li> <li>• Decreased duties on food imports to zero</li> <li>• Fixed reference price for levying taxes</li> <li>• Subsidised electricity tariff</li> <li>• Monitored fuel distributors to prevent speculation</li> <li>• Provided high-yielding seeds to small farmers</li> <li>• Sold seeds and fertilisers at subsidised prices to selected farmers</li> <li>• Doubled bank minimum reserve requirement from 8 to 16 percent</li> <li>• Introduced 15 percent cap on real estate lending</li> <li>• Increased minimum capital requirement for commercial banks</li> </ul>	<ul style="list-style-type: none"> <li>• No taxes on agricultural inputs, and increase taxes on luxury items (cars, alcohol and cosmetics)</li> <li>• Increase agricultural productivity</li> <li>• Increase irrigated land and land available for cultivation</li> <li>• Grain storage in rural areas and at farm/provincial/ national level</li> <li>• Enhance production through increased irrigation of the second rice crop</li> <li>• Reduce post harvest losses</li> <li>• Improve information database to complement policy intervention</li> </ul>

Source: Hay (forthcoming); IFAD (2011)

As regards medium term responses, the government has reduced tariffs on agricultural inputs to zero as an incentive for farmers to increase production, increased taxes on luxury items (cars, alcohol and cosmetics), and improved agricultural productivity. The government's five-year Rectangular Strategy Phase II (finalised in September 2008) and the National Strategic Development Plan (NSPD) Update 2009-2013 put strong emphasis on both agriculture and social protection. These strategies recognise the importance of the

<sup>8</sup> A Memorandum of Understanding with the World Food Programme was signed on 24 April 2008.

<sup>9</sup> This project has an overall budget of USD40.08 million, of which the government co-financed USD5.08 million.

agricultural sector, which contributes 30 percent of total GDP and employs 60 percent of the total labour force, and acknowledge the urgent need to create social safety nets to support vulnerable groups. Recognising that the agricultural sector still suffers from low yield and that potential opportunities, particularly during the dry season, have not been fully explored, the government launched the “Policy Paper on the Promotion of Paddy Production and Rice Export” on 25 July 2010 in order to increase paddy production and rice export.<sup>10</sup> Given the lack of irrigation—only 31.6 percent of cultivated land is irrigated, the government announced that USD310 million would be invested in upgrading irrigation infrastructure in 2011-12 (Table 19). To strengthen existing social protection and social safety nets<sup>11</sup>, the government officially launched the National Social Protection Strategy for the Poor and Vulnerable in April 2011. The main purposes of this strategy are to protect the poorest and most disadvantaged, to mitigate risks that could lead to negative coping strategies and further impoverishment, and to help the poor move out of poverty by building human capital and expanding opportunities.

Policy interventions to control aggregate demand during the crisis were effective in curbing inflation, though the magnitude of the impact has yet to be investigated empirically. Here we discuss the impacts by looking at possible associations among variables. Theoretically, monetary policy is viewed as the main instrument to keep inflation under control. This tool has been employed by many countries. In Cambodia, the cooling in prices came amid the decrease in money supply through the increased reserve requirement and the real estate credit cap, though the significance of the relationship between the two remains to be tested. The slow growth of M2<sup>12</sup> was paralleled by the declining growth of the CPI between September and November 2008 (IFAD 2011). These measures were withdrawn in 2009 because of the government’s commitment to liberalisation (*ibid.*).

The government also realised that a Keynesian regulatory tightening to control aggregate demand was not the only approach needed to keep inflation at bay. FDI, for instance, makes it difficult to control money supply (IFAD 2011). A turn to fiscal tightening was also used. Fiscal policy is also believed to affect aggregate demand. In Cambodia, the fiscal policy intervention did not raise taxes but just improved revenue collection and the monitoring of needless current administrative expenditure. Government development programmes were not forfeited. Although there was a current budget surplus, the impact of the fiscal tightening on inflation was minimal.

Macro responses were less effective in addressing the soaring food prices caused by external forces – rising oil prices, a weak US dollar and rising international food prices. Here, the only immediate measure was to ban exports and release stocks of agricultural commodities. Many food-exporting countries in the region chose this policy. In Cambodia, the selling of rice at subsidised prices during the peak period drove down the domestic price, but the impact on the world rice market was not favourable.

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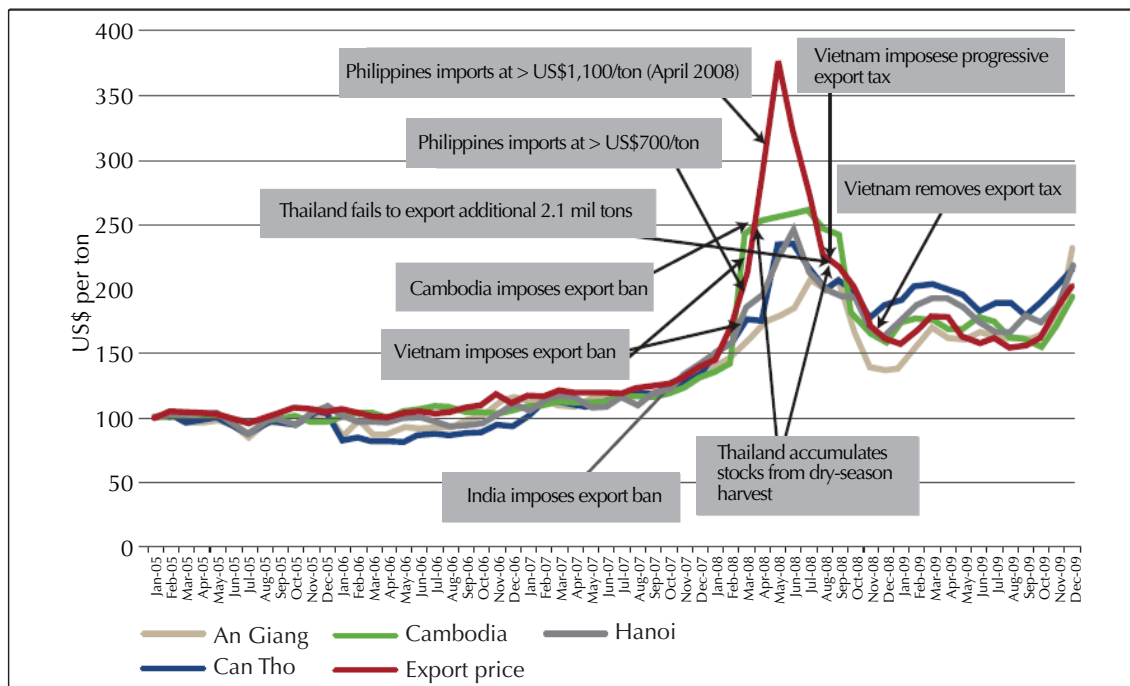
<sup>10</sup> With this policy in place, the government of Cambodia intends to increase annual paddy rice surplus to more than 4 million tonnes and milled rice export to at least 1 million tonnes by 2015.

