

付録 A 品目別の貿易規模, 輸送機関分担と財単価の詳細

表-A.1 World Trade Serviceにおける国・地域分類

Region No	国・地域の分類	Region No	国・地域の分類
1	Argentina	29	Malaysia
2	Australia	30	Mexico
3	Austria	31	Netherlands
4	Belgium	32	Norway
5	Bulgaria	33	New Zealand
6	Brazil	34	Peru
7	Canada	35	Portugal
8	China	36	Philippines
9	Chile	37	Pakistan
10	Colombia	38	Poland
11	Czech Republic	39	Romania
12	Denmark	40	Russia
13	Egypt	41	South Africa
14	United Arab Emirates	42	Singapore
15	Finland	43	Saudi Arabia
16	France	44	Slovak Republic
17	Germany	45	Spain
18	Greece	46	Sweden
19	Hong Kong	47	Switzerland
20	Hungary	48	Thailand
21	India	49	Turkey
22	Ireland	50	Taiwan
23	Indonesia	51	United Kingdom
24	Israel	52	United States
25	Italy	53	Vietnam
26	Japan	54	Venezuela
27	South Korea	55	その他の地域
28	Kenya		

Source: Global Insight

表-A.2 全世界の貿易を対象とした航空貿易額の推移(2003年上位から)

Commodity	1998	1999	2000	2001	2002	2003
Semi-conductors, Electronic Tubes,etc	72,315,799	86,788,291	109,477,404	77,730,061	77,145,091	84,635,845
Office and Computing Machinery	60,186,934	65,145,062	74,682,833	58,772,725	60,194,163	62,841,140
Other Communications Equipment	21,989,753	26,820,854	36,254,398	32,574,949	35,792,597	41,708,849
Other Manufacturing, nes.	15,694,102	18,159,457	20,253,259	17,313,453	19,176,644	20,612,258
Wearing Apparel	15,386,246	17,425,302	18,690,781	16,729,448	18,315,514	19,864,976
Professional Equipment	14,229,248	16,064,780	21,159,220	19,019,245	17,600,598	19,401,961
Electrical Industrial Machinery	13,565,266	14,775,386	18,004,778	13,526,377	12,637,694	14,187,111
Goods not classified by kind	11,990,531	12,215,887	19,579,766	18,941,202	12,222,225	13,594,407
Electrical Apparatus, nec.	7,701,202	8,853,245	11,364,773	8,114,354	8,261,951	8,914,977
Drugs and Medicines	4,177,149	5,174,562	5,520,708	6,027,429	6,742,522	7,865,444
Engines and Turbines	6,238,133	6,116,796	6,814,191	7,291,483	7,166,283	7,839,835
Organic Chemicals	4,164,667	4,611,901	5,131,972	5,160,263	5,936,011	7,340,455
Special Industrial Machinery	6,666,318	7,860,275	12,797,855	8,527,832	7,388,081	7,268,272
Machinery and Equipment, nec.	5,432,990	6,089,481	7,704,765	6,458,809	6,482,534	6,800,916
Aircraft	5,423,823	5,130,633	4,883,266	5,588,778	5,364,453	5,764,084
Photographic and Optical Goods	5,307,166	5,812,720	6,223,744	5,370,119	5,198,780	5,226,987
Radio and TV	1,400,327	1,526,983	2,094,201	2,202,506	2,788,602	3,413,329
Metal Products	3,132,972	3,019,210	3,294,646	3,038,547	2,998,569	3,309,444
Textiles	3,790,623	3,887,226	4,092,092	3,360,199	3,081,445	3,199,693
Chemical Products, nec.	1,935,647	2,127,635	2,694,849	2,402,164	2,772,013	3,191,805
Non-Ferrous Metals	3,950,727	4,454,714	6,024,780	4,549,369	2,908,933	3,170,534
Watches and Clocks	3,273,988	3,191,835	3,187,650	2,751,814	2,739,791	2,831,953
Metal and Wood Working Machinery	2,331,072	2,639,370	3,710,473	2,651,288	2,517,283	2,442,586
Leather and Products	1,618,949	1,779,053	1,926,082	1,849,816	1,755,259	1,980,305
Synthetic Resins	1,098,888	1,179,490	1,489,876	1,313,065	1,476,044	1,697,795
Parts of Motor Vehicles	1,190,191	1,363,376	1,437,807	1,302,617	1,556,231	1,660,054
Footwear	1,438,802	1,541,076	1,506,867	1,505,922	1,571,821	1,539,574
Plastic Products, nec.	1,085,489	1,191,476	1,361,028	1,177,750	1,231,331	1,384,690
Iron and Steel	820,433	817,423	1,012,311	836,629	862,114	1,081,804
Glass and Products	671,675	777,592	1,180,469	1,196,072	961,731	1,007,611
Other Agriculture	897,675	952,992	927,031	829,945	801,084	886,282
Meat/Dairy/Fish Requiring Refrigeration	833,804	911,591	913,866	837,263	833,927	865,681
Soap and Cleaning Preparations	588,194	651,749	725,633	705,599	756,795	843,804
Printing and Publishing	680,590	636,423	668,138	815,046	657,436	620,472
Inorganic Chemicals	533,481	570,208	704,348	586,183	590,224	608,553
Furniture and Fixtures	383,053	429,225	545,512	486,119	495,663	543,828
Paints, Varnishes and Lacquers	455,534	485,387	549,885	511,193	511,348	543,509
Rubber Products	431,219	463,253	528,299	458,555	471,673	527,309
Electrical Appliances and Houseware	286,509	345,587	421,076	413,316	425,371	493,325
Non-Metallic Products, nec.	563,299	594,028	728,779	614,667	416,583	406,574
Other Food	238,060	229,465	250,446	286,732	284,763	387,982
Motorcycles and Bicycles	346,519	378,058	393,772	348,277	349,697	378,152
Motor Vehicles	243,446	224,604	253,021	247,995	305,336	332,487
Vegetables, Fruits and Eggs - req Refrigeration	228,156	279,667	293,720	292,301	297,058	325,827
Paper and Paperboard and Products	274,657	299,595	327,410	280,313	256,921	284,013
Ores and Scrap	98,951	105,979	155,669	130,465	124,717	168,169
Tobacco	349,009	274,157	260,867	188,373	155,237	151,389
Stone, Clay and Other Crude Minerals	137,620	137,417	156,201	133,709	129,269	132,247
Pottery, China etc.	108,167	106,632	112,104	94,293	97,442	108,855
Vegetables and Fruits - non-Refrigerated	93,114	113,039	112,157	109,819	99,338	103,180
Shipbuilding and Repairing	96,985	87,784	88,148	85,847	94,175	95,682
Wood Products	97,632	101,817	107,835	86,841	88,112	93,974
Other Meat/Dairy/Fish/Fruit/Vegetables	62,621	69,945	85,647	84,140	73,306	87,626
Beverages	57,476	59,711	62,145	62,273	90,238	84,836
Railroad Equipment	73,969	54,799	48,026	58,216	47,354	56,816
Natural Rubber	39,958	33,874	41,092	33,627	38,698	54,423
Petroleum Refineries	28,828	37,623	51,582	39,585	38,131	54,239
Agricultural Machinery	33,243	33,737	50,927	47,460	45,877	52,190
Grain	28,547	33,048	38,643	22,515	30,951	38,785
Transport Equipment, nec.	27,619	28,010	80,687	27,634	31,534	29,425
Animal Feed	20,017	20,825	24,164	25,175	29,682	29,000
Fertilizers and Pesticides	12,429	15,514	13,011	22,499	13,927	20,118
Animal and Vegetable Oils	14,572	14,628	13,272	11,920	15,558	19,029
Other Raw Textile Materials	16,242	16,178	18,514	17,465	18,279	18,279
Cork and Wood	15,521	17,543	20,030	12,203	12,469	14,910
Oil Seeds	6,077	6,520	5,742	6,362	6,276	8,401
Sugar	6,678	6,704	5,548	10,119	7,255	6,913
Waste Paper	986	1,403	1,783	1,516	1,751	2,492
Scrap	499	989	1,646	1,746	2,222	1,781
Residual Petroleum Products	675	1,260	943	1,408	3,757	1,362
Crude Fertilizers	613	870	836	4,183	1,149	1,167
Cotton	1,724	1,694	1,005	938	1,163	1,100
Natural Gas	1,133	1,238	2,630	683	397	276
Briquettes and Coke	142	92	124	113	116	125
Coal	72	47	51	44	67	61
Pulp	154	78	143	45	7	41
Crude Petroleum	5	10	-	-	3	3

(million US\$) source: Global Insight

輸送機関分担と単価に着目した国際貿易の品目間類似性および異質性に関する分析
 / 石倉智樹・柴崎隆一・米本清

表-A.3 全世界の貿易を対象とした品目別航空分担率

	1998	1999	2000	2001	2002	2003
Semi-conductors, Electronic Tubes,etc	51.44%	51.69%	50.34%	46.82%	43.48%	42.34%
Professional Equipment	42.77%	42.16%	46.73%	46.22%	43.81%	41.07%
Other Communications Equipment	27.33%	29.95%	31.80%	30.75%	31.79%	33.45%
Drugs and Medicines	30.25%	33.82%	33.36%	33.06%	33.84%	33.39%
Office and Computing Machinery	35.91%	34.55%	33.07%	33.56%	32.88%	31.64%
Goods not classified by kind	20.26%	21.67%	35.12%	41.85%	23.52%	24.72%
Engines and Turbines	24.50%	23.82%	24.10%	25.10%	24.29%	24.58%
Photographic and Optical Goods	25.08%	26.50%	29.35%	29.22%	29.00%	24.33%
Watches and Clocks	26.33%	26.48%	25.82%	24.40%	24.14%	23.42%
Aircraft	18.48%	24.41%	30.37%	24.19%	24.02%	22.34%
Electrical Industrial Machinery	24.22%	24.51%	25.98%	23.00%	22.17%	21.27%
Special Industrial Machinery	20.17%	24.42%	31.60%	25.26%	22.81%	20.16%
Other Manufacturing, nes.	18.21%	19.66%	21.67%	20.05%	20.30%	19.90%
Electrical Apparatus, nec.	19.39%	19.23%	21.85%	19.35%	19.17%	17.89%
Metal and Wood Working Machinery	15.76%	19.42%	22.72%	19.17%	19.30%	16.95%
Wearing Apparel	16.10%	17.27%	17.59%	15.96%	17.40%	16.54%
Other Agriculture	15.11%	15.64%	14.86%	15.00%	14.76%	14.63%
Organic Chemicals	12.70%	12.47%	11.54%	12.34%	14.36%	14.20%
Chemical Products, nec.	9.48%	9.49%	10.74%	10.57%	12.63%	13.40%
Radio and TV	6.41%	7.15%	8.07%	9.25%	10.58%	12.19%
Glass and Products	10.54%	10.76%	13.54%	13.79%	12.08%	11.06%
Printing and Publishing	13.49%	12.41%	13.44%	14.70%	12.37%	10.90%
Non-Ferrous Metals	11.26%	11.93%	12.79%	13.22%	9.48%	9.15%
Metal Products	10.11%	9.34%	9.54%	9.10%	9.17%	8.73%
Soap and Cleaning Preparations	8.29%	8.69%	8.74%	8.01%	8.29%	8.03%
Machinery and Equipment, nec.	7.69%	8.20%	9.00%	8.21%	8.22%	7.64%
Leather and Products	7.50%	7.96%	7.75%	7.33%	7.37%	7.12%
Plastic Products, nec.	6.89%	6.94%	7.53%	6.96%	6.85%	6.50%
Paints, Varnishes and Lacquers	6.13%	6.07%	6.30%	6.18%	6.46%	6.19%
Motorcycles and Bicycles	5.90%	6.02%	5.83%	5.52%	5.74%	5.79%
Textiles	5.77%	5.83%	5.71%	5.70%	5.65%	5.23%
Inorganic Chemicals	4.76%	4.80%	5.33%	4.77%	5.37%	4.90%
Footwear	5.11%	5.39%	5.10%	5.04%	5.15%	4.68%
Non-Metallic Products, nec.	6.90%	7.02%	8.10%	6.93%	5.05%	4.34%
Vegetables, Fruits and Eggs - req Refrigeration	3.46%	4.15%	4.04%	4.08%	4.10%	3.86%
Railroad Equipment	3.94%	3.62%	3.83%	4.37%	3.11%	3.66%
Parts of Motor Vehicles	3.71%	3.80%	3.44%	3.32%	3.92%	3.62%
Rubber Products	3.57%	3.74%	4.07%	3.79%	3.72%	3.56%
Synthetic Resins	3.15%	3.13%	3.24%	3.08%	3.32%	3.25%
Tobacco	4.94%	4.57%	4.05%	3.42%	3.02%	2.98%
Stone, Clay and Other Crude Minerals	3.26%	3.14%	3.36%	3.00%	3.05%	2.74%
Electrical Appliances and Houseware	2.15%	2.39%	2.67%	2.75%	2.59%	2.59%
Other Food	1.45%	1.50%	1.64%	1.94%	1.95%	2.40%
Pottery, China etc.	2.81%	2.74%	2.62%	2.51%	2.48%	2.38%
Meat/Dairy/Fish Requiring Refrigeration	2.42%	2.48%	2.34%	2.19%	2.28%	2.20%
Furniture and Fixtures	2.78%	2.63%	2.80%	2.55%	2.25%	2.08%
Transport Equipment, nec.	2.45%	2.38%	3.62%	2.23%	2.60%	1.95%
Vegetables and Fruits - non-Refrigerated	2.03%	2.23%	2.33%	2.11%	1.99%	1.88%
Beverages	1.11%	1.31%	1.33%	1.56%	2.19%	1.84%
Iron and Steel	1.68%	1.82%	1.92%	1.82%	1.80%	1.78%
Agricultural Machinery	1.42%	1.38%	2.02%	1.87%	1.74%	1.70%
Paper and Paperboard and Products	1.81%	1.81%	1.78%	1.69%	1.66%	1.63%
Wood Products	1.01%	0.93%	1.16%	1.04%	0.99%	0.98%
Natural Rubber	0.96%	1.00%	1.00%	0.97%	0.97%	0.95%
Ores and Scrap	0.67%	0.73%	0.90%	0.75%	0.73%	0.73%
Other Meat/Dairy/Fish/Fruit/Vegetables	0.67%	0.70%	0.78%	0.75%	0.67%	0.72%
Other Raw Textile Materials	0.72%	0.69%	0.69%	0.70%	0.69%	0.71%
Shipbuilding and Repairing	0.45%	0.45%	0.50%	0.48%	0.47%	0.48%
Animal Feed	0.37%	0.43%	0.43%	0.44%	0.48%	0.43%
Motor Vehicles	0.27%	0.24%	0.25%	0.26%	0.29%	0.29%
Grain	0.20%	0.24%	0.34%	0.20%	0.26%	0.29%
Fertilizers and Pesticides	0.20%	0.25%	0.20%	0.35%	0.20%	0.26%
Sugar	0.18%	0.20%	0.20%	0.27%	0.23%	0.21%
Cork and Wood	0.14%	0.13%	0.15%	0.14%	0.14%	0.16%
Waste Paper	0.17%	0.18%	0.16%	0.15%	0.15%	0.14%
Animal and Vegetable Oils	0.13%	0.15%	0.17%	0.16%	0.15%	0.14%
Petroleum Refineries	0.11%	0.11%	0.10%	0.09%	0.09%	0.10%
Oil Seeds	0.11%	0.12%	0.09%	0.10%	0.09%	0.08%
Crude Fertilizers	0.02%	0.03%	0.05%	0.27%	0.07%	0.07%
Residual Petroleum Products	0.04%	0.06%	0.03%	0.05%	0.14%	0.04%
Cotton	0.05%	0.05%	0.03%	0.03%	0.04%	0.03%
Scrap	0.01%	0.02%	0.02%	0.03%	0.03%	0.02%
Briquettes and Coke	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Natural Gas	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%
Pulp	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Coal	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Crude Petroleum	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

