OCP Policy Center Seminar series

Optimal Commodity Taxation and Consumer Welfare: A Case Study of the UAE

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April 24, 2004

gulfnews.com
UAE | General

UAE plans to impose more fees, new tax to cut deficit

The UAE is edging closer to heeding proposals by the International Monetary Fund to introduce new fees on services, increase existing fees and impose relatively low taxes.

May 5, 2004

gulfnews.com
UAE | General

Proposal to impose VAT scrapped

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The Federal National Council (FNC) yesterday scrapped its own proposal of introducing Value Added Tax (VAT) and suggested levying taxes on commercial and trade activities.

May 16, 2004

gulfnews.com
UAE | General

Gulf states urged to introduce VAT

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By Nadim Kawach, Bureau Chief
Published: 00:00 May 16, 2004

GULF NEWS

The GCC states and other Arab nations need to impose value added taxes within overall economic reforms to offset volatile oil prices and ensure balance in their deficit-ridden fiscal systems, the top Arab monetary official said.

August 8, 2005

gulfnews.com

Business | Banking

UAE asks IMF to help develop value added tax

The UAE has asked the International Monetary Fund to help it develop a value added tax (VAT) system, the fund said in a report.

February 8, 2006

gulfnews.com
Business | Economy

Gulf states plan up to 5% VAT by next year

The Gulf countries are considering up to five per cent value-added tax (VAT) that, according to a senior government official, will replace the five per cent customs duty currently charged on imports, following the implementation of the free trade agreements with major trading partners.

March 3, 2007

gulfnews.com

Business | Investment

Vatman returns!

VAT is back in the news again. In the past week it has been reported that the GCC states have agreed a 3-5 per cent band on all items.

February 21, 2008

gulfnews.com
Business | Economy

UAE will not implement VAT soon

The introduction of a value added tax (VAT) has not yet been studied by the Ministry of Finance, officials said on Wednesday.

June 2, 2008

gulfnews.com
Business | General

Dubai wants VAT rate set at 3%

Dubai Customs has recommended a rate of three per cent for the value added tax (VAT) the UAE would introduce next year as part of a Gulf initiative.

May 14, 2009

gulfnews.com

Business | Economy

VAT plans put on hold

The UAE appears to have abandoned plans to implement value-added tax (VAT) for the time being, a top official said, adding that the worst for Dubai is over.

June 9, 2011

gulfnews.com

Business | Economy

Time to reconsider VAT

The system would assist in diversifying public
revenue streams

Policy Motivations

- Reduce government dependence on hydrocarbon tax revenue.

- Budget surpluses are not sustainable due to fluctuations in oil prices.

- Budget deficits at 12% of GDP (2001, 2002, 2009, 2010).

- Loss of custom duties due to several FTAs.

- Synchronizing with other GCC countries.

Hesitations

- Food and financial crises of the late 2010s.

- Unanswered issues:
  - Mechanics of implementation
  - Fraud
  - Inflationary impact
  - Driving investors and expatriates away from the UAE
  - What should the tax rates be?
  - How would the rates impact low income consumers?

Objective

- Address two questions:
  - What should the tax rates be?
  - How would the rates impact low income consumers?

- Methodology:
  - Lay out a theoretical economic model of optimal commodity taxation.
  - Econometrically estimate supporting parameters from a Linear Expenditure Demand System using UAE household data.
  - Estimate the tax burden by income quintile using the compensating variation.

