



VAT Pass-Through in Developing Countries: Evidence from Grocery Prices in Saudi Arabia

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Abstract: We provide the first evidence on the impact of VAT rate change on consumer prices in a developing economy. On May 7th, 2020, Saudi Arabia announced a 10% increase in VAT, from 5% to 15%, to take effect by July 1st of the same year. Using data on all grocery items sold by two of the largest hypermarkets chains in the country, we show that the pass-through was complete as prices increased by 10% between May and July. For less durable goods, such as grocery and fresh food items, the price adjustment happened gradually within the period between the announcement and July 1. But for durable goods, such as beauty and personal care, frozen food, and cleaning and household, we find that the adjustment happened immediately following the announcement. Interestingly, while both retailers raised prices by 10%, *Retailer A* raised prices by 8% between May and June, and by another 2% between June and July, whereas *Retailer B* raised prices by 3% and 7% over May-June and June-July, respectively. Prices in other GCC countries did not rise over the same period. The evidence is important for the optimal design and implementation of tax policies in developing countries, as they offer insights on the impact these policies will have on inflation.

Keywords: value-added tax, pass-through, Saudi Arabia, online price data, price adjustment

JEL classification: D22, D43, H22, L11, L13, O53

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1. INTRODUCTION

A key determinant of optimal policy design is the degree to which policies or shocks affect consumer prices. For this reason, the degree of pass-through into consumer prices has been extensively studied in economics, with plenty of studies examining the impact of cost-shocks (e.g., Hellerstein, 2008; Nakamura and Zerom, 2010), exchange rate shocks (e.g., Auer and Chaney, 2009), and other shocks such as taxes (e.g., Bird and Gendron, 2007) and currency choice (e.g., Gopinath and Itskhoki, 2011) on the prices consumers pay.

Despite its importance, evidence from developing countries remains limited, primarily due to lack of good data. However, understanding both the degree and determinants of pass-through into consumer prices in developing countries is even more important, as the number of new policies enacted in these economies, as well as the number of shocks experienced during their transition, are substantial in both frequency and in magnitude.

This is particularly true for the study of new tax policies or changes in tax rates. For example, the IMF – through its Article IV consultations – encourages many developing countries either to introduce *value-added tax* (VAT) or to increase the tax rate if VAT is already introduced as part of their fiscal prudence recommendations.¹

The degree of tax pass-through into consumer prices as well as the time taken for prices to adjust are important questions for policy makers and academics. While the consensus points to full pass-through of VAT changes into consumer prices and inflation (Benedek et al., 2015), there is evidence that under certain conditions pass-through may be incomplete. Among the most important factors that determine the degree and timing of pass-through are the structure of market competition and the size of retailers (Antoniades and Zaniboni, 2016; Berardi et al., 2016; Campos-Vázquez and Medina-Cortina, 2019; Marion and Muehlegger, 2011; Shiraishi, 2022). Despite the importance of the topic, there is little research on the extend and timing of tax pass-through in developing countries.²

In this study we exploit the unanticipated VAT increase in Saudi Arabia from 5% to 15% in July 2020 to measure the degree of pass-through into consumer prices. The announcement was made on May 7th as part of a set of austerity measures taken by Saudi Arabia to cope with the impact of the COVID-19 pandemic. The authorities announced a decrease in the value of

the allowances provided to government employees and an increase in VAT from 5% to 15%, that had to be completed by July 1st of the same year.³

To study the impact the tax rate increase had on prices, we use monthly data on thousands of *fast-moving consumer goods* (FMCGs) from two of the largest retailers in Saudi Arabia. The data is scrapped off the websites of the two retailers across multiple stores and regions during the first week of each month and covers the period between April 2020 and March 2021. To control for other factors that may also affect prices, such as an increase in oil prices or changes in demand during the summer months, we also collected and analyzed prices across all GCC countries during the same period.

Our analysis shows that grocery prices between April 2020 and July 2020 rose by 10% in Saudi Arabia, the exact equivalent of the VAT rate increase. This suggests that the pass-through was complete and immediate. 6% of the increase happened between May and June, and 4% between June and July. For grocery and fresh food items, prices adjusted gradually between June and July, but for more durable grocery items, such as beauty and health care, cleaning and household, and frozen food, prices fully adjusted immediately following the announcement. Interestingly, we document that while both chains raised prices by 10%, one chose to frontload the increase by raising prices by 8% and 2% between May-June and June-July, respectively, while the other chose the opposite strategy by raising prices 3% and 7% over the same periods. Prices in the other GCC countries did not change during the same period.

