Beyond the Iceberg Hypothesis: Opening the Black Box of Transport Costs

Online Appendix

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A. Three models: Comparison

Table A.1: Estimation results of the three models (Air, 3-digit level)

Year	**1974**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2013**
# obs.	14955	16118	19908	24958	31037	35027	41806	40279	39351
# origin countries	152	165	169	181	207	208	211	210	210
# sectors	203	204	207	212	217	218	217	216	212
Model (A) - Iceberg transport costs only ($\widehat{\tau}^{ice}$)									
Mean (in %)	6.93	5.41	6.08	5.03	4.61	3.60	4.10	4.19	3.36
Median (in %)	5.43	3.79	5.47	4.37	3.80	2.47	3.12	3.41	2.92
Std	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02
Model (B) - With additive and ad-valorem transport costs									
Multiplicative term ($\widehat{\tau}^{adv}$)									
Mean (in %)	3.64	2.32	2.46	2.38	2.05	1.66	2.00	2.57	1.70
Median (in %)	2.71	1.57	1.79	1.60	1.39	1.20	1.57	2.24	1.72
Std	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01
Additive term ($\widehat{t}/\widetilde{p}$)									
Mean (in %)	2.56	2.04	2.83	1.83	1.64	1.30	1.43	1.13	1.01
Median (in %)	1.13	0.54	1.30	0.84	0.68	0.45	0.53	0.43	0.47
Std	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02
Model (C) - With additive transport costs only ($\widehat{t^{add}}/\widetilde{p}$)									
Mean (in %)	6.88	4.82	5.99	4.44	3.80	3.09	4.00	4.49	3.29
Median (in %)	4.45	1.82	3.36	2.27	1.72	1.39	1.93	2.72	2.06
Std	0.09	0.08	0.08	0.10	0.09	0.06	0.07	0.07	0.05

Table A.2: Quality-of-fit diagnostic tests of the three models (Air, 3-digit level)

Year	**1974**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2013**
R^2									
Model (A)	0.297	0.267	0.302	0.251	0.142	0.318	0.460	0.421	0.313
Model (B)	0.594	0.646	0.635	0.627	0.658	0.640	0.593	0.513	0.419
Model (C)	0.489	0.543	0.531	0.517	0.546	0.518	0.464	0.339	0.295
SER									
Model (A)	0.791	0.860	0.831	0.811	0.798	0.844	0.837	0.857	0.920
Model (B)	0.674	0.715	0.692	0.675	0.641	0.697	0.727	0.787	0.847
Model (C)	1.610	1.778	1.736	1.699	1.700	1.786	1.783	1.776	1.723
AIC criteria									
Model (A)	35675.0	41171.0	49315.0	60715.6	74386.4	87492.5	103983.0	102297.7	106130.6
Model (B)	31387.3	35738.4	42535.8	52098.9	61343.7	74954.9	92758.6	95887.1	100155.4
Model (C)	40808.1	45138.5	55214.8	69458.5	83958.6	100040.8	123592.1	129359.0	127399.2
Log-likelihood									
Model (A)	-17530.5	-20253.5	-24315.5	-29977.8	-36811.2	-43341.3	-51648.5	-50746.8	-52690.3
Model (B)	-15125.6	-17263.2	-20686.9	-25393.5	-30036.9	-36788.4	-45768.3	-47277.5	-49419.7
Model (C)	-20074.1	-22217.2	-27251.4	-34355.3	-41634.3	-49625.4	-61533.0	-64339.5	-63316.6
Test LL									
Stat LL ratio (B vs A)	4809.7	5980.6	7257.3	9168.7	13548.7	13105.7	11760.4	6938.6	6541.2
\# restrictions	16929	18098	21893	26948	33032	37027	43811	42289	41364
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stat LL ratio (B vs C)	4948.4	4954.0	6564.5	8961.8	11597.4	12837.0	15764.7	17062.0	13896.9
\# restrictions	16929	18098	21893	26948	33032	37027	43811	42289	41364
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A.3: Estimation results of the three models (Vessel, 3-digit level)

