

WEB APPENDIX: Income effects and the welfare consequences of  
tax in differentiated product oligopoly

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In this appendix we include estimated market price elasticities and marginal costs for the polynomial utility, linear utility and preference shifter specifications. Table 1 presents a matrix of average market own and cross price elasticities for the 10 products with the highest market share. It contains the matrix for each of the three model specifications. The numbers show: 1) Demand for all products is elastic, with own price elasticities ranging from -1.7 to -5.0. 2) Cross-price elasticities exhibit a high degree of variation, showing estimates are far from those from a conditional logit (in which there would be no within column variation in cross price elasticities). The cross-price elasticities also indicate a much higher degree of substitution within the butter products (Ar: Anchor NZ 500g, Ar: Lurpak spread ss 500g and Ar: Lurpak light ss 500g) than between them and the margarine products. 3) The three models yield similar estimates for market own and cross price elasticities. This contrasts with their predictions for household level elasticities which differ (see Table 4 and Figure 3 of the main paper).

Table 2 presents the mean marginal cost estimates for the 10 largest market share products. They are based on the assumption that firms compete in a Nash-Bertrand game and therefore are a functions of the market level price elasticities and the ownership structure of products. Given the similarities in market elasticities between the three model specifications, it is not surprising that the models generate a similar set of marginal costs. Margins are estimated to be lower for the butter products than for the margarine products.

Table 1: Own and cross price elasticities

Polynomial utility													
	Ar: Anchor NZ 500g	Ar: Lurpak spread ss 500g	Ar: Lurpak light ss 500g	Ar: Lurpak light ss 500g	Un: Flora buttery 500g	DC: Utterly Butterly 500g	DC: Clover spread 500g	Un: Flora 500g	Un: Flora light 500g	Un: ICBINB 500g	Un: ICBINB Light 500g	Un: Stork 500g	Outside option
Ar: Anchor NZ 500g	-4.7723	0.1465	0.1441	0.0333	0.0357	0.0333	0.0344	0.0340	0.0340	0.0358	0.0356	0.0361	0.0364
Ar: Lurpak spread ss 500g	0.2470	-4.9456	0.2562	0.0570	0.0593	0.0570	0.0600	0.0585	0.0603	0.0605	0.0602	0.0603	0.0597
Ar: Lurpak light ss 500g	0.1757	0.1852	-5.0412	0.0412	0.0431	0.0412	0.0436	0.0425	0.0437	0.0439	0.0437	0.0437	0.0429
DC: Clover spread 500g	0.0346	0.0356	0.0357	-2.4253	0.0516	-2.4253	0.0524	0.0538	0.0495	0.0493	0.0495	0.0505	0.0423
DC: Utterly Butterly 500g	0.0239	0.0236	0.0324	0.0331	-1.7729	0.0331	0.0324	0.0331	0.0328	0.0330	0.0328	0.0331	0.0304
Un: Flora butterly 500g	0.0412	0.0429	0.0431	0.0603	0.0576	0.0603	-2.1381	0.0604	0.0584	0.0598	0.0600	0.0584	0.0517
Un: Flora light 500g	0.0270	0.0279	0.0280	0.0411	0.0395	0.0411	0.0403	-2.4811	0.0404	0.0403	0.0404	0.0390	0.0320
Un: ICBINB 500g	0.0328	0.0332	0.0333	0.0443	0.0461	0.0443	0.0460	0.0464	0.0477	-1.8513	0.0477	0.0458	0.0417
Un: ICBINB light 500g	0.0166	0.0167	0.0168	0.0225	0.0233	0.0225	0.0234	0.0236	0.0232	0.0242	-1.9077	0.0232	0.0210
Un: Stork 500g	0.0131	0.0131	0.0131	0.0176	0.0180	0.0176	0.0177	0.0176	0.0178	0.0180	0.0180	-1.6520	0.0173
Linear utility													
	Ar: Anchor NZ 500g	Ar: Lurpak spread ss 500g	Ar: Lurpak light ss 500g	Ar: Lurpak spread 500g	DC: Utterly Butterly 500g	DC: Clover spread 500g	Un: Flora buttery 500g	Un: Flora light 500g	Un: Flora 500g	Un: ICBINB 500g	Un: ICBINB Light 500g	Un: Stork 500g	Outside option
Ar: Anchor NZ 500g	-4.7133	0.1452	0.1429	0.0335	0.0363	0.0335	0.0351	0.0342	0.0342	0.0366	0.0364	0.0369	0.0375
Ar: Lurpak spread ss 500g	0.2484	-4.8383	0.2586	0.0581	0.0611	0.0581	0.0618	0.0597	0.0623	0.0626	0.0623	0.0624	0.0622
Ar: Lurpak light ss 500g	0.1772	0.1873	-4.9295	0.0421	0.0445	0.0421	0.0450	0.0435	0.0452	0.0455	0.0453	0.0452	0.0448
DC: Clover spread 500g	0.0341	0.0350	0.0351	-2.3811	0.0518	-2.3811	0.0525	0.0536	0.0498	0.0496	0.0498	0.0508	0.0423
DC: Utterly Butterly 500g	0.0235	0.0232	0.0232	0.0328	-1.7471	0.0328	0.0322	0.0328	0.0328	0.0330	0.0328	0.0332	0.0300
Un: Flora butterly 500g	0.0407	0.0423	0.0425	0.0599	0.0577	0.0599	-2.0934	0.0601	0.0586	0.0598	0.0601	0.0586	0.0511
Un: Flora light 500g	0.0267	0.0275	0.0277	0.0410	0.0397	0.0410	0.0404	-2.4320	0.0406	0.0405	0.0406	0.0392	0.0320
Un: ICBINB 500g	0.0324	0.0326	0.0327	0.0440	0.0461	0.0440	0.0457	0.0460	0.0477	-1.8185	0.0477	0.0459	0.0410
Un: ICBINB light 500g	0.0163	0.0165	0.0165	0.0224	0.0233	0.0224	0.0232	0.0234	0.0232	0.0241	-1.8736	0.0232	0.0206
Un: Stork 500g	0.0128	0.0128	0.0128	0.0173	0.0179	0.0173	0.0175	0.0174	0.0178	0.0178	0.0178	-1.6266	0.0169
Preference shifter													
	Ar: Anchor NZ 500g	Ar: Lurpak spread ss 500g	Ar: Lurpak light ss 500g	Ar: Lurpak spread 500g	DC: Utterly Butterly 500g	DC: Clover spread 500g	Un: Flora buttery 500g	Un: Flora light 500g	Un: Flora 500g	Un: ICBINB 500g	Un: ICBINB Light 500g	Un: Stork 500g	Outside option
Ar: Anchor NZ 500g	-4.7609	0.1458	0.1434	0.0332	0.0357	0.0332	0.0344	0.0339	0.0339	0.0358	0.0356	0.0361	0.0367
Ar: Lurpak spread ss 500g	0.2466	-4.9109	0.2570	0.0570	0.0594	0.0570	0.0600	0.0586	0.0602	0.0606	0.0604	0.0604	0.0602
Ar: Lurpak light ss 500g	0.1756	0.1858	-5.0039	0.0413	0.0432	0.0413	0.0437	0.0426	0.0438	0.0440	0.0438	0.0438	0.0433
DC: Clover spread 500g	0.0347	0.0356	0.0357	-2.4295	0.0519	-2.4295	0.0526	0.0540	0.0497	0.0495	0.0497	0.0508	0.0426
DC: Utterly Butterly 500g	0.0239	0.0237	0.0237	0.0333	-1.7807	0.0333	0.0326	0.0333	0.0332	0.0332	0.0331	0.0334	0.0307
Un: Flora butterly 500g	0.0413	0.0430	0.0432	0.0606	0.0580	0.0606	-2.1433	0.0608	0.0588	0.0602	0.0604	0.0588	0.0522
Un: Flora light 500g	0.0271	0.0279	0.0281	0.0412	0.0397	0.0412	0.0405	-2.4840	0.0406	0.0405	0.0406	0.0392	0.0323
Un: ICBINB 500g	0.0330	0.0333	0.0333	0.0446	0.0464	0.0446	0.0463	0.0467	0.0462	-1.8579	0.0481	0.0462	0.0421
Un: ICBINB light 500g	0.0166	0.0168	0.0168	0.0227	0.0234	0.0227	0.0235	0.0237	0.0234	0.0244	-1.9143	0.0234	0.0211
Un: Stork 500g	0.0131	0.0132	0.0132	0.0177	0.0182	0.0177	0.0179	0.0178	0.0178	0.0182	0.0182	-1.6600	0.0174