<sup>11</sup> Over the past 20 years, Cambodia has implemented a number of social safety net projects such as food distribution, scholarships, public work programmes, health equity funds, community-based health insurance and social welfare services for special vulnerable groups, mostly funded by external sources, to improve the livelihood and food security of the poor and vulnerable groups.

<sup>12</sup> M2 is the total amount of money available in the economy and usually includes M1 (currency outside banks and demand deposits) and Quasi-Money (time and savings deposits and foreign currency deposits).

While rising food prices were a global phenomenon, restricting exports only decreased world food supply and consequently contributed to further increases in prices (Figure 11). The policy also might have discouraged local producers, hence reducing their production and sparking further global and domestic price rises (IFPRI 2008). Moreover, in Cambodia the export ban was not really effective because the potential stabilising impact on domestic rice price was thwarted by illegal cross-border trade with Thailand and Vietnam to take advantage of high international food prices (IFAD 2011). Extending credit to the Rural Development Bank was the government’s best option, not just for increasing food stocks but also for improving storage facilities, which will be of great advantage in the future.

**Figure 11: Effects of Domestic Food Supply Policies on International Food Prices**



Source: IFAD (2011)

The government performed well by removing restrictions (imposed before the crisis to control the spread of disease) on pork imports from neighbouring countries. Lifting the ban dampened not only the pork price but also those of other foods like fish and beef due to substitution effects. At that time, the government also appealed to fish producers to release fish stocks to the market in order to lower prices (Mingxin 2008). Moreover, although the impacts were debatable, the government’s subsidy of fuel and electricity was perhaps the only way to cool prices and reduce the cost of living. A fixed reference price for fuel tax avoided increasing taxes with the fluctuation of fuel prices in international markets. In addition, zero taxes on agricultural inputs, free high-yielding seeds and selling seeds and fertilisers at subsidised prices all proved essential.

The food crisis ended under the blow of the later global economic and financial crisis, which resulted in a decline in world aggregate demand. Although the later crisis caused prices to subside substantially, world food prices have been on a rising trend recently. In Cambodia, though food prices began to surge again from the second quarter of 2009, there have been no immediate responses by the government like the ones in 2008. This might be because the government has been able to keep overall inflation under control (below 10 percent)

irrespective of food prices. Since the crisis, however, the government has put more emphasis on long-term policy to promote agriculture: the zero tariff on agricultural inputs is still in effect and a new rice policy has been initiated to increase production and exports, allocating USD300 million over two years to improve rice irrigation systems and to expand food reserves (ADB 2011). Although this broad policy does not aim to address food prices directly, it provides incentives for farmers to increase production and thus increase the domestic and world food supply, hence reducing the risk of food crisis and food insecurity.

## **5.2 Some Lessons from ASEAN**

The soaring food prices of 2008 prompted each ASEAN government to respond. This section discusses some of the main policies adopted, from which we can draw lessons for future policy.

Like Cambodia, Vietnam and Thailand restricted exports during the food crisis to enhance domestic supply and keep domestic prices under control. Importer countries like the Philippines and Indonesia relaxed import restrictions so as to ensure food sufficiency. The Philippines also substantially increased its reserves by importing rice from many ASEAN countries. However, export bans were not really effective and only distorted markets as world prices continued to rise due to reduced supply. Moreover, export restrictions resulted in huge cross-border illegal trade not only between Thailand, Vietnam and Cambodia, but also between the Philippines and Malaysia.

Other ASEAN countries also released stocks at subsidised prices. Vietnam sent 200 tonnes of rice to food stores across the country. There was a similar response in the Philippines (direct sale of rice at subsidised prices) and in Thailand (though on a smaller scale). In addition, price controls were exercised by Indonesia and the Philippines.

Other social safety nets were implemented in some ASEAN countries. In Thailand, the government carried out “six measures for six months”, including the reduction of excise charges for gasoline and diesel, price adjustment for cooking gas for household use, reduction of water charges and electricity charges and subsidised transport fares. While those short-term measures were necessary to ease rising prices, the problem in Thailand was the inaccurate identification of target groups, which should have been the real poor (Jitsuchon & Siamwalla 2009).

In Indonesia, the social safety net covered around 19 million poor households which benefited from the distribution of subsidised rice (at 70 percent price subsidy, 15 kg per month per household), cash transfers (IDR100,000 or USD11 per month per household), free healthcare and subsidised education costs, especially for primary and secondary schools. Other short-term responses included subsidising the soybean price for small processors, and subsidised fuel to small food processors through conversion from kerosene to LPG (Sudaryanto 2011).

In the Philippines, the social safety net took the form of cash transfers to specific groups. The programme, called *Katasng VAT*, included a power subsidy for lifeline users, scholarships for poor students, microcredit for public utility vehicles, and loans for wives and immediate relatives of transport workers. As in Thailand, an issue was the loose targeting of households which resulted in only one-third of the subsidised rice going to the poor; the sustainability of the programme was also a concern (Reyes *et al.* 2008).



As regards long-term responses, most ASEAN countries have committed to self-sufficiency through the promotion of food production. In Laos, the government provides technical support to farmers, has reduced import taxes on fertilisers and, more importantly, created a special fund of USD13-15 million to support agriculture, including infrastructure rehabilitation and improvement. Vietnam also issued directives to spur agriculture through improved credit for expanded production of various products, strengthened extension services, research and technology development and improvement of irrigation and other infrastructure (IFAD 2011).

Lessons from the 2008 food crisis have prompted ASEAN governments, especially food importer countries, to prioritise food security and self-sufficiency. The Philippines has gradually increased rice stocks to some 3.4 million tonnes, a 30.5 percent increase. Indonesia provides cash incentives and tax exemptions for agricultural production supplies, Laos provides tax cuts and subsidised credits for farmers as well as other incentives for agricultural infrastructure investment, and Vietnam is expanding infrastructure, including storage facilities. Indonesia and the Philippines are still implementing social safety net programmes, including rice subsidies for the poor. Export restrictions are over, but there are still reduced import tariffs for key commodities in Indonesia and for fertilisers in Laos. Price controls on rice, meat and poultry are still in effect in Laos, the Philippines, Thailand and Vietnam. Tables 17 and 18 summarise the policy responses to the food crisis by ASEAN countries.

