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# **Middle East and North Africa Countries' Vulnerability to Commodity Price Increases**

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### III. MENA COUNTRIES' VULNERABILITIES TO COMMODITY PRICE INCREASES

Commodity prices have been on an upward trend since early 2009, following the sharp drop in late 2008 as the financial crisis unfolded. In the second half of 2010, commodity prices began rising rapidly, particularly for food and oil (Figure 15).

The most important factor underpinning the food price surges are weather-related supply shocks in key producing countries since June 2010. Production shortfalls in wheat, barley and other grains occurred in net cereals exporters such as Russia and Ukraine. Additionally, Russia imposed a wheat export ban in August, and yields were disappointing in Europe and North America which are major net cereal exporting regions. These factors, which outweighed favorable production outcomes elsewhere (e.g. Argentina and Australia), induced large draw downs in food stocks thereby tightening the global demand and supply balance. Another leading factor has been the weakening of the US dollar since mid-September, which continues to sustain the prices of nearly all agricultural and non-agricultural commodities. Strong economic growth, particularly in emerging economies during 2010, has also contributed to the rise in commodity prices.

As with food prices, energy prices have also risen in the second half of 2010, notably since September (Figure 15). Oil supply disruptions in Libya have pushed oil prices up further in early 2011. The latter is contributing to sustaining food price increases given their high energy intensity and the fact that

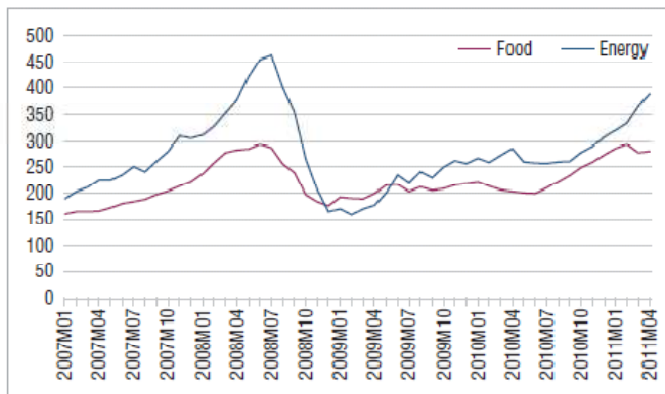
some foods (notably corn, edible oils and sugar) are used to produce biofuels, a key alternative to oil.

Agricultural prices reached 17 percent above their June 2008 peak in February 2011, but prices appear to have softened somewhat albeit with some markets experiencing volatility month-to-month. The food index as a whole has increased 40 percent since June 2010 through April 2011 despite a recent retreat after reaching its 2008 peak in February 2011 (Figure 15).<sup>18</sup> Food prices fell in March but rose again in April mainly due to a strengthening in grain markets.<sup>19</sup> In early May, prices fell for most agricultural products but, as stocks of major grains remain low, prices could rise again if the 2011/12 crop outlook deteriorates. Despite the magnitudes, however, the current price increases remain smaller than the 2007/08 increases (Figure 16).

Meanwhile, oil prices continued climbing up with the average oil price index rising almost 50 percent between June 2010 and April 2011. Ongoing political strife in the Middle East and North Africa suggests continued upward pressure on oil prices, although an expected temporary fall-off in demand from Japan (in the aftermath of the natural disaster) will likely help diminish pressures temporarily. However, demand for liquefied natural gas (LNG) will increase as it is one of the substitute energy sources for nuclear power generation in Japan. Some of

**Figure 15. International Food and Energy Prices**

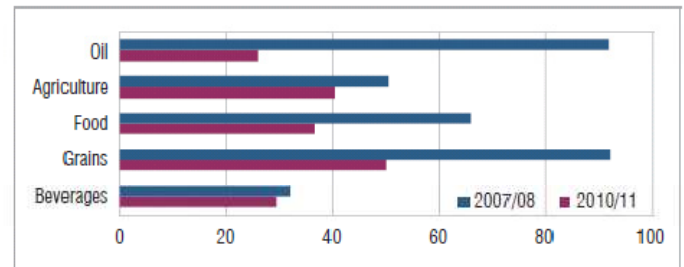
(Index, current, US\$ 2000 = 100)



Source: World Bank, DEC prospects group.

**Figure 16. Price Spikes of 2007/08 and 2010/11**

(Percentage change, Apr-Jun 2008 from a year earlier, and Feb-Apr 2011 from a year earlier)



Source: World Bank, DEC prospects group.

<sup>18</sup> Prices for wheat, maize, and soybeans fell by 25 percent, 14 percent, and 12 percent from recent peaks to mid March.

<sup>19</sup> Wheat prices rose 6 percent due to drought affecting the winter crop in US, Europe and China; while maize and sorghum prices increased 9–10 percent due to wet-weather induced late plantings.



the MENA countries are large producers and exporters of LNG and are likely to benefit from the positive terms of trade shock. Others are likely to pay more for energy imports.

## MACROECONOMIC IMPLICATIONS OF RISING GLOBAL FOOD PRICES

The recent price increases in international food prices have macroeconomic implications for the countries in MENA. They have increased import bills, and put pressure on inflation and government spending, in those cases when governments subsidize food. Recent food price increases have also affected poor households' ability to meet food requirements, increasing the chance of malnutrition in the region.

Wheat accounts for the largest share in the value of MENA's total grain consumption (see Annex Table 2). Wheat alone represents more than half of both domestic grain consumption and imports in market year 2010,<sup>20</sup> and nearly half of MENA's domestic wheat consumption was imported. Rice—the second most consumed grain—represents 16.7 percent of total grain consumption, followed by corn accounting for 15 percent of total grain consumption, and barley accounting for 10.2 percent. In terms of imports, corn takes the second place with 19.6 percent of total grain imports, followed by rice which represents 15.3 percent of the total (see Annex Table 2). At the regional level, the highest dependency on imports is for corn, with more than two thirds of domestic corn consumption being imported.

The assessment of ex ante vulnerability considers increases in international grains, oils, meat, and sugar prices in market year 2010 relative to the previous market year.<sup>21</sup> Over this period wheat prices surged nearly 30 percent, corn prices surged 53 percent, sorghum rose 32 percent, and barley prices rose 27 percent (Table 5). The increase in rice prices was more muted, at 7 percent. The increase in edible oil prices was also significant, with sunflower seed oil prices up 54 percent, rapeseed prices up 50 percent, soybean oil prices up 40 percent, and palm oil prices up 46 percent so far in the market year 2010. Sugar prices were up 39 percent, while beef prices rose 22 percent. The only prices that have declined in market year 2010 are olive oil and poultry prices.