source: Global Insight

表-A.4 アジア発貿易を対象とした品目別航空分担率

	1998	1999	2000	2001	2002	2003
Other Communications Equipment	17.6%	21.9%	23.7%	22.9%	25.6%	28.5%
Office and Computing Machinery	29.6%	28.6%	26.7%	26.5%	27.8%	27.0%
Semi-conductors, Electronic Tubes,etc	35.1%	34.4%	34.4%	31.1%	28.8%	26.9%
Photographic and Optical Goods	21.1%	22.5%	24.1%	23.9%	23.1%	19.7%
Goods not classified by kind	13.7%	16.0%	23.7%	28.5%	18.6%	17.7%
Watches and Clocks	21.4%	20.8%	20.0%	18.2%	17.5%	17.0%
Professional Equipment	16.4%	17.3%	18.4%	17.9%	17.0%	16.2%
Electrical Industrial Machinery	18.2%	18.6%	20.1%	17.0%	16.3%	15.6%
Drugs and Medicines	12.0%	14.6%	15.2%	14.3%	14.8%	15.4%
Wearing Apparel	14.2%	15.5%	15.6%	14.3%	15.6%	15.0%
Electrical Apparatus, nec.	14.6%	14.7%	15.9%	13.7%	13.2%	12.6%
Radio and TV	6.2%	6.9%	7.8%	8.9%	10.2%	12.0%
Engines and Turbines	11.8%	11.0%	11.2%	10.8%	10.7%	11.1%
Organic Chemicals	9.2%	9.0%	8.4%	9.1%	11.1%	11.1%
Other Manufacturing, nes.	9.4%	10.2%	10.9%	10.4%	10.0%	9.7%
Metal and Wood Working Machinery	7.6%	9.1%	10.6%	10.6%	9.8%	8.7%
Other Agriculture	7.6%	7.6%	7.1%	7.2%	7.2%	6.8%
Special Industrial Machinery	6.7%	7.0%	7.9%	7.2%	6.9%	6.3%
Glass and Products	6.4%	6.8%	7.2%	7.3%	6.1%	6.1%
Chemical Products, nec.	4.7%	4.8%	5.3%	5.3%	6.0%	5.9%
Metal Products	6.3%	6.1%	6.3%	5.9%	6.0%	5.6%
Motorcycles and Bicycles	5.1%	5.1%	5.0%	4.7%	4.8%	5.0%
Plastic Products, nec.	4.4%	4.5%	4.6%	4.6%	4.3%	4.2%
Leather and Products	4.1%	4.2%	3.9%	3.6%	3.9%	3.8%
Footwear	4.1%	4.2%	4.1%	4.1%	4.2%	3.8%
Machinery and Equipment, nec.	4.0%	4.2%	4.7%	3.9%	3.9%	3.8%
Textiles	4.2%	4.1%	4.0%	3.9%	3.8%	3.5%
Non-Ferrous Metals	3.8%	3.7%	3.4%	4.1%	3.4%	3.5%
Paints, Varnishes and Lacquers	3.0%	2.9%	3.1%	2.9%	3.0%	2.9%
Printing and Publishing	2.7%	3.5%	3.3%	2.6%	3.1%	2.9%
Rubber Products	2.8%	2.9%	3.0%	2.8%	2.8%	2.7%
Soap and Cleaning Preparations	3.0%	3.0%	2.9%	2.7%	2.7%	2.6%
Non-Metallic Products, nec.	3.0%	3.4%	4.3%	3.7%	2.6%	2.4%
Parts of Motor Vehicles	1.9%	2.0%	2.0%	1.8%	2.3%	2.2%
Electrical Appliances and Houseware	1.7%	1.9%	2.1%	2.1%	2.1%	2.1%
Inorganic Chemicals	2.1%	1.9%	2.2%	2.1%	2.0%	2.0%
Synthetic Resins	1.9%	1.9%	1.8%	1.8%	1.8%	1.8%
Pottery, China etc.	1.9%	1.9%	1.9%	1.7%	1.8%	1.8%
Furniture and Fixtures	1.7%	1.7%	1.7%	1.6%	1.6%	1.5%
Transport Equipment, nec.	1.5%	1.5%	3.2%	1.4%	1.4%	1.5%
Aircraft	1.5%	1.8%	1.8%	1.5%	1.5%	1.3%
Stone, Clay and Other Crude Minerals	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%
Iron and Steel	1.1%	1.1%	1.2%	1.1%	1.1%	1.1%
Natural Rubber	0.9%	1.0%	1.0%	1.0%	0.9%	0.9%
Paper and Paperboard and Products	0.8%	0.9%	0.9%	0.8%	0.9%	0.9%
Meat/Dairy/Fish Requiring Refrigeration	0.8%	0.8%	0.8%	0.8%	0.9%	0.8%
Other Food	0.4%	0.4%	0.5%	0.5%	0.6%	0.8%
Vegetables and Fruits - non-Refrigerated	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%
Railroad Equipment	0.5%	0.5%	0.7%	0.8%	1.0%	0.7%
Vegetables, Fruits and Eggs - req Refrigeration	0.5%	0.6%	0.6%	0.6%	0.6%	0.6%
Wood Products	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Tobacco	0.5%	0.5%	0.4%	0.5%	0.5%	0.5%
Agricultural Machinery	0.5%	0.5%	0.6%	0.4%	0.5%	0.5%
Shipbuilding and Repairing	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Other Meat/Dairy/Fish/Fruit/Vegetables	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Motor Vehicles	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Other Raw Textile Materials	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Ores and Scrap	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%
Animal Feed	0.1%	0.1%	0.1%	0.1%	0.2%	0.1%
Cork and Wood	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Grain	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Animal and Vegetable Oils	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Fertilizers and Pesticides	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
Beverages	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Sugar	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Petroleum Refineries	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%
Waste Paper	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Oil Seeds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Briquettes and Coke	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cotton	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Crude Fertilizers	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Residual Petroleum Products	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Scrap	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Natural Gas	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pulp	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Crude Petroleum	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