Simple Tax Model
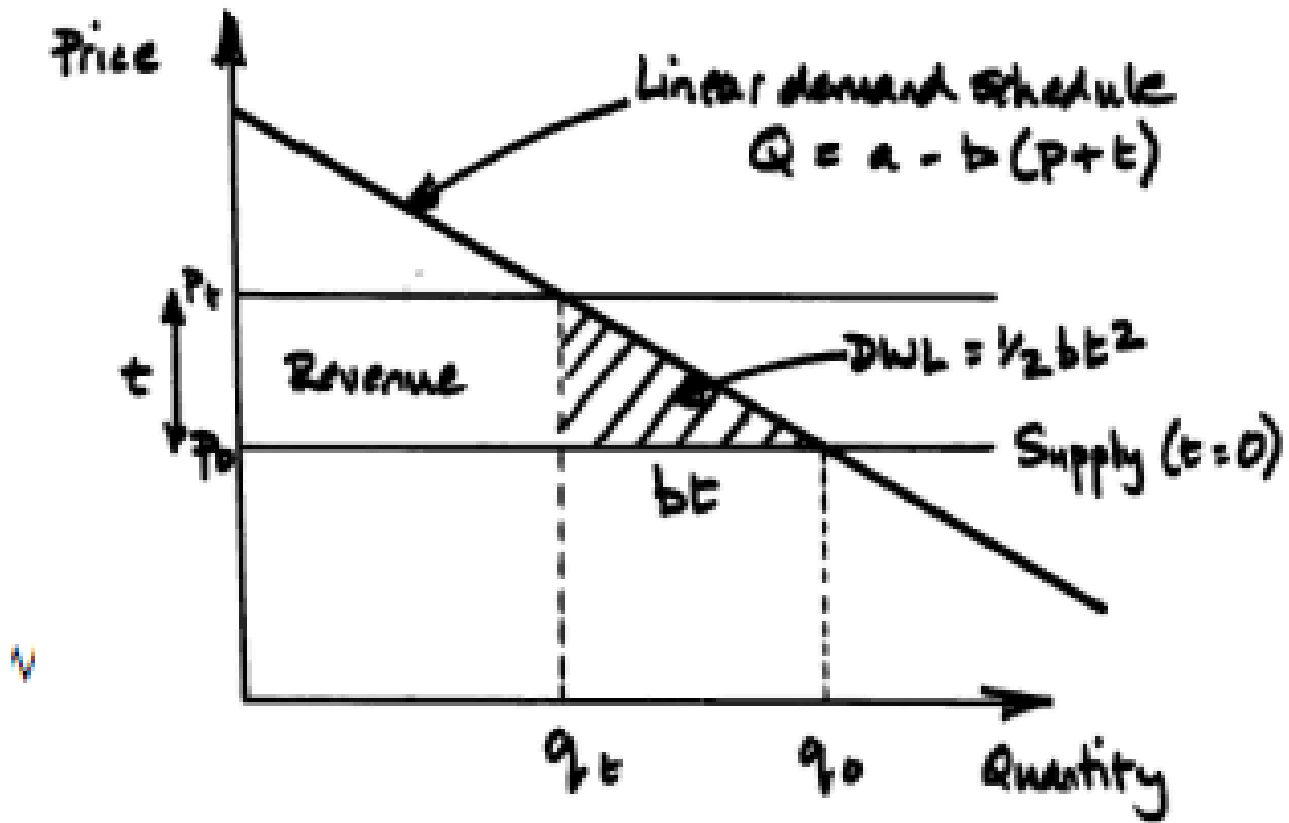
Frank Ramsey. 1927. A contribution to the theory of taxation. *Economic Journal* 37:47-61.

- Linear compensated demand schedules take the form $Q = a - b(p+t)$
- $DWL = \frac{1}{2}bt^2$ so marginal DWL = bt
- Tax revenue = $tQ = t[a - b(p+t)]$
- so marginal revenue = $a - b(p+2t)$
- Efficiency requires that marginal excess burden should be the same across all taxes
  - ie the ratio of marginal revenue to marginal deadweight loss should be the same for all commodities
- $MR/MDWL = [a - b(p+2t)] / bt = [Q / bt] - 1 = a$ constant k'
- Rewriting this in terms of k, where $k = 1 / (1 + k')$, w have

  $Q/bt = 1+k'$ or equivalently $t = kQ/b$
- Rewriting in terms of the elasticity of demand $e = bp/Q$, we have