Our findings provide some of the first measures of VAT pass-through on consumer prices in developing countries and suggest that the impact of VAT policies on overall inflation may be higher than initially thought (e.g., in the comments provided by the IMF in its Article IV consultations with several developing countries).

The rest of the paper proceeds as follows: in Section 2 we present the data used in the study. In Section 3 we present the methodology and results, and in Section 4 we conclude.

2. DATA

The data come from two of the largest retailers in Saudi Arabia that also have presence in all other GCC countries. Both retailers have multiple hypermarkets in each country but differ in how they set prices. For *Retailer A*, we observe

a small variation in prices across hypermarkets within the country, which we think reflects differences in the selection of some weekly and monthly promotions by local store managers. This only affects about 5% of the prices. For *Retailer B*, prices across all outlets are identical. Therefore, we scrape prices off multiple websites (outlets) of *Retailer A* in each country each month, and we scrape prices from the website of the largest hypermarket of *Retailer B* in each country monthly.

The information collected is the information consumers see when they access the retailers' website to check prices or to order online. For each product (barcode) we obtain the price, brand, product category and subcategories (e.g., Grocery > Food Cupboard > Canned Foods > Canned Beans). We also know whether the item is on promotion, the type or promotion, the product description, if the item is out of stock, and sometimes the country of origin.

Table 1 below presents the number of grocery products recorded each month per retailer in each country. *Retailer A* data are collected for Saudi Arabia (KSA), Qatar (QAT), and the United Arab Emirates (UAE). *Retailer B* data are collected for all GCC countries but UAE. Due to a technical issue in September 2020, no data was collected for *Retailer B* across all countries and in UAE for *Retailer A*. However, this does not affect the analysis in any significant way.

Table 1: Number of products per retailer, all GCC countries

Date	Retailer A			Retailer B				
	KSA	QAT	UAE	BAH	KSA	KUW	OMN	QAT
Apr-20	8,440	7,699	14,507	7,757	5,798	5,157	7,877	4,918
May-20	7,762	6,970	28,033	6,572	5,728	4,553	7,113	4,752
Jun-20	8,130	7,669	33,578	9,432	6,234	2,191	5,752	6,861
Jul-20	8,270	7,948	41,282	10,333	6,423	3,145	9,544	5,366
Aug-20	8,227	9,126	87,933	10,608	6,628	6,201	9,898	7,293
Sep-20	11,612	9,586	-	-	-	-	-	-
Oct-20	12,505	9,843	24,296	11,704	9,632	7,316	11,099	11,309

Note: We scrape prices off retailers' websites the first week of each month between April 2020 and March 2021. For each retailer, we scrape the universe of grocery products sold. The number of unique products (barcodes) are reported above each month by retailer.

We also report the number of products in Saudi Arabia by product category in *Table 2*. In total, there are eight product categories within groceries,

with *Beauty* and *Personal Care* being the largest in terms of product availability (share of barcodes: 40%), followed by *Food Cupboard* (29%), and *Cleaning and Household* (10%). *Bakery* (2%) and *Fresh Food* (7%) represent the least durable categories and include products that we believe consumers will be more sensitive to in terms of price and price changes (e.g., bread and milk). We will come back to this later in the analysis as we study the degree of VAT pass-through across product categories.

Table 2: Number of products per category, Saudi Arabia

Product category		Avg share	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20
1	Baby Products	0.05	3,653	4,493	4,946	5,064	6,007	1,055	4,163
2	Bakery	0.02	1,196	1,004	1,166	1,285	1,492	535	2,127
3	Beauty & Personal Care	0.40	20,301	25,562	31,709	39,096	84,830	4,094	22,781
4	Beverages	0.05	3,276	3,144	3,032	3,383	4,786	2,016	6,459
5	Cleaning & Household	0.10	7,006	7,300	8,286	9,340	10,799	2,169	10,929
6	Food Cupboard	0.29	20,120	23,578	23,902	26,486	28,489	7,157	36,246
7	Fresh Food	0.07	4,540	4,260	4,495	5,074	6,153	2,909	10,197
8	Frozen Food	0.03	2,057	2,137	2,306	2,578	3,352	1,263	4,802

Note: We report the number of products by product category in Saudi Arabia across both retailers. As our focus is to study how the price of each product changes in response of the VAT, we consider each product per retailer as unique observation.

