On the pass-through of food prices to local inflation in MENA countries

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Abstract: - This paper investigates the effects of global food price shocks to consumer prices in Middle East and North African (MENA) countries using a multiple regression model to examine the short- and long-term impact. The paper finds significant relationships between global food price and local inflation and these relationships vary dependent on the studied countries. The effect of GDP growth on CPI inflation is significant with different lags. We find that countries with a similar long-run effect are related with each other through synchronized business cycles. We could find evidence that the pass-through impact is different regarding the country-specific agriculture production level but not the income level.

Keywords: - Food price pass-through, Consumer Price Index, MENA region

1. Introduction

This paper is investigating the impact of the global food prices on local inflation in Middle East and North Africa (MENA) region countries.

Study of the global food prices impact on the countries of the MENA region is important because it will help us to understand how the economies in the region respond in different ways to the fluctuations in or even shocks to the global food prices. It may help us to understand the effect of the intervention policies adopted by the different countries in a region considered as one of the most food importing-dependent regions in the world. Even more, it reveals vulnerabilities of national political systems to international food price movements. One example in this context are bread price hikes as one of the drivers of the Arab spring.

The countries in the region are facing challenges of insulating their local food markets from global price movements. Those challenges stem from external and internal impacts. The external influence is constituted by wide fluctuations of global food prices in the last decades. The internal influence includes the high food-dependence rate in the MENA region and the resulting costly intervention policies. In this paper, we study the pass-through effects of the global food prices to inflation of the MENA countries as an attempt to understand how the fluctuations in global food prices and the corresponding intervention actions may interact to affect the economies (and politics) of the MENA countries.

Previous studies looked at the impact of commodity prices, mostly from the perspective of industrialised economies [11, 12] or oil exporting countries [6]. Few results are available for non-oil exporting emerging countries [5, 13]. A further strand of literature considers the price linkage and the transmission between energy and agricultural markets [7]. Other studies focus on the impact of the global food prices on the local food price. Following Ianchovichina, Loening and Wood [8] a one percent increase of global food prices raises domestic food prices by 0.2 to 0.4 percent. The paper by Belke and Dreger [2] finds that oil and food price shocks increase domestic prices in the long run, whereby the impact of food prices dominates, the shock effect is asymmetric and international price shocks do not affect local MENA GDP growth. This study will rather focus on the impact of the global food prices on local inflation.

By checking the effect of global price movements on local inflation for the countries of the MENA region, we also hope to identify any variations between them, i.e. country-specific transmission schemes. We aim to answer the question whether mechanisms that provide insulation from world food inflation are country-specific or suitable even for groups of MENA countries. We start now with the description of the economic and political background of our study.

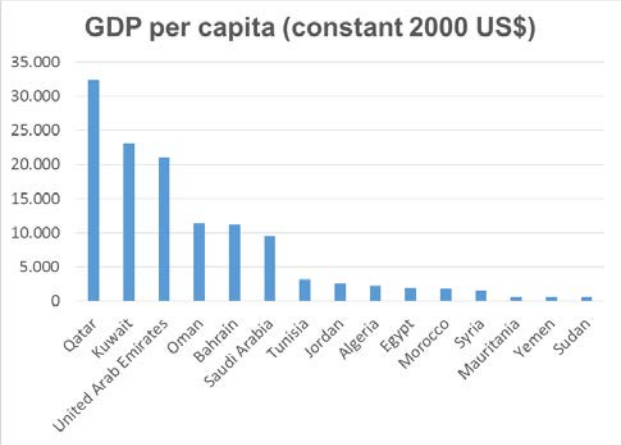
2. Background

In general, the definition of the MENA region differs. Some studies even use the terms Arab World and MENA region as synonyms. The

region's economic diversity is, among others, expressed, by the co-existence of high-income and low-income countries. One can classify the region's countries into oil-importing and oil-exporting countries in order to reflect the GDP gap between the region countries. For the purpose of our research, we will follow the subdivision of MENA countries into Gulf Cooperation Council (GCC) countries, other oil exporters and oil importers countries which allows us to focus on common factors within each group and investigate the differences between the country groups.