Based on the increases in food prices for the market year 2010 above, the impact on the import bill as a share of GDP

**Table 5. International Food Price Increases in 2010**

	percent
<b>Grains</b>	
Barley	27.3
Corn	53.1
Rice, Milled	7.0
Wheat	29.9
Sorghum	31.6
<b>Edible oils</b>	
Olive	-5.3
Palm	46.1
Rapeseed	49.9
Soybean	39.9
Sunflower seed	54.2
Sugar	39.0
<b>Meat</b>	
Beef	21.5
Poultry	-0.9

Source: WB DECPG

in the MENA region is estimated at 0.6 percent of GDP, and 1.4 percent of international reserves,<sup>22</sup> with grains making the largest contribution, followed by edible oils, sugar and meat (Table 6). Oil importers are expected to be hardest hit by the increase in food prices. The increase in the import bill is estimated to be 1.2 percent of GDP, with half of the increase attributed to the impact of higher grain prices. The expected increase in the import bill of the developing oil exporters as a result of higher food product prices is estimated at 0.8 percent of GDP and 2.3 percent of international reserves. Increases in prices of edible oils and sugar account for more than half of the increase in the import bill. The GCC countries are expected to be least impacted by the higher food prices at the macro level as they have small populations and high per capita incomes. The overall impact on the GCC is estimated to be 0.3 percent of GDP and 0.5 percent of reserves, with the largest shock coming from the increase in sugar prices.

A critical consideration in identifying the MENA countries most vulnerable to commodity price shocks at the macroeconomic

<sup>20</sup> Market year refers to the 2010/11 market year which runs from July to June.

<sup>21</sup> The assessment assumes that the 2010 market year average is equal to the average prices observed so far in the market year to February 2011.

<sup>22</sup> International reserves exclude gold.

**Table 6. Impact of International Food Prices on the Import Bill**

(percent of GDP and international reserves)

	2010 GDP	International reserves		2010 GDP	International reserves
<b>MENA</b>			<b>GCC</b>		
<b>Total</b>	<b>0.62</b>	<b>1.44</b>	<b>Total</b>	<b>0.25</b>	<b>0.45</b>
Grains	0.27	0.63	Grains	0.07	0.12
Oils	0.17	0.40	Oils	0.06	0.12
Meat	0.04	0.09	Meat	0.02	0.04
Sugar	0.14	0.32	Sugar	0.09	0.17
<b>Developing oil exporters</b>			<b>Oil importers</b>		
<b>Total</b>	<b>0.78</b>	<b>2.28</b>	<b>Total</b>	<b>1.15</b>	<b>4.39</b>
Grains	0.33	0.98	Grains	0.59	2.32
Oils	0.22	0.61	Oils	0.35	1.23
Meat	0.05	0.14	Meat	0.05	0.24
Sugar	0.19	0.55	Sugr	0.15	0.59

Source: WB DECPG.

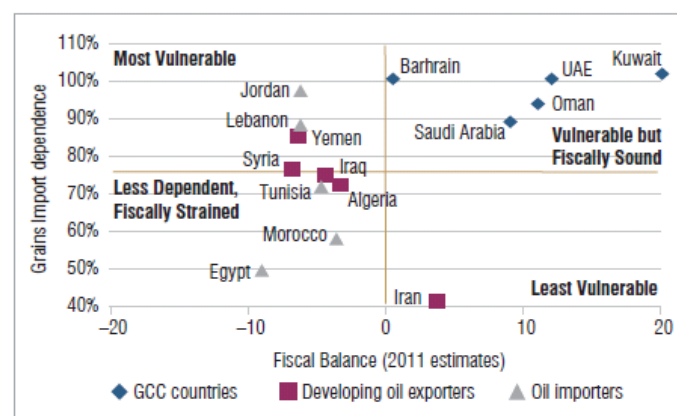
level is the country's relative exposure to food price and quantity risk as a function of fiscal balances and dependence on food imports.<sup>23</sup> A country's fiscal position determines its ability to cushion price shock impacts on the economy as well as on households. Grain imports are used as a proxy for food imports because MENA is the largest net grain importer in the world (13 million metric tons more than Asia in 2010) and because 50 percent of MENA's per capita daily caloric intake comes from cereals alone. Countries with high cereal import dependency and large fiscal deficits are found to be most vulnerable at the macroeconomic level a priori, assuming that the full import cost associated with the price increase is absorbed by the national budgets and there are no other fiscal shocks. The analysis suggests that the MENA countries most vulnerable to a sustained food price surge are largely among the MENA oil importers, notably Jordan, and Lebanon, and developing oil exporters, such as Yemen, Iraq and Syria (Figure 17). Less vulnerable are typically the GCC countries, with high quantity risk but currently low price risk as rising oil prices have eased pressure on fiscal balances.

Egypt and Morocco face high price risk, but their quantity risk is lower due to higher domestic production levels. Nonetheless, over the medium to long-run, water scarcity and climate change will stress domestic production, and thereby raise quantity risk. Iran appears least vulnerable among MENA countries

because it has lower cereal import dependence and its fiscal position has improved as rising oil prices have increased its oil revenues, but the government's recent removal of widespread price subsidies on oil products, electricity, water, gas, bread and other basic products is expected to transmit commodity price increases to domestic consumer prices to a higher degree than in the past.

## CONSUMER VULNERABILITY TO GLOBAL COMMODITY PRICE INCREASES

Food security has been featured prominently in public policy discussions in the MENA region, as food production in the region is far lower than domestic demand, making the region heavily reliant on imports, and malnutrition rates are high. According to data published by FAO in 2008, most MENA countries import at least 50 percent of consumed food calories. Of particular concern is the 40 percent rise in the cereal price index and the 77 percent rise in the sugar price index in the second half of 2010.<sup>24</sup> Together, these two commodities comprise roughly 61 percent of per capita caloric consumption in the region, which is seven percentage points higher than the worldwide average. At the same time, roughly 58 percent of consumed cereal and 75 percent of consumed sugar come from

**Figure 17. Macro Level Vulnerability of MENA Countries**

Sources: WB data and staff calculations from USDA data, based on World Bank (2011c).

Notes: Grains import dependence is measured as net grain imports as a share of total grains consumption, using USDA data for 2010.

23 The assessment is based on World Bank (2011c). Price risk is the risk that grain prices will be prohibitively high, making purchase difficult even though quantity is available on world markets. Quantity risk is the risk of food not being available, even if there are sufficient funds for purchase.

24 FAO Food Price Indices: Measured by percent change from June 2010–March/April 2011.



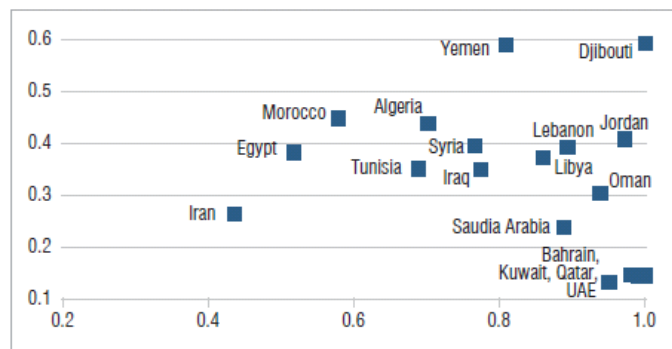
imports (Figure 18). In 2007, the MENA region was the largest net importer of cereals in the world.