3. ANALYSIS

We start the analysis by reporting price changes for each product between April 2020 and June 2020. This is done in *Figure 1*, where the percentage change in price for each product (contingent on a price change taking place) is plotted on a histogram for each country. To hide outliers from the graph, we only consider price changes between -20% and 20%. In subsequent analysis all price changes are taken into account.

Two important insights come from the histogram: first, for all countries but Saudi Arabia, there are as many price increases as there are price decreases. The uniformity of the price distribution in these countries suggests that overall prices did not change over the same period; second, for Saudi Arabia, there is a significant cluster of price changes at 10%. This is the first evidence that VAT pass-through may be full.

Next, we compute the average monthly change across all products for each retailer in each country and report the findings in *Table 3*. In *panel (i)*, we pool

all products together across retailers in each country and report the average monthly change. In *panel (ii)* and *panel (iii)*, we report the average price change across *Retailer A* and *Retailer B*, respectively. This allows us to explore any variations in pricing behavior across the two retailers. For comparison purposes, we report results across both retailers for each GCC country.

The results show that in Saudi Arabia there was a 6% increase in prices between May and June 2020, followed by a 4% increase between June and July. Overall, this points to a 10% increase, which is consistent with the histogram analysis above, and the hypothesis that VAT pass-through is complete. There was no price increase in any of the other GCC countries, which suggests that the entire increase in prices we observe is due to the VAT rate change and not due to some other underlying conditions, such as seasonality or changes in demand, inflation, and oil prices (which would have a positive income effect for all the GCC countries).

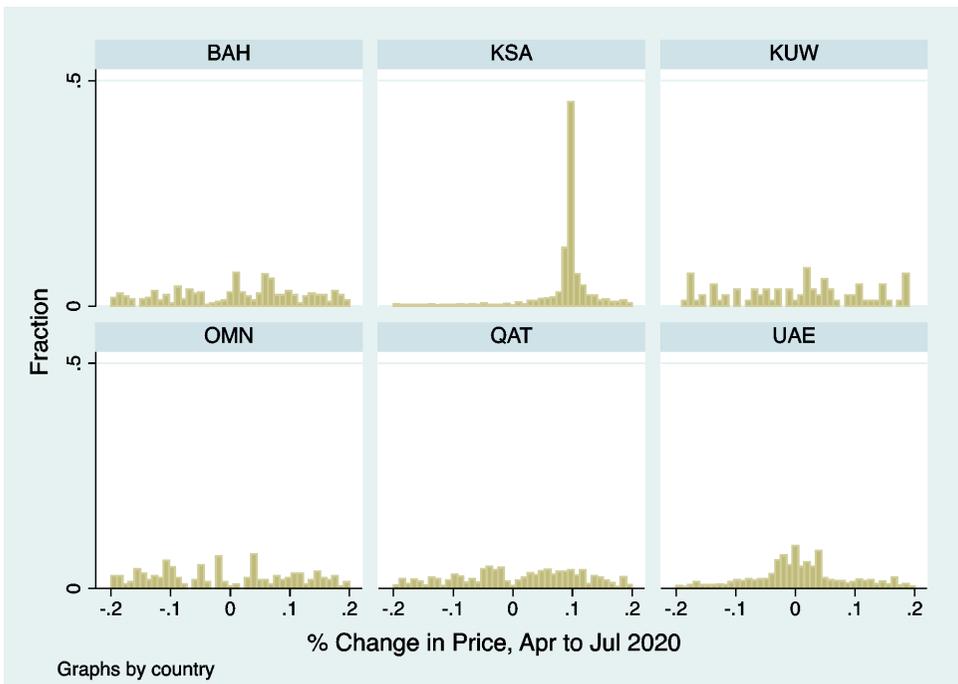


Figure 1: Price change histogram, April 2020 to July 2020, by GCC country

Note: For each product per retailer, we compute the percentage change in price between April 2020 and July 2020. The distribution of price changes, contingent on a price change taking place, for each country is plotted above. For clarity, we restrict price changes to between -20% and 20% when plotting the distribution.

