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AUBURN UNIVERSITY

SOURCE–SPECIFIC DEMAND ELASTICITIES FOR DATES IN INTERNATIONAL TRADE

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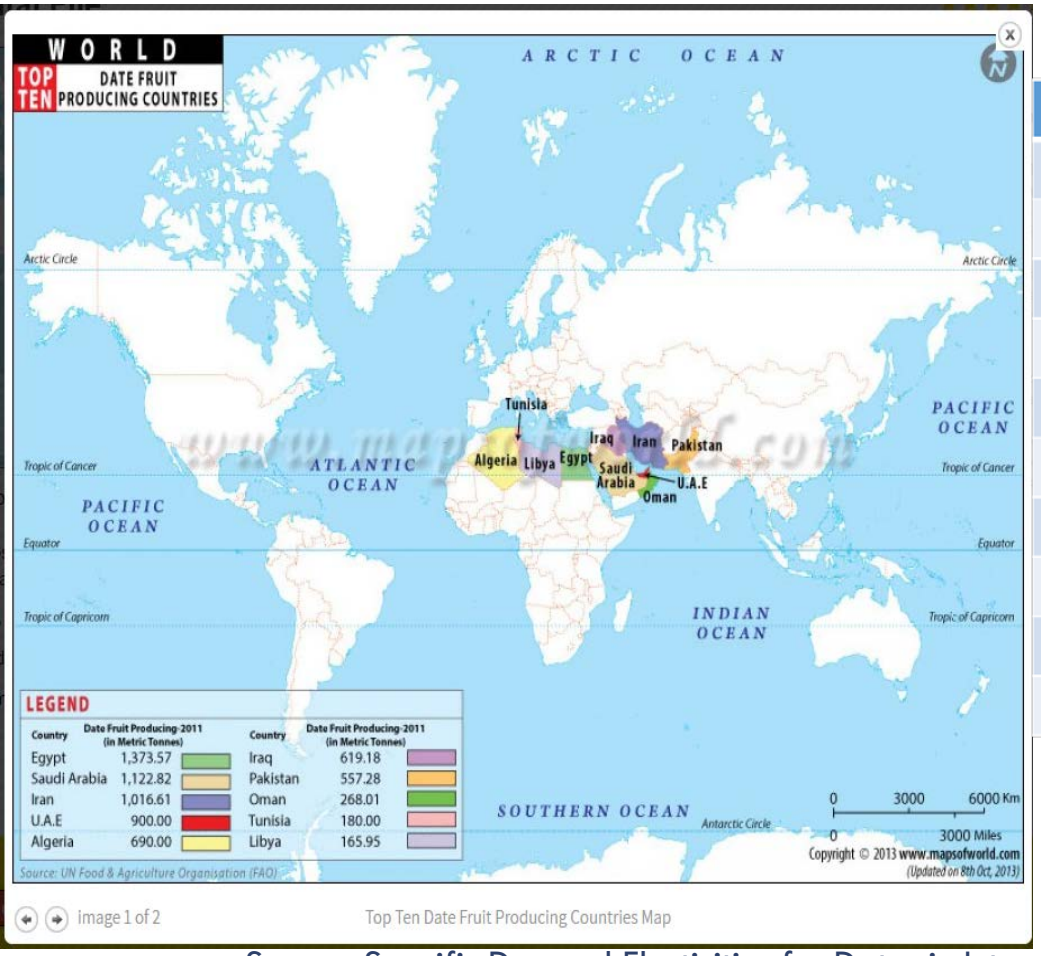
Introduction

- There are a big number of articles that estimate different kinds of elasticities for various types of goods produced in the Middle East and North Africa.
- But very few articles mention the estimation of demand elasticities of the most important agricultural commodities such as dates in these regions.
- Rotterdam model is applied for world demand for dates with a particular focus on Iraq.

Top Ten Date Fruit Producing Countries Map



WORLD TOP 10: DATE FRUIT PRODUCING COUNTRIES 2011

RANK	COUNTRY	(1000 metric tonnes)
1	Egypt	1,373.57
2	Saudi Arabia	1,122.82
3	Iran	1,016.61
4	United Arab Emirates	900
5	Algeria	690
6	Iraq	619.18
7	Pakistan	557.28
8	Oman	268.01
9	Tunisia	180
10	Libya	165.95

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Objective

- The principle objective of this study is to applied a theoretical foundation model and estimate world demand elasticities for the date market.
- More specifically, this study will estimate the world demand for dates segmented by origin.
- Estimating the elasticities of demand is essential because it provides a better view of demand status in importing countries.

The Model

The Rotterdam model used to investigate factors affecting world demand for dates. This model was selected for estimation because it is consistent with demand theory and is derived from the consumer utility function.

It is specified as:

$$\bar{R}_{it}\Delta q_{it} = \alpha_i + \sum_{j}^{5} \beta_{ij}\Delta p_{jt} + \emptyset_{it} S_{it} + \mu_i \Delta Q_t + \varepsilon_{it} \qquad (1)$$

In which $\alpha_i, \beta, and\ \emptyset$, are estimation parameters, and S_{it} denotes the dummy variable for war years between Iraq and Iran (1988-1991), Iraq and Kuwait (1990-1991), and Iraq and the US (2003-2013).