Heavy dependence on imported food implies that surging international prices can place significant upward pressure on national and household budgets, depending on the level of domestic consumption subsidies and the pass-through from international to retail price.<sup>25</sup> Net food buyers, mostly the urban population and the rural poor, will likely be hardest hit because they typically spend anywhere from a third to two thirds of their income on food. Also, a sustained surge in prices is likely to lead to an increase in poverty because a large number of people live close to the poverty line. But the magnitude of the impact depends on the degree to which governments subsidize and regulate domestic prices of these food commodities,<sup>26</sup> and many other country-specific factors including domestic supply chain functioning, infrastructure and exchange rate movements.

With substantial increases in international prices of a broad range of foods,<sup>27</sup> and fast-growing domestic food demand,<sup>28</sup> some countries in MENA have been facing fiscal as well as domestic inflationary pressures (Crowley 2010). The fiscal pressures vary by country as some governments have been more successful than others in cutting consumption subsidies, and targeting the poor. Most MENA countries have introduced reforms since the 1980s. Some measures such as self-targeting, increasing prices by stealth, subsidy rationing and replacing subsidies with cash transfers, succeeded in reducing the subsidy burden, but many others failed and in some cases measures were withdrawn after public pressure. Even when changes were achieved, reforms remained partial, as all MENA countries still offer at least some consumer price subsidies,<sup>29</sup> and social assistance schemes remain poor at channeling resources to the needy. This year many governments responded to the political turmoil with further increases in food subsidies, further straining fiscal budgets (see Table 3).<sup>30</sup>

Price controls however have not been able to prevent the increase in domestic food prices. In a number of MENA countries, food and general inflation have been high over the past five years, and in most cases annual food price inflation surpasses CPI inflation (Figure 19). To help households deal with the burden of domestic food price increases MENA governments have relied on cash transfers and other forms of social protection measures (Lampietti *et al.* 2011). More recently, most governments

**Figure 18. Household and Country Food Vulnerability**



Source: National statistical offices, USDA, and other.

Notes: Share of household food expenditures in total household consumption (vertical axis) are from the latest available data often for urban centers. Shares of net cereal imports in domestic consumption (horizontal axis) are the averages from 2009–2010.

increased transfers and some of them increased wages of public servants and unemployment benefits (Table 3).

## HOW EXPOSED ARE CONSUMERS TO INTERNATIONAL PRICE FLUCTUATIONS?

International food price shocks are a risk for consumers in MENA as these shocks have been transmitted to various degrees to domestic food prices in nearly all MENA countries (Figure 20, see Annex for details). The strongest pass-through effects<sup>31</sup> of an increase in world food prices have been observed

25 In MENA countries, the cost of importing grain sometimes does not fall upon the consumer because governments often regulate prices. Thus, part of the food-price risk is absorbed at the country-level as fiscal risk.

26 MENA governments use a variety of measures to control domestic prices of food (see Lampietti *et al.* (2011)). Consumer subsidies and price controls are widely used but so are tax cuts on food grains, food grain stock changes, and export restrictions or bans.

27 See most recent Global Economic Prospects (World Bank 2011b).

28 Due to high population growth, food consumption in MENA is growing at a faster pace than food demand of all other region except Africa. However, unlike Africa which can rely on domestic production of food, MENA is highly dependent on food imports. Furthermore, in the case of cereals, foreign supply is concentrated in five exporters—Argentina, Australia, Canada, EU and US.

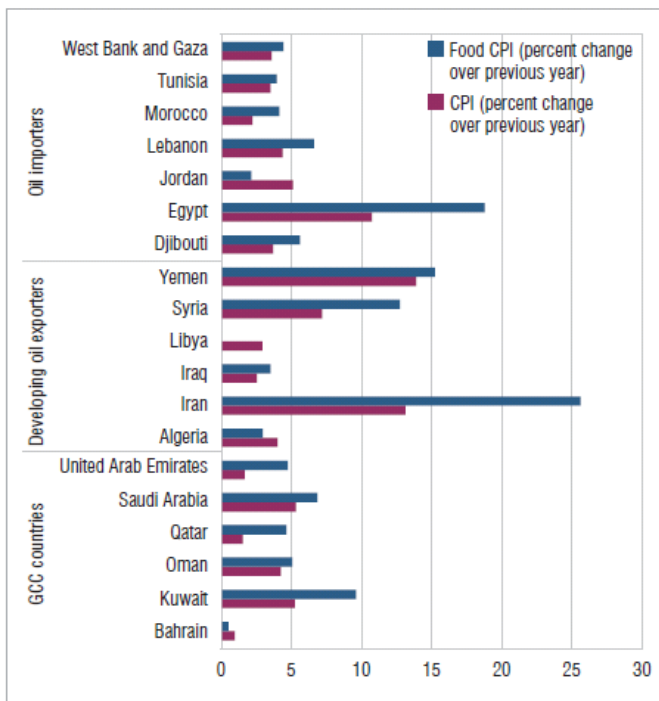
29 Jordan offers bread subsidies. In Egypt, wheat subsidies come in the form of bread sold by bakeries in predominantly urban areas and flour, sold from warehouses to rural households. Morocco subsidizes sugar, wheat and bread only. In Tunisia, the government subsidizes semolina, traditional bread, reconstituted packaged milk, and generic grain oil (see Kelly 2009).

30 Bahrain, Egypt and Algeria increased food subsidies. Kuwait offered free food for 13 months through a discount price program. Jordan offered new food subsidies worth \$550 million.

31 It is worthwhile to highlight that there is not always a perfect one-to-one match between pass-through and actual observed inflation. This is because the methodology for estimating the pass-through uses historical time series data. The coefficients report 'average' pass-through effects over the past decade. But if a country is recently subsidizing or intervening in the food market, there will be a gap between the expected pass-through (coefficients) and the actual pass-through (observed food inflation).

**Figure 19. Annual Price Changes in MENA**

(in percent)

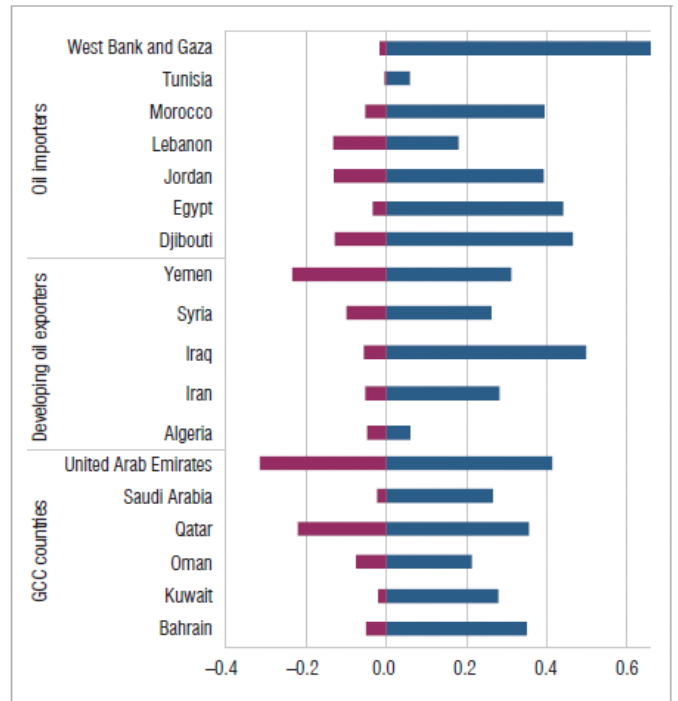


Note: The annual inflation rates for most countries are until January or February 2011. Data for Oman, Iraq, and Iran are until December 2010; for Lebanon, Libya and West Bank and Gaza until November 2010; and for Yemen until October 2010. No food price data for Libya is available; however, anecdotal evidence suggests very high food inflation rates.