  $t/p = kQ / bp = k / e$
- Efficient revenue raising (which equalises marginal excess burden across all taxes) will thus set taxes on each commodity in inverse proportion to demand elasticity.
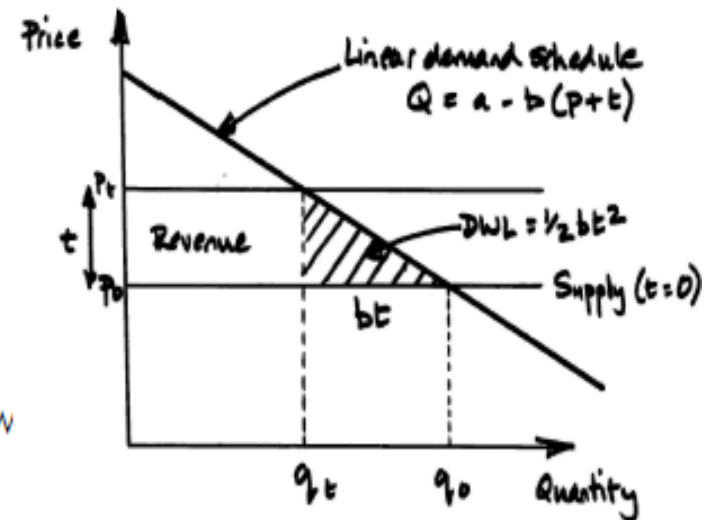
Literature: Pre-Auerbach's Review (1985)

- Primarily theoretical

- Main focus
  - General equilibrium effects
  - Whether taxes should be non-uniform or uniform
  - Implications of consumer heterogeneity
  - Consideration of multiple products

Literature: Post-Auerbach' Review (1985)

- Still theoretical

- Offshoots
  - Optimal commodity taxes in the presence of:
    - Children
    - Tax evasion
    - Electronic commerce

- Empirical
  - India
  - Australia
  - Brazil
  - Finland
  - (Not aware of any on MENA region)

Asano, S. and T. Fukushima. 2006. Some empirical evidence on demand system and optimal commodity taxation. *Japanese Economic Review* 57:50-68.

- **Utility**: $U = f(q_1, q_2, \dots, q_{n-1}, q_n)$
  - q_i, for *i =1, 2, … , n-1* = consumption level of commodity *i.*
  - q_n = the consumption level of leisure.
- **Time endowment** : $T = L + q_{n.}$
  - *L* = time spend on work.
- **Income from work:**
  - $p_n L = p_n (T - q_n)$
  - p_n = Labor wage
- **Budget constraint:**
  - $p_1 q_1 + p_2 q_2 + \dots + p_{n-1} q_{n-1} + p_n q_n = p_n T = y$
  - *y =* Total endowment (income + leisure valued at its opportunity cost)

Marshallian demand curves
Indirect utility function
Expenditure function

- **Max** : $U = f(q_{1,} q_2, \ldots, q_{n-1}, q_n)$

  Subject to: $p_1 q_1 + p_2 q_2 + \cdots + p_{n-1} q_{n-1} + p_n q_n = y$

- **Solution:**

  Commodity 1: $q_1^* = q_1^*(p_{1,} p_2, \ldots, p_{n-1}, p_n)$

  Commodity 2: $q_2^* = q_2^*(p_{1,} p_2, \ldots, p_{n-1}, p_n)$

  Commodity *n-1*: $q_{n-1}^* = q_{n-1}^*(p_{1,} p_2, \ldots, p_{n-1}, p_n)$

  Leisure: $q_n^* = q_n^*(p_{1,} p_2, \ldots, p_{n-1}, p_n)$

  Supply of labor: $L = T - q_n^*(p_{1,} p_2, \ldots, p_{n-1}, p_n)$

- **Indirect utility function:** $V = v(p_1, p_2, \ldots, p_{n-1}, p_n, y)$

- **Expenditure function:** $y = (p_1, p_2, \ldots, p_{n-1}, p_n, U)$

Optimal Non-Uniform Tax Rates

Max $V = v(p_1, p_2, \ldots, p_{n-1}, p_n, y)$

   Subject to

Government revenue constraint:
$\sum_{i=1}^{7}(\pi_i - p_i)q_i - R = 0.$

  – p_i = prices before tax
  – πi = price after tax

- Solution
  – Optimum tax rates $t_i^* = (\pi_i^* - p_i)/p_i$, for *i=1, 2, …, n*
  – *Optimum Government Revenue:* $R^* = \sum_{i=1}^{n-1}(\pi_i -$