source: Global Insight

輸送機関分担と単価に着目した国際貿易の品目間類似性および異質性に関する分析
 / 石倉智樹・柴崎隆一・米本清

表-A.5 北米発貿易を対象とした品目別航空分担率

	1998	1999	2000	2001	2002	2003
Semi-conductors, Electronic Tubes, etc	97.6%	97.7%	98.0%	98.1%	98.3%	98.7%
Professional Equipment	89.0%	90.7%	92.4%	90.7%	90.2%	89.8%
Office and Computing Machinery	90.3%	91.4%	91.3%	89.7%	87.5%	86.3%
Watches and Clocks	77.0%	60.8%	70.4%	69.0%	73.2%	80.5%
Other Manufacturing, nes.	78.1%	79.0%	78.7%	81.2%	79.8%	79.7%
Electrical Apparatus, nec.	67.5%	69.6%	80.2%	72.4%	78.3%	78.8%
Drugs and Medicines	76.9%	79.4%	76.8%	75.1%	77.4%	77.1%
Footwear	51.3%	67.7%	56.0%	55.3%	72.5%	75.5%
Other Communications Equipment	84.3%	85.9%	87.4%	83.0%	80.9%	75.5%
Electrical Industrial Machinery	71.6%	74.3%	73.9%	69.0%	70.5%	74.7%
Printing and Publishing	78.0%	75.8%	70.6%	75.2%	68.1%	71.3%
Engines and Turbines	56.8%	57.2%	58.8%	67.4%	67.5%	70.5%
Photographic and Optical Goods	70.8%	64.0%	68.1%	71.4%	72.2%	68.8%
Metal and Wood Working Machinery	64.3%	81.2%	86.0%	68.7%	70.0%	66.3%
Wearing Apparel	56.4%	59.2%	65.1%	59.6%	60.0%	65.6%
Special Industrial Machinery	61.9%	74.0%	81.7%	71.6%	67.4%	65.4%
Metal Products	47.7%	49.3%	49.3%	46.8%	49.6%	49.7%
Glass and Products	26.7%	30.9%	50.0%	49.0%	52.6%	46.2%
Motorcycles and Bicycles	29.5%	44.9%	39.9%	40.5%	48.7%	44.1%
Chemical Products, nec.	30.0%	30.3%	33.5%	31.3%	37.3%	40.0%
Goods not classified by kind	31.4%	15.9%	80.5%	82.0%	14.2%	40.0%
Other Agriculture	42.6%	46.1%	40.7%	38.0%	35.8%	36.9%
Machinery and Equipment, nec.	30.3%	38.8%	42.0%	38.0%	37.2%	36.8%
Non-Metallic Products, nec.	52.2%	53.1%	54.0%	48.5%	40.0%	34.1%
Plastic Products, nec.	32.9%	30.3%	30.1%	31.1%	32.7%	33.4%
Aircraft	22.7%	30.4%	38.3%	31.8%	28.8%	29.9%
Radio and TV	21.1%	28.9%	27.7%	40.1%	41.0%	29.4%
Non-Ferrous Metals	23.3%	28.3%	32.4%	36.6%	29.2%	29.0%
Electrical Appliances and Houseware	15.4%	20.6%	25.5%	23.6%	27.8%	27.9%
Railroad Equipment	20.6%	19.3%	26.5%	21.6%	21.0%	24.6%
Pottery, China etc.	12.9%	17.7%	17.4%	17.6%	22.6%	22.8%
Textiles	22.6%	28.8%	26.6%	27.6%	24.6%	22.2%
Rubber Products	12.7%	17.2%	20.9%	20.1%	18.8%	20.6%
Soap and Cleaning Preparations	16.9%	18.9%	20.5%	17.5%	19.2%	19.3%
Paints, Varnishes and Lacquers	16.1%	16.3%	19.4%	19.6%	19.8%	18.6%
Parts of Motor Vehicles	19.5%	19.5%	14.7%	17.3%	15.0%	14.4%
Transport Equipment, nec.	13.0%	14.0%	13.1%	17.3%	31.1%	13.9%
Furniture and Fixtures	16.2%	19.7%	28.0%	21.7%	15.8%	12.6%
Iron and Steel	10.7%	17.3%	21.6%	21.4%	21.2%	12.5%
Leather and Products	12.5%	15.3%	14.2%	11.7%	12.0%	12.1%
Other Food	4.0%	3.9%	4.9%	7.2%	7.3%	11.2%
Synthetic Resins	8.0%	8.4%	9.7%	8.8%	10.3%	10.6%
Inorganic Chemicals	9.5%	11.8%	12.7%	9.6%	10.5%	10.4%
Vegetables, Fruits and Eggs - req Refrigeration	7.8%	10.9%	10.4%	10.3%	10.2%	10.1%
Shipbuilding and Repairing	5.5%	6.5%	13.0%	5.2%	3.8%	9.7%
Agricultural Machinery	8.4%	7.1%	12.1%	9.6%	9.0%	9.1%
Beverages	1.3%	1.8%	2.7%	2.6%	11.9%	8.2%
Organic Chemicals	6.2%	5.3%	4.1%	5.5%	5.8%	5.7%
Wood Products	4.1%	3.3%	6.3%	5.1%	4.2%	4.7%
Stone, Clay and Other Crude Minerals	6.6%	5.9%	6.9%	5.5%	5.4%	4.6%
Vegetables and Fruits - non-Refrigerated	5.2%	7.4%	6.7%	5.4%	5.1%	4.4%
Other Raw Textile Materials	9.3%	2.9%	9.4%	5.6%	6.7%	3.7%
Paper and Paperboard and Products	2.7%	3.0%	2.8%	3.3%	3.2%	3.5%
Other Meat/Dairy/Fish/Fruit/Vegetables	1.7%	2.0%	2.6%	2.8%	2.5%	3.3%
Motor Vehicles	1.9%	1.2%	1.3%	1.9%	3.9%	3.2%
Meat/Dairy/Fish Requiring Refrigeration	3.8%	3.7%	3.2%	2.7%	3.1%	2.6%
Natural Rubber	3.7%	4.8%	11.6%	3.9%	10.0%	2.3%
Ores and Scrap	1.8%	2.2%	3.9%	3.2%	1.9%	2.1%
Fertilizers and Pesticides	1.7%	2.1%	1.3%	2.4%	1.3%	2.1%
Petroleum Refineries	1.2%	1.0%	1.2%	0.8%	0.8%	1.4%
Tobacco	1.0%	0.7%	0.5%	0.4%	1.4%	1.3%
Animal and Vegetable Oils	0.2%	0.3%	0.9%	0.8%	0.9%	0.9%
Sugar	0.6%	0.9%	0.7%	2.2%	1.1%	0.8%
Animal Feed	0.4%	0.4%	0.4%	0.4%	0.6%	0.5%
Residual Petroleum Products	0.2%	0.5%	0.2%	0.4%	0.8%	0.2%
Crude Fertilizers	0.0%	0.0%	0.1%	0.5%	0.1%	0.1%
Grain	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Scrap	0.0%	0.1%	0.1%	0.0%	0.1%	0.1%
Cork and Wood	0.0%	0.0%	0.1%	0.1%	0.0%	0.1%
Oil Seeds	0.1%	0.1%	0.0%	0.1%	0.0%	0.0%
Natural Gas	0.7%	0.6%	1.4%	0.4%	0.1%	0.0%
Waste Paper	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%
Cotton	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
Pulp	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Crude Petroleum	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Briquettes and Coke	0.0%	0.2%	0.2%	0.4%	0.1%	0.0%
Coal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

source: Global Insight

表-A.6 欧州発貿易を対象とした品目別航空分担率

	1998	1999	2000	2001	2002	2003
Semi-conductors, Electronic Tubes, etc	31.2%	30.8%	30.7%	30.0%	29.7%	29.4%
Watches and Clocks	21.3%	21.3%	20.9%	20.8%	20.9%	20.7%
Professional Equipment	21.8%	22.5%	22.2%	21.6%	21.5%	20.5%
Goods not classified by kind	10.2%	12.0%	9.6%	19.9%	20.3%	19.5%
Engines and Turbines	19.2%	20.0%	21.0%	20.4%	19.5%	19.1%
Photographic and Optical Goods	18.5%	19.6%	20.1%	18.8%	18.6%	18.2%
Drugs and Medicines	18.4%	19.8%	18.4%	17.7%	18.3%	17.5%
Electrical Industrial Machinery	18.6%	19.2%	19.2%	18.0%	17.6%	17.0%
Other Communications Equipment	18.4%	18.5%	18.4%	17.2%	17.3%	16.7%
Other Manufacturing, nes.	13.4%	14.4%	15.0%	12.1%	14.6%	14.7%
Tobacco	23.2%	22.2%	25.6%	20.7%	14.1%	14.5%
Aircraft	8.9%	11.6%	12.7%	11.6%	14.7%	13.9%
Electrical Apparatus, nec.	14.6%	15.4%	15.3%	14.5%	13.9%	13.6%
Leather and Products	13.1%	14.1%	13.2%	12.7%	11.7%	11.9%
Other Agriculture	12.9%	14.4%	12.7%	12.0%	11.8%	11.0%
Metal and Wood Working Machinery	11.7%	11.4%	12.0%	11.2%	10.9%	10.7%
Organic Chemicals	11.3%	11.3%	10.9%	10.7%	10.5%	10.4%
Office and Computing Machinery	9.6%	10.0%	9.7%	9.8%	10.2%	9.6%
Special Industrial Machinery	9.3%	10.0%	9.8%	9.3%	9.1%	8.8%
Metal Products	8.3%	9.0%	8.7%	8.3%	7.1%	6.9%
Textiles	8.8%	9.1%	8.6%	7.9%	7.4%	6.8%
Glass and Products	7.7%	8.4%	7.9%	7.7%	6.8%	6.7%
Non-Ferrous Metals	10.2%	10.1%	10.0%	8.1%	6.9%	6.6%
Soap and Cleaning Preparations	7.5%	8.6%	7.8%	7.2%	6.7%	6.4%
Motorcycles and Bicycles	7.1%	7.7%	7.5%	7.1%	6.3%	6.2%
Inorganic Chemicals	5.9%	5.1%	5.1%	5.1%	6.0%	6.0%
Wearing Apparel	6.2%	6.8%	6.6%	6.2%	5.9%	5.8%
Footwear	5.4%	6.9%	6.1%	6.0%	5.7%	5.6%
Plastic Products, nec.	6.1%	7.6%	7.0%	6.2%	5.7%	5.6%
Radio and TV	5.1%	6.0%	6.7%	6.0%	5.6%	5.3%
Paints, Varnishes and Lacquers	6.1%	6.3%	5.8%	5.3%	5.4%	5.2%
Machinery and Equipment, nec.	4.7%	4.9%	4.8%	4.6%	4.5%	4.4%
Pottery, China etc.	4.0%	4.4%	4.1%	3.7%	3.5%	3.3%
Synthetic Resins	3.1%	3.3%	3.3%	3.1%	3.3%	3.2%
Rubber Products	3.4%	3.8%	3.6%	3.4%	3.3%	3.2%
Non-Metallic Products, nec.	5.1%	5.4%	5.6%	5.5%	3.4%	3.0%
Grain	0.2%	1.2%	2.9%	0.1%	2.1%	3.0%
Chemical Products, nec.	2.8%	2.8%	2.9%	2.9%	3.0%	3.0%
Furniture and Fixtures	2.7%	3.6%	3.4%	3.3%	2.9%	2.9%
Parts of Motor Vehicles	2.7%	2.7%	2.7%	2.6%	2.5%	2.4%
Beverages	1.7%	2.1%	2.0%	2.2%	2.1%	2.1%
Vegetables and Fruits - non-Refrigerated	1.5%	2.0%	2.2%	2.0%	2.0%	2.0%
Other Food	1.8%	2.2%	2.3%	2.3%	1.9%	1.9%
Railroad Equipment	2.9%	3.1%	3.4%	2.7%	2.0%	1.9%
Paper and Paperboard and Products	3.4%	3.0%	2.8%	2.4%	1.9%	1.8%
Meat/Dairy/Fish Requiring Refrigeration	2.3%	2.5%	2.3%	1.9%	1.8%	1.8%
Electrical Appliances and Houseware	1.7%	2.3%	2.1%	1.9%	1.7%	1.6%
Printing and Publishing	1.6%	2.1%	2.1%	1.9%	1.5%	1.5%
Transport Equipment, nec.	1.9%	2.6%	2.3%	1.8%	1.5%	1.4%
Iron and Steel	1.3%	1.4%	1.3%	1.2%	1.3%	1.3%
Stone, Clay and Other Crude Minerals	1.2%	1.5%	1.3%	1.2%	1.3%	1.2%
Other Raw Textile Materials	1.1%	0.9%	0.8%	0.8%	0.8%	0.8%
Wood Products	1.0%	1.1%	1.0%	0.8%	0.8%	0.8%
Agricultural Machinery	0.6%	0.8%	0.8%	0.8%	0.7%	0.7%
Natural Rubber	1.2%	1.0%	0.4%	0.9%	0.6%	0.7%
Shipbuilding and Repairing	0.6%	0.5%	0.7%	0.5%	0.5%	0.6%
Animal Feed	0.7%	0.9%	0.7%	0.7%	0.6%	0.6%
Other Meat/Dairy/Fish/Fruit/Vegetables	0.4%	0.5%	0.6%	0.6%	0.6%	0.6%
Crude Fertilizers	0.5%	0.6%	0.3%	0.1%	0.6%	0.5%
Motor Vehicles	0.3%	0.4%	0.4%	0.3%	0.3%	0.3%
Waste Paper	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
Sugar	0.2%	0.4%	0.2%	0.6%	0.3%	0.3%
Oil Seeds	0.1%	0.3%	0.1%	0.1%	0.2%	0.2%
Vegetables, Fruits and Eggs - req Refrigeration	0.2%	0.6%	0.4%	0.6%	0.2%	0.2%
Animal and Vegetable Oils	0.2%	0.1%	0.2%	0.2%	0.1%	0.2%
Ores and Scrap	0.3%	0.3%	0.1%	0.1%	0.1%	0.1%
Petroleum Refineries	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Cork and Wood	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Coal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fertilizers and Pesticides	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cotton	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Residual Petroleum Products	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Briquettes and Coke	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Crude Petroleum	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Natural Gas	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pulp	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Scrap	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