In Figure 1, we denote the gap in GDP per capita between GCC countries and other countries in the region. The GDP per capita for 2011 in the GCC countries ranges between $9,499 for Saudi Arabia and $32,356 in Qatar, comparing to the other countries in the region with its modest GDP per capita between $550 for Sudan and $3,144 for Tunisia.

Fig. 1

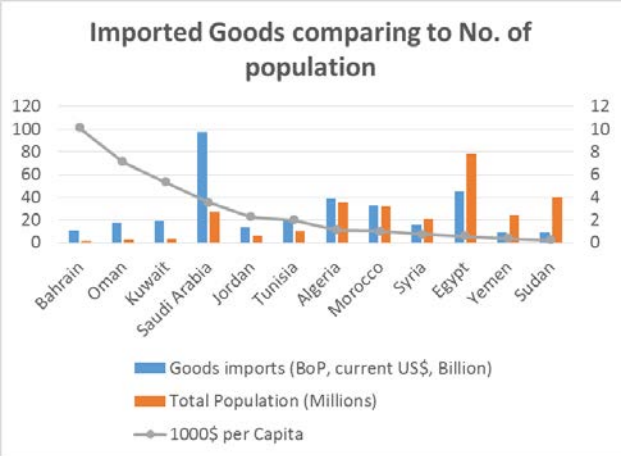


Source: Own calculations based on data from The World Bank for the year 2012.

The region considered as the most food import–dependent region in the world [4]. As we see in Figure 3, food dependency ratios for the MENA region in general is in average 53 percent calculating as net imports as a share of consumption. These ratios varies between the region's three groups as 48 percent for the oil importers, 49 percent for the oil exporters and 83 percent for the GCC countries [8].

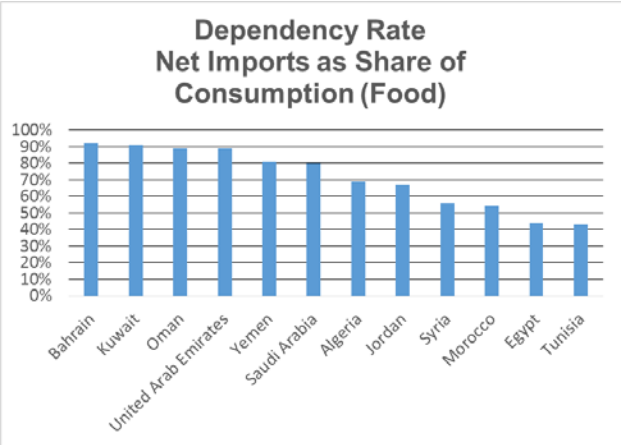
Figure 2 shows the volume of imports comparing to population in some of the region countries. This may reflect the wealth of the country and the effect of global prices on the local market. As we see in this figure, the GCC's imports per capita is the highest, while other countries with higher population coming next. GCC countries which include just 12 percent of the region's population are importing 44 percent of the region's imports. While some of the variations may partly explained by slight differences in the dependency rate - which is the highest in the GCC countries - the general importing behavior may explained easier by the GDP levels (Figure 3).

Fig. 2



Source: Own calculations based on data from World Bank, 2012, for the imported goods data and International Monetary Fund, 2010, for population data.

Fig. 3



Source: Ianchovichina *et al* [8]

Another criterion categorizing the regions' countries' local inflation reaction is whether a specific MENA country is an oil-importer or an oil-exporter. To understand the importance of the oil revenues for the region countries, it is important to note that the region's oil exports as percent of GDP is around 60 percent, 40 percent and 5 percent for GCC countries, non-GCC oil exporters and oil importers respectively. Moreover, oil exports as percentage of the total exports is 85 percent, 90 percent and 15 percent, respectively [16]. Depending on these figures, we notice the significant role of oil for the GCC revenues and to a

lesser degree for the other oil-exporters. The inflationary pressure of the global oil price rise is not expected to be the same among these three groups. This paper investigates whether the same is valid with respect to food price hikes.

Intervention policies in the region countries are very common and include subsidies and food strategic reserves. Energy and food subsidies used to be for decades the major part of the social security safety net in the region's countries; they are very high in some of the region countries comparing to other regions in the world [1, 10]. According to IMF figures, the food subsidies' amount was estimated to be about 0.7 percent of GDP of the MENA countries in 2011 [10].