Year	1974	1980	1985	1990	1995	2000	2005	2010	2013
#obs.	19007	17356	23348	28383	32146	36090	41319	37748	38473
# origin countries	154	163	171	179	201	206	206	198	203
# sectors	239	232	232	232	228	230	231	226	224
Model (A) - Iceberg transport costs only ($\widehat{\tau}^{ice}$)									
Mean (in %)	9.79	6.53	6.88	5.67	5.14	5.10	5.47	3.99	3.60
Median (in %)	9.58	5.50	6.33	4.63	4.29	4.85	4.90	3.56	3.28
Std	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02
Model (B) - With additive and ad-valorem transport costs									
Multiplicative term ($\widehat{\tau}^{adv}$)									
Mean (in %)	5.42	3.08	4.02	3.31	2.79	2.49	2.68	1.95	2.22
Median (in %)	4.93	2.42	3.60	2.81	2.53	2.07	2.08	1.76	1.82
Std	0.04	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.01
Additive term ($\widehat{t}/\widetilde{p}$)									
Mean (in %)	5.08	3.38	3.19	2.73	2.73	2.80	3.02	2.47	1.46
Median (in %)	2.94	2.27	2.06	1.70	1.82	2.19	2.16	1.89	0.76
Std	0.09	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.02
Model (C) - With additive transport costs only ($\widehat{t^{add}}/\widetilde{p}$)									
Mean (in %)	14.51	10.05	10.47	14.62	8.37	8.02	8.41	6.40	5.23
Median (in %)	9.53	6.69	7.16	6.22	4.68	4.93	5.74	3.87	3.57
Std	0.24	0.17	0.18	0.30	0.15	0.16	0.15	0.15	0.10

Table A.4: Quality-of-fit diagnostic tests of the three models (Vessel, 3-digit level)

Year	**1974**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2013**
R^2									
Model (A)	0,450	0,415	0,427	0,456	0,438	0,401	0,378	0,350	0,339
Model (B)	0,612	0,575	0,571	0,590	0,611	0,571	0,541	0,491	0,462
Model (C)	0,424	0,401	0,374	0,429	0,456	0,431	0,417	0,358	0,349
SER									
Model (A)	0,576	0,620	0,569	0,592	0,615	0,652	0,673	0,740	0,758
Model (B)	0,484	0,528	0,493	0,514	0,512	0,551	0,578	0,656	0,684
Model (C)	1,271	1,339	1,283	1,326	1,302	1,319	1,336	1,392	1,410
AIC criteria									
Model (A)	33328,81	33010,27	40275,70	51142,62	60414,92	71365,89	85051,02	84789,89	88191,87
Model (B)	27331,52	28067,31	34170,52	43664,74	49275,33	60475,91	73020,09	76161,33	80873,72
Model (C)	46082,40	44370,26	58829,71	71461,52	77052,41	88746,51	103310,93	101166,91	104290,27
Log-likelihood									
Model (A)	-16287,40	-16129,13	-19767,85	-25169,31	-29790,46	-35263,95	-42122,51	-41998,95	-43692,93
Model (B)	-12985,76	-13353,65	-16398,26	-21171,37	-23905,66	-29490,96	-35844,04	-37418,66	-39751,86
Model (C)	-22674,20	-21814,13	-29045,86	-35403,76	-38125,20	-43963,25	-51245,46	-50348,45	-51783,14
Test LL									
Stat LL ratio (B vs A)	6603,28	5550,96	6739,18	7995,88	11769,59	11545,98	12556,94	9160,56	7882,15
# restrictions	393	395	403	411	429	436	437	424	427
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stat LL ratio (B vs C)	19376,88	16920,95	25295,20	28464,79	28439,08	28944,59	30802,84	25859,58	24062,55
# restrictions	393	395	403	411	429	436	437	424	427
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