in West Bank and Gaza (WBG),<sup>32</sup> Iraq, Djibouti, Egypt, and the United Arab Emirates (UAE). In these countries the pass-through coefficients are above 0.4 percent, indicating high vulnerability of households to world food price shocks. The pass-through is smaller but still sizable, varying between 0.2 and 0.4 percent, for a large group of MENA countries, including Morocco, Jordan, Syria, Iran, Yemen, and all GCC countries other than UAE. This indicates a high degree of vulnerability of households to international food price increases in virtually all MENA countries. Only a few countries have low pass-through coefficients. In particular, in Algeria and Tunisia, international food prices have had little effect on domestic prices. Government policies including subsidies effectively safeguard against price transmission in Algeria, while domestic food inflation is contained by subsidies and appropriate monetary policy in Tunisia.

Analysis of price movements over the past 6 years finds that a decline in international food prices transmit slowly into domestic food markets in MENA. A common finding is that in virtually all countries prices are highly downwardly rigid,

**Figure 20. Pass-through of Food Prices into Domestic Food Prices in MENA**



Note: The figure shows the percentage increase (decrease) in domestic food price growth for a one percent increase (decrease) in world food prices after 12-months. In most countries, the effect of a world food price shock fades out after one year. The time period for the estimates is from 2000–2011. The time period is shorter for Lebanon, Djibouti, Yemen, Syria, Iraq, Oman, Qatar, and UAE.

the only exceptions being UAE and Yemen. This downward rigidity is often a common feature of price transmissions for agricultural and other commodities, including energy (Peltzman, 2000). The reasons underlying the apparent asymmetric transmission of prices are often complex and require further study (Meyer and Cramon-Taubadel, 2004), but a number of factors highlighted in the literature could explain this phenomenon in MENA:

- An adjustment problem somewhere at the wholesale and retail level, causing domestic prices to be downwardly rigid;<sup>33</sup>
- Uncertainty over whether food price shocks are permanent or transitory, along with political uncertainty in some MENA countries, exacerbate market reluctance to respond to downward food price signals;

32 West Bank and Gaza's high pass-through in the context of currently low domestic food inflation (less than 5 percent) is likely due to the recent easing of restrictions on the entry of consumer goods.

33 For example, in Iraq FAO (2009) finds that changes in the wholesale price are not met with proportional changes in retail price.

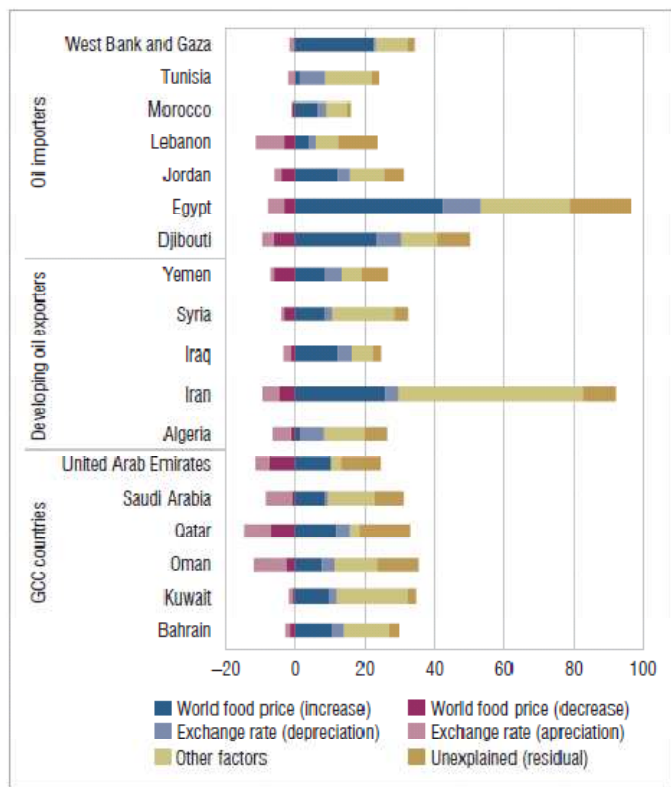


- Government interventions to support lower consumer prices and/or non-competitive practices in the domestic market;
- Price declines may be relatively rare, as prices may trend upward, making estimation of the impact of declines in international prices on domestic prices difficult.

Consumers in most MENA countries have been significantly affected by food price increases since the 2006 global food crisis. With the exception of Morocco, all countries have experienced an increase in their domestic food prices by more than 20 percent since December 2006 (Figure 21), and Djibouti, Egypt and Iran have experienced extreme (over 40 percent) food price increases.<sup>34</sup> Rising world food prices have been a major factor behind increases in domestic food prices, typically explaining some 20 to 30 percent of the variation in domestic prices. International prices have been a particularly strong driver of food inflation in Iraq and West Bank and Gaza, accounting for over 50 percent of the food inflation, followed by Egypt, Djibouti and the United Arab Emirates (over 40 percent of the food inflation). And except for Tunisia and Algeria, exchange rate depreciation has been a minor factor in domestic food inflation. However, other domestic factors also play a major role in explaining food inflation in nearly all MENA countries. These include procurement legislation and methods that are inflexible, outdated and costly in some countries; poor logistics that result in cost increases; lack of monitoring of supply-side developments; poor forecasting of prices shocks; inadequate stockpiling practices; and insufficient use of financial instruments to establish virtual stockpiles (Lampietti *et al.* 2011).

Investments in domestic market infrastructure may help to reduce domestic food prices in the medium-run. These investments would be very country-specific and depend on the local cost-build up of imported food commodities. It is likely that inefficiencies in the transport and handling infrastructure might contribute to the cost of imported food commodities. The country-specific identification of major infrastructural bottlenecks (such as ports, roads, or administrative barriers, including procurement) may therefore be advantageous. Other

**Figure 21. Decomposition of Domestic Food Price Increase in MENA since December 2006 (pre 2007–08 food crisis)**



Note: The figure shows accumulated percentage increase in domestic food prices since December 2006 until October 2009–February 2011 (depending on country data availability). The increase in domestic food prices is then decomposed into the effects of world food prices, the domestic exchange rate, and other factors using variance decomposition. The time period for most countries is 2000–2011. The time period for Lebanon, Djibouti, Yemen, Syria, Iraq, Oman, Qatar, and UAE is shorter.

areas of focus include regional trade to smoothen supply and cereal stock shortages, improve overall supply chain efficiency, and eventually create instruments and build capacity to engage in modern price risk management (World Bank, 2009b). A review of successful examples and an assessment of the effective demand for these focus areas would be a useful first step.