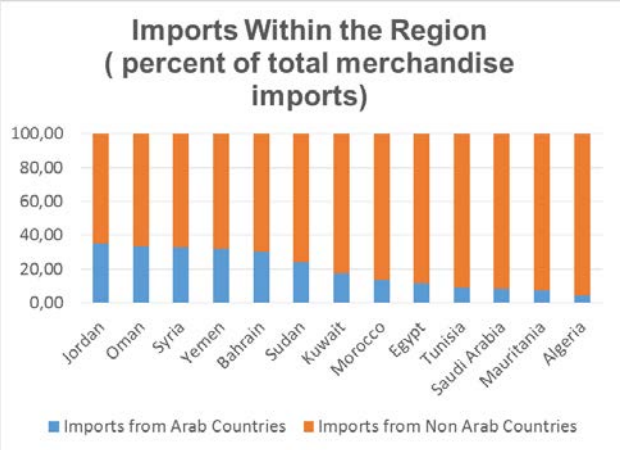
The other intervention tool is constituted by the strategic food reserves wish also cost significant amounts: the MENA region countries now hold more than 13 percent of global wheat stocks and 15 percent of global wheat trade. It is suggested that this strategy can reduce the variability of domestic wheat prices and despite some failures can insulate the region countries from off-shore price disturbances [14].

In some definition, for a country to be considered as food secure, it supposed to generate enough foreign exchange from its exports to finance its food imports [4]. However, as noticed further above, keeping domestic prices and imports of food as stable as possible in the Arab countries, is not just about importing enough food. It is also about using interventions such as food stocks and price subsidies on imported food [10]. Those costly interventions will even cost more in case of global price fluctuations, since the government will have to increase the subsidy paid per unit of imported food. In case of a shock doubling the world food price the government would have to double the subsidy in order to keep imports at levels prevailing at the previously prevailing international prices [8].

Figure 4 finally displays the percentage of goods imported by the MENA region's countries from other countries in the region. We note that that the trade within the region is poor. The imports from countries in the region vary between 4.5 % for Algeria and 35.2 % for Jordan. Although the economic relations within the region are usually characterized as poor trade exchange, there is evidence of a high linkage between the GCC countries and the other countries in the region through financial flows and, especially, remittances [9].

In addition to the poor trade, the different countries in the region connecting to different business cycles. MENA oil exporting countries, especially the GCC, will benefit on the macro level from rising oil prices, having more fiscal space to cover the food imports and the costs of interventions [3].

Fig. 4



Source: Own calculations based on data from The World Bank for the year 2012.

The situation in the MENA oil-importing countries will differ and their fiscal space depends on other factors including their relations with the region and the rest of the world through remittances and trade. Here it is worth to mention the fact that the EU is receiving half of the oil-importing countries' exports, while Asia is the most important destination for the non-oil merchandise exports of the developing oil-exporters [16]. We now turn to the empirical part of our study.

3. Data

Our data source is IHS Global Insight and The World Bank. The data used in the empirical model include:

- seasonally adjusted quarterly consumer price index data measured by local currencies and base year 2005=100, IHS,
- seasonal adjusted quarterly Real Gross Domestic Product data measured by Billion real local currency, IHS, and
- quarterly World Bank food price data based on nominal USD and 2005=100.

4. Impacts of international food price shocks on local CPI inflation

We now check whether the impact of global food price shocks on domestic consumer prices varies between different MENA countries. In other words, we indirectly assess whether any country or country-group in the region has developed a

significant effective policy to insulate itself from the food price shocks. Our motivation is the presumed effect of global food movements on local MENA country inflation. Food price fluctuations may affect the local inflation via three channels:

- the significant importance of imported food as a share of consumption,
- the significant cost of the intervention policies (subsidies and strategic food reserves) in the region to insulate the local markets, and
- the effects of the inter-region linkages and the outer-world linkages on the region's business cycles.

We suggest that the degree of the food price inflation pass-through will vary between MENA countries. If any country or group in the region is effectively insulated more than the others, we may proceed to some suggestions about the specific measures of the country or group that make it better insulated.