source: Global Insight

輸送機関分担と単価に着目した国際貿易の品目間類似性および異質性に関する分析
 /石倉智樹・柴崎隆一・米本清

表-A.7 全世界の貿易を対象とした品目別財単価（全輸送機関の平均）

	1998	1999	2000	2001	2002	2003
Aircraft	473.33	466.64	363.39	411.58	431.82	297.13
Semi-conductors, Electronic Tubes,etc	96.32	81.94	93.63	75.62	56.73	55.60
Professional Equipment	68.71	72.21	73.11	50.94	56.59	55.20
Drugs and Medicines	56.49	49.26	49.24	44.43	41.21	44.20
Watches and Clocks	40.95	40.47	40.18	40.21	38.90	38.85
Other Communications Equipment	32.15	33.34	37.20	38.27	36.30	35.14
Office and Computing Machinery	43.36	38.92	39.99	35.60	32.25	29.41
Photographic and Optical Goods	34.57	35.06	34.60	32.96	30.67	29.20
Engines and Turbines	16.29	16.42	15.46	15.12	14.49	15.09
Wearing Apparel	16.47	15.72	15.59	14.98	13.92	13.55
Radio and TV	14.83	12.42	12.11	12.15	11.36	10.91
Metal and Wood Working Machinery	12.44	12.54	13.13	11.61	10.95	10.88
Electrical Industrial Machinery	15.56	14.54	15.52	12.43	10.17	10.17
Other Manufacturing, nes.	10.98	9.50	10.30	9.11	9.90	9.98
Footwear	9.86	9.55	9.55	9.57	9.31	9.33
Motor Vehicles	9.30	9.41	9.34	9.21	9.14	8.96
Machinery and Equipment, nec.	10.21	10.80	10.78	9.53	8.43	8.50
Electrical Apparatus, nec.	11.32	10.51	11.23	9.88	8.29	8.34
Special Industrial Machinery	9.51	10.83	11.70	9.60	7.98	7.99
Goods not classified by kind	1.77	4.43	4.90	7.22	7.59	7.74
Leather and Products	6.94	6.60	6.26	5.79	5.62	6.30
Parts of Motor Vehicles	7.63	7.47	7.44	7.05	6.11	6.26
Motorcycles and Bicycles	6.54	6.33	5.90	6.06	5.29	5.22
Agricultural Machinery	5.85	5.54	5.30	4.98	4.75	4.82
Electrical Appliances and Houseware	6.07	5.47	5.41	4.98	4.58	4.64
Printing and Publishing	5.42	4.74	5.15	5.21	4.23	4.00
Tobacco	6.91	6.12	6.24	5.02	3.80	3.79
Textiles	3.52	3.61	4.53	4.09	3.44	3.52
Rubber Products	3.24	3.08	2.91	2.56	2.71	2.85
Soap and Cleaning Preparations	3.23	3.11	3.02	3.00	2.71	2.69
Other Raw Textile Materials	2.39	2.38	2.73	2.47	2.57	2.54
Furniture and Fixtures	3.11	2.84	2.77	2.66	2.50	2.48
Meat/Dairy/Fish Requiring Refrigeration	2.32	2.29	2.27	2.07	1.97	2.08
Paints, Varnishes and Lacquers	2.93	2.81	2.69	2.49	2.09	2.06
Other Agriculture	2.15	2.08	2.15	1.91	1.91	1.96
Plastic Products, nec.	3.04	2.64	2.73	2.26	1.89	1.93
Metal Products	3.23	2.44	2.63	2.04	1.66	1.70
Transport Equipment, nec.	2.10	1.95	2.78	1.94	1.73	1.66
Railroad Equipment	3.45	3.43	3.02	2.69	1.96	1.61
Other Meat/Dairy/Fish/Fruit/Vegetables	1.61	1.56	1.62	1.61	1.49	1.49
Pottery, China etc.	2.02	1.79	1.63	1.53	1.42	1.43
Non-Ferrous Metals	2.29	1.97	2.50	1.66	1.31	1.34
Glass and Products	1.61	1.43	1.62	1.67	1.26	1.25
Shipbuilding and Repairing	1.15	1.13	0.91	1.06	1.07	1.22
Cotton	1.49	1.31	1.17	1.14	0.98	1.14
Other Food	1.35	1.11	1.14	1.02	1.03	1.11
Synthetic Resins	1.08	1.07	1.17	1.07	0.97	1.03
Natural Rubber	0.76	0.62	0.66	0.60	0.70	1.00
Chemical Products, nec.	1.42	1.34	1.35	1.17	0.98	1.00
Organic Chemicals	0.96	0.99	0.99	0.96	0.82	0.83
Wood Products	0.77	0.76	0.77	0.73	0.69	0.74
Paper and Paperboard and Products	0.80	0.78	0.83	0.78	0.63	0.65
Vegetables, Fruits and Eggs - req Refrigeration	0.66	0.67	0.63	0.59	0.57	0.59
Beverages	1.66	1.72	1.71	1.36	0.54	0.54
Animal and Vegetable Oils	0.65	0.48	0.40	0.31	0.42	0.52
Pulp	0.43	0.44	0.53	0.43	0.41	0.47
Vegetables and Fruits - non-Refrigerated	0.47	0.40	0.41	0.36	0.40	0.39
Iron and Steel	0.45	0.38	0.41	0.08	0.36	0.38
Inorganic Chemicals	0.54	0.53	0.55	0.46	0.38	0.38
Petroleum Refineries	0.14	0.18	0.24	0.23	0.22	0.28
Oil Seeds	0.28	0.23	0.22	0.21	0.23	0.26
Animal Feed	0.24	0.23	0.23	0.24	0.24	0.26
Natural Gas	0.12	0.10	0.10	0.16	0.16	0.24
Scrap	0.26	0.23	0.26	0.21	0.21	0.23
Crude Petroleum	0.10	0.13	0.17	0.17	0.16	0.20
Sugar	0.24	0.17	0.17	0.19	0.18	0.18
Residual Petroleum Products	0.13	0.13	0.16	0.16	0.15	0.18
Fertilizers and Pesticides	0.18	0.16	0.15	0.15	0.15	0.17
Grain	0.17	0.16	0.14	0.15	0.14	0.15
Cork and Wood	0.16	0.15	0.17	0.14	0.14	0.15
Non-Metallic Products, nec.	0.17	0.14	0.15	0.14	0.14	0.14
Crude Fertilizers	0.19	0.17	0.14	0.12	0.13	0.12
Waste Paper	0.08	0.08	0.11	0.08	0.09	0.11
Briquettes and Coke	0.08	0.07	0.07	0.08	0.08	0.08
Ores and Scrap	0.05	0.05	0.05	0.05	0.05	0.06
Stone, Clay and Other Crude Minerals	0.03	0.03	0.03	0.02	0.03	0.03
Coal	0.04	0.03	0.03	0.03	0.03	0.03

(thousand US\$/ton) source: Global Insight

表-A.8 アジア発の貿易を対象とした品目別財単価（全輸送機関の平均）

	1998	1999	2000	2001	2002	2003
Aircraft	1488.77	1517.51	1095.27	1854.27	2128.10	2324.90
Drugs and Medicines	124.89	126.15	132.62	141.83	133.05	129.39
Professional Equipment	94.18	96.40	95.53	62.72	71.80	68.91
Semi-conductors, Electronic Tubes, etc	105.50	88.47	100.08	80.14	59.58	58.47
Watches and Clocks	45.71	46.03	45.75	46.08	44.81	44.71
Other Communications Equipment	34.93	36.13	40.59	41.97	39.88	38.41
Photographic and Optical Goods	40.38	41.62	41.86	39.95	37.31	34.83
Office and Computing Machinery	44.95	40.27	41.79	37.40	33.73	30.73
Engines and Turbines	23.02	21.45	20.03	20.00	18.50	19.39
Railroad Equipment	15.57	14.61	17.99	23.62	20.58	17.36
Other Raw Textile Materials	17.09	18.83	18.15	14.54	16.03	15.70
Wearing Apparel	18.57	17.61	17.67	16.83	15.62	15.11
Metal and Wood Working Machinery	16.03	16.31	16.33	14.85	14.32	14.04
Goods not classified by kind	9.60	16.83	24.42	11.50	11.64	12.83
Tobacco	21.82	20.99	20.19	14.92	13.52	12.26
Cotton	25.88	12.25	8.54	23.19	9.78	12.07
Electrical Industrial Machinery	18.84	16.92	18.22	14.58	11.84	11.73
Radio and TV	15.09	12.56	12.27	12.30	11.49	11.04
Leather and Products	12.26	11.58	11.93	11.55	10.54	10.88
Machinery and Equipment, nec.	13.73	13.88	14.02	12.71	11.04	10.87
Special Industrial Machinery	13.28	14.22	15.92	13.67	10.85	10.55
Other Manufacturing, nes.	11.43	10.84	11.12	10.43	10.34	10.41
Motor Vehicles	10.39	10.35	10.48	10.59	10.47	10.36
Footwear	10.35	9.96	9.97	10.01	9.70	9.75
Electrical Apparatus, nec.	13.08	12.05	12.78	11.36	9.36	9.36
Agricultural Machinery	9.27	9.66	9.88	10.39	9.25	8.80
Oil Seeds	7.35	5.81	6.03	5.50	4.67	8.63
Parts of Motor Vehicles	9.20	8.98	9.09	8.58	7.50	7.84
Meat/Dairy/Fish Requiring Refrigeration	6.95	7.01	7.31	6.44	6.08	6.18
Motorcycles and Bicycles	7.17	6.83	6.57	6.52	5.64	5.57
Printing and Publishing	8.09	6.81	6.87	6.94	5.51	5.31
Electrical Appliances and Houseware	6.79	5.94	5.90	5.47	5.02	5.05
Textiles	6.00	6.18	6.19	5.69	4.77	4.85
Soap and Cleaning Preparations	5.92	5.23	5.10	5.20	4.79	4.75
Paints, Varnishes and Lacquers	5.46	5.19	5.27	4.87	4.17	4.17
Other Agriculture	3.90	3.78	3.93	3.61	3.86	4.10
Rubber Products	3.86	3.63	3.45	3.04	3.24	3.37
Non-Ferrous Metals	6.68	4.85	7.55	3.72	2.85	2.72
Furniture and Fixtures	3.47	3.05	2.99	2.87	2.66	2.64
Other Meat/Dairy/Fish/Fruit/Vegetables	3.20	2.96	3.02	2.88	2.54	2.52
Pulp	2.03	2.84	3.74	2.17	1.96	2.13
Plastic Products, nec.	3.40	2.88	3.02	2.50	2.07	2.10
Chemical Products, nec.	2.68	2.30	2.81	2.14	2.00	1.99
Transport Equipment, nec.	2.50	2.19	3.13	2.35	2.09	1.96
Metal Products	3.81	2.79	3.02	2.33	1.87	1.92
Other Food	2.96	2.04	2.16	1.75	1.74	1.91
Crude Petroleum	0.72	1.04	1.44	1.39	1.35	1.71
Glass and Products	2.13	1.76	2.07	2.18	1.59	1.57
Ores and Scrap	1.13	1.08	1.18	1.21	1.14	1.55
Pottery, China etc.	2.23	1.92	1.75	1.67	1.55	1.55
Shipbuilding and Repairing	1.29	1.23	1.08	1.16	1.18	1.41
Synthetic Resins	1.37	1.40	1.56	1.44	1.34	1.41
Organic Chemicals	1.50	1.56	1.64	1.46	1.31	1.31
Vegetables, Fruits and Eggs - req Refrigeration	1.63	1.48	1.44	1.26	1.18	1.27
Wood Products	0.95	0.98	1.13	1.10	1.09	1.17
Paper and Paperboard and Products	1.40	1.33	1.48	1.38	1.11	1.14
Natural Rubber	0.78	0.63	0.67	0.62	0.71	1.03
Animal Feed	1.19	0.89	0.89	0.81	0.85	0.94
Fertilizers and Pesticides	0.96	0.89	0.81	0.78	0.90	0.77
Scrap	0.87	0.83	1.20	0.64	0.66	0.74
Beverages	6.08	4.56	4.72	3.18	0.73	0.73
Iron and Steel	0.74	0.67	0.72	0.09	0.64	0.71
Cork and Wood	0.69	0.65	1.04	0.83	0.68	0.71
Animal and Vegetable Oils	0.94	0.66	0.52	0.38	0.54	0.67
Inorganic Chemicals	1.04	1.02	1.01	0.78	0.63	0.64
Natural Gas	0.58	0.60	0.46	0.39	0.41	0.63
Petroleum Refineries	0.26	0.34	0.48	0.47	0.50	0.63
Vegetables and Fruits - non-Refrigerated	0.77	0.63	0.63	0.58	0.66	0.62
Sugar	0.83	0.65	0.44	0.62	0.61	0.61
Grain	0.85	0.86	0.53	0.58	0.56	0.49
Waste Paper	0.41	0.61	0.72	0.38	0.39	0.48
Residual Petroleum Products	0.24	0.25	0.34	0.32	0.30	0.35
Crude Fertilizers	1.22	1.05	0.50	0.31	0.44	0.35
Non-Metallic Products, nec.	0.20	0.16	0.17	0.16	0.17	0.17
Briquettes and Coke	0.09	0.08	0.08	0.09	0.09	0.10
Coal	0.14	0.10	0.09	0.09	0.08	0.08
Stone, Clay and Other Crude Minerals	0.04	0.05	0.05	0.03	0.05	0.06