Table 18: ASEAN Policy Responses to Food Crisis, 2008

Country	Reduce import duties	Increase supply using reserves	Build reserves/stockpiles	Increase imports/relax restrictions	Raise export duties	Export restrictions	Price controls/consumer subsidies	Minimum support prices	Minimum export prices	Assistance/subsidy to farmers	Promote self-sufficiency	Actions against/appeals to profiteers	Cash transfer	Food rations/stamp
Cambodia		✓	✓			✓	✓					✓		
Indonesia	✓	✓		✓		✓	✓				✓			✓
Malaysia			✓				✓				✓			
Myanmar											✓			
Philippines			✓	✓			✓	✓		✓	✓	✓		✓
Singapore			✓										✓	

Source: ADB (2008)

Table 19: ASEAN Policy Responses to Food Crisis as of 16 February 2011

Country	Domestic food price reduction (trade and stock)			Safety net programmes (consumption)		Stimulate response (production)
	Reduce taxes (import duties, VAT) on food	Increase supply using buffer food grain stocks	Price controls/consumer subsidies	Food aid (rations/stamps)		
Cambodia		Plan to establish food reserve (ADB). A small reserve by a state-owned enterprise exists				Feb 2010: USD310 million allocation for rice irrigation systems over the next 2 years
Indonesia (world #4 rice importer)	Suspended import duties for 57 commodities				Rice for the poor (Raksin Programme) for 17.5 million households	Wheat production cash incentive, tax exemption for production supplies
Laos	Tariff reduction for fertiliser	Rice reserve of 30,000 tonnes in Aug-Sep 2010. Some released, but limited impact on domestic rice price	Prices of rice, meat, and poultry controlled by internal trade department. Controls added for 15 goods including fuel, rice and cement			Tax cuts and subsidised credit for farmers. Incentives for investments in irrigation, small and medium enterprises, input supply, public-private partnerships, foreign direct investment
Philippines (world #1 rice importer)		Given ample rice stock of 3.42 million tonnes (30.5% increase) and good harvest, no plan to increase reserves. The government planned to cut rice imports in 2011 by half from 2.5 million tonnes in 2010	The National Food Authority (NFA) monopolises rice imports and guarantees a minimum rice purchase price, though no interventions due to stable rice price		Rice price subsidy programme (over 70% of public social protection expenditures, yet only 46% of beneficiaries are considered poor, and only 24% of poor households have access)	
Thailand (world #1 rice exporter)		Rice reserves reduced to 1 million tonnes from 5 million tonnes during 2009-10	Prices of food items are controlled, including eggs and palm oil			Price guarantee scheme for rice
Vietnam (world #2 rice exporter)			Temporary subsidy for food during Tet (Vietnamese Lunar New Year)			Exemption of land-lease fees for construction of storage facilities for rice, corn, aquatic products, vegetables and coffee

Source: ADB (2011)

## 6. SUMMARY OF KEY FINDINGS, CONCLUSIONS AND POLICY OPTIONS

Using household survey data, this paper primarily investigates the first-order welfare impact of high food prices on poor households in Cambodia. To measure the effects, we adopted a simple model in which patterns of a household's food production and consumption determine whether it is a net food buyer or seller. This paper also attempted to examine the causes of domestic food price increases, and the policy responses to address the impacts and control prices.

International agricultural commodity prices hit a record high in 2008, mainly due to the increased costs of food production, processing and marketing linked to higher energy prices, the use of food crops such as corn for bio-fuel production in the United States and European Union, growing consumption of high quality food such as meat and dairy products in the emerging economies, increasing demand for animal feed, poor harvests in major agricultural regions, a low stock-to-use ratio, the weakness of the US dollar and speculative behaviour by both government and commercial agents. In 2011 agricultural prices increased again, some commodity prices reaching or exceeding peaks of 2008. Abbott *et al.* (2011) reveal that factors such as demand shocks, adverse weather, smaller stocks and the weakness of the US dollar remain the key drivers of global price increases in 2011. In addition, the new mechanism behind the agricultural commodity markets today is likely to be a reduction in elasticity or price responsiveness to demand and supply.

In line with global prices, agricultural prices in Cambodia rose significantly in 2008 and showed an upward trend in 2011. Some studies highlighted that the increase of prices in Cambodia in 2008 was mostly driven by international changes in food and oil prices. Having reviewed the evidence, we can confirm that international commodity prices, energy prices and the weakness of the US dollar are also the primary causes of the domestic food price increases in 2011. We also note that the higher inflation rate in 2008 was mainly due to domestic demand pressure (real estate boom), an increase of commodity and oil prices and the weak US dollar. In contrast, inflation in 2011 was lower than in 2008. However, food prices remain high, reflecting higher global commodity and oil prices and the weakness of the US dollar. In addition to the descriptive analysis, a VAR modelling framework reconfirms that external factors are part of Cambodia's food price inflation. Specific evidence highlights that external food and oil shocks account for a small proportion of food price inflation, while inflationary expectations account for most of it. This implies that food price inflation is not entirely due to outside factors beyond the government's control.

We argue that the increase in food prices diminished household welfare unevenly across income groups, though the poorest were hardest hit. The effects on poverty were dramatic, and the results are consistent with international literature. The poorest suffered more as their net benefit ratios were lower than richer groups'. In rural areas, most poor households are not net rice sellers; their rice production is not sufficient to feed the whole family the full year round. Those with high net benefit ratios are richer families with high food production surpluses, especially rice. The impact on poverty is less striking but still significant if only the rice price increases, other food prices remaining constant. This finding also suggests that

for a rice exporter like Cambodia, a rising rice price does not necessarily benefit the poor, but on the contrary reduces their purchasing power.

Policy interventions by the government during the crisis were considerable and would have reduced the negative effects of the price rises although the magnitude of the impact needs to be further investigated. Monetary, fiscal and exchange rate responses were all needed and effective in curbing general inflationary pressures rather than that specifically on food, though their indirect impact on food prices cannot be ruled out. Direct responses to soaring food prices were mostly short-lived, while some trade policies resulted only in market distortion. There have been hardly any short-term policy responses by the government to the recent upsurge in food prices, aside from its previous commitment to promoting agriculture, particularly rice, and strengthening social protection and social safety nets. Since most social protection spending appears to target public employees and formal sector workers, it would be beneficial to expand the target groups to include informal sector workers i.e. the self-employed or employees of non-registered enterprises, which account for the largest proportion of the total labour force; CDRI (2002) estimated that 95 percent were employed in the informal sector in 2001-01, while the Economic Institute of Cambodia (EIC) estimated 85 percent (cited in ILO 2006).

Policies to address food price shocks range from short to medium to long term. The outcomes of the policies implemented by ASEAN countries were varied. Some were forceful for a very short time but produced distortions later; for instance, export bans eased domestic prices at the time but the increased shortage of world supply bid up food prices later. This section proposes some key measures for Cambodia in times of food price surges. These proposals are drawn from careful examination of past government responses and their impacts. We consider both short-term and long-term measures.