34 As the price transmission mechanism typically takes about one year, some of the recent increases in international food prices may have not yet have been fully transmitted into domestic markets.

## ANNEX II: FOOD PRICE PASS-THROUGH METHODOLOGY

### Empirical Approach

Recent analysis on food-price pass-through (e.g. Ferrucci *et al.* 2010) finds that international commodity prices were the main determinant of producer and consumer food price inflation in the Euro area. Albers *et al.* (2011) find evidence of positive food price pass-through into consumer prices for a number of South Mediterranean countries. Crowley (2010) analyses structural determinants of inflation in the Middle East, Northern Africa and Central Asia. He finds that commodity prices exhibit a strong and mostly significant impact on domestic inflation. By contrast, international fuel prices do not explain the rising inflation trend.

Methodologically, analyzing food price pass-through is related to the broader literature of energy prices or exchange rate pass-through (see for example Chen, 2009; Campa and Goldberg, 2005; De Gregorio *et al.*, 2007; McCarthy, 2007). The empirical strategies typically focus on the estimates and interpretation of *short-run* coefficients. Long-run co-integration evidence is rare, particularly evidence on the relationship between international and domestic food prices. One reason may be that food items are typically not perfectly arbitrated. Not only are the costs of arbitrage high, but also institutional factors and policy influences domestic prices, rendering long run relationships unstable (Ardeni, 1989).

Thus, for the present analysis, we explicitly focus on the short-run correlations between international and domestic food prices. As a baseline model for the calculations of the pass-through effects, we consider the following autoregressive model:

$$\Delta p_t = \alpha + \sum_{i=1}^k \beta_i \Delta p_{t-i} + \sum_{i=1}^k \gamma_i \Delta wfp_{t-i} + \varepsilon_t$$

where  $\Delta p$  is the annual percentage change of the food consumer price index,  $\Delta p_{t-i}$  represents lagged annual percentage changes of the food prices, to account for domestic factors and expectations, and  $\Delta wfp_{t-i}$  is the annual percentage change of the World Bank's international food price index, which is calculated from food prices measured in current US\$. The pass-through from an international food price shock to

inflation, denominated as  $\theta$ , can be obtained by inverting the equation as follows:

$$\theta = \frac{\sum_{i=1}^k \gamma_i}{1 - \sum_{i=1}^k \beta_i}$$

The logic behind the equation is to discount for the effects of domestic inflation, including inertia or expectations. For example, in the case of strong domestic factors or expectations driving inflation ( $\beta \approx 1$ ), the role of world food price transmission would be small. On the other hand, if there are insignificant domestic factors ( $\beta \approx 0$ ) then the pass-through can be measured by simply summing up the coefficients.

In addition to world food prices, exchange rate shocks are important in determining inflation. If the domestic currency depreciates (appreciates), international food price increases will have a stronger (weaker) pass-through effect. This is a significant consideration, because some of the inflationary effects could be due to domestic currency devaluations, rather than a direct effect of an increase in world food prices.

A second consideration is to take advantage of findings on food price transmission (Vavra and Goodwin, 2005). One particularly important area is asymmetric food price transmission, wherein increases or decreases in commodity prices are considered as separate variables. Albers *et al.* (2011) provide evidence of non-linearity of international food price transmission into domestic prices for a number of South Mediterranean countries.

Based on these two considerations, the baseline model is transformed into a threshold regression, which controls for lagged annual percentage changes in the domestic exchange rate,  $\Delta e_{t-i}$ , and allows studying asymmetric food price transmission:

$$\Delta p_t = \alpha + \sum_{i=1}^k \beta_i \Delta p_{t-i} + \begin{cases} \sum_{i=1}^k \gamma_i^p \Delta wfp_{t-i} + \sum_{i=1}^k \delta_i^p \Delta e_{t-i} & \text{if } \Delta wfp_{t-i} > 0 \\ \sum_{i=1}^k \gamma_i^n \Delta wfp_{t-i} + \sum_{i=1}^k \delta_i^n \Delta e_{t-i} & \text{if } \Delta wfp_{t-i} < 0 \end{cases}$$

To facilitate a consistent interpretation across MENA countries, we derive estimates of the pass-through coefficients from cumulative impulse response functions and forecast error variance decompositions to assess their relative magnitude.



The coefficients show the model's predicted adjustment of domestic food prices to changes in world food prices and the exchange rate. In most countries, the food price pass-through effects fade out after about one year. Our pass-through coefficients are therefore identical, or very similar, to those that can be directly obtained from the equation.

When estimating the model, we use monthly data from December 1998 to early 2011 for most countries, allowing for lags. The cumulative lag structure is chosen to minimize the Akaike Information Criterion (AIC) and by means of lag exclusion tests. The optimal lag length is found to be  $k = 12$ . In a few cases, different lag structures are suggested, but for simplicity and comparability we use the same lag length. The overall results are robust to changes in the lag structure. For Lebanon, Djibouti, Yemen, Syria, Iraq, Oman, Qatar, and the UAE, the estimation period is shorter, which forces us to use less lags because of data restrictions. For these countries, the results are sensitive to outliers. We selectively employ impulse dummies to correct for outliers. We also use time trends when significant. Because we estimate the model in annual growth rates, we explicitly control for seasonal factors.

## Food Price Data

Historical price data for MENA is scarce and for some countries not readily available. Monthly consumer price index (CPI) and food consumer price data were compiled from various sources for 18 MENA countries. The primary sources of data are the national statistical offices, and collected over time by the World Bank staff. The consumer price data was also complemented with information from the International Labor Organization (ILO), and updates provided by the statistical offices themselves.

Efforts were made to ensure data accuracy. Specifically, we compared trend and annual growth consistency for the different series. The data has also been corroborated with market information on food prices and field documentation from the United States Department of Agriculture (USDA). In general, preference was given to the original data provided by the national statistical offices. For Lebanon, data collected by World Bank staff was utilized. For Iran, food price data compiled from the Central Bank was used. There is no information available on food prices for Libya.<sup>35</sup>

In some cases, specifically Djibouti, Jordan, Lebanon and Tunisia, the data in different series shows small divergences from the original series due to rebasing. For example, the CPI data for Tunisia is rebased to the year 2005, to make it consistent with the data available from the national statistical office. Similarly, for Djibouti, the data has been re-based to March-April 1999, to ensure consistency with official data. In a few cases, missing observations were interpolated.