B. Transport Cost Estimates: Yearly Detailed Results

B.1. 3-Digits Level Product Classification

Table B.1: Air: Transport costs estimates, all years, 3-digit

Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Model (A) - With only Ad-Valorem Trade Costs ($\widehat{\tau}^{ice}$, in %)																				
Mean	6.9	7.5	7.2	7.7	6.9	6.1	5.4	6.0	6.4	6.9	7.2	6.1	6.4	6.6	5.7	5.3	5.0	5.1	4.9	5.1
Median	5.4	6.4	6.9	7.1	6.3	5.3	3.8	4.9	5.3	6.1	6.7	5.5	5.9	6.3	5.3	4.6	4.4	4.5	4.5	4.4
Model (B) - With Additive & Ad-Valorem Trade Costs																				
Ad-valorem term ($\widehat{\tau}^{adv}$, in %)																				
Mean	3.6	3.7	3.9	3.8	3.2	3.0	2.3	2.8	2.8	2.6	3.3	2.5	3.2	2.6	3.1	3.1	2.4	2.7	2.2	2.4
Median	2.7	2.7	2.9	2.7	2.1	2.4	1.6	1.8	1.9	1.9	2.7	1.8	2.1	2.0	2.0	1.9	1.6	1.5	1.5	1.6
Additive term ($\widehat{t}^{add}/\widetilde{p}$, in %)																				
Mean	2.6	3.0	2.3	3.1	2.6	2.1	2.0	2.0	2.3	2.8	2.5	2.8	2.6	2.9	1.7	4.6	1.8	1.8	1.9	1.9
Median	1.1	1.2	0.9	1.3	1.1	0.7	0.5	0.6	0.8	1.0	1.0	1.3	1.3	1.5	1.0	0.7	0.8	0.6	0.9	0.8
# observations	14955	15299	11397	10707	15222	15684	16118	16864	17322	18180	20644	19908	20695	20793	24663	25197	24958	25156	26191	28296

Continued

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Model (A) - With only Ad-Valorem Trade Costs ($\widehat{\tau}^{ice}$, in %)																				
Mean	4.6	4.6	4.2	4.1	3.8	3.8	3.6	3.5	3.8	3.9	4.0	4.1	3.9	4.1	4.1	4.0	4.2	3.9	3.7	3.4
Median	3.7	3.8	3.1	3.0	2.7	2.8	2.5	2.4	2.7	2.6	2.9	3.1	2.7	3.0	3.2	3.0	3.4	3.1	3.0	2.9
Model (B) - With Additive & Ad-Valorem Trade Costs																				
Ad-valorem term ($\widehat{\tau}^{adv}$, in %)																				
Mean	2.3	2.1	1.9	1.8	1.8	1.8	1.7	1.6	1.6	1.9	1.9	2.0	1.8	2.3	2.3	2.3	2.6	2.2	2.2	1.7
Median	1.3	1.4	1.4	1.3	1.3	1.5	1.2	1.1	1.2	1.4	1.4	1.6	1.4	1.9	1.9	1.8	2.2	1.7	1.9	1.7
Additive term ($\widehat{t}^{add}/\widetilde{p}$, in %)																				
Mean	1.7	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.6	1.4	1.5	1.4	1.3	1.2	1.2	1.2	1.1	1.1	0.9	1.0
Median	0.8	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.5
# observations	29948	31037	32187	33502	33492	33523	35027	34885	35159	35891	36990	41806	42554	40858	40159	38275	40279	41190	40909	39351

Table B.2: Vessel: Transport costs estimates, all years, 3-digit

Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Model (A) - With only Ad-Valorem Trade Costs ($\widehat{\tau}^{ice}$, in %)																				
Mean	9.8	9.9	8.9	8.3	8.1	7.5	6.5	6.0	6.3	7.0	7.0	6.9	6.7	6.2	6.1	5.7	5.7	5.5	5.0	5.2
Median	9.6	8.5	8.0	7.3	7.1	6.5	5.5	5.0	5.9	5.7	6.1	6.3	7.0	6.3	5.7	4.8	4.6	4.4	4.2	4.7
Model (B) - With Additive & Ad-Valorem Trade Costs																				
Ad-valorem term ($\widehat{\tau}^{adv}$, in %)																				
Mean	5.4	4.8	5.4	5.2	5.9	4.6	3.1	3.3	3.4	4.2	4.1	4.0	3.9	3.6	4.0	3.0	3.3	3.0	2.6	2.9
Median	4.9	4.1	4.8	4.4	5.4	4.0	2.4	2.9	2.9	3.9	3.5	3.6	3.6	3.0	3.5	2.6	2.8	2.7	2.3	2.6
Additive term ($\widehat{t}^{add}/\widetilde{p}$, in %)																				
Mean	5.1	5.5	3.5	3.5	2.5	3.1	3.4	2.9	3.5	2.9	3.2	3.2	2.9	2.8	2.4	2.9	2.7	2.8	2.7	2.7
Median	2.9	3.6	1.9	1.7	1.2	1.7	2.3	1.5	2.3	2.0	2.3	2.1	1.8	1.8	1.3	2.0	1.7	1.7	1.8	1.6
# observations	19007	18710	13615	12826	16601	17274	17356	17788	18075	18883	21650	23348	23729	23626	27661	29106	28383	28095	29050	30839