For short-term responses, the government needs to maintain social safety nets, which include conditional cash transfers, food-for-work and food stamps. Without such immediate responses, vulnerable groups, including urban poor and landless households, could face social and economic collapse, malnutrition and deep poverty. The need for a strong social safety net in Cambodia has been echoed in many research publications. We join them to emphasise that such programmes are indispensable; however, they do not come without costs, especially given the limited financial resources and institutional capacity. Mechanisms to channel resources have to be effective and transparent so that they reach the right targets. Target groups should be the most vulnerable and poorest. Tools to identify those groups such as the Identification of Poor Households Targeting Programme of the Ministry of Planning should be expanded nationwide.

Medium or long-term responses need to be considered alongside short term policy interventions. One of the basic causes of food price inflation is an imbalance between demand and supply. Many scholars and international organisations working in the food sector believe that inattention to agricultural development and inadequacy of resources devoted to productivity research and development are partly to blame for the food price shock. This is especially relevant to Cambodia. One key message is that the country needs to stay focused on promoting agriculture.

It is good news that the government has reasserted its commitment to promoting rice production and making Cambodia one of the biggest rice exporters in the world by 2015. The effort is important, not just to spur economic growth, but also to ensure food self-sufficiency, reduce the risk of food insecurity and stabilise food prices. Our recommendation is

ambitious: to go beyond rice to embrace more foods. While rice is the main focus, Cambodia's endowments of land and labour would allow it to strengthen other food crops as well. Hard and soft infrastructure (i.e. roads, irrigation, energy/electricity, agricultural research and extension, land management, credit system, marketing, trade logistics and facilitation, and processing capacity) building and upgrading would be key to providing spill-over effects for the whole sector.

Finally, to be complete, this impact assessment should take a second-order effect into account. It is unlikely that household consumption decisions remain unchanged amid sudden food price inflation. Should this be the case, a theoretical model that captures such changes would more accurately estimate the welfare impact. We leave this rather complex assignment to others.

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## Appendix A: Theoretical Model and Data

### Welfare Effects

It is widely noted that rising food prices will affect households differently (e.g. ADB 2008; Warr 2008). Some households may benefit from higher prices, while others are adversely affected. The first-order welfare impact of rising food prices depends on whether a household is a net consumer (buyer) or net producer (seller) of those food items. Typically, the urban poor are net consumers and are adversely affected by higher food prices. The effects on the rural poor are varied since they depend on the structure of consumption and household crop production.

In Deaton's (1989) model, the first-order welfare effect of food price changes on households can be estimated by calculating the net benefit ratio (NBR). This ratio is the difference between the consumption ratio (CR) and production ratio (PR). If NBR is positive (negative), the household is defined as net seller (net buyer). The consumption ratio is defined as the elasticity of the cost of living with respect to changes in price, whereas the production ratio is the elasticity of food sales to total household income. The proxy used for the production ratio (*PR*) is the share of the value of agricultural sales and own consumption in total household income, while the proxy used for the consumption ratio (*CR*) is the share of the value of food purchases and own consumption in total household expenditure. This method was subsequently employed in many academic papers (see for instance Barrett & Dorosh 1996; Kytchukova & Diop 2006; Arndt *et al.* 2008; Ivanic & Martin 2008).

Deaton's model can be represented as follows:

$$\begin{aligned}\Delta W &= \Delta p \times NBR \\ \Delta W &= \Delta p \times (PR - CR)\end{aligned}\quad (1)$$

If price of food item  $i$  changes, its impact on welfare of household  $h$  can be simply written as:

$$\Delta W_h = \Delta p_i \times (p_i Q_i - p'_i Z_i) / X_h, \quad (2)$$

where  $\Delta W_h$  is the change in welfare of household  $h$ ,  $\Delta p_i$  is a change in price of food item  $i$ .  $p_i Q_i$  is gross production and  $p'_i Z_i$  is the household's consumption of food item  $i$ .  $p'_i$  here means the household may face a different price level at the time of purchase of food item  $i$ .  $p'_i$  can be greater or smaller than  $p_i$  depending on the market price of food item  $i$ .

However, the production ratio matters if the household had to incur costs, which is not uncommon in the production of food item  $i$ . In this case, net production is perhaps a better proxy for PR calculation. As a result, production expenditure  $E_i$  can be subtracted from the gross production  $p_i Q_i$  in equation (2) to yield:

$$\Delta W_h = \Delta p_i \times (p_i Q_i - E_i - p'_i Z_i) / X_h \quad (3)$$

Moreover, in reality, a household faces price increases in a wide array of food items; some of them are not own produce. Since we are interested in a combination of food price increases, equation (3) can be subsequently adapted as follows:

$$\Delta W_h = \Delta p \times \left( \sum_{i=1}^k (p_i Q_i - E_i) - \sum_{j=1}^m p_j Z_j \right) / X_h \quad (4)$$

Here,  $\Delta p$  is food price inflation; the household produces  $i$  food items,  $i = 1, 2, 3, \dots, k$  and consumes  $j$  items,  $j = 1, 2, 3, \dots, m$ ; in most cases,  $j \geq i$ .

Finally, we use net food sales instead of net production, and food purchases instead of total food consumption to derive equation (5) below:

$$\Delta W_h = \Delta p \times \left( \sum_{i=1}^k (p_i q_i - e_i) - \sum_{j=1}^m p_j z_j \right) / X_h \quad (5)$$

where  $q_i$  is quantity of food sales,  $e_i$  is production expenditure per quantity of food sales, and  $z_j$  is quantity of food purchases. This paper uses equation (5) to measure the welfare impact of food price increases on households.

It is worth noting that these techniques do not allow for any behavioural change in production or consumption, i.e. production and consumption patterns remain unchanged. It is highly likely that production of commodities whose prices have risen would increase due to higher profitability, while fuel-intensive producers' profitability would decline. The changing production structure will affect factor returns. For example, if rising prices favour rice and if rice production uses land and unskilled labour, then land rental rates and unskilled wages should rise relative to the market returns for capital and skilled labour.<sup>13</sup> In this case, a rise in rural wages following a food price increase could mitigate the negative first-order impacts for net food buyer households.

Consumption patterns may also change in times of price shock. In reality, people may choose to replace the now expensive food items with cheaper ones. In such a case, substitution effects matter. A model to capture these substitution effects is embraced in papers by Green and Alston (1990), Alston *et al.* (1994) and Haq *et al.* (2008) using an "almost ideal demand system" by Deaton (1980). In the model, three elasticities are estimated: compensated (Hicksian), uncompensated (Marshallian) and expenditure elasticities. These elasticities are then used to simulate the impact of price shock on food consumption and on poverty (Haq *et al.* 2008). The substitution effects and second order adjustments summarised above are not analysed in this study.