Interestingly, we observe that both retailers raised prices by 10%, but they took very different approaches: *Retailer A* raised prices by 8% and 2% between May-June and June-July, respectively. *Retailer B*, on the other hand, chose a smaller increase in prices over June (3%) and instead pushed the rest of the price increase by July (7%).

For Saudi Arabia, we break down prices changes by product group in *Table 4*. We observe that for *Bakery* and *Fresh Food* the June price increase was relatively muted, but for *Beauty and Personal Care*, *Cleaning and Household*, and *Frozen Food* most of the price adjustment happened in June. This may reflect the fact that *Bakery* and *Fresh Food* products are less durable and/or that consumers are the most sensitive on the prices of these items.

Table 3: Monthly price changes

<i>Date</i>	<i>BAH</i>	<i>KSA</i>	<i>KUW</i>	<i>OMN</i>	<i>QAT</i>	<i>UAE</i>
<i>(i) All</i>						
May-20	-0.01	-0.01	0.00	0.00	0.00	0.01
Jun-20	0.00	0.06	0.00	0.00	0.01	0.00
Jul-20	0.00	0.04	0.00	0.00	0.00	0.00
Aug-20	0.00	-0.02	0.00	0.00	-0.01	0.01
Sep-20	0.00	0.01	0.00	0.01	0.00	0.00
Oct-20		0.01			0.00	
<i>(ii) Retailer A</i>						
May-20		0.00			0.00	0.01
Jun-20		0.08			0.00	0.00
Jul-20		0.02			0.00	0.00
Aug-20		-0.02			0.00	0.01
Sep-20		0.00			0.00	
Oct-20		0.01			0.00	0.00
<i>(iii) Retailer B</i>						
May-20	-0.01	-0.01	0.00	0.00	-0.02	-
Jun-20	0.00	0.03	0.00	0.00	0.01	-
Jul-20	0.00	0.07	0.00	0.00	-0.01	-
Aug-20	0.00	-0.03	0.00	0.00	-0.02	-
Sep-20	-	-	-	-	-	-
Oct-20	0.00	0.01	0.00	0.01	0.01	-

Note: We report the average of the percentage monthly price change for all items, and for items across each retailer per country.

Table 4: VAT Pass-Through by Product Category

Product category		May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20
1	Baby Products	0.02	0.02	0.04	-0.01	-0.01	0.02
2	Bakery	0.00	0.02	0.07	-0.02	0.01	0.01
3	Beauty & Personal Care	-0.04	0.08	0.04	-0.07	0.05	0.03
4	Beverages	-0.01	0.04	0.05	-0.01	0.00	0.01
5	Cleaning & Household	0.01	0.09	0.01	0.00	-0.01	0.00
6	Food Cupboard	0.00	0.06	0.03	-0.02	0.00	0.02
7	Fresh Food	0.00	0.03	0.05	-0.01	-0.02	0.00
8	Frozen Food	0.00	0.07	0.03	-0.04	0.02	0.00

Note: We report the average monthly percentage change in price for all items across each of the eight grocery categories in Saudi Arabia. The data are pooled together across retailers but can also be made available by retailer upon request from the author.

Finally, we construct price indexes for grocery items by country and by retailer. The results are presented in *Figure 2* below. To construct the price index, we run a price regression with product and time dummies for each country. We then report the coefficients of the price regression.⁴ Regardless of whether we build the price index based on data coming from *Retailer A* or *Retailer B*, the price index jumps about 10% between May and July and then remains flat. This suggests that there is no price correction taking place in the months that follow.

4. CONCLUSION

Understanding both the degree and the determinants of cost pass-through into retailer prices is a key topic in economics. While there is a large and active literature on this and on the degree of tax pass-through, there is little research that studies the degree of pass-through and the impact of changes in VAT tax rates on consumer prices in developing countries and in the Middle East.