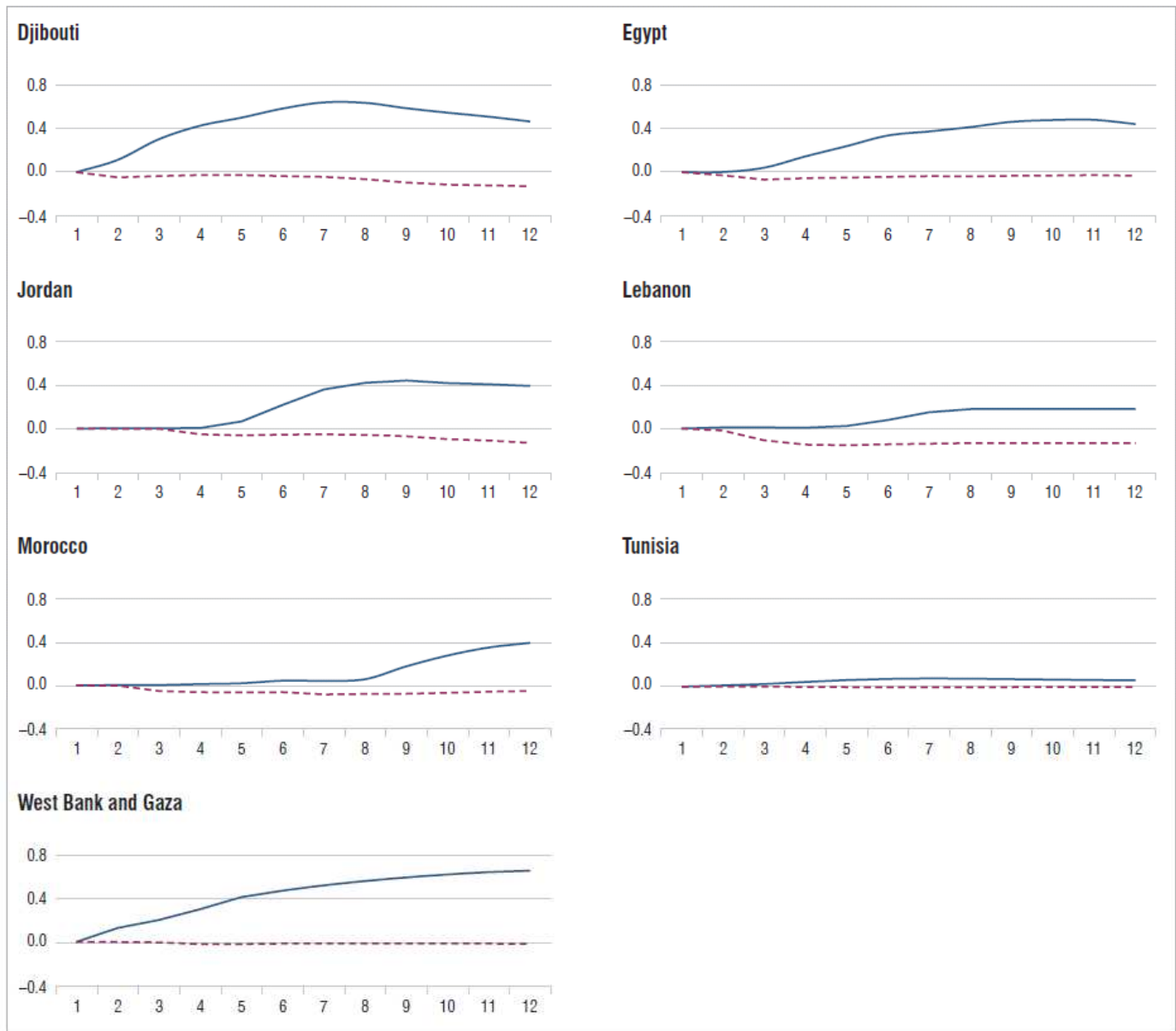
## Transmission of Food Price Shocks in MENA is Relatively Fast

In MENA the dynamics and the magnitude of the food price pass-through largely vary by country, but the overall transmission of international food prices into domestic food prices is relatively fast. The transmission takes about one year to reach full impact, but in many cases is already apparent after about 3–6 months. Annex Figure 1a-c plot the percentage change in domestic food prices to a one percent increase in international food prices by MENA country group:

In oil importers, pass-through effects appear relatively pronounced, but the speed of transmission varies (Annex Figure 1a).

- Djibouti, one of the poorest countries in the region with a fragile food security situation, shows the strongest pass-through effects both in terms of magnitude and transmission speed. Nevertheless, overall food inflation has remained relatively low because of an awareness campaign aimed at inducing wholesalers and retailers to limit their margins thereby insulating domestic prices from international price movements. Furthermore, production from government-owned farms in Ethiopia and Sudan has helped stabilize wheat and bread prices.
- In Egypt, food price pass-through is significant and visible after a few months. After about one year an international price shock reaches its full strength. A one percent increase in international food prices increases the domestic price of food by more than 0.44 percent. In contrast, a decrease in international food prices has little effects on domestic prices. The relatively high levels of food inflation are also

<sup>35</sup> The Consumer Price Index (CPI) is available until November 2010 in the International Financial Statistics (IFS) database.

**Annex Figure 1a. Oil Importers' Food Price Pass-through Dynamics**

Note: The figure shows the percentage increase (decrease) in domestic food prices for a one percent increase (decrease) in world food prices over a 12-month window. Data for most countries are for 2000–2011. In the cases of WBG, Djibouti and Lebanon however we rely on shorter time series.

due to domestic factors, such as pressure from growing demand and unfavorable weather events.

- In Jordan, food price transmission starts to pick-up after about 6 months. The overall effects after one year are strong. A one percent increase in world food prices increases the domestic prices by more than 0.39 percent. The currently low levels of food inflation, despite high-pass through effects, can be explained by a number of government interventions, such as consumer subsidies,
- release of grain reserves, and tax reductions of several agricultural inputs, including fuel.
- In Lebanon, a one percent increase in world food prices translates into a 0.18 increase in prices of domestic foodstuff; high government subsidies for food and fuel (Albers and Peeters, 2011) that absorb international shocks may help to explain these pass-through effects.
- In Morocco, food price transmission typically builds up after about 8 months, reaching magnitudes similar to those



observed for Egypt and Jordan. A one percent increase in world food prices lifts domestic prices by some 0.39 percent. The fact that food inflation currently remains subdued can be attributed to a number of factors: the government's decision to use subsidies to regulate domestic food prices, suspension of customs duties on cereal imports, suspension of local tax collection targeting fresh food traded in wholesale markets, and price control operations to contain price increases resulting from speculation.