### Link to Poverty

As Deaton (1989) postulates, the welfare changes are synonymous with real income changes of a household due to increasing food prices. From this theoretical viewpoint, we can observe the effects on poverty through changes in household consumption. The new consumption after food price changes can be simply calculated as:

$$C'_h = C_h + (C_h \times \Delta W)$$

where  $C'_h$  is new consumption and  $C_h$  is old consumption. We observe the change in poverty headcount through comparison with the national poverty line.

### Price Pass-through Effects

To observe the causes of food price increases, theoretically one needs to examine the pass-through of international prices to domestic prices. Empirically, a vector autoregression (VAR) model is commonly used to examine the pass-through of external shocks—fuel and food—into inflation (Bhundia 2002; McCarthy 2007; Duma 2008) and then a recursive Cholesky is applied to identify the primitive shock in the VAR model. Because this is a rapid assessment and due to data constraints, we have to forego this part and let others pursue it in future studies. In light of this, we adopt a simple method to observe whether the co-movement of prices exists.

<sup>13</sup> The impact of higher food prices on wages has been empirically examined in many countries but the conclusion is not unanimous. For example, Ravallion (1990, 2000) uses data from Bangladesh and India and finds that the rural poor are adversely affected in the short run by rising food prices, but the long-run impact can be neutral after adjusting for changes in wage rates. Conversely, Rashid (2002), using time-series data from Bangladesh, argues that changes in rice prices since the 1980s have had negligible effect on agricultural wages. Christiaensen *et al.* (2006), using data from a number of African countries, conclude that policies leading to higher food prices are likely to increase poverty even after accounting for wage and productivity effects.

Overall, a literature and desk review were carried out specifically to observe the policy responses to rising food prices that have already been implemented by the government since the food price shocks of 2008 and 2009-11. This is not limited to the consideration of policy responses implemented by the Cambodian government and its development partners, but also looks at other countries' experiences. Such lessons serve as crucial inputs into policy recommendations in the last part of this paper.

### **Data**

The paper utilises a data set from a rapid survey of 420 households in eight villages in Cambodia. This data set is used primarily to compute net benefit ratio to identify net food buyers and net food sellers. The household survey captures information on food production including own production and expenditure, and sales and own food consumption. Information on shocks and risk coping strategies are also among the variables observed (see the survey questionnaire in Annex C). The 2011 rapid survey uses the sampling frame of previous surveys<sup>14</sup> carried out in 2008 and 2009 to determine the random sample size (see Table 19 for details). The survey was conducted in October 2011.

In our analysis of causes of food price increases, we use monthly consumer price index (CPI) data, particularly of food and non-alcoholic beverages over 2007–11 published by the National Institute of Statistics. Information on government policy responses to food price rises was obtained through consultation with the Ministry of Economy and Finance and its publications and through secondary sources including published papers.

**Table 20: Household Survey Samples**

	CDRI 2008	CEA 2009	2011
Provinces	24	9	6
Villages	149	15	8
Households per village	15	71*	53
<b>Total number of households</b>	<b>2235</b>	<b>1070</b>	<b>420</b>

\* See Appendix B for 2009 Cambodia Economic Association (CEA) sampling frame details. To obtain a comparable data set with the CEA survey in terms of villages, we selected eight villages (six provinces) out of 15 villages (nine provinces) of the CEA sampling frame.

<sup>14</sup> CDRI (2008), "Impact of High Food Prices in Cambodia" by CDRI in 2008 and "Impact of the Economic Downturn on Households and Communities in Cambodia" by Cambodia Economic Association (CEA) in 2009.

## Appendix B: Selected Villages for CEA Study in 2009

No	Type	Village	Commune	District	Province	#HHs
1	wet season rice surplus	Nikom Krao	Chroy Sdau	Thma Koul	Battambang	66
2	wet season rice surplus	Ta Ngak Srae	Phnov Ti Pir	Sithor Kandal	Prey Veng	76
3	dry season rice surplus	Ponley Cheung	Ponley	Angkor Borei	Takeo	69
4	dry season rice surplus	Ponley	Ba Baong	Peamro	Prey Veng	91
5	maize production	Kbal Tumnup	Ou Sampor	Malai	Banteay Meanchey	75
6	cassava production	Spean	Dar	Memut	Kompong Cham	70
7	soybean production	Sampoar	Ta Ong	Chamkar Leu	Kompong Cham	71
8	fishing	Kompong Preah	Chhnok Tru	Baribour	Kompong Chhnang	70
9	land abundant	Tumnop Takuon	Kdol Tahen	Bavel	Battambang	66
10	land abundant	Kang Meas	Tnaot Chum	Baray	Kompong Thom	76
11	poorest areas in the poorest provinces	Anhaseh	Toap Mean	Thpong	Kompong Speu	62
12	poorest areas in the poorest provinces	Sambuor	Popok	Stoung	Kompong Thom	71
13	poor urban	Damnak Thom	Stung Meanchey	Meanchey	Phnom Penh	70
14	poor urban	Phum 6	Khmuonh	Sen Sok	Phnom Penh	63
15	tourism dependent	Rohal	Nokor Thom	Siem Reap	Siem Reap	74

## Appendix C: Vector Autoregression Analysis

In the early 1980s, Sim (1980) provided a new macro econometric framework, namely vector autoregressions (VAR) to examine the relationship between monetary policy and real economic activities in the United States. Since then, a number of studies have used the VAR modelling framework in analysing different channels of transmission. Most recently, the VAR approach has been expanded to capture external shocks such as oil and food prices. For instance, McCarthy (1999) uses recursive VAR modelling to examine the impact of exchange rates and import prices on domestic producers and consumer prices in selected industrialised countries. Following McCarthy (*ibid.*), there is a large body of empirical studies that use the VAR modelling framework to investigate the degree to which fluctuations in oil prices, food prices and/or exchange rates transmit to producer and consumer prices in various countries, including Sri Lanka, Turkey, Brazil, South Africa, Oman, China, India, Indonesia, Korea, Malaysia, the Philippines, Thailand and Vietnam (Duma (2008); Leigh & Rossi (2002); Bhundia (2002); Hakro & Omezzine (2010); Jongwanich & Park (2008).