Continued

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Model (A) - With only Ad-Valorem Trade Costs ($\widehat{\tau}^{ice}$, in %)																				
Mean	5.2	5.1	4.8	4.7	4.8	5.0	5.1	5.0	4.8	5.2	5.4	5.5	4.8	4.7	4.4	4.3	4.0	3.5	3.6	3.6
Median	4.1	4.3	3.9	3.9	3.9	4.5	4.9	4.6	4.1	4.8	5.1	4.9	4.2	4.2	3.8	4.1	3.6	3.0	3.1	3.3
Model (B) - With Additive & Ad-Valorem Trade Costs																				
Ad-valorem term ($\widehat{\tau}^{adv}$, in %)																				
Mean	2.6	2.8	2.6	2.5	2.2	2.5	2.5	2.7	2.4	2.4	2.7	2.6	2.3	2.5	2.1	2.2	1.9	1.8	1.8	2.2
Median	2.2	2.5	2.2	2.2	1.9	2.1	2.1	2.6	2.3	1.9	2.8	2.2	1.9	2.3	1.8	2.0	1.8	1.6	1.4	1.8
Additive term ($\widehat{t}^{add}/\widetilde{p}$, in %)																				
Mean	2.9	2.7	2.5	2.5	3.2	2.8	2.8	2.4	2.6	3.2	2.9	3.0	2.8	2.4	2.4	2.1	2.5	1.9	1.9	1.5
Median	2.0	1.8	1.6	1.3	2.0	2.0	2.2	1.6	2.0	2.5	1.9	2.2	1.9	1.8	2.1	1.7	1.9	1.6	1.6	0.8
# observations	31865	32146	32344	33181	33986	34585	36090	36407	37255	37672	37757	41431	41763	39604	38950	37332	37748	38562	38387	38473

C. Eliminating the composition effects: Primary vs. Maufacturing sector

In this Section, we characterize the time trend in international transport costs at a more disaggregated level, by distinguishing the trade flows for primary goods and manufactured goods. The evolution in transport costs over time, by transport mode (overall transport costs and composition effects excluded) are reported in 1 for the manufacturing sector, and in Figure 2 for the primary goods.