4.1 Empirical model

To study the global food price effects we apply a multiple regression to examine the short- and long-term impact of the world food price inflation rate on country-specific MENA inflation rates. Seven countries are investigated: Syria, Jordan, Kuwait, Egypt, Algeria, Tunisia, and Morocco. The simple regression equation applied employed for every country is:

$$Pl_t = c + \alpha.Pl_{t-1} + \beta.Pg_{t-1} + \gamma.GDP_{t-1} + u_t (1)$$

where:

C: constant,
Pl_t: local consumer price index at time t,
Pl_{t-1}: local consumer price index at time t-1,
Pg_{t-1}: global food price at time t-1,
GDP_{t-1}: gross domestic product at time t-1, and
u_t: iid disturbance.

4.2 Estimation

We now proceed with our estimations of the AR regressions for Algeria, Egypt, Morocco, Tunisia, Syria, Jordan and Kuwait. After some pretesting, we have found that our variables in levels (national CPIs and real GDPs, world food price level) are non-stationary, but that their differences (inflation rates and real GDP growth rates) are in fact stationary. The results are available on request. Hence, we feel legitimized to use growth rates in individual inflation AR estimation equations for 7 MENA countries: Π(CPI)i=f(Π(CPI)i(-1), Π(world food price), gi), with i presenting the country index. As usual in such a scenario, we use OLS for estimations procedures.

The country-specific regression results are displayed in Table 1 below, together with the usual goodness-of-fit criteria. Moreover, we display the short-run and the long-run impact of food price inflation on consumer price inflation for each of the specific MENA countries.

Table 1: Country-specific inflation regression results

Algeria

Dependent Variable: D_CPI_ALGERIA
Method: Least Squares
Date: 06/20/13 Time: 12:42
Sample (adjusted): 1991Q4 2011Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.704592	0.482376	3.533742	0.0007
D_CPI_ALGERIA(-1)	0.823654	0.048811	16.87438	0.0000
D_WORLD_CPI_FOOD	0.014275	0.007976	1.789721	0.0775
D_GDP_ALGERIA	-0.382936	0.329107	-1.163560	0.2483
D_GDP_ALGERIA(-1)	0.632901	0.429654	1.473049	0.1449
D_GDP_ALGERIA(-3)	-0.569575	0.189210	-3.010279	0.0036

R-squared	0.854968	Mean dependent var	5.308642
Adjusted R-squared	0.845299	S.D. dependent var	4.051672
S.E. of regression	1.593606	Akaike info criterion	3.841063
Sum squared resid	190.4686	Schwarz criterion	4.018430
Log likelihood	-149.5631	Hannan-Quinn criter.	3.912225
F-statistic	88.42525	Durbin-Watson stat	1.905801
Prob(F-statistic)	0.000000		

Egypt

Dependent Variable: D_CPI_EGYPT
Method: Least Squares
Date: 06/20/13 Time: 12:51
Sample (adjusted): 1991Q4 2013Q1
Included observations: 86 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.301022	0.649750	-0.463289	0.6444
D_CPI_EGYPT(-1)	0.917884	0.032882	27.91410	0.0000
D_WORLD_CPI_FOOD	0.050703	0.008888	5.704473	0.0000
D_GDP_EGYPT	0.823991	0.372382	2.212760	0.0298
D_GDP_EGYPT(-1)	-1.309984	0.609694	-2.148593	0.0347
D_GDP_EGYPT(-2)	0.918698	0.608256	1.510380	0.1349
D_GDP_EGYPT(-3)	-0.261197	0.364480	-0.716630	0.4757

R-squared	0.923963	Mean dependent var	7.918605
Adjusted R-squared	0.918189	S.D. dependent var	6.134215
S.E. of regression	1.754552	Akaike info criterion	4.040195
Sum squared resid	243.1976	Schwarz criterion	4.239967
Log likelihood	-166.7284	Hannan-Quinn criter.	4.120594
F-statistic	159.9956	Durbin-Watson stat	1.349393
Prob(F-statistic)	0.000000		