(thousand US\$/ton) source: Global Insight

輸送機関分担と単価に着目した国際貿易の品目間類似性および異質性に関する分析
 / 石倉智樹・柴崎隆一・米本清

表-A.9 北米発の貿易を対象とした品目別財単価（全輸送機関の平均）

	1998	1999	2000	2001	2002	2003
Semi-conductors, Electronic Tubes,etc	412.96	542.04	707.20	617.02	767.37	862.86
Aircraft	759.51	638.27	450.67	594.61	770.18	567.52
Professional Equipment	121.69	127.12	166.76	147.87	145.18	141.90
Other Communications Equipment	107.91	105.29	124.87	110.07	98.13	91.25
Office and Computing Machinery	160.01	162.47	149.35	128.73	90.69	87.16
Engines and Turbines	33.01	44.93	48.97	59.46	61.92	64.45
Watches and Clocks	52.01	32.56	31.77	35.93	52.34	63.22
Other Manufacturing, nes.	38.75	40.07	47.61	46.94	42.71	44.48
Electrical Industrial Machinery	24.54	27.20	30.48	32.15	28.48	32.64
Electrical Apparatus, nec.	19.56	20.20	27.32	24.79	30.09	31.19
Drugs and Medicines	29.05	32.82	32.54	32.00	31.99	30.55
Goods not classified by kind	12.07	12.65	15.01	10.40	30.50	28.88
Special Industrial Machinery	25.42	36.57	50.75	35.34	27.29	27.56
Metal and Wood Working Machinery	33.95	49.37	62.20	39.43	35.71	26.45
Photographic and Optical Goods	22.13	21.54	26.07	27.09	28.83	25.77
Motorcycles and Bicycles	20.75	22.21	21.01	19.67	21.22	22.50
Wearing Apparel	20.85	19.88	20.45	19.26	19.38	20.59
Railroad Equipment	17.89	15.27	15.46	15.93	13.18	16.47
Machinery and Equipment, nec.	14.06	16.14	17.30	16.93	16.67	15.99
Radio and TV	17.99	16.22	17.46	23.40	23.59	14.78
Printing and Publishing	15.07	13.05	12.39	16.69	13.20	12.19
Parts of Motor Vehicles	11.94	11.93	11.90	12.02	11.45	10.76
Metal Products	9.01	8.56	8.89	8.34	10.38	10.62
Furniture and Fixtures	9.05	7.70	7.75	9.68	10.21	9.77
Motor Vehicles	11.25	9.98	11.15	11.08	10.80	9.49
Shipbuilding and Repairing	7.59	5.59	5.72	3.39	19.89	7.43
Electrical Appliances and Houseware	8.60	7.76	9.91	9.43	7.28	7.18
Agricultural Machinery	7.69	7.30	8.34	8.05	7.22	7.07
Plastic Products, nec.	7.33	7.12	8.34	8.11	7.14	7.06
Tobacco	10.57	11.09	12.14	8.39	6.58	6.77
Pottery, China etc.	5.64	5.92	6.22	6.40	6.41	6.66
Footwear	20.93	22.04	21.14	17.14	13.87	5.88
Glass and Products	4.12	4.39	6.23	6.86	5.61	5.38
Rubber Products	4.17	4.35	4.90	4.79	5.03	5.03
Soap and Cleaning Preparations	4.46	4.32	4.57	4.90	4.85	4.84
Textiles	4.93	4.68	4.79	4.49	4.09	4.06
Chemical Products, nec.	2.74	3.06	3.26	3.16	3.59	4.01
Other Raw Textile Materials	4.58	3.37	3.32	3.46	2.91	3.84
Transport Equipment, nec.	3.34	3.74	3.93	5.02	6.90	3.40
Non-Ferrous Metals	2.95	3.06	3.55	3.88	3.20	3.32
Other Agriculture	3.66	3.60	3.27	2.74	2.75	2.77
Leather and Products	2.68	2.63	2.30	2.07	2.08	2.77
Paints, Varnishes and Lacquers	3.19	3.14	3.24	3.06	2.87	2.75
Meat/Dairy/Fish Requiring Refrigeration	1.82	2.02	1.87	1.68	1.75	2.24
Other Food	1.16	1.17	1.20	1.35	1.43	1.83
Synthetic Resins	1.62	1.56	1.63	1.47	1.48	1.50
Non-Metallic Products, nec.	1.60	1.51	2.14	1.61	1.34	1.49
Wood Products	1.21	1.11	1.23	1.24	1.35	1.41
Other Meat/Dairy/Fish/Fruit/Vegetables	1.45	1.45	1.48	1.45	1.43	1.39
Cotton	1.48	1.17	1.16	1.07	0.93	1.25
Natural Rubber	5.62	4.12	5.54	5.01	1.25	1.15
Inorganic Chemicals	0.98	0.93	0.97	1.01	1.07	1.05
Iron and Steel	1.01	0.63	0.92	1.25	1.58	0.87
Vegetables, Fruits and Eggs - req Refrigeration	0.77	0.87	0.81	0.81	0.82	0.84
Organic Chemicals	0.69	0.70	0.85	0.86	0.79	0.81
Beverages	0.89	0.94	0.88	0.86	0.75	0.73
Crude Fertilizers	0.73	0.73	0.73	0.73	0.73	0.73
Paper and Paperboard and Products	0.68	0.67	0.73	0.75	0.70	0.70
Sugar	0.45	0.58	0.67	0.64	0.62	0.66
Vegetables and Fruits - non-Refrigerated	0.70	0.61	0.60	0.47	0.60	0.58
Animal and Vegetable Oils	0.63	0.51	0.44	0.42	0.44	0.53
Pulp	0.46	0.47	0.50	0.47	0.46	0.52
Scrap	0.31	0.28	0.36	0.27	0.25	0.29
Oil Seeds	0.25	0.21	0.20	0.20	0.22	0.27
Animal Feed	0.22	0.21	0.20	0.24	0.24	0.26
Petroleum Refineries	0.17	0.18	0.26	0.19	0.19	0.25
Cork and Wood	0.18	0.18	0.19	0.20	0.22	0.25
Ores and Scrap	0.16	0.18	0.23	0.19	0.21	0.24
Fertilizers and Pesticides	0.15	0.16	0.18	0.20	0.19	0.22
Crude Petroleum	0.23	0.34	0.32	0.17	0.18	0.21
Briquettes and Coke	0.57	0.06	0.26	0.87	0.05	0.18
Natural Gas	0.11	0.12	0.13	0.13	0.15	0.16
Grain	0.12	0.11	0.11	0.11	0.13	0.14
Waste Paper	0.09	0.10	0.11	0.08	0.09	0.10
Residual Petroleum Products	0.06	0.05	0.07	0.07	0.07	0.09
Stone, Clay and Other Crude Minerals	0.09	0.08	0.08	0.09	0.09	0.09
Coal	0.05	0.04	0.04	0.04	0.04	0.04

(thousand US\$/ton) source: Global Insight

表-A.10 欧州発の貿易を対象とした品目別財単価（全輸送機関の平均）

	1998	1999	2000	2001	2002	2003
Aircraft	612.17	435.50	700.18	585.56	575.78	582.09
Semi-conductors, Electronic Tubes,etc	250.38	172.01	234.05	255.84	292.71	301.46
Professional Equipment	117.16	117.97	114.55	113.86	107.34	120.22
Other Manufacturing, nes.	92.89	100.43	109.17	81.12	104.98	116.71
Watches and Clocks	95.84	98.71	100.20	103.63	104.11	110.20
Drugs and Medicines	86.88	78.14	91.18	72.13	89.28	101.07
Other Communications Equipment	123.14	122.80	108.91	119.55	97.10	93.12
Office and Computing Machinery	103.30	93.40	88.48	82.66	72.83	64.84
Photographic and Optical Goods	39.18	39.31	44.82	38.26	45.43	51.04
Wearing Apparel	37.41	35.89	29.90	30.91	27.68	28.80
Engines and Turbines	21.22	25.44	24.97	23.66	24.92	27.91
Radio and TV	25.78	33.20	34.19	28.89	27.49	25.67
Leather and Products	10.72	10.20	13.23	13.72	18.74	20.33
Electrical Industrial Machinery	17.55	19.15	18.47	17.74	15.89	18.34
Footwear	21.00	20.53	16.76	18.53	14.65	15.32
Special Industrial Machinery	14.16	17.27	14.59	13.71	13.41	15.25
Machinery and Equipment, nec.	16.20	17.65	15.50	14.48	13.37	14.86
Metal and Wood Working Machinery	13.95	14.46	11.54	12.27	12.11	13.87
Electrical Apparatus, nec.	16.58	13.89	15.22	14.74	11.98	12.67
Motor Vehicles	12.56	14.37	12.48	10.78	10.49	10.42
Parts of Motor Vehicles	10.94	11.12	9.43	9.56	8.50	9.32
Electrical Appliances and Houseware	8.23	9.18	8.42	8.47	5.82	6.17
Motorcycles and Bicycles	11.77	17.48	18.52	14.01	5.61	5.80
Agricultural Machinery	7.76	6.14	4.77	5.00	5.24	5.57
Tobacco	7.34	5.12	5.24	4.95	5.15	5.17
Soap and Cleaning Preparations	5.12	5.94	5.28	4.95	4.37	4.31
Printing and Publishing	4.90	3.33	5.99	5.76	4.07	4.15
Textiles	5.97	6.34	5.24	5.62	4.08	4.13
Furniture and Fixtures	5.55	6.01	4.88	5.10	3.74	3.99
Pottery, China etc.	4.62	5.52	4.80	4.08	3.64	3.85
Goods not classified by kind	1.29	1.84	1.98	3.32	3.71	3.66
Rubber Products	4.11	4.06	3.70	3.78	3.16	3.60
Metal Products	5.98	6.26	5.63	5.11	3.05	3.33
Plastic Products, nec.	4.65	4.80	4.10	3.35	2.82	3.05
Other Agriculture	3.19	3.29	3.51	2.85	2.72	3.02
Organic Chemicals	4.10	4.33	4.01	3.73	2.69	2.85
Transport Equipment, nec.	3.69	3.64	2.78	2.43	2.26	2.39
Paints, Varnishes and Lacquers	3.03	3.19	2.70	2.49	2.00	2.05
Beverages	2.05	2.54	2.35	2.19	1.86	1.92
Other Raw Textile Materials	1.54	1.53	1.72	1.47	1.52	1.82
Natural Rubber	1.82	0.98	0.99	1.45	1.20	1.78
Non-Ferrous Metals	4.05	3.61	4.10	2.64	1.74	1.75
Chemical Products, nec.	2.21	2.09	2.23	1.89	1.38	1.45
Railroad Equipment	6.81	6.87	4.92	2.64	1.43	1.44
Meat/Dairy/Fish Requiring Refrigeration	1.65	1.45	1.49	1.40	1.27	1.35
Glass and Products	2.00	2.24	1.88	1.76	1.27	1.28
Synthetic Resins	1.74	1.43	1.45	1.40	1.12	1.26
Other Meat/Dairy/Fish/Fruit/Vegetables	1.25	1.26	1.32	1.32	1.13	1.19
Cotton	1.31	1.20	1.09	1.11	0.96	1.06
Other Food	1.12	0.82	0.91	1.10	0.94	1.03
Inorganic Chemicals	1.12	1.32	1.68	1.24	0.79	0.93
Shipbuilding and Repairing	1.19	2.11	0.56	0.72	0.82	0.87
Animal and Vegetable Oils	0.73	0.58	0.53	0.55	0.71	0.87
Animal Feed	0.70	0.73	0.59	0.67	0.60	0.70
Paper and Paperboard and Products	1.11	0.93	0.99	0.94	0.64	0.68
Wood Products	1.23	0.97	0.77	0.71	0.53	0.58
Pulp	0.49	0.46	0.50	0.48	0.45	0.52
Petroleum Refineries	0.44	0.36	0.33	0.38	0.41	0.52
Non-Metallic Products, nec.	0.65	0.90	0.71	0.74	0.49	0.51
Vegetables, Fruits and Eggs - req Refrigeration	0.72	0.51	0.52	0.55	0.44	0.46
Iron and Steel	0.59	0.41	0.42	0.43	0.40	0.42
Oil Seeds	0.31	0.22	0.22	0.26	0.25	0.29
Cork and Wood	0.48	0.50	0.42	0.33	0.27	0.29
Sugar	0.34	0.21	0.26	0.27	0.26	0.27
Fertilizers and Pesticides	0.32	0.26	0.34	0.30	0.22	0.25
Scrap	0.30	0.23	0.21	0.19	0.22	0.24
Residual Petroleum Products	0.22	0.20	0.22	0.18	0.19	0.22
Crude Petroleum	0.07	0.10	0.20	0.18	0.18	0.21
Vegetables and Fruits - non-Refrigerated	0.47	0.27	0.29	0.33	0.20	0.21
Crude Fertilizers	0.12	0.08	0.10	0.19	0.12	0.14
Waste Paper	0.04	0.06	0.10	0.07	0.09	0.13
Grain	0.11	0.10	0.09	0.10	0.10	0.10
Ores and Scrap	0.08	0.09	0.07	0.08	0.07	0.08
Natural Gas	0.03	0.01	0.05	0.25	0.07	0.07
Stone, Clay and Other Crude Minerals	0.04	0.06	0.04	0.04	0.04	0.04
Briquettes and Coke	0.05	0.04	0.04	0.02	0.02	0.02
Coal	0.01	0.01	0.00	0.01	0.01	0.01