This paper also attempts to use the VAR approach to examine the pass-through of international oil and food prices to food inflation in Cambodia. The methodology is drawn from McCarthy (1999), Bhundia (2002), Duma (2008) and Jongwanich and Park (2008). Given the lack of reliable real sector statistics i.e. output gap/industrial production, import and producer prices, our model contains only four variables and has the following ordering for the endogenous variables: international oil prices  $\pi^{oil}$ , international rice prices, which are a proxy for international food prices  $\pi^{rice}$ , the nominal exchange rate of the US dollar relative to the euro  $\Delta e$ , and food price index  $\pi^{FPI}$ . The estimated system can be represented as follows:

$$[1] \quad \pi^{oil} = E_{t-1}(\pi_t^{oil}) + \varepsilon_t^{oil}$$

$$[2] \quad \pi^{rice} = E_{t-1}(\pi_t^{rice}) + a_1 \varepsilon_t^{oil} + \varepsilon_t^{rice}$$

$$[3] \quad \Delta e_t = E_{t-1}(\Delta e_t) + c_1 \varepsilon_t^{oil} + c_2 \varepsilon_t^{rice} + \varepsilon_t^{\Delta e}$$

$$[4] \quad \pi_t^{FPI} = E_{t-1}(\pi_t^{FPI}) + f_1 \varepsilon_t^{oil} + f_2 \varepsilon_t^{rice} + f_3 \varepsilon_t^{\Delta e} + \varepsilon_t^{FPI}$$

where  $\varepsilon_t^{oil}$ ,  $\varepsilon_t^{rice}$  and  $\varepsilon_t^{\Delta e}$  are the supply (oil and rice) and exchange rate shocks,  $\varepsilon_t^{FPI}$  is the shock emerging from food price inflation, and  $E_{t-1}(\cdot)$  is the expectation of a variable based on information available at period  $t-1$ . The shocks are assumed to be serially uncorrelated and uncorrelated with one another within a period.

The model is estimated for the period 1999m1 to 2011m9 of monthly data. Oil prices, rice prices and the exchange rate of the US dollar relative to the euro are derived from the IMF database, while the food price index is obtained from the National Institute of Statistics.

- Oil price: an average of the spot UK Brent, Dubai and West Texas Intermediate by converting to riels using an average riel-US dollar exchange rate
- Rice price: Thailand 5 percent broken milled white rice free on board (FOB) Bangkok by converting to riels using an average riel-US dollar exchange rate
- US dollar-euro exchange rate: the value of a euro in US dollars
- Food price index: food and non-alcoholic beverage prices (December 2006=100)

To determine the stationarity of the variables in the system, unit root tests are run on the logarithm levels of the series. Augmented Dickey-Fuller tests suggest all series are integrated in order i.e. I (1) so that the VAR is estimated in first differences.

Standard lag length selection criteria are used to select the number of lags of the VAR. Akaike Information Criterion (AIC) selects three lags of the first-differenced series, while Hannan-Quinn information criterion (HQIC) and Bayesian information criterion (SBIC) select two lags. Given this

fact, Wald tests are performed in order to ensure that lags with significant information content are not excluded from the VAR. They show that two lags are jointly significant for all equations in the VAR system. Therefore, the VAR was estimated with two lags.

**Table 21: Unit Root Test**

Variable	Unit Root Test		Order of Integration
	ADF Statistic		
	Level	First difference	
Oil price	-1.933	-9.396***	I(1)
Rice price	-0.210	-7.037***	I(1)
Exchange rate	-0.732	-8.895***	I(1)
Food price inflation	1.092	-7.746***	I(1)

\*\*\* Statistically significant at the 5 percent level according to the Augmented Dickey-Fuller distribution's critical value.

**Table 22: VAR Lag Length Selection Criteria**

Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	231.10		4.70E-07	-3.22128	-3.18728	-3.13762
1	1047.26	1632.300	5.50E-12	-14.57100	-14.4010	-14.15270
2	1095.30	96.099	3.50E-12	-15.02560	-14.7197*	-14.27270*
3	1112.82	35.022	3.4e-12*	-15.04700*	-14.6051	-13.95950
4	1118.13	10.624	4.00E-12	-14.89540	-14.3175	-13.47330
5	1134.22	32.180	4.00E-12	-14.89670	-14.1828	-13.14000

\* Indicates lag order selected by the criteria at 5 percent level.

Note: LR is the sequential modified likelihood ratio test; FPE is the final prediction error; AIC is the Akaike information criterion; HDIC is the Hannan-Quinn information criterion; SBIC is the Bayesian information criterion.

After fitting the VAR model, a Lagrange multiplier test, normality test (Jarque-Bera/Skewness/Kurtosis) and stability condition are applied. The Lagrange multiplier test reveals that the null hypothesis of no serial correlation at lag order 2 cannot be rejected, implying that there is no autocorrelation in the residuals for any of the two orders tested. The Eigen value is strictly less than 1, satisfying the stability condition. We could not overcome the normality test because the joint normality test applied to the residuals is statistically significant at the 1 percent level, indicating that the residuals are not normally distributed. As noted in Stata Manual (Stata Corp 2009), if the residuals are not normally distributed, the parameter estimates are still consistent but they are not efficient.

## Appendix D: Household Questionnaire

<b>Questionnaire Number</b>	
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### HOUSEHOLD SURVEY QUESTIONNAIRE

#### IMPACT OF FOOD PRICE INCREASES ON THE POOR AND VULNERABILITY IN CAMBODIA

October 2011

Geographical Information			
1	Province/City	Name:	Code:
2	District/Khan	Name:	Code:
3	Commune/Sangkat	Name:	Code:
4	Village/Krom	Name:	Code:
5	House number:	(for households in Phnom Penh only)	
6	Street number:	(for households in Phnom Penh only)	

Interviewer Information			
7	Interviewee	Name:	Sex: 1= Male 2 = Female
8	Interviewer	Name:	Code:
9	Date of interview (dd/mm/yy):		
10	Time started:	Completed:	

Quality Control Record	
11	Survey Team Leader Name:
This questionnaire has already been checked.      Signature _____ Date _____	

Data Entry Record	
12	Name of entry staff:
13	Date of data entry (dd/mm/yy):



## I. HOUSEHOLD INFORMATION

### Note

- 1) "Household" refers to those who are living in the same house and sharing the same food. If they live in the same house but cook and eat separately, they should be considered as different households.
- 2) In order to be counted as a household member the person has to have been present in the household in the last six months (since May 2011). If the person has not been present in the house at all since May 2011, then he/she is not counted as a household member.