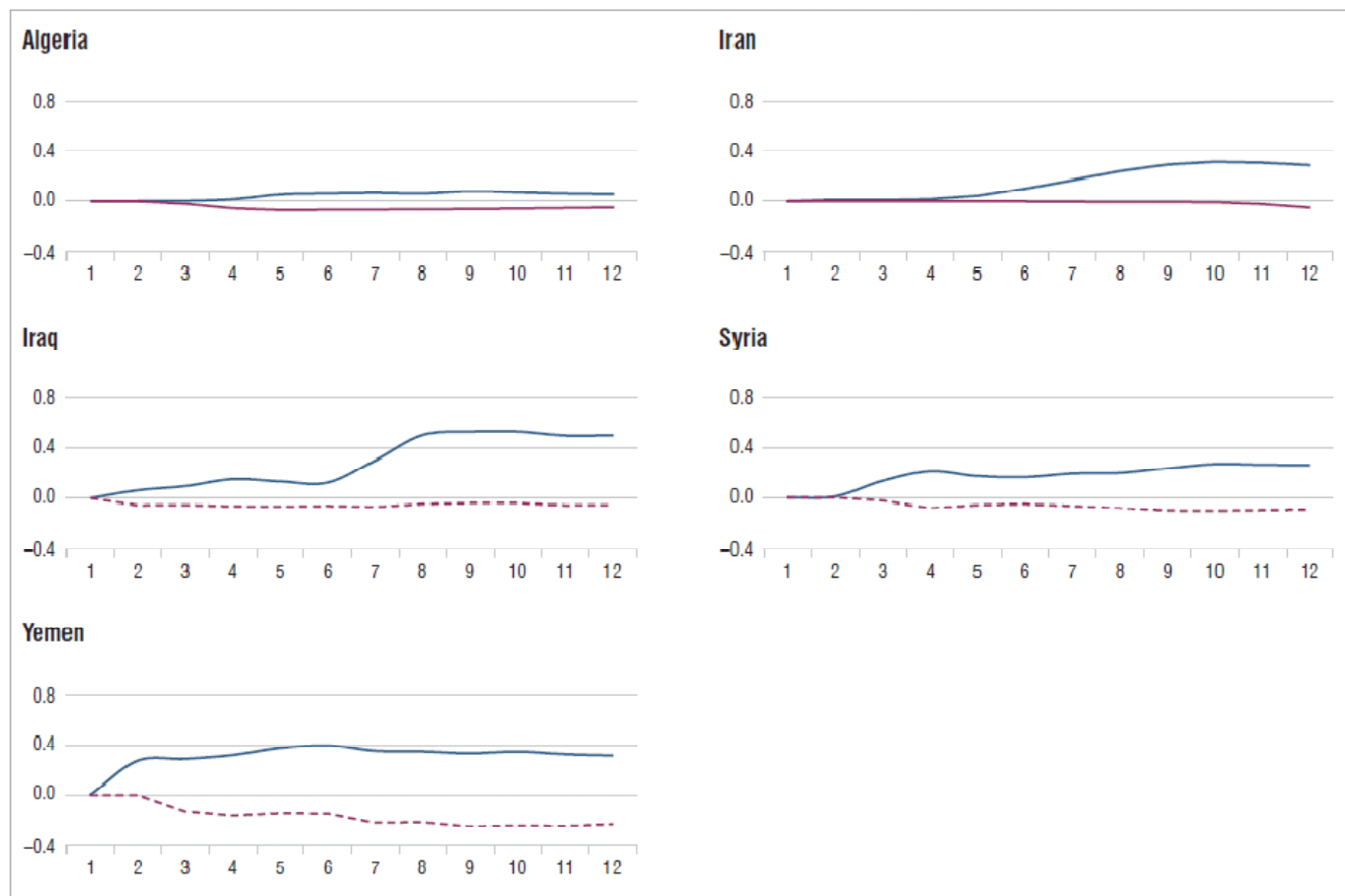
- In Tunisia, food pass-through is small. Price controls and food subsidies seem to effectively undermine the transmission of international food prices into domestic prices. A one percent increase in international food prices increases the domestic price of food by only 0.06 percent.
- Finally, in WBG food price transmission both in terms of speed and magnitude appears as one of the strongest in the region reaching above 0.6 percent after 12 months.

Nevertheless, loosening of restrictions on the entry of consumer goods along with government and donor interventions may help to curb domestic food prices.

In developing oil exporters, the pass-through effects range from small in Algeria to large in Iraq (Annex Figure 1b).

- In Algeria, rising international food prices have little overall effect on domestic prices. Algeria's food subsidies and other government interventions effectively protect the consumers from food price shocks.
- In Iran, food price transmission is gradual and reaches its peak after 10 months. A one percent increase in international prices translates into a 0.3 percent increase in domestic food prices. A more significant agricultural sector may explain the weaker price transmission. The pronounced increase in overall food inflation is attributed to reform of the local subsidy system, which increased

**Annex Figure 1b. Developing Oil Exporters' Food Price Pass-through Dynamics**



Note: The figure shows the percentage increase (decrease) in domestic food prices for a one percent increase (decrease) in world food prices over a 12-month window. Data for Algeria and Iran are for 2000–2011; other countries use shorter time series.

consumer and transport costs of food, as well as to international price increases.<sup>36</sup>

- In Iraq, food price transmission appears to have a stepwise effect. Pass-through is relatively slow during the first 6 months, but becomes quite significant after 12 months. The country has in effect one of the strongest pass-through effects in the region. A one percent increase of world food prices increases domestic prices by almost 0.5 percent. The stepwise effects might be explained by the fact that Iraq is a net food importer but partly relies on a food ration system.
- In Syria the pass-through is relatively fast, but appears less pronounced than for other countries, which can be attributed to domestic policies. In Syria, transmission is determined not so much by cereals, but by sugar and oil foodstuff. Syria is quasi self-sufficient in wheat production and the government controls the domestic price of wheat.
- Similarly, in Yemen, the pass-through is relatively fast. Yemen is among the ten countries in the world with the highest rates of food insecurity thus explaining the rapid transmission. To address the looming impact of food price increases the government decided to subsidize seed. In Yemen a decline in world food prices appears to transmit into the domestic market.

In GCC countries, world food price pass-through to domestic prices is relatively slower when compared to other countries in the region (Annex Figure 1c):

- In Bahrain, Kuwait, Qatar, and Saudi Arabia, pass-through effects become visible after about 7 month. By contrast, in Oman pass-through effects appear after just 3 months. In all these countries, food price pass-through is typically below 0.4 percent.
- In UAE pass-through effects are relatively fast and stronger than the GCC average. UAE is also among the few countries where a world food price decline rapidly transmits into the domestic market.

## Robustness

To get a sense of the robustness of the estimates, we use Monte Carlo simulation (1,000 iterations) and bootstrap standard errors for the 6 and 12-month food price pass-through coefficients. The results are displayed in Annex Table 3. For many countries (Bahrain, Kuwait, Qatar, UAE,

Iraq, Syria, Egypt, Jordan, Morocco and WBG) the estimated 12-month pass-through elasticities are statistically significant at the 5-percent level. For the other countries the pass-through coefficients are not significant (which may either be attributed to limited price transmission because of policy interventions, or short time-series, particularly relevant in the case of Lebanon, Djibouti, and Yemen).