(thousand US\$/ton) source: Global Insight

輸送機関分担と単価に着目した国際貿易の品目間類似性および異質性に関する分析
 / 石倉智樹・柴崎隆一・米本清

表-A.11 全世界の貿易を対象とした品目別航空貿易財単価

	1998	1999	2000	2001	2002	2003
Aircraft	358.27	341.70	322.14	335.46	353.44	363.96
Drugs and Medicines	130.56	115.60	141.27	137.53	147.74	152.57
Organic Chemicals	128.90	139.31	139.58	146.17	137.42	146.82
Professional Equipment	154.60	159.16	173.00	134.88	137.97	134.94
Semi-conductors, Electronic Tubes,etc	279.33	257.90	280.36	197.81	131.95	130.10
Other Communications Equipment	103.36	106.75	121.40	127.53	123.68	119.88
Engines and Turbines	110.77	108.82	106.23	122.57	110.99	117.08
Watches and Clocks	107.67	105.26	104.59	111.85	105.26	110.84
Other Manufacturing, nes.	81.16	75.00	82.88	82.22	86.33	88.89
Office and Computing Machinery	129.83	114.66	118.47	101.06	87.05	81.54
Photographic and Optical Goods	86.87	87.37	87.86	88.75	78.29	73.50
Special Industrial Machinery	72.55	89.87	111.82	88.30	71.56	67.63
Radio and TV	62.37	53.14	56.96	67.22	65.66	60.71
Electrical Apparatus, nec.	52.19	50.50	63.88	54.77	48.24	46.34
Metal and Wood Working Machinery	46.79	55.95	66.03	51.66	49.91	45.92
Goods not classified by kind	23.35	35.64	73.66	29.80	41.46	40.53
Chemical Products, nec.	48.50	41.36	43.68	45.73	45.15	39.73
Machinery and Equipment, nec.	36.17	39.54	41.10	38.04	33.17	33.73
Railroad Equipment	28.80	28.15	27.29	27.33	28.02	26.81
Electrical Industrial Machinery	44.11	41.21	45.65	34.81	26.75	26.23
Wearing Apparel	24.81	24.20	24.55	23.35	21.59	21.43
Inorganic Chemicals	26.92	22.02	22.94	20.67	18.70	19.96
Leather and Products	20.44	18.75	20.03	19.81	17.08	18.69
Fertilizers and Pesticides	15.08	15.72	12.02	18.91	12.71	18.52
Non-Ferrous Metals	36.99	33.97	48.89	31.94	19.10	18.44
Motor Vehicles	17.09	15.39	15.81	16.22	17.14	17.16
Electrical Appliances and Houseware	23.59	21.26	21.05	20.34	16.67	16.81
Motorcycles and Bicycles	17.70	17.71	16.93	17.51	16.40	16.25
Rubber Products	17.86	17.24	16.60	17.11	15.34	16.24
Ores and Scrap	14.73	15.93	19.81	16.77	14.99	15.57
Footwear	18.35	18.83	18.64	18.83	17.00	15.28
Glass and Products	16.25	12.90	19.97	24.13	16.08	15.07
Parts of Motor Vehicles	18.59	18.71	16.94	17.65	15.20	15.06
Printing and Publishing	17.31	14.58	15.31	20.02	15.05	13.77
Agricultural Machinery	14.63	15.65	14.30	16.53	13.63	13.63
Soap and Cleaning Preparations	15.73	14.93	14.31	14.24	13.21	13.22
Non-Metallic Products, nec.	18.63	16.61	18.43	16.74	14.06	12.57
Transport Equipment, nec.	15.05	15.63	13.15	14.94	15.08	11.62
Textiles	13.72	13.48	14.44	13.09	10.93	10.87
Synthetic Resins	11.02	10.54	11.37	10.70	9.93	10.67
Furniture and Fixtures	12.68	11.65	11.10	11.33	10.51	10.48
Paints, Varnishes and Lacquers	13.49	11.95	13.00	12.67	11.18	9.66
Metal Products	17.29	12.32	13.76	10.41	8.57	8.76
Plastic Products, nec.	13.77	13.05	12.94	10.31	8.35	8.63
Pottery, China etc.	10.23	9.29	8.26	7.76	7.27	8.13
Other Food	6.54	5.60	5.75	6.16	6.11	8.11
Tobacco	19.25	18.24	17.46	15.34	7.48	7.94
Other Agriculture	6.96	7.11	7.32	6.54	6.71	6.95
Petroleum Refineries	2.51	3.43	4.47	4.86	4.81	6.56
Stone, Clay and Other Crude Minerals	9.46	7.76	6.97	7.11	6.75	6.37
Other Meat/Dairy/Fish/Fruit/Vegetables	5.25	4.73	5.08	5.19	4.67	5.22
Natural Rubber	3.57	2.92	3.18	2.98	3.28	4.69
Beverages	4.95	5.04	4.88	5.26	5.16	4.49
Residual Petroleum Products	3.52	3.60	2.49	2.82	7.75	4.22
Meat/Dairy/Fish Requiring Refrigeration	4.80	4.79	4.67	4.32	3.89	4.11
Animal and Vegetable Oils	3.67	3.16	1.83	2.33	3.07	3.35
Other Raw Textile Materials	2.88	2.65	2.69	2.67	3.05	3.19
Wood Products	3.67	3.13	3.44	2.96	2.93	3.16
Shipbuilding and Repairing	2.90	2.87	2.86	2.77	2.94	3.00
Paper and Paperboard and Products	4.32	4.27	4.20	4.12	2.90	2.99
Cotton	2.43	2.38	2.66	2.41	2.37	2.97
Iron and Steel	2.15	1.93	2.22	1.98	1.77	1.87
Vegetables, Fruits and Eggs - req Refrigeration	1.53	2.04	1.92	1.71	1.62	1.68
Coal	0.67	0.84	0.71	1.69	1.46	1.45
Pulp	0.58	1.18	0.87	1.45	3.50	1.32
Sugar	1.47	1.16	1.14	1.55	1.22	1.21
Grain	1.16	1.00	0.87	0.97	0.91	0.94
Oil Seeds	0.94	0.91	0.77	0.76	0.78	0.92
Animal Feed	0.84	0.99	1.04	1.16	0.83	0.82
Crude Fertilizers	0.67	0.79	0.76	0.73	0.75	0.73
Vegetables and Fruits - non-Refrigerated	0.58	0.51	0.55	0.51	0.70	0.68
Cork and Wood	0.71	0.69	0.71	0.57	0.60	0.62
Natural Gas	9.60	4.59	7.29	6.90	1.70	0.53
Scrap	3.14	2.72	1.89	1.13	0.84	0.41
Briquettes and Coke	0.36	0.26	0.36	0.39	0.36	0.39
Waste Paper	0.12	0.13	0.19	0.13	0.15	0.19
Crude Petroleum	-	-	-	-	-	-

(thousand US\$/ton) source: Global Insight

表-A.12 アジア発の貿易を対象とした品目別航空貿易財単価

	1998	1999	2000	2001	2002	2003
Drugs and Medicines	174.38	207.36	233.31	243.99	253.52	263.88
Aircraft	346.86	325.06	244.22	269.16	282.30	230.52
Organic Chemicals	162.85	183.40	183.67	188.89	198.84	202.99
Chemical Products, nec.	124.59	124.21	128.14	125.53	109.66	122.63
Other Communications Equipment	82.60	91.83	107.35	114.66	114.99	113.90
Watches and Clocks	100.94	97.06	95.52	101.26	93.24	98.48
Professional Equipment	119.82	128.97	131.21	87.37	97.88	94.75
Semi-conductors, Electronic Tubes,etc	213.78	190.15	208.66	140.31	91.51	86.88
Engines and Turbines	84.97	78.29	77.09	88.43	77.03	81.03
Office and Computing Machinery	119.90	104.42	107.24	90.72	81.03	75.86
Photographic and Optical Goods	89.59	90.65	88.05	89.11	75.90	71.05
Ores and Scrap	44.28	48.71	55.35	51.38	55.25	64.04
Radio and TV	62.10	52.90	56.83	66.39	65.32	60.49
Goods not classified by kind	36.05	59.99	119.22	79.80	56.23	53.12
Other Manufacturing, nes.	51.25	48.25	50.59	53.34	50.84	51.01
Special Industrial Machinery	52.49	57.18	64.62	56.20	44.73	41.31
Electrical Apparatus, nec.	56.66	56.61	63.80	51.80	42.62	40.69
Metal and Wood Working Machinery	36.46	40.51	46.20	41.92	38.16	34.04
Machinery and Equipment, nec.	32.27	34.42	35.23	31.37	27.46	27.27
Tobacco	25.86	26.84	27.17	21.75	24.02	23.38
Fertilizers and Pesticides	7.38	7.04	6.69	8.40	6.04	23.24
Railroad Equipment	13.75	14.80	30.32	28.88	39.86	22.94
Electrical Industrial Machinery	41.78	37.73	43.24	31.26	23.10	22.25
Wearing Apparel	25.57	24.85	25.05	23.80	21.95	21.68
Motor Vehicles	16.76	16.90	17.07	17.16	17.48	17.94
Footwear	17.17	17.59	17.44	17.58	16.40	17.70
Motorcycles and Bicycles	18.03	17.69	17.51	17.69	16.37	16.44
Leather and Products	17.15	15.78	15.89	15.52	14.79	16.06
Electrical Appliances and Houseware	24.38	20.75	19.67	19.35	15.68	15.82
Rubber Products	18.65	17.75	16.18	16.93	15.01	15.75
Inorganic Chemicals	22.96	21.17	22.78	19.32	14.56	14.93
Other Food	10.62	7.96	8.82	9.09	10.26	14.51
Non-Ferrous Metals	36.65	24.26	39.29	21.55	14.73	14.34
Paints, Varnishes and Lacquers	17.47	16.19	17.69	16.05	14.33	14.04
Parts of Motor Vehicles	15.95	16.16	16.33	15.10	13.69	13.50
Glass and Products	14.11	11.22	17.67	20.29	12.74	13.10
Non-Metallic Products, nec.	11.89	11.04	13.89	11.85	11.77	11.89
Transport Equipment, nec.	13.52	14.14	12.54	13.80	11.13	10.62
Furniture and Fixtures	11.76	10.52	9.89	10.33	9.96	10.16
Textiles	14.49	14.12	14.00	12.04	9.87	9.79
Synthetic Resins	9.79	9.69	10.44	9.57	8.70	9.16
Soap and Cleaning Preparations	12.57	10.71	10.24	10.02	9.32	8.99
Agricultural Machinery	14.39	14.07	9.10	13.14	11.06	8.84
Other Agriculture	8.10	7.79	8.05	7.32	7.90	7.80
Other Raw Textile Materials	5.38	7.23	7.55	6.76	6.44	7.61
Printing and Publishing	8.50	9.27	8.24	7.78	7.25	6.98
Metal Products	15.37	10.41	12.10	8.62	6.88	6.88
Pottery, China etc.	8.79	7.76	7.02	6.61	6.13	6.86
Plastic Products, nec.	11.65	10.97	10.23	7.85	6.38	6.55
Other Meat/Dairy/Fish/Fruit/Vegetables	6.87	6.55	6.25	6.61	6.14	6.34
Stone, Clay and Other Crude Minerals	9.63	7.63	6.89	6.45	5.91	5.75
Petroleum Refineries	2.78	3.36	4.68	4.47	4.32	4.95
Meat/Dairy/Fish Requiring Refrigeration	5.00	4.97	5.13	4.82	4.80	4.82
Natural Rubber	3.56	2.86	3.11	2.93	3.24	4.74
Scrap	9.00	26.33	1.33	1.50	1.27	4.00
Wood Products	3.46	3.43	3.64	3.26	3.62	3.87
Animal and Vegetable Oils	3.97	3.49	2.60	2.00	2.78	3.47
Shipbuilding and Repairing	2.85	2.71	2.61	2.47	2.81	2.92
Paper and Paperboard and Products	4.23	4.57	4.31	3.97	2.94	2.82
Vegetables, Fruits and Eggs - req Refrigeration	2.24	2.20	2.08	1.96	2.04	2.31
Residual Petroleum Products	8.86	1.64	1.57	2.28	7.50	2.08
Iron and Steel	2.02	1.82	1.97	1.74	1.58	1.69
Cotton	1.31	2.25	2.93	1.31	1.39	1.67
Oil Seeds	1.79	1.70	1.67	1.56	1.18	1.47
Grain	1.61	1.58	1.21	1.31	1.16	1.18
Sugar	1.98	1.61	1.26	1.31	1.18	1.16
Cork and Wood	0.63	0.63	0.65	0.51	0.55	0.57
Natural Gas	2.03	1.58	2.10	-	0.62	0.53
Vegetables and Fruits - non-Refrigerated	0.33	0.25	0.27	0.28	0.49	0.51
Beverages	3.09	3.11	3.28	1.91	0.50	0.51
Animal Feed	0.33	0.58	0.70	0.70	0.42	0.43
Briquettes and Coke	0.36	0.29	0.33	0.38	0.36	0.39
Crude Fertilizers	0.10	12.00	4.00	3.33	0.63	0.35
Waste Paper	0.15	0.19	0.27	0.15	0.17	0.18
Coal	-	-	-	-	-	-
Crude Petroleum	-	-	-	-	-	-
Pulp	-	-	-	-	-	-