Uniform Tax Rates

- When taxes are uniform: $t = t_1 = t_{2} = \ldots = t_{n-1}$

- Government Revenue: $R^* = \sum_{i=1}^{n-1}(\pi_i^* -$

Welfare Effect

- Compensating variation:
  - $CV = y\left(\pi_{1,}\pi_{2}, \dots, \pi_{n-1}, p_{n}, U_{p}\right) - y\left(p_{1,}p_{2}, \dots, p_{n-1}, p_{n}, U_{p}\right)$
  - The difference between the minimum expenditure to maintain the initial utility level at the after-tax prices and the minimum expenditure to maintain the utility level at the before-tax prices.
  - The minimum amount of income a consumer would be willing to accept to tolerate the higher commodity prices.
  - The burden of taxation is defined as the ratio of CV to income.

Empirical Framework

$$\text{Max } U = \beta_1 \ln(q_1 - \alpha_1) + \beta_2 \ln(q_2 - \alpha_2) + \cdots + \beta_{n-1} \ln(q_{n-1} -$$

Marshallian Demand Functions

$$p_1 q_1 = \alpha_1 p_1 + \beta_1 \{y - (p_1 \alpha_1 + p_2 \alpha_2 + \cdots + p_{n-1} \alpha_{n-1} + p_n \alpha_n)\}$$

$$p_2 q_2 = \alpha_2 p_2 + \beta_2 \{y - (p_1 \alpha_1 + p_2 \alpha_2 + \cdots + p_{n-1} \alpha_{n-1} + p_n \alpha_n)\}$$

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$$p_{n-1} q_{n-1} = \alpha_{n-1} p_{n-1} + \beta_{n-1} \{y - (p_1 \alpha_1 + p_2 \alpha_2 + \cdots + p_{n-1} \alpha_{n-1} + p_n \alpha_n)\}$$

$$p_n q_n = \alpha_n n + \beta_n \{y - (p_1 \alpha_1 + p_2 \alpha_2 + \cdots + p_{n-1} \alpha_{n-1} + p_n \alpha_n)\}$$

Data

- Repeated panel of 3905 households (April 2007, March 2008).

- Repeated panel consists of households of similar profiles surveyed at different time periods.

- Reported: income and expenditure on 25 categories.

- 7 Commodity groups: FOOD, CLTH, HOUS, FURN, TRANS, RECR, MISC

- Prices provided by Dubai Chamber of Commerce.

Consumption Groups

Food and Beverage (FOOD)

- Food
- Nuts and spices/condiments
- Non-alcoholic beverages

Clothing and Footwear (CLTH)

- Clothing
- Footwear

Housing and Utilities (HOUS)

- Housing and water
- Electricity and fuel

Furnishings and Household Services (FURN)

- Furniture and Furnishings
- Mattresses and Household textiles
- Household appliances and electrical equipment
- Glasswares, tablewares and Household containers
- Disinfectants and Other cleaning materials
- Household services

Transportation and Communication (TRAN)

- Operation/Maintenance of Transport equipment
- Transport cost
- Other equipment and services

Recreation (RECR)

- Audio-visual, photographic and information processing equipment
- Leisure and amusement services
- Newspapers, books and Other reading materials
- Education services and materials
- Hotels and restaurants expenses

Miscellaneous (MISC)

- Personal care goods and services
- Jewelries and Other accessories
- Non-health insurance and Other financial services
- Other services

Leisure Variable

– Time available for work and leisure = 480 hours (30 days x 16 hours/day) per month.

– Work = 160 hours per month.

– Available leisure time = 480 – 160 = 320.

– Opportunity cost of leisure = Monthly household income/160.