Notes: Each cell contains the price elasticity of demand for the product indicated in row 1 with respect to the price of the product in column 1. Numbers are means across markets.

Table 2: *Marginal costs: top 10 market share products*

	Price	Polynomial utility		Linear utility		Preference shifter	
		Cost	Margin	Cost	Margin	Cost	Margin
Ar: Anchor NZ 500g	1.99	1.49	0.25	1.49	0.26	1.49	0.25
Ar: Lurpak spread ss 500g	2.15	1.64	0.24	1.63	0.24	1.64	0.24
Ar: Lurpak light ss 500g	2.17	1.66	0.24	1.64	0.24	1.65	0.24
DC: Clover spread 500g	1.20	0.67	0.44	0.66	0.45	0.67	0.44
DC: Utterly Butterly 500g	0.80	0.32	0.60	0.31	0.61	0.32	0.60
Un: Flora buttery 500g	1.02	0.46	0.55	0.44	0.57	0.46	0.55
Un: Flora light 500g	1.22	0.63	0.48	0.62	0.50	0.63	0.48
Un: ICBINB 500g	0.85	0.31	0.64	0.30	0.65	0.31	0.63
Un: ICBINB light 500g	0.87	0.33	0.62	0.31	0.64	0.33	0.62
Un: Stork 500g	0.72	0.20	0.72	0.19	0.74	0.20	0.72

*Notes: Margins are defined as  $(p - mc)/p$ . Numbers are market share weighted means.*