Q1.1 Please fill in the information on household head and spouse below:

1	2	3	4	5	6	7
	Name	Sex	Age (year)	Marital status	Education (highest grade)	Main occupation*
	1	2	3	4	5	6
1. Household Head						

\* Please take note of occupation of household head in addition to putting code here: \_ \_ \_ \_ \_

Column 2: Sex: 1= Male 2=Female

Column 4: Marital Status: 1=married/living together, 2=separated, 3=widowed, 4=single

Column 6: Education: 0=pre-school, 1=class one, 12=class twelve, 13=technical/vocational training, 14=college/university undergraduate, 15=post graduate

Column 6: Main occupation: see attached paper for codes

Q1.2. Please fill in the information on household members below:

Q1.2 How many members in your household? (number)	
Q1.3 How many members in your household, including yourself earned income in the last 12 months? (number)	
Q1.4 How many children in your household are in school? (number)	

## II. HOUSING, WATER, ELECTRICITY AND FUEL ACCESS

Q2.1	What is the legal status of the dwelling? 1= Owned by the household 2= Not owned but no rent is paid 3= Rented 4= Other (specify)	
Q2.2	What is your residential land area? (square metres)	
Q2.3	What is the floor area of your house? (square metres)	

Q2.4	<p>What is the primary material of the wall of the housing occupied by your household?</p> <p>1= Bamboo, thatch/leaves, grass                  2= Wood or logs                  3= Plywood                  4= Galvanised iron or aluminum or other metal sheets                  5= Concrete, brick, stone                  6= Other (specify)</p>	
Q2.5	<p>What is the primary material of the roof of the housing occupied by your household?</p> <p>1= Thatch/leaves/grass                  2= Tiles                  3= Fibrous cement                  4= Galvanised iron or aluminum                  5= Concrete                  6= Other (specify)</p>	
Q2.6	<p>What is the primary material of the floor of the housing occupied by your household?</p> <p>1= Earth, clay                  2= Wooden planks                  3= Bamboo strips                  4= Concrete                  5= Ceramic tiles                  6= Other (specify)</p>	
Q2.7	<p>What toilet facility does your household have inside the premises?</p> <p>1= Pour flash                  2= Pit latrine                  3= Latrine                  4= None                  5= Other (specify)</p>	
Q2.8	<p>What is your household's main source of lighting?</p> <p>1= Public/municipality/private company-provided electricity                  2= Generator                  3= Battery                  4= Kerosene lamp                  5= Other (specify)</p>	
Q2.9	<p>What is your household's main source of drinking water?</p> <p>1= Piped in dwelling                  2= Tube/piped well                  3= Protected dug well                  4= Unprotected dug well                  5= Pond, river or stream                  6= Other (specify)</p>	
Q2.10	<p>What kind of fuel does your household mainly use for cooking?</p> <p>1= Firewood                  2= Charcoal                  3= Liquefied petroleum gas                  4= Kerosene                  5= Public-provided electricity                  6= Other (specify)</p>	

### III. HOUSEHOLD NON-LAND ASSETS (USEABLE)

Q3.1 Please fill in the information on the quantity of non-land assets owned by a household below.

No	Item	1. Quantity
1	Radio	
2	Stereo	
3	Television	
4	Desk phone/cell phone	
5	VCD/DVD player/photocopier	
6	Camera	
7	Bicycle	
8	Motorcycle	
9	Car/jeep/van	
10	Refrigerator	
11	Electric/gas cooker	
12	Washing machine	
13	Electric iron	
14	Electric fan	
15	Air conditioner	
16	Generator	
17	Batteries	
18	Rowing boat	
19	Motor boat	
20	Cart (pulled by animal)	
21	Plough	
22	Threshing machine	
23	Hand tractor ( <i>kou yon</i> )	
24	Rice mill	
25	Water pump	
26	Total	

#### IV. HOUSEHOLD PRODUCTION

Please provide the following information on crops, including fruits and vegetable grown by your household during the past year (both dry and wet seasons).

Q4.1.1	Does your household own any land that could be used for crop production? 1=Yes 2=No (go to Q4.1.3)	
Q4.1.2	What is the total land area of crop production? (ha)	
Q4.1.3	Did your household lease any land for crop production? 1=Yes 2=No (go to Section 04 part 2 about livestock and poultry)	
Q4.1.4	Did your household produce any crops including fruit and vegetables during the past wet and/or dry season? 1=Yes 2=No (go to Section 04 part 2 about livestock and poultry)	

**Note:**

- 1) Past wet-season should refer to the wet-season last calendar year (2010).
- 2) As interview takes place in October, past dry-season should refer to the dry-season this calendar year (2011)
- 3) 1m<sup>2</sup>= 0.0001 ha; 1 acre=0.01 ha; 1 rai=0.16 ha, 1 kong=0.09 ha

1) **Crops and Vegetables (Please record 0 if there is no information)**

Q4.1.7 Please provide the information on the production, sale and consumption, and expenditure below

No	Crop	Production			Total value of production ('0000 riels)	Sale and Consumption			Expenditure ('0000 Riels)								
		Total harvested area (ha)	Quantity produced	Unit		Unit price (riels/kg or note other unit)	Sale	Own consumption	Fertilizer/pesticide	Gasoline	Hired labour	Water	Rent	Total*			
		1	2	3	4	Q (kg)	'0000 riels	Q (kg)	7	8	9	10	11	12	13	14	15
1	Paddy (dry)			kg													
2	Paddy (wet)			kg													
3	Maize			kg													
4	Beans			kg													
5	Sesame			kg													
6	Cucumbers			kg													
7	Watermelon			kg													
8	Vegetables			kg													
9	Fruit			kg													
10	Lotus /Reed			kg													
11	Cassava			kg													

**Note:** \*Please verify the total expenditure (column 15) with the value of total production (column 5) and confirm with the household whether there is a gain or loss.

Q4.1.5	If you grow rice, is the rice you keep sufficient for your family's consumption for the whole year?											
Q 4.1.6	If not enough, how many months do you have to buy rice for your household consumption?											
Q 4.1.7	Which month (s)? (please circle below)											
Month	1	2	3	4	5	6	7	8	9	10	11	12
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

## 2) Livestock and Poultry

Q4.2.1	Has your household raised any livestock and/or poultry in the past 12 months? 1=Yes 2=No ( go to Section 4 part 3 about fish)
--------	---

Q4.2.2 Please complete the information on value of livestock and poultry sold and/or consumed in the household during the past 12 months.

No	Livestock/ Poultry	Production		Sale and Consumption			Expenditure ('0000 Riels)				Total*
		Total # livestock/ poultry owned	Value of livestock/ poultry owned ( '0000 riels)	Sale in the past 12 months Q (#)	'0000 Riels	Own consumption in the past 12 months Q (#)	'0000 Riels	Fodder for livestock/poultry	Hired labour	Veterinary services and medicines	
1	Cattle	1	2	3	4	5	6	7	8	9	10
2	Buffalo										
3	Pigs			kg		kg					
4	Chickens			kg		kg					
5	Ducks			kg		kg					

**Note:** \*Please verify the total expenditure (column 10) with the value of total production (column 2) and confirm with the household whether there is a gain or loss. Please record only poultry of marketable weight. Please record proceeds from selling by-products such as eggs in column 4 and those kept for own consumption in column

3) Fish

Q4.3.1	Did you raise/catch fish including shrimps and frogs in the past 12 months? 1=Yes 2=No ( go to Section 05)	
--------	--	--

Q4.3.2. Please complete the value of fish/shrimp/frogs sold or consumed in the household during the past 12 months.