Morocco

Dependent Variable: D_CPI_MOROCCO
Method: Least Squares
Date: 06/20/13 Time: 13:01
Sample (adjusted): 1992Q1 2013Q1
Included observations: 85 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.476538	0.362033	4.078457	0.0001
D_CPI_MOROCCO(-1)	0.556267	0.083521	6.660237	0.0000
D_WORLD_CPI_FOOD	0.011856	0.005993	1.978512	0.0514
D_GDP_MOROCCO	-0.101879	0.043295	-2.353141	0.0211
D_GDP_MOROCCO(-3)	0.087435	0.050632	1.726867	0.0881
D_GDP_MOROCCO(-4)	-0.154858	0.062735	-2.468448	0.0157

R-squared	0.445012	Mean dependent var	2.164706
Adjusted R-squared	0.409886	S.D. dependent var	1.534113
S.E. of regression	1.178488	Akaike info criterion	3.234315
Sum squared resid	109.7179	Schwarz criterion	3.406738
Log likelihood	-131.4584	Hannan-Quinn criter.	3.303668
F-statistic	12.66906	Durbin-Watson stat	2.245121
Prob(F-statistic)	0.000000		

Tunisia

Dependent Variable: D_CPI_TUNISIA
Method: Least Squares
Date: 06/20/13 Time: 13:04
Sample (adjusted): 1991Q4 2013Q1
Included observations: 86 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.140057	0.317943	3.585731	0.0006
D_CPI_TUNISIA(-1)	0.805125	0.062473	12.88767	0.0000
D_WORLD_CPI_FOOD	0.006874	0.003943	1.743461	0.0850
D_GDP_TUNISIA(-2)	0.077318	0.042908	1.801942	0.0753
D_GDP_TUNISIA(-3)	-0.189011	0.043076	-4.387882	0.0000

R-squared	0.758937	Mean dependent var	3.523256
Adjusted R-squared	0.747033	S.D. dependent var	1.500798
S.E. of regression	0.754839	Akaike info criterion	2.331756
Sum squared resid	46.15229	Schwarz criterion	2.474450
Log likelihood	-95.26549	Hannan-Quinn criter.	2.389183
F-statistic	63.75304	Durbin-Watson stat	1.746721
Prob(F-statistic)	0.000000		

Syria

Dependent Variable: D_CPI_SYRIA
Method: Least Squares
Date: 06/20/13 Time: 13:08
Sample (adjusted): 1991Q3 2011Q2
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.425631	0.609589	-0.698226	0.4872
D_CPI_SYRIA(-1)	0.755428	0.055871	13.52097	0.0000
D_WORLD_CPI_FOOD	0.071721	0.013036	5.501578	0.0000
D_GDP_SYRIA(-2)	0.225417	0.096118	2.345205	0.0216

R-squared	0.773715	Mean dependent var	4.750000
Adjusted R-squared	0.764783	S.D. dependent var	5.181515
S.E. of regression	2.512992	Akaike info criterion	4.729532
Sum squared resid	479.9499	Schwarz criterion	4.848634
Log likelihood	-185.1813	Hannan-Quinn criter.	4.777283
F-statistic	86.62001	Durbin-Watson stat	2.058439
Prob(F-statistic)	0.000000		

Jordan

Dependent Variable: D_CPI_JORDAN
Method: Least Squares
Date: 06/20/13 Time: 13:10
Sample (adjusted): 1991Q2 2013Q1
Included observations: 88 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.923566	0.325285	2.839248	0.0057
D_CPI_JORDAN(-1)	0.709877	0.054409	13.04706	0.0000
D_WORLD_CPI_FOOD	0.067471	0.009271	7.277723	0.0000
D_GDP_JORDAN	-0.090198	0.029111	-3.098392	0.0027
D_GDP_JORDAN(-1)	0.070330	0.029578	2.377777	0.0197

R-squared	0.781976	Mean dependent var	3.909091
Adjusted R-squared	0.771469	S.D. dependent var	3.786353
S.E. of regression	1.810065	Akaike info criterion	4.079742
Sum squared resid	271.9357	Schwarz criterion	4.220500
Log likelihood	-174.5087	Hannan-Quinn criter.	4.136450
F-statistic	74.42290	Durbin-Watson stat	1.562756
Prob(F-statistic)	0.000000		