All the variables in the Rotterdam demand system are specified as discrete change and approximated by replacing logarithmic differentials with log differences in model estimation. For example, $\Delta p_{jt} = (\log p_t - \log p_{t-1})$.

Restrictions

- 1) The parameters of which satisfy the adding-up constraints by the implied budget constraint:
- $\sum_{i=1}^{6} \mu_i = 1$ (1a)
- 2) Homogeneity : $\sum_{j=1}^{6} \beta_{ij} = 0 \quad , i = 1,2, \ldots, 6$ (2b)
- 3) Symmetry : $\beta_{ij} = \beta_{ji} \qquad \forall \;\; i, j \;\; i \neq j$ $(3c)$
- 4) Cournot: $\sum_{i=1}^{6} \beta_{ij} = 0 \quad j = 1,2, \ldots . , 6$ (4d)

Elasticities

- Elasticities are calculated using the following expressions:
- (Expenditure elasticities) $E_i^Y = b_i / R_i$
- (Conditional Hicksian elasticities) $E_{ij}^* = \mu_{ij} / R_i$
- (Conditional Marshallian elasticities) $E_{ij} = E_{ij}^* - R_j A_i$

Data Description

- This paper will examine five countries exporting dates to the global market.
- The study focuses on the total exports of dates from the Middle East and North Africa.
- The specific countries for this case study are Algeria, Tunisia, Saudi Arabia, Iraq, Iran, and the Rest of the World (ROW). dates for the time series data of 1961-2013.
- The above countries represent the supply side of the date market according to the UN Food & Agriculture Organization (FAO).
- There is one source for the data, which is the UN Food & Agriculture Organization Statistics Division (FAOSTAT)
- All trade values are in Free-On-Board (FOB).

Table 2. SUR Estimates of the Rotterdam Model with Homogeneity and Symmetry imposed

Price and Expenditure Effects

	Price Coefficient										
Equation	ṗDZ	ṗTN	ṗIQ	ṗSA	ṗROW	ṗIn	Expend.	Intercept	Dummy	R^2	D.W
Algeria	**-0.035**						0.123	-0.0050	0.005	0.10	2.66
	(-1.15)						(2.32)**	(-0.49)	(0.23)		
Tunisia	0.031	**-0.150**					0.173	0.0057	0.008	0.08	2.76
	(-1.17)	(-2.84)***					(3.44)***	(0.72)	(0.51)		
Iraq	-0.023	0.038	**-0.081**				0.275	-0.0073	-0.008	0.38	2.60
	(-0.91)	-1.46	(-2.06)**				(4.38)***	(-0.58)	(-0.31)		
Saudi Arabia	0.009	-0.026	0.007	**-0.012**			0.037	0.0024	-0.002	0.16	2.72
	(-0.89)	(-1.49)	-0.64	(-1.03)			(1.74)*	(0.71)	(-0.24)		
ROW	0.043	0.108	0.110	0.013	**-0.307**		0.288	0.0045	0.002	0.76	2.55
	(-1.47)	(-2.73)***	(-3.5)***	(-0.78)	(-5.74)***		(4.29)***	(0.41)	(0.09)		
Iran	-0.025	-0.0001	-0.051	0.009	0.033	**0.034**	0.103	-0.0004	-0.005	0.11	2.70
	(-1.32)	(-0.01)	(-2.3)**	(-1.05)	(-1.34)	(1.77)	(1.90)	(0.21)	(0.015)		

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- Point estimates range from smallest to largest price effects: -0.31 for ROW to 0.03 for Iran and Algeria and Saudi Arabia in between at -0.04 and -0.01, respectively.
- Dates have positive signs and significant expenditure coefficients across each equations, implying that date exports do change in response to group expenditure change. Thus, an increase in total group expenditure will lead to an increase in the quantity of dates exported by the respective percentage change per year.

Conditional Hicksian Elasticities

The Slutsky equation is $\frac{\partial q_i}{\partial p_i} = \left(\frac{\partial q_i}{\partial p_i}\right)^* - q_j \frac{\partial q_i}{\partial y}$, in which $\left(\frac{\partial q_i}{\partial p_i}\right)^*$ is the substitution effect that holds real income constant.

Table 3. Estimated Conditional Hisksian and Marshallian Elasticities

	Conditional Marshallian Elasticities					
Country	*Algeria*	*Tunisia*	*Iraq*	*Saudi Arabia*	*ROW*	*Iran*
Algeria	**-0.51**	0.13	-0.57	0.03	-0.04	-0.40
Tunisia	0.10	**-1.16**	-0.02	-0.23	0.28	-0.11
Iraq	-0.21	-0.02	**-0.62**	-0.03	0.03	-0.33
Saudi Arabia	0.11	-0.61	-0.03	**-0.26**	-0.07	0.10
ROW	0.04	0.12	0.04	-0.01	**-1.10**	0.01
Iran	-0.36	-0.17	-0.78	0.03	-0.06	**0.25**