Demand and Expenditure Elasticities

	FOOD	CLTH	HOUS	FURN	TRAN	RECR	MISC	LESR
Marshallian demand elasticities and standard errors								
Elasticity	-0.203	-0.3694	-1.6094	-0.4722	-1.4295	-0.9833	-0.2607	-0.3003
(s.e)	0.009	0.0176	0.0145	0.0265	0.0116	0.0647	0.0142	0.0057
Expenditure elasticities and standard errors								
Elasticity	0.483	0.9129	1.1802	4.0738	1.1803	2.489	0.6403	0.3184
(s.e)	0.0208	0.0423	0.0648	0.0328	0.0648	0.0163	0.034	0.0008

Non-uniform tax rates, tax revenue, and welfare: all commodities taxed

Monthly tax payment per Household (AED)	182	911	1821	2732	3642
Monthly tax payment as % of average household income of AED 18211	1%	5%	10%	15%	20%
Number of households	652,865	652,865	652,865	652,865	652,865
Yearly government tax revenue (bn AED)	1.427	7.134	14.267	21.404	28.534
2012 GDP (bn AED)	358	358	358	358	358
Government tax revenue as % of GDP	0.40%	1.99%	3.99%	5.98%	7.97%
Non-uniform tax rates (%)					
FOOD	1.76	9.69	22.25	39.51	65.29
CLTH	1.19	6.21	13.07	20.48	27.88
HOUS	0.90	4.57	9.31	14.05	18.41
FURN	1.09	5.67	11.81	18.27	24.52
TRAN	0.90	4.61	9.39	14.18	18.59
RECR	1.43	7.61	16.55	27.01	38.56
MISC	0.90	4.57	9.31	14.05	18.41
Average welfare effect					
1st quintile					
Welfare loss (AED)	56	296	644	1064	1593
Welfare loss as % income	1.97	10.48	22.79	37.67	56.36
2st quintile					
Welfare loss (AED)	88	459	977	1569	2259
Welfare loss as % income	1.43	7.46	15.87	25.48	36.69
3rd quintile					
Welfare loss (AED)	143	740	1549	2436	3405
Welfare loss as % income	1.38	7.16	14.99	23.57	32.94
4th quintile					
Welfare loss (AED)	201	1039	2158	3359	4624
Welfare loss as % income	1.04	5.37	11.16	17.37	23.92
5th quintile					
Welfare loss (AED)	423	2169	4464	6854	9243
Welfare loss as % income	0.81	4.14	8.53	13.09	17.65

Uniform tax rates, tax revenue, and welfare: all commodities taxed

Monthly tax payment per Household (AED)	182	911	1821	2732	3642
Monthly tax payment as % of average household income of AED 18211	1%	5%	10%	15%	20%
Number of households	652,865	652,865	652,865	652,865	652,865
Yearly government tax revenue (bn AED)	1.427	7.134	14.267	21.404	28.534
2012 GDP (bn AED)	358	358	358	358	358
Government tax revenue as % of GDP	0.40%	1.99%	3.99%	5.98%	7.97%
			Uniform tax rates (%)		
	1.02	5.30	11.15	17.67	24.94
			Welfare effect		
1st quintile					
Welfare loss (AED)	44	231	485	767	1080
Welfare loss as % income	1.58	8.18	17.17	27.15	38.22
2st quintile					
Welfare loss (AED)	80.0	412.0	864.0	1362.0	1914.0
Welfare loss as % income	1.29	6.69	14.02	22.13	31.08
3rd quintile					
Welfare loss (AED)	140	723	1512	2383	2245
Welfare loss as % income	1.35	6.39	14.63	23.06	32.36
4th quintile					
Welfare loss (AED)	204	1053	2204	3472	4869
Welfare loss as % income	1.05	5.45	11.40	17.96	25.18
5th quintile					
Welfare loss (AED)	446	2304	4820	7589	10638
Welfare loss as % income	0.85	4.40	9.21	14.49	20.32