Kuwait

Dependent Variable: D_CPI_KUWAIT
Method: Least Squares
Date: 06/20/13 Time: 22:45
Sample(adjusted): 1991:4 2012:2
Included observations: 83 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.355413	0.170565	2.083739	0.040458
D_CPI_KUWAIT(-1)	0.834425	0.042563	19.604140	7.118197
D_WORLD_CPI_FOOD	0.029059	0.005446	5.335352	9.070003
D_GDP_KUWAIT(-2)	-0.025222	0.012156	-2.074845	0.041298
D_GDP_KUWAIT(-3)	0.027278	0.011158	2.444601	0.016757

R-squared	0.874458	Mean dependent var	2.855421
Adjusted R-squared	0.868020	S.D. dependent var	2.905556
S.E. of regression	1.055560	Akaike info criterion	3.004371
Sum squared resid	86.908297	Schwarz criterion	3.150085
Log likelihood	-119.681433	F-statistic	135.826581
Durbin-Watson stat	1.883720	Prob(F-statistic)	0

As turns out, the estimated coefficients are significant and display the correct signs expected from theory. What is more, the goodness-of-fit criteria are fulfilled. Our results are summarized in Table 2 below to convey an impression of the pattern of the estimation results.

We note that most of the World CPI food coefficients are significant on the trust level of 95% except for the Algeria and Tunisia. Moreover, R2 values for all the regressions are high and close to one except for morocco, which its R2 equal to 0.44.

The short and long-term impact of world food price inflation rate on the MENA countries' inflation rates (seven countries) can be derived from collecting terms in Table 2 and are displayed in Table 3 below.

Table 2: Inflation AR Regressions for MENA countries

	Syria	Jordan	Kuwait	Egypt	Algeria	Tunisia	Morocco
Dep. var.	D_CPI_ SYRIA	D_CPI_ JORDAN	D_CPI_ KUWAIT	D_CPI_ EGYPT	D_CPI_ ALGERIA	D_CPI_ TUNISIA	_CPI_ MOROCCO
No. obs.	80	88	83	86	81	86	85
Const.	-0.4256	0.9236	0.3554	-0.3010	1.7046	1.1401	1.4765
	(0.6096)	(0.3253)	(0.1706)	(0.6498)	(0.4824)	(0.3179)	(0.3620)
D _CPI_(-1)	0.7554	0.7099	0.8344	0.9179	0.8237	0.8051	0.5563
	(0.0559)	(0.0544)	(0.0426)	(0.0329)	(0.0488)	(0.0625)	(0.0835)
D_WORLD_CPI_FOOD	0.0717	0.0675	0.0291	0.0507	0.0143	0.0069	0.0119
	(0.0130)	(0.0093)	(0.0054)	(0.0089)	(0.0080)	(0.0039)	(0.0060)
D_GDP	-	-0.0902	-	0.8240	-0.3829	-	-0.1019
		(0.0291)		(0.3724)	(0.3291)		(0.0433)
D_GDP_(-1)	-	0.0703	-	-1.3100	0.6329	-	-
		(0.0296)		(0.6097)	(0.4297)		
D_GDP_(-2)	0.2254	-	-0.0252	0.9187	-	0.0773	-
	(0.0961)		(0.0122)	(0.6083)		(0.0429)	
D_GDP_(-3)	-	-	0.0273	-0.2612	-0.5696	-0.1890	0.0874
			(0.0112)	(0.3645)	(0.1892)	(0.0431)	(0.0506)
D_GDP_(-4)	-	-	-	-	-	-	-0.1549
							(0.0627)
R^2	0.7737	0.7820	0.8745	0.9240	0.8550	0.7589	0.4450
Ser	2.5130	1.8101	1.0556	1.7546	1.5936	0.7548	1.1785

Table 3: Short-run and long-run impacts of food price inflation on local consumer price inflation

Country	α	β	$\frac{\beta}{1-\alpha}$
Morocco	0.56	0.01	0.02
Tunisia	0.81	0.01	0.05
Algeria	0.82	0.01	0.06
Kuwait	0.83	0.03	0.18
Jordan	0.71	0.06	0.21
Syria	0.76	0.07	0.29
Egypt	0.91	0.05	0.56

Note: α denotes the estimated autoregressive coefficient of the lagged endogenous variable, β stands for the estimated short-term impact of food price inflation, and the quotient for the long-run impact of food prices on local MENA consumer price inflation.