Figure 1: Transport costs (with and without composition effects), Manufacturing

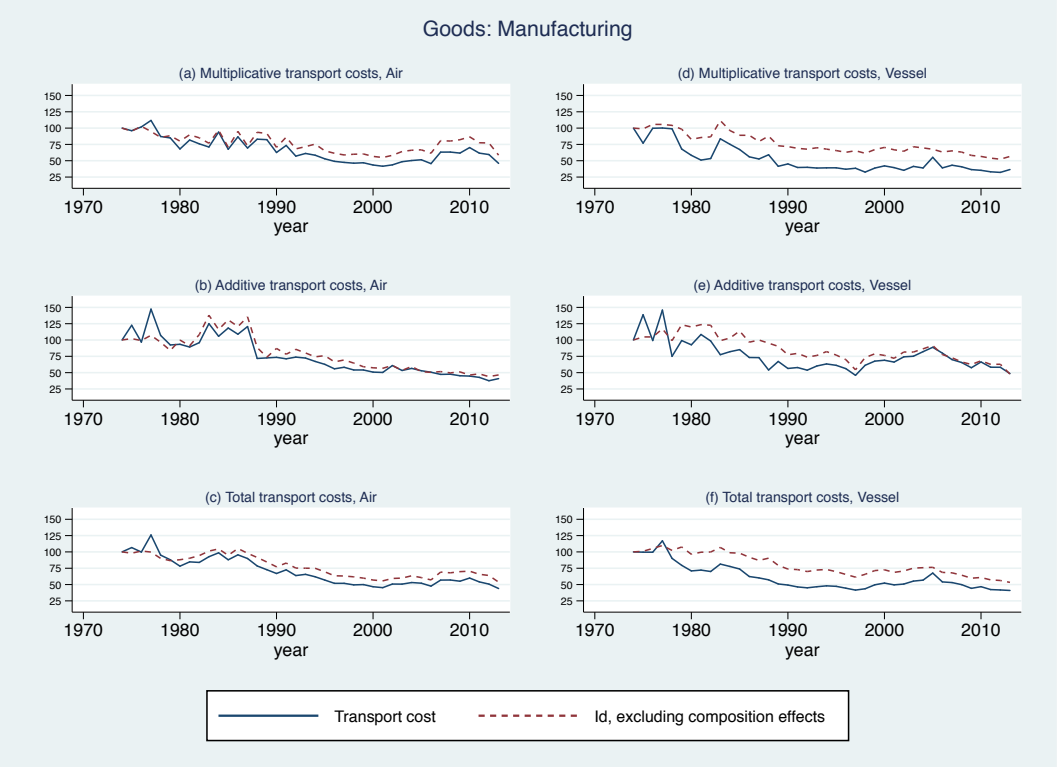

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Figure 2: Transport costs (with and without composition effects), Primary goods

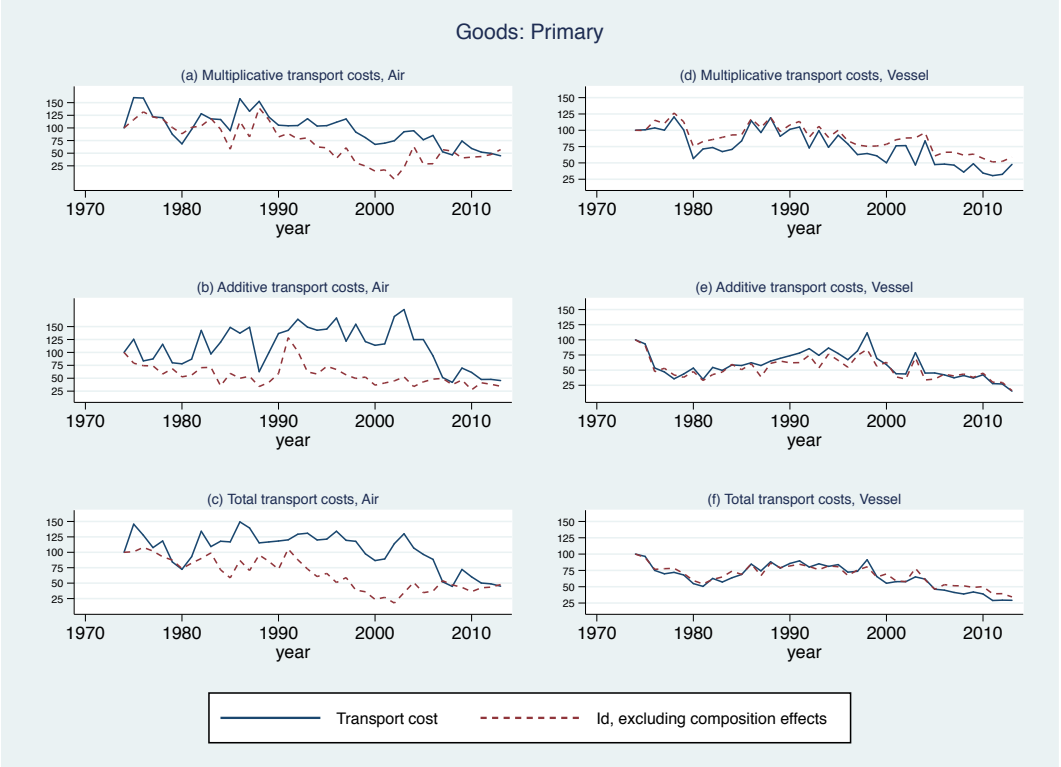

Figure 3: Share of primary goods in the value of total US imports