Welfare losses from non-uniform versus uniform tax rates: all commodities taxed

	182		911		1821		2732		3642	
Monthly tax revenue per Household (AED)										
Monthly tax revenue as % of average household income of AED 18,211	1%		5%		10%		15%		20%	
Average welfare loss										
1st quintile	non-uniform	uni-form	non-uniform	uni-form	non-uniform	uni-form	non-uniform	uni-form	non-uniform	uni-form
Welfare loss (AED)	56	44	296	231	644	485	1064	767	1593	1080
Welfare loss as % income	1.97	1.58	10.48	8.18	22.79	17.17	37.67	27.15	56.36	38.22
2st quintile										
Welfare loss (AED)	88	80.0	459	412.0	977	864.0	1569	1362.0	2259	1914.0
Welfare loss as % income	1.43	1.29	7.46	6.69	15.87	14.02	25.48	22.13	36.69	31.08
3rd quintile										
Welfare loss (AED)	143	140	740	723	1549	1512	2436	2383	3405	2245
Welfare loss as % income	1.38	1.35	7.16	6.39	14.99	14.63	23.57	23.06	32.94	32.36
4th quintile										
Welfare loss (AED)	201	204	1039	1053	2158	2204	3359	3472	4624	4869
Welfare loss as % income	1.04	1.05	5.37	5.45	11.16	11.40	17.37	17.96	23.92	25.18
5th quintile										
Welfare loss (AED)	423	446	2169	2304	4464	4820	6854	7589	9243	10638
Welfare loss as % income	0.81	0.85	4.14	4.40	8.53	9.21	13.09	14.49	17.65	20.32

Non-uniform tax rates, tax revenue, and welfare: food tax-exempt					
Monthly tax payment per Household (AED)	182	911	1821	2732	3642
Monthly tax payment as % of average household income of AED 18211	1%	5%	10%	15%	20%
Number of Households	652,865	652,865	652,865	652,865	652,865
Yearly government tax revenue (bn AED)	1.427	7.134	14.267	21.404	28.534
2012 GDP (bn AED)	358	358	358	358	358
Government tax revenue as % of GDP	0.40%	1.99%	3.99%	5.98%	7.97%
Non-uniform tax rates (%)					
FOOD	0.00	0.00	0.00	0.00	0.00
CLTH	1.44	7.71	16.91	28.05	41.38
HOUS	1.05	5.43	11.32	17.61	24.02
FURN	1.31	6.96	15.00	24.30	34.75
TRAN	1.06	5.48	11.43	17.80	24.31
RECR	1.76	9.72	22.44	40.34	68.99
MISC	1.05	5.43	11.32	17.61	24.02
Average welfare effect					
1st quintile					
Welfare loss (AED)	40	210	456	662	948
Welfare loss as % income	1.40	7.44	16.14	23.43	33.56
2st quintile					
Welfare loss (AED)	76	397	844	1290	1827
Welfare loss as % income	1.23	6.44	13.71	20.95	29.66
3rd quintile					
Welfare loss (AED)	138	717	1509	2365	3330
Welfare loss as % income	1.33	6.93	14.60	22.88	32.21
4th quintile					
Welfare loss (AED)	204	1057	2218	3514	4937
Welfare loss as % income	1.05	5.47	11.47	18.18	25.54
5th quintile					
Welfare loss (AED)	454	2347	4899	7835	10981
Welfare loss as % income	0.87	4.48	9.36	14.96	20.97

Welfare effect of uniform tax rates: food tax-exempt

Monthly tax payment per Household (AED)	182	911	1821	2732	3642
Monthly tax payment as % of average household income (AED 18211)	1%	5%	10%	15%	20%
Number of households	652,865	652,865	652,865	652,865	652,865
Yearly government tax revenue (bn AED)	1.427	7.134	14.267	21.404	28.534
2012 GDP (bn AED)	358	358	358	358	358
Government tax revenue as % of GDP	0.40%	1.99%	3.99%	5.98%	7.97%
		Uniform tax rates (%)			
	1.11	5.53	12.36	19.73	28.08
		Welfare effect			
1st quintile					
Welfare loss (AED)	34	170	379	602	853
Welfare loss as % income	1.21	6.02	13.40	21.29	30.18
2st quintile					
Welfare loss (AED)	72.0	354.0	788.0	12151	1768
Welfare loss as % income	1.16	5.76	12.80	20.30	28.70
3rd quintile					
Welfare loss (AED)	135	672	1491	2363	3337
Welfare loss as % income	1.31	6.50	14.42	22.86	32.20
4th quintile					
Welfare loss (AED)	203	1009	2239	3548	5009
Welfare loss as % income	1.05	5.21	11.60	18.34	25.90
5th quintile					
Welfare loss (AED)	461	2287	5072	8032	11334
Welfare loss as % income	0.88	4.37	9.68	15.34	21.64