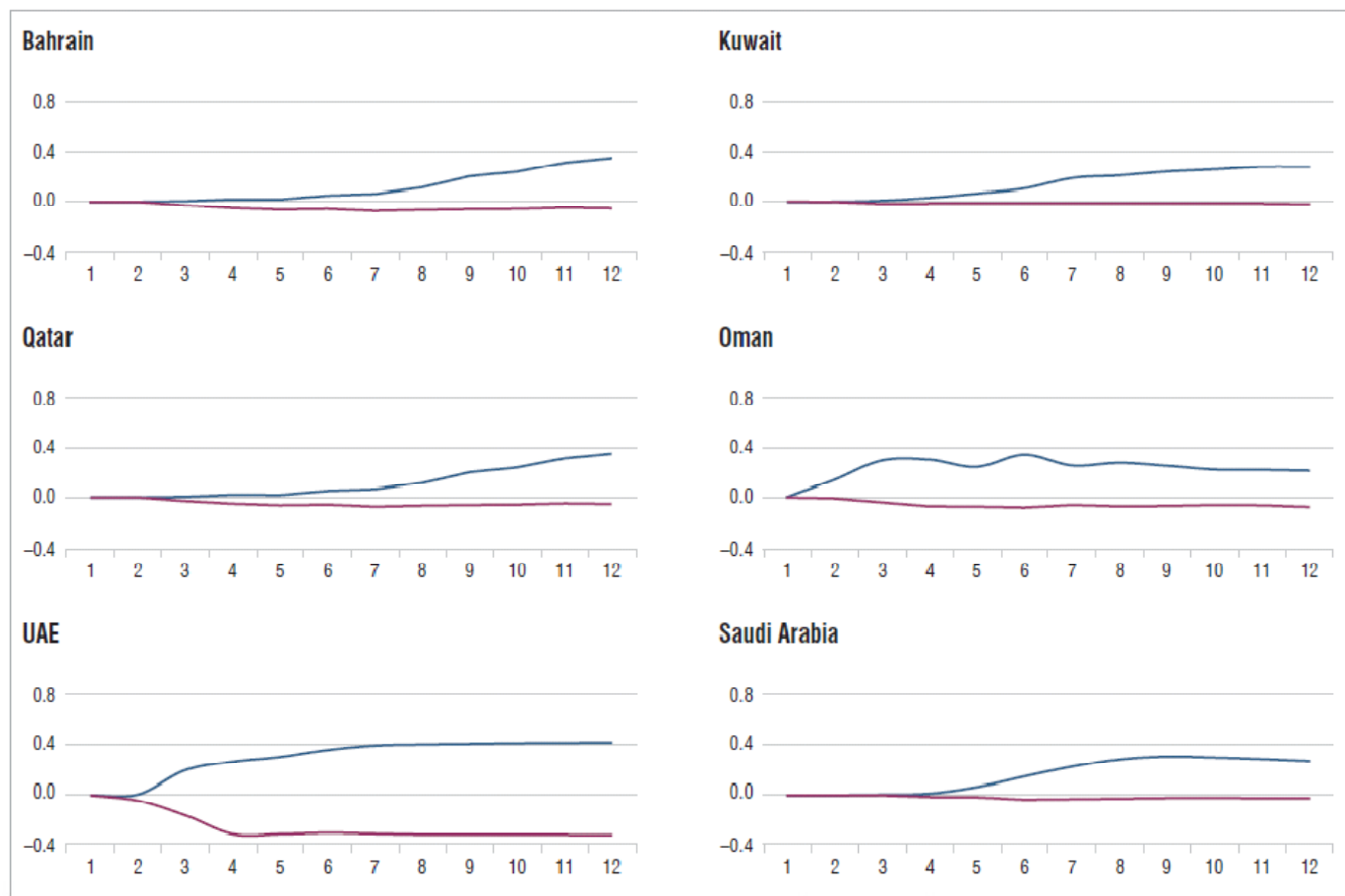
As an alternative to the World Bank's Food Price Index, we also used the FAO world food price index. Both indices are similar, however, the FAO index shows higher peaks in 2011. The main effect of using the FAO index is that the pass-through coefficients remain of similar magnitude, while the standard errors of the coefficients increase. Using disaggregated world price index data both from the FAO and World Bank also works for cereals, but produces lower pass-through coefficients than those obtained from aggregated indices (which is consistent with a lower share of cereal than total food consumption in household expenditures).

The market rate vis-à-vis the euro works better empirically than the US\$ market exchange rate, or the nominal effective exchange rate. We suspect that this is because even in oil-producing MENA countries, a significant share of food imports is denominated in Euro. We suspect that the nominal effective exchange rate (which is a trade-weighted average of the nominal exchange rate) may not be a good proxy for import prices because it also contains export data. We do not find the type of exchange rate choice significantly impacting the size of the pass-through coefficients.

<sup>36</sup> In December 2010, the Government of Iran removed widespread subsidies on oil products, electricity, water, gas, bread and other basic products.



**Annex Figure 1c. GCC Food Price Pass-through Dynamics**



Note: The figure shows the percentage increase (decrease) in domestic food prices for a one percent increase (decrease) in world food prices over a 12-month window. Data for Saudi Arabia, Bahrain, and Kuwait are for 2000–2011. In the cases of Oman, Qatar, and UAE we rely on shorter time series.

**Annex Table 3. Food Price Pass-through Coefficients in MENA**

Country and group	6-month food price pass-through		12-month food price pass-through		
	World price increase	World price decrease	World price increase	World price decrease	
GCC countries	Bahrain	0.050 (0.057)	0.057 (0.036)	<b>0.349</b> (0.113)	0.051 (0.034)
	Kuwait	0.107 (0.081)	0.016 (0.029)	<b>0.279</b> (0.128)	0.020 (0.029)
	Oman	<b>0.341</b> (0.142)	0.079 (0.063)	0.213 (0.130)	0.075 (0.074)
	Qatar	<b>0.286</b> (0.125)	<b>0.182</b> (0.085)	<b>0.355</b> (0.161)	<b>0.220</b> (0.099)
	Saudi Arabia	0.144 (0.278)	0.033 (0.024)	0.266 (0.232)	0.023 (0.021)
	UAE	0.355 (0.178)	<b>0.298</b> (0.143)	<b>0.413</b> (0.202)	0.315 (0.163)
	Developing oil exporters	Algeria	0.065 (0.077)	0.066 (0.048)	0.059 (0.072)
Iran		0.103 (0.081)	0.003 (0.026)	<b>0.282</b> (0.116)	0.052 (0.043)
Iraq		0.122 (0.131)	0.062 (0.083)	<b>0.497</b> (0.158)	0.055 (0.100)
Syria		<b>0.163</b> (0.097)	0.052 (0.053)	<b>0.261</b> (0.114)	0.100 (0.067)
Yemen		<b>0.393</b> (0.161)	0.147 (0.177)	0.311 (0.166)	0.234 (0.192)
Oil importers		Djibouti	<b>0.583</b> (0.180)	0.037 (0.078)	<b>0.464</b> (0.183)
	Egypt	<b>0.336</b> (0.124)	0.041 (0.032)	<b>0.441</b> (0.140)	0.034 (0.031)
	Jordan	<b>0.219</b> (0.102)	0.054 (0.047)	<b>0.392</b> (0.118)	0.130 (0.069)
	Lebanon	0.080 (0.172)	0.145 (0.096)	0.180 (0.209)	0.132 (0.093)
	Morocco	0.044 (0.063)	0.061 (0.050)	<b>0.394</b> (0.121)	0.052 (0.042)
	Tunisia	0.070 (0.092)	0.004 (0.022)	0.058 (0.092)	0.005 (0.025)
	WBG	<b>0.475</b> (0.123)	0.015 (0.034)	<b>0.658</b> (0.134)	0.017 (0.040)

Note: Bootstrapped standard errors in parenthesis; bold numbers indicate significant at the 5 percent level.