Seen on the whole, the results show that the lagged endogenous variable has the higher effect on the dependent variable. This result is consistent with the *asymmetric error-correction* in MENA inflation equations identified in other papers [8, 2] which note that the reaction of domestic consumer prices to negative shocks in international prices is lower than the reaction to positive shocks.

We clearly establish a pass-through effect from global food price movements to local consumer price inflation. The effect is significant and, even more important, the long-run effect is higher than the short-run effect for all the MENA countries under consideration here. This pattern may be explained by the fact that the effect is passing to the local CPI indirectly through local food prices.

As expected, pass-through coefficients are less than one on both short- and long-term effect for all the MENA countries. That may be a result of the intervention policies applied by the governments of those countries, so the increase in global prices are not totally reflected by the local markets.

The pass-through effect of the global food prices to local CPI inflation varies between countries. In Morocco, Tunisia and Algeria, the coefficient is very small for both the short and the long run. For Kuwait, Jordan and Syria, the impact is higher. Egypt is witnessing the highest long-run effect which amounts to 56 percent.

The effect of GDP growth on CPI inflation is significant for most of the countries under consideration with different lags. In some cases like Algeria, Morocco, Tunisia, Egypt, and Jordan the sign of the coefficient is even negative. This implies more complicated dynamics in the reaction of local inflation to GDP growth. For those countries with a negative GDP effect, a higher GDP growth "today" means lower inflation rates "tomorrow", while for the other countries just like Syria and Kuwait, the higher GDP growth now means higher inflation in the future.

5. Conclusions

As we find, there is a significant relationship between global food price inflation and local consumer price inflation. This relationship varies within the countries under consideration. The pass-through variation may be explained by specific economic and political measures which characterize those countries. It is worth to mention that the relation between global food prices and the local consumer prices is an indirect relation. We are not necessarily suggesting that global food price inflation is directly affecting local inflation, but that the impact is transmitted through the channels mentioned before in this paper and covered by the AR-term in the regression equation.[1]

We are not able to find a relation between the degree of pass-through of global food prices and the income level of the respective MENA countries. However, we notice that a country like Syria, which is generally considered as a "high self-sufficiency" country [4] is characterized by a high pass-through effect, while other countries such as Tunisia and Morocco with less agriculture production levels experience a rather low pass-through. The degree of the pass-through of global food prices may be affected by the business cycles the countries are correlated with. Considering the importing behavior of the countries under consideration, as mentioned in Minot et al. 2010, we may come up with the following interpretation of our empirical results.

Two of the countries less affected by global food price movements (Morocco and Tunisia) are importing more than other countries from the European Union and less from the MENA region. Egypt, which experiences a higher pass-through effect according to our results, imports more from the United States and the developing countries and less from the other MENA countries. Syria and Jordan have similar pass-through rates and similar importing patterns; both of them are importing more from the developing countries and MENA countries and less from European Union comparing to other countries in the sample. Table 4 is showing the importing pattern of the MENA countries under consideration.

Table 4: Agricultural imports in MENA region (in %)

	Import shares				
Region/ country	**Egypt**	**Jordan**	**Mor-occo**	**Syria**	**Tunisia**
MENA					
Egypt		3	1	4	2
Jordan	0		0	2	0
Morocco	0	1		1	1
Syria	2	6	0		1
Tunisia	0	0	1	0	
Total MENA	3	22	3	19	5
OECD					
EU25	19	17	37	17	39
United States	27	11	10	10	11
Total developed countries	50	35	55	29	57
Other					
Argentina	13	9	9	11	10
Brazil	8	2	12	7	6
China	2	2	5	1	1
India	1	5	0	1	1
Total develop-ing countries	45	42	41	51	37
Total LDCs	2	1	1	1	1

Source: Minot et al. [15] based on MAcMap–HS6 database for 2004.
Notes: EU25, European Union (25 members as of 2004); LDCs, least developed countries; MENA, Middle East and North Africa; OECD, Organization for Economic Co-operation and Development.

[1] In this context, we consider our AR regression equation as a reduced form of a more structural model.

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