Table 4C: Welfare losses of non-uniform versus uniform taxes by quintile: all commodities taxed except food

	non-uniform	uni-form	non-uniform	uni-form	non-uniform	uni-form	non-uniform	uni-form	non-uniform	uni-form
Monthly tax revenue per Household (AED)	182		911		1821		2732		3642	
Monthly tax revenue as % of average household income (AED 18211)	1%		5%		10%		15%		20%	
					Average welfare loss					
1st quintile	non-uniform	uni-form	non-uniform	uni-form	non-uniform	uni-form	non-uniform	uni-form	non-uniform	uni-form
Welfare loss (AED)	40	34	210	170	456	379	662	602	948	853
Welfare loss as % income	1.40	1.21	7.44	6.02	16.14	13.40	23.43	21.29	33.56	30.18
2st quintile										
Welfare loss (AED)	76	72	397	354	844	788	1290	12151	1827	1768
Welfare loss as % income	1.23	1.16	6.44	5.76	13.71	12.80	20.95	20.30	29.66	28.70
3rd quintile										
Welfare loss (AED)	138	135	717	672	1509	1491	2365	2363	3330	3337
Welfare loss as % income	1.33	1.31	6.93	6.50	14.60	14.42	22.88	22.86	32.21	32.20
4th quintile										
Welfare loss (AED)	204	203	1057	1009	2218	2239	3514	3548	4937	5009
Welfare loss as % income	1.05	1.05	5.47	5.21	11.47	11.60	18.18	18.34	25.54	25.90
5th quintile										
Welfare loss (AED)	454	461	2347	2287	4899	5072	7835	8032	10981	11334
Welfare loss as % income	0.87	0.88	4.48	4.37	9.36	9.68	14.96	15.34	20.97	21.64

Taxing All Commodities

- Most to least taxed (non-uniform): FOOD, RECR, CLTH, FURN, HOUS, TRANS, and MISC.
- Non-uniform or uniform: Raising tax revenue by x percent requires raising tax rates by more than x percent.
- Tax burden is regressive irrespective of type of households and form of taxation.
- Non-uniform: the burden on the lowest-income average UAE household is about 2.5 times the burden on the highest income households.
- Uniform: the burden on the lowest-income average UAE household is about 2 times the burden on the highest income households.

Exempting Food

- Most to least taxed (non-uniform): RECR, CLTH, FURN, HOUS, TRANS, and MISC.
- Non-uniform or uniform: Raising tax revenue by x percent requires raising tax rates by more than x percent.
- Tax burden is regressive irrespective of type of households and form of taxation.
- Non-uniform: the burden on the lowest-income average UAE household is about 1.6 times the burden on the highest income households.
- Uniform: the burden on the lowest-income average UAE household is about 1.4 times the burden on the highest income households.

- Considering that
  - Uniform taxation is perhaps the least cumbersome administratively
  - Food is the most likely candidate for exemption should a tax be implemented
  - The chosen tax rates would not be too far off from what has been suggested by officials in the past
  - The smaller tax burden associated with uniform taxes

Recommendations

➢ Exempt food.

➢ Institute tax rate between 1.11% and 5.53%.

➢ Tax rebate for low-income households: between 24 AED and 179 AED monthly.

شكراً

Thank you!

Merci!

Table 1A. Tax revenue from a retail sales tax

	a	b	c	d	e
	Sales	Purchases	Value added	Tax rate	Tax on sales
			a-b		d*a
Farmer	1,000,000	0	1,000,000	0.00%	0
Food processor	1,500,000	1,000,000	500,000	0.00%	0
Food retailer	2,000,000	1,500,000	500,000	10.00%	200,000
Total tax revenue					200,000

Table 1B. Tax revenue from a value-added tax

	a	b	c	d	e	f	g
						Credit for tax	
	Sales	Purchases	Value added	Tax rate	Tax on sales	on purchases	Net tax
			a-b		d*a	d*b	e-f
Farmer	1,000,000	0	1,000,000	10.00%	100,000	0	100,000
Food processor	1,500,000	1,000,000	500,000	10.00%	150,000	100,000	50,000
Food retailer	2,000,000	1,500,000	500,000	10.00%	200,000	150,000	50,000
Total tax revenue							200,000