No	Type**	Production		Sale and Consumption			Expenditure ('0000 Riels)				
		Total (kg)	Value '0000 riels	Sale in the past 12 months		Own consumption in the past 12 months		Fodder	Hired labour	Tools/ maintenance	Total*
				kg	'0000 Riels	kg	'0000 Riels				
1	Fish	1	2	3	4	5	6				10
2	Shrimp										
3	Frogs**										

**Note:** \*Please verify the total expenditure (column 10) with the value of total production (column 2) and confirm with the household whether there is a

Exchange rate: 1USD = 4,000 riels; 1 THB= 134 riels; 1 Chi=720,000 riels

## V. HOUSEHOLD INCOME FROM OTHER SOURCES

Q5.1 Please provide the information on other income earned or received in the **last 6 months** below:

No	Source	1. Value '0000 riels
1	Pension	
2	Remittance (from relatives or friends)	
3	Transfer from NGOs	
4	Interest from lending money	
5	Salary (teacher, police, health staff, garment worker, hotel or restaurant staff, etc)	
6	Wage from selling labour or service (agriculture, construction, repair, transportation, etc)	
7	Profits from trade, handicrafts, and other business, etc.	
8	Rental from land/house/animal/agricultural tools	
9	Proceeds from selling assets including land	
10	Total	

## VI. HOUSEHOLD CONSUMPTION

### 1) Food Consumption

Q6.1 Rice (consumption per day multiply by 7 days)	_____ kg
--	----------

Q6.2 Please provide the information on food, beverage and tobacco consumption during the **past 7 Days**.

No	Item	1. Purchase in riels	2. Own produce (gift & free collection) in riels
1	Rice		
2	Cereal		
3	Fish		
4	Meat and poultry		
5	Eggs		
6	Dairy products		
7	Oils and fats		
8	Fresh vegetables		
9	Tubers		
10	Pulses and legumes		
11	Prepared and preserved vegetables		
12	Fruit		
13	Dried nuts and edible seeds		
14	Sugar, salt and spices		
15	Tea, coffee and cocoa		
16	Non-alcoholic beverages		
17	Alcoholic beverages		
18	Tobacco		
19	Prepared meals bought outside and eaten at home		
20	Total		

**2) Non-food Consumption**

Q6.3 Please provide the information on non-food consumption within the time period specified below:

No	Item	Time period	1. Purchase in riels
1	House rent	Last 1 month	
2	Water charge	Last 1 month	
3	Fuel and power	Last 1 month	
4	Wood fuel	Last 1 month	
5	Medical care	Last 1 month	
6	Transportation	Last 1 month	
7	Communication	Last 1 month	
8	Personal care	Last 1 month	
9	Clothing and footwear	Last 6 months (Khmer New Year)	
10	Furniture, furnishings and household equipment	Last 6 months (Khmer New Year)	
11	Domestic salaries	Last 6 months (Khmer New Year)	
12	Recreation	Last 6 months (Khmer New Year)	
13	Education	Last 6 months (Khmer New Year)	
14	Personal effects	Last 6 months (Khmer New Year)	
15	Gambling	Last 6 months (Khmer New Year)	
16	Other	Last 6 months (Khmer New Year)	
17	Total		



**VII. SHOCKS AND COPING STRATEGIES (faced by household in the last 12 months)**

No	Type of Shock	1= Yes 2= No	2. Coping Strategies and Codes												List of Coping Strategies				
<b>Individual Shocks</b>																			1 = spent savings 2 = incurred debts 3 = sold out productive non-land assets (farm equipment, transports, etc) 4 = sold out domestic assets (radio, TVs, fridge, etc) 5 = sold out residential land/house 6 = sold out agricultural land 7 = sold out more livestock than usual 8 = reduced expenditure on food consumption 9 = consumed seed stocks kept for next season 10 = reduced expenditure on education and healthcare 11 = got help from relatives/friends 12 = got help from NGOs 13 = household member(s) migrated to look for jobs 14 = placed children in labour service 15 = other (specify) 16 = no solution
7.1	Household member(s) became very sick/ badly injured	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
7.2	Settlement fire	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
<b>Crop/Livestock-related Shocks</b>																			
7.3	Crop failure due to pest damage	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
7.4	Crop damage due to flood/drought/fire	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
7.5	Livestock/poultry/fish deaths/thefts	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
<b>Business and Employment Shocks</b>																			
7.6	Loss employment/reduced salary	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
7.7	Business slowdown or reduced proceeds due to falling in prices of	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
7.8	Business shut	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
<b>Price Shocks</b>																			
7.9	High food prices	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
7.10	High fuel prices/transportation costs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
7.11	High agricultural input prices	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		

## VIII. ASSISTANCE

Q8.1 Has your household received any of the following assistance in the **past 6 months**?

No	Type of Assistance	1= Yes 2= No
1	Food for school children (eaten at school or take-home)	
2	Food for young/malnourished children or for pregnant/lactating women	
3	Free food rations for the household	
4	Food-for-work	
5	Cash transfers from social assistance programme (government, private, NGO)	
6	Free healthcare/drugs, from an NGO programme	
7	Seeds, fertiliser	
8	Fodder, animal feed	
9	Veterinary services	

## IX. HOUSEHOLD LOAN

Q9.1	Since <b>April 2011</b> , has your household incurred any debt (cash or in-kind)?  1= Yes 2=No (end the interview)	
Q9.2	If yes, how many loans? (number)	

Q9.3 Please fill in the loan information (in cash and in kind), if any, below:

Loan	Loan type	Source	Purpose	Amount ('0000 riels)	Date the loan taken (month/year)	Interest rate per month (%)
	1	2	3	4	5	6
1						
2						
3						
4						
5						

**Code:**

Column 1: Loan type	Column 2: Source	Column 3: Purpose
1= Cash or gold to be repaid in cash/gold	1= Relative	1= Farming
2= In-kind such as paddy, rice or fertiliser to be repaid in kind	2= Friend	2= Buy inputs for other business
	3= Money lender	3= Offset food shortage
	4= NGO	4= Treat ill hh member(s)
	5= ACLEDA	5= Education
	6= PRASAC	6= Solve hh conflicts
	7= AMRET	7= Build/renovate house
	8= AMK	8= Ceremony
	9= Hathakaseka	9= Pay existing debt
	10= CREDIT	10= Other (specify)
	11= Self Help Group	
	12= Vision Funds	
	13= Thaneakea Phum	
	14= Other (specify)	

**Thank you very much for your time and cooperation!**



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