Using the unanticipated VAT increase in Saudi Arabia from 5% to 15% in July 2020 as a natural experiment, we are able to measure by how much the grocery prices changed during that period. This is made possible because we have started collecting monthly price data on grocery items from two of the largest retailers in the country prior to the announcement.

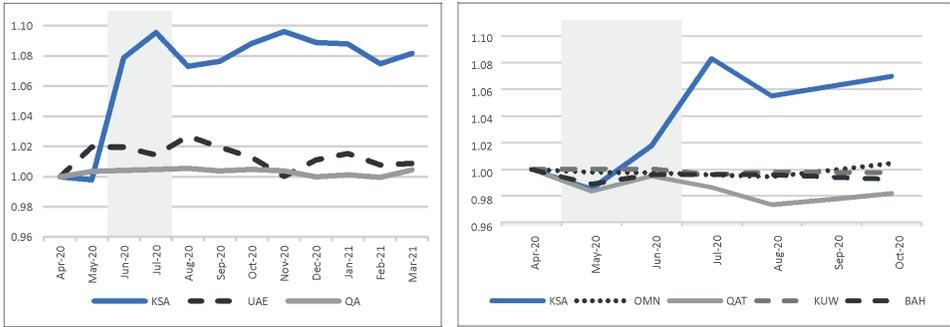


Figure 2: Price Index for Grocery Goods in the GCC

(i) Retailer A (April 2020 to March 2021) (ii) Retailer B (April 2020 to November 2020)

We find that pass-through was complete as prices increased by 10% between May and July 2020. For less durable goods, such as grocery and fresh food items, the price adjustment happened gradually within the period between the announcement and July 1st, 2020. But for durable goods, such as beauty and personal care, frozen food, and cleaning and household, we find that the adjustment happened immediately following the announcement. Interestingly, while both retailers raised prices by 10%, *Retailer A* raised prices 8% between May and June, and another 2% between June and July, whereas *Retailer B* raised prices 3% and 7% over May-June and June-July, respectively. Prices in other GCC countries did not rise over the same period.

NOTES

1. These recommendations are usually accompanied with a statement that the impact of VAT on consumer prices will be incomplete. For example, in the latest Atricle IV consultations for the state of Qatar, the IMF advises the state to introduce a 5% VAT, and in a footnote states that such a policy would only raise consumer prices by 1.7%, although no justification is given on how the estimate comes about.
2. An exception is Antoniadis and Zaniboni (2016). The authors use micro-level data to study the degree and determinants of exchange rate pass-through into fast-moving consumer good (FMCG) prices in the United Arab Emirates. They measure a 20% long-run (over twelve months) ex-rate pass-through in UAE and provide evidence that pass-through increases with retailer market share and with the frequency the price a product adjusts, and it decreases with both product quality and the elasticity of substitution of the product category.

3. On December 10, 2015, the Gulf Cooperation Countries (GCC) reached an agreement for implementing a *Unified Value Added Tax (VAT) Framework*. The framework called for the simultaneous introduction of VAT in the GCC at a starting rate of 5% and is perceived as part of the GCC countries' efforts to harmonize their economies and diversify the sources of government revenue. The agreement was then delegated to the *Financial and Economic Cooperation Committee for Council States* for completion. A 5% VAT was first introduced in Saudi Arabia and in the United Arab Emirates on January 1st, 2018, followed by Bahrain on January 1st, 2019, and finally Oman on April 16th, 2021. As of the beginning of 2023, Qatar and Kuwait still have not implemented a VAT system. In May 2020, Saudi Arabia announced a 10% increase in VAT to take effect by July 1st of the same year.
4. This approach follows the Country-Product-Dummy (CPD) regression for measuring prices. The advantage is that it includes all items in each period, which is ideal when working with scanner and barcoded data. This is because a large share of products (at the barcode level) disappears each month as new products (barcodes) appear, so taking price differences with alternative methodologies results in a large share of missing observations. We also constructed these price indexes by replicating the approach the Bureau of Labor Statistics uses to construct the CPI. Specifically, we first calculate elementary price indexes for each of the eight product categories using a Laspeyres price index (which reduces to the Jevons index as no expenditure shares are used to weight the data) and then we aggregate these up to a higher-level index. For more on these approaches see Antoniadou et al. (2022). The results are identical and omitted for brevity. For inquiries, please contact the author.

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