	Conditional Hicksian Elasticities							
Country	*Algeria*	*Tunisia*	*Iraq*	*Saudi Arabia*	*ROW*	*Iran*	ei^x	R_i
Algeria	**-0.39**	0.34	-0.26	0.10	0.47	-0.27	1.36	0.09
Tunisia	0.20	**-0.99**	0.25	-0.17	0.71	-0.001	1.14	0.15
Iraq	-0.10	0.16	**-0.35**	0.03	0.47	-0.22	1.19	0.23
Saudi Arabia	0.18	-0.49	0.13	**-0.23**	0.25	0.16	0.70	0.05
ROW	0.11	0.29	0.29	0.04	**-0.81**	0.09	0.76	0.38
Iran	-0.26	-0.001	-0.53	0.09	0.34	**0.36**	1.08	0.10

- The uncompensated own-price elasticities indicate that world demand of date is particularly sensitive to Tunisia date price (-0.99), also the world demand is sensitive in lower degrees to Algeria (-0.39), Iraq (-0.35), Saudi Arabia (-0.32), and Iran (0.36) date prices respectively. When the own-price elasticity is less than one, the demand is less elastic or inelastic. In other words, the own- price elstictisties suggest that date demands is price inelastic.

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The marginal budget shares (*Rj*) are positive. Note that the marginal share is relatively large for Iraq (0.23), which is to be expected since it is, the largest supplier of date to the world, but significantly smaller for the remaining countries: Tunisia (0.15), Iran (0.10), Algeria (0.09), and Saudi Arabia (0.05). These estimates indicate that for every dollar increase in total foreign date expenditures, about $0.23 was spent on Iraq date and $0.15 on Tunisia date, while only $0.10 – 0.05 went to date from each of the remaining sources.

The conditional Marshallian elasticities tell us dates are gross complements but net substitutes

Figure 1. Market shares for countries exporting dates (1961-2013)

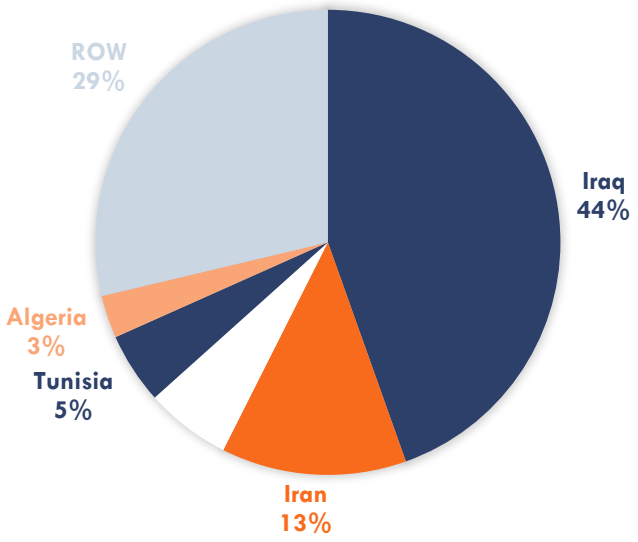

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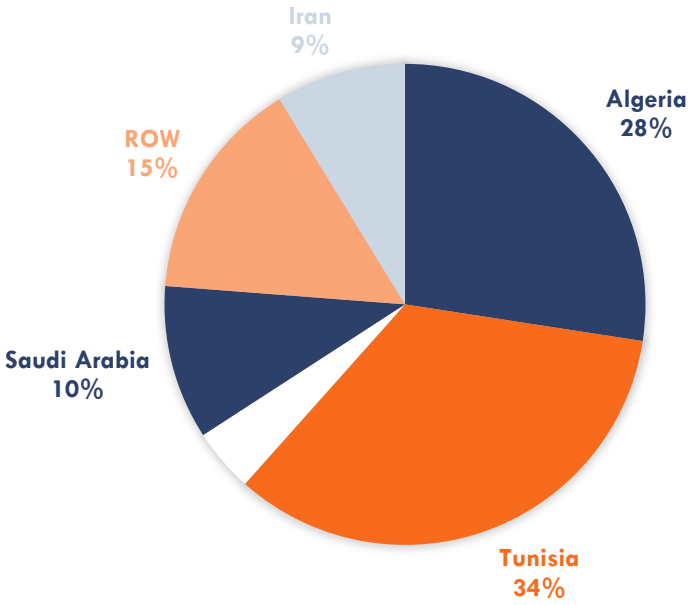
Figure 2. Prices percentage distributed among leaders countries exporting dates (1961-2013)



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Conclusion

Conclusion based on Preliminary Results

- ✓ The basic theme of this research is to apply a world-demand system to estimate the global demand for dates for the time series data of 1961-2013.
- ✓ The results showed that the own-price elasticities are negative and the world demand is inelastic.
- ✓ The uncompensated own-price elasticities indicate that world demand of date is particularly sensitive to Tunisia date price (-0.99).
- ✓ The marginal budget share indicates Iraq has relatively large marginal share (0.23), This means that for every dollar increase in total foreign date expenditures, about $0.23 was spent on Iraq date

Thank you
Questions and Comments