(thousand US\$/ton) source: Global Insight

輸送機関分担と単価に着目した国際貿易の品目間類似性および異質性に関する分析
 / 石倉智樹・柴崎隆一・米本清

表-A.13 北米発の貿易を対象とした品目別航空貿易財単価

	1998	1999	2000	2001	2002	2003
Semi-conductors, Electronic Tubes, etc	1593.94	1598.72	1555.64	1286.72	1221.55	1210.07
Aircraft	342.39	340.10	319.73	329.94	346.76	365.89
Engines and Turbines	260.12	263.93	267.08	320.64	294.18	332.00
Professional Equipment	213.33	215.10	251.86	236.56	214.84	211.37
Office and Computing Machinery	222.23	224.27	234.23	221.70	190.25	205.05
Other Communications Equipment	198.06	216.73	224.07	203.79	201.69	195.34
Watches and Clocks	161.65	139.20	137.23	176.68	198.05	176.28
Metal and Wood Working Machinery	115.29	145.32	176.30	154.05	152.48	142.01
Other Manufacturing, nes.	126.46	116.70	136.91	147.59	130.69	136.04
Special Industrial Machinery	117.38	142.76	184.72	158.63	133.79	129.23
Electrical Apparatus, nec.	49.54	41.67	90.24	115.03	123.15	126.60
Drugs and Medicines	128.00	122.51	130.04	113.62	136.43	116.93
Photographic and Optical Goods	98.88	96.60	114.44	121.84	114.31	107.29
Goods not classified by kind	44.39	25.06	69.91	11.60	35.60	98.22
Radio and TV	68.14	61.61	64.88	135.78	85.11	89.11
Electrical Industrial Machinery	80.13	88.99	85.44	83.80	80.01	83.66
Machinery and Equipment, nec.	51.39	55.66	61.32	60.10	49.76	53.39
Leather and Products	30.13	30.51	38.98	41.34	23.18	37.50
Metal Products	36.64	34.91	31.93	31.93	34.28	36.74
Motorcycles and Bicycles	33.93	36.92	39.77	39.05	37.81	36.48
Electrical Appliances and Houseware	27.82	29.54	38.29	35.75	36.71	36.17
Railroad Equipment	30.22	33.87	26.36	33.05	27.90	35.63
Rubber Products	25.26	25.46	33.97	34.75	29.83	33.46
Organic Chemicals	28.48	27.04	24.53	28.91	24.61	31.27
Agricultural Machinery	19.73	26.71	28.41	29.81	24.09	27.66
Chemical Products, nec.	33.95	26.23	28.59	30.56	32.79	27.66
Shipbuilding and Repairing	22.55	19.76	44.93	40.63	24.87	27.31
Wearing Apparel	24.66	23.91	24.63	24.19	24.35	27.17
Plastic Products, nec.	24.05	24.43	28.33	27.79	23.66	27.13
Parts of Motor Vehicles	28.52	29.22	22.19	32.35	25.62	26.37
Pottery, China etc.	19.11	20.93	22.38	20.65	17.20	25.39
Natural Rubber	23.20	38.45	31.42	22.10	58.14	24.61
Motor Vehicles	39.90	17.27	20.32	27.16	27.19	24.22
Glass and Products	31.13	19.95	28.68	44.91	31.31	24.15
Inorganic Chemicals	27.37	19.13	19.92	18.80	21.18	24.11
Other Agriculture	21.80	23.36	23.91	21.35	20.59	23.84
Printing and Publishing	24.58	21.29	22.15	32.22	25.89	23.11
Furniture and Fixtures	26.22	23.90	24.28	30.95	23.77	22.77
Transport Equipment, nec.	20.28	19.61	29.88	22.83	41.18	20.41
Synthetic Resins	19.00	16.53	19.16	19.08	16.94	18.94
Non-Ferrous Metals	17.72	19.67	25.62	28.21	18.34	18.53
Soap and Cleaning Preparations	17.65	18.88	21.51	19.93	18.24	18.32
Fertilizers and Pesticides	21.04	19.44	16.96	27.49	19.19	18.14
Textiles	16.29	15.87	16.06	18.30	16.96	16.50
Non-Metallic Products, nec.	45.06	44.91	38.52	47.53	23.86	16.41
Petroleum Refineries	2.04	3.84	4.08	7.80	7.09	15.23
Other Food	6.76	6.38	6.29	8.07	8.26	10.93
Tobacco	11.90	15.27	10.30	10.18	11.74	10.41
Meat/Dairy/Fish Requiring Refrigeration	7.73	7.46	7.57	7.09	6.67	8.98
Iron and Steel	4.33	4.22	6.43	7.40	6.77	7.32
Paints, Varnishes and Lacquers	11.36	8.92	12.42	13.13	12.61	7.28
Ores and Scrap	9.79	10.33	17.72	17.03	11.05	7.07
Beverages	3.25	2.63	2.47	2.97	9.57	5.74
Footwear	27.36	29.51	29.90	30.93	16.64	5.23
Stone, Clay and Other Crude Minerals	8.56	7.63	6.25	6.40	6.72	5.14
Other Meat/Dairy/Fish/Fruit/Vegetables	3.70	3.36	3.91	4.01	3.67	4.49
Wood Products	4.99	3.03	4.54	3.96	3.89	4.42
Residual Petroleum Products	3.09	3.81	2.85	2.83	7.75	4.38
Paper and Paperboard and Products	3.07	2.86	2.96	3.40	3.37	3.95
Vegetables, Fruits and Eggs - req Refrigeration	3.18	3.47	3.62	3.34	3.41	3.36
Cotton	3.45	2.17	1.87	1.65	2.07	3.23
Other Raw Textile Materials	2.86	0.92	2.33	2.30	4.96	2.88
Animal and Vegetable Oils	2.02	1.69	0.79	2.18	3.67	2.67
Sugar	1.67	1.87	1.43	2.59	2.05	1.83
Animal Feed	2.68	2.02	1.63	2.41	1.73	1.70
Cork and Wood	1.39	1.01	1.26	1.04	1.25	1.36
Pulp	0.58	1.18	0.87	1.45	3.50	1.19
Grain	0.91	0.83	1.11	0.88	1.16	1.12
Vegetables and Fruits - non-Refrigerated	1.49	1.64	1.63	1.03	1.19	1.06
Oil Seeds	0.83	0.79	0.64	0.71	0.76	0.95
Crude Fertilizers	0.73	0.73	0.73	0.73	0.73	0.73
Natural Gas	12.80	6.33	7.76	6.69	5.85	0.52
Scrap	2.79	2.51	2.06	0.87	0.78	0.38
Waste Paper	0.29	0.29	0.26	0.24	0.18	0.24
Briquettes and Coke	-	0.07	-	-	1.50	0.00
Coal	0.05	0.22	0.15	-	-	-
Crude Petroleum	-	-	-	-	-	-

(thousand US\$/ton) source: Global Insight

表-A. 14 欧州発の貿易を対象とした品目別航空貿易財単価

	1998	1999	2000	2001	2002	2003
Semi-conductors, Electronic Tubes,etc	415.19	310.16	471.35	607.53	711.78	771.12
Aircraft	720.08	381.05	600.26	598.73	677.96	722.63
Other Manufacturing, nes.	283.93	353.47	350.41	242.35	378.14	440.60
Watches and Clocks	158.92	161.91	163.18	165.88	163.99	173.18
Other Communications Equipment	204.86	183.20	173.55	184.14	159.92	158.67
Radio and TV	114.16	127.33	134.21	109.72	153.75	155.33
Organic Chemicals	208.71	225.43	217.48	190.88	137.45	146.93
Office and Computing Machinery	146.27	173.13	153.38	145.68	136.49	129.79
Professional Equipment	122.29	122.08	119.81	118.53	111.32	128.71
Drugs and Medicines	96.54	93.44	99.71	103.67	112.84	124.99
Engines and Turbines	91.75	107.75	105.75	98.31	97.88	112.23
Photographic and Optical Goods	78.11	84.82	102.16	82.21	97.78	112.23
Leather and Products	44.07	40.67	38.64	49.73	51.51	57.75
Special Industrial Machinery	47.30	58.92	52.60	46.66	44.71	52.41
Ores and Scrap	76.13	87.20	45.33	139.83	48.45	48.81
Inorganic Chemicals	68.85	70.64	79.70	57.19	33.30	40.42
Electrical Industrial Machinery	36.91	39.25	37.41	35.74	33.26	39.76
Machinery and Equipment, nec.	37.73	42.02	38.06	36.15	34.05	39.24
Electrical Apparatus, nec.	35.82	37.44	37.64	33.68	29.50	34.27
Railroad Equipment	47.53	39.13	38.22	26.24	30.29	32.95
Metal and Wood Working Machinery	27.13	30.97	26.96	28.18	27.14	32.19
Wearing Apparel	38.60	36.33	37.13	38.11	29.47	30.69
Footwear	29.30	28.38	26.62	29.31	25.88	27.20
Pottery, China etc.	23.29	23.43	21.54	21.30	19.92	22.68
Electrical Appliances and Houseware	21.74	28.95	26.98	24.12	16.63	19.01
Tobacco	22.40	22.01	20.33	18.90	17.87	18.40
Soap and Cleaning Preparations	20.43	20.01	17.60	16.60	15.13	16.68
Transport Equipment, nec.	20.49	18.84	13.24	14.16	13.97	15.83
Textiles	25.75	23.59	21.86	22.84	14.80	15.44
Non-Ferrous Metals	30.73	33.12	41.21	22.08	14.25	14.76
Non-Metallic Products, nec.	22.62	21.27	19.29	22.64	12.15	13.64
Parts of Motor Vehicles	13.78	14.50	13.38	13.27	11.41	12.46
Plastic Products, nec.	15.37	14.92	12.41	11.63	9.78	11.50
Motor Vehicles	11.17	10.51	11.00	10.65	11.31	11.44
Glass and Products	14.47	14.93	14.09	16.42	9.92	11.04
Goods not classified by kind	5.38	7.43	11.99	11.52	12.59	10.93
Chemical Products, nec.	14.91	14.62	15.00	12.77	9.68	10.31
Animal and Vegetable Oils	3.60	4.24	4.42	7.06	7.43	10.12
Rubber Products	12.66	11.17	10.88	10.94	8.31	9.61
Animal Feed	7.89	7.66	5.50	8.70	7.96	9.32
Printing and Publishing	15.84	5.59	14.78	14.15	8.67	9.27
Paints, Varnishes and Lacquers	12.15	11.05	9.91	10.14	8.12	8.65
Agricultural Machinery	10.92	9.82	9.57	8.41	7.61	8.29
Furniture and Fixtures	10.23	11.43	9.32	10.51	6.88	7.79
Metal Products	14.43	14.20	13.29	12.32	6.69	7.69
Other Agriculture	6.48	6.51	7.74	6.09	6.10	7.39
Beverages	6.18	6.60	6.70	6.76	6.06	7.06
Synthetic Resins	8.55	7.58	6.82	6.67	5.96	6.96
Motorcycles and Bicycles	14.69	18.54	18.42	16.70	5.81	6.04
Natural Rubber	7.67	4.50	5.50	7.33	2.33	6.00
Residual Petroleum Products	39.00	-	-	17.00	5.00	6.00
Crude Fertilizers	4.75	4.33	24.00	1.20	4.38	5.57
Stone, Clay and Other Crude Minerals	6.35	5.87	4.54	4.52	4.72	5.04
Petroleum Refineries	3.65	3.35	2.87	3.12	3.84	4.90
Fertilizers and Pesticides	2.64	3.56	5.14	4.16	3.06	4.31
Other Meat/Dairy/Fish/Fruit/Vegetables	4.86	4.09	3.89	4.21	3.53	4.04
Other Food	3.97	3.25	3.62	4.03	2.83	3.24
Cotton	5.25	2.93	3.18	2.00	2.11	3.00
Meat/Dairy/Fish Requiring Refrigeration	2.74	2.83	2.65	2.73	2.59	2.89
Paper and Paperboard and Products	6.96	6.60	6.32	6.19	2.34	2.56
Iron and Steel	2.62	2.03	2.16	2.08	1.79	1.97
Sugar	1.44	1.03	1.18	0.87	1.68	1.78
Shipbuilding and Repairing	1.82	4.34	1.13	2.07	1.53	1.50
Cork and Wood	4.97	3.61	2.76	2.76	1.27	1.47
Coal	1.68	1.67	1.69	1.69	1.35	1.45
Wood Products	3.64	2.73	1.97	1.71	1.22	1.36
Other Raw Textile Materials	1.04	1.10	1.03	0.79	0.94	1.16
Vegetables, Fruits and Eggs - req Refrigeration	2.62	2.55	2.30	2.60	0.86	0.83
Oil Seeds	0.54	1.49	0.63	0.47	0.74	0.83
Grain	0.38	0.71	0.66	0.26	0.66	0.72
Vegetables and Fruits - non-Refrigerated	0.95	0.93	0.75	0.62	0.31	0.35
Waste Paper	0.06	0.10	0.17	0.11	0.14	0.20
Briquettes and Coke	-	-	-	-	-	-
Crude Petroleum	-	-	-	-	-	-
Natural Gas	-	-	-	-	-	-
Pulp	-	-	-	-	-	-
Scrap	-	-	-	-	-	-

(thousand US\$/ton) source: Global Insight

輸送機関分担と単価に着目した国際貿易の品目間類似性および異質性に関する分析
 / 石倉智樹・柴崎隆一・米本清

表-A. 15 全世界の貿易を対象とした品目別単価差（航空貿易財—全輸送機関）

	1998	1999	2000	2001	2002	2003
Organic Chemicals	127.94	138.32	138.59	145.21	136.60	145.99
Drugs and Medicines	74.06	66.34	92.03	93.10	106.53	108.37
Engines and Turbines	94.48	92.41	90.77	107.45	96.50	101.99
Other Communications Equipment	71.21	73.41	84.20	89.26	87.37	84.74
Professional Equipment	85.88	86.94	99.89	83.94	81.38	79.74
Other Manufacturing, nes.	70.18	65.50	72.58	73.10	76.42	78.91
Semi-conductors, Electronic Tubes,etc	183.00	175.95	186.73	122.19	75.23	74.50
Watches and Clocks	66.72	64.79	64.41	71.64	66.36	71.98
Aircraft	-115.06	-124.94	-41.25	-76.12	-78.39	66.84
Special Industrial Machinery	63.04	79.04	100.12	78.70	63.58	59.64
Office and Computing Machinery	86.47	75.74	78.48	65.46	54.80	52.13
Radio and TV	47.55	40.72	44.85	55.07	54.29	49.80
Photographic and Optical Goods	52.29	52.31	53.26	55.79	47.62	44.30
Chemical Products, nec.	47.08	40.02	42.33	44.56	44.17	38.74
Electrical Apparatus, nec.	40.88	39.99	52.65	44.89	39.95	38.00
Metal and Wood Working Machinery	34.35	43.41	52.91	40.05	38.97	35.03
Goods not classified by kind	21.58	31.22	68.76	22.59	33.87	32.78
Machinery and Equipment, nec.	25.95	28.75	30.31	28.51	24.74	25.23
Railroad Equipment	25.35	24.72	24.27	24.64	26.06	25.21
Inorganic Chemicals	26.38	21.49	22.39	20.21	18.32	19.58
Fertilizers and Pesticides	14.91	15.56	11.87	18.75	12.56	18.35
Non-Ferrous Metals	34.70	32.00	46.39	30.27	17.78	17.10
Electrical Industrial Machinery	28.55	26.67	30.13	22.38	16.59	16.05
Ores and Scrap	14.68	15.88	19.75	16.72	14.94	15.51
Glass and Products	14.64	11.47	18.35	22.46	14.82	13.82
Rubber Products	14.62	14.16	13.69	14.55	12.63	13.39
Non-Metallic Products, nec.	18.46	16.47	18.28	16.60	13.92	12.43
Leather and Products	13.50	12.15	13.77	14.03	11.46	12.38
Electrical Appliances and Houseware	17.52	15.79	15.64	15.36	12.09	12.17
Motorcycles and Bicycles	11.16	11.37	11.03	11.45	11.11	11.03
Soap and Cleaning Preparations	12.50	11.83	11.29	11.25	10.50	10.53
Transport Equipment, nec.	12.95	13.68	10.37	12.99	13.35	9.95
Printing and Publishing	11.89	9.84	10.17	14.81	10.82	9.77
Synthetic Resins	9.94	9.47	10.20	9.63	8.96	9.64
Agricultural Machinery	8.79	10.11	9.00	11.54	8.88	8.82
Parts of Motor Vehicles	10.96	11.24	9.50	10.60	9.08	8.80
Motor Vehicles	7.79	5.98	6.47	7.00	8.00	8.20
Furniture and Fixtures	9.57	8.81	8.33	8.67	8.01	8.00
Wearing Apparel	8.34	8.48	8.95	8.38	7.66	7.88
Paints, Varnishes and Lacquers	10.56	9.14	10.31	10.17	9.09	7.60
Textiles	10.20	9.86	9.90	9.01	7.49	7.35
Metal Products	14.05	9.88	11.13	8.37	6.91	7.06
Other Food	5.19	4.49	4.61	5.13	5.08	7.00
Plastic Products, nec.	10.72	10.41	10.21	8.05	6.46	6.70
Pottery, China etc.	8.21	7.50	6.63	6.23	5.84	6.70
Stone, Clay and Other Crude Minerals	9.43	7.73	6.94	7.09	6.72	6.33
Petroleum Refineries	2.37	3.25	4.24	4.64	4.60	6.29
Footwear	8.49	9.28	9.09	9.26	7.69	5.96
Other Agriculture	4.81	5.02	5.17	4.63	4.80	5.00
Tobacco	12.34	12.12	11.23	10.32	3.68	4.15
Residual Petroleum Products	3.39	3.47	2.33	2.67	7.59	4.04
Beverages	3.29	3.32	3.17	3.89	4.63	3.95
Other Meat/Dairy/Fish/Fruit/Vegetables	3.64	3.17	3.45	3.58	3.19	3.73
Natural Rubber	2.82	2.30	2.52	2.37	2.59	3.68
Animal and Vegetable Oils	3.01	2.68	1.44	2.02	2.65	2.83
Wood Products	2.90	2.37	2.67	2.23	2.23	2.42
Paper and Paperboard and Products	3.52	3.49	3.36	3.35	2.27	2.33
Meat/Dairy/Fish Requiring Refrigeration	2.48	2.49	2.40	2.25	1.93	2.02
Cotton	0.94	1.06	1.49	1.26	1.39	1.83
Shipbuilding and Repairing	1.75	1.74	1.94	1.70	1.86	1.78
Iron and Steel	1.69	1.55	1.80	1.90	1.41	1.48
Coal	0.63	0.81	0.68	1.66	1.42	1.42
Vegetables, Fruits and Eggs - req Refrigeration	0.87	1.37	1.29	1.12	1.05	1.09
Sugar	1.23	0.99	0.97	1.35	1.05	1.02
Pulp	0.15	0.74	0.34	1.03	3.09	0.85
Grain	0.99	0.84	0.72	0.82	0.77	0.79
Oil Seeds	0.66	0.68	0.55	0.55	0.55	0.66
Other Raw Textile Materials	0.49	0.26	-0.04	0.20	0.49	0.65
Crude Fertilizers	0.48	0.62	0.62	0.62	0.62	0.61
Animal Feed	0.60	0.76	0.82	0.92	0.59	0.56
Cork and Wood	0.55	0.54	0.54	0.42	0.46	0.47
Briquettes and Coke	0.27	0.19	0.29	0.31	0.29	0.30
Vegetables and Fruits - non-Refrigerated	0.11	0.10	0.14	0.16	0.30	0.29
Natural Gas	9.48	4.48	7.19	6.74	1.54	0.29
Scrap	2.88	2.49	1.63	0.93	0.63	0.18
Waste Paper	0.04	0.05	0.08	0.05	0.06	0.09
Crude Petroleum	-	-	-	-	-	-

(thousand US\$/ton) source: Global Insight

表-A.16 アジア発の貿易を対象とした品目別単価差（航空貿易財－全輸送機関）

	1998	1999	2000	2001	2002	2003
Organic Chemicals	161.35	181.85	182.03	187.43	197.53	201.68
Drugs and Medicines	49.49	81.21	100.69	102.16	120.48	134.49
Chemical Products, nec.	121.90	121.91	125.33	123.39	107.67	120.64
Other Communications Equipment	47.67	55.70	66.76	72.69	75.11	75.49
Ores and Scrap	43.14	47.63	54.16	50.17	54.12	62.49
Engines and Turbines	61.94	56.84	57.06	68.43	58.53	61.64
Watches and Clocks	55.23	51.03	49.77	55.18	48.43	53.76
Radio and TV	47.00	40.34	44.55	54.09	53.82	49.46
Office and Computing Machinery	74.95	64.15	65.44	53.31	47.30	45.14
Other Manufacturing, nes.	39.82	37.41	39.48	42.91	40.50	40.60
Goods not classified by kind	26.45	43.15	94.80	68.30	44.60	40.29
Photographic and Optical Goods	49.21	49.02	46.19	49.16	38.59	36.22
Electrical Apparatus, nec.	43.57	44.56	51.01	40.44	33.26	31.33
Special Industrial Machinery	39.22	42.97	48.70	42.53	33.88	30.76
Semi-conductors, Electronic Tubes, etc	108.28	101.67	108.57	60.17	31.94	28.41
Professional Equipment	25.64	32.57	35.68	24.65	26.08	25.84
Fertilizers and Pesticides	6.42	6.15	5.88	7.61	5.15	22.47
Metal and Wood Working Machinery	20.43	24.20	29.87	27.07	23.84	20.00
Machinery and Equipment, nec.	18.53	20.54	21.21	18.67	16.42	16.40
Inorganic Chemicals	21.92	20.15	21.76	18.54	13.93	14.29
Other Food	7.66	5.92	6.66	7.34	8.53	12.60
Rubber Products	14.79	14.12	12.73	13.89	11.77	12.38
Non-Metallic Products, nec.	11.69	10.88	13.72	11.69	11.60	11.72
Non-Ferrous Metals	29.97	19.41	31.74	17.83	11.88	11.63
Glass and Products	11.98	9.47	15.61	18.11	11.16	11.53
Tobacco	4.04	5.86	6.97	6.83	10.50	11.12
Motorcycles and Bicycles	10.86	10.86	10.94	11.17	10.73	10.87
Electrical Appliances and Houseware	17.59	14.80	13.77	13.88	10.66	10.77
Electrical Industrial Machinery	22.94	20.81	25.02	16.68	11.26	10.51
Paints, Varnishes and Lacquers	12.02	11.00	12.43	11.19	10.16	9.87
Transport Equipment, nec.	11.02	11.95	9.41	11.45	9.04	8.66
Footwear	6.82	7.63	7.46	7.57	6.70	7.95
Synthetic Resins	8.42	8.29	8.87	8.12	7.36	7.75
Motor Vehicles	6.36	6.54	6.58	6.57	7.01	7.58
Furniture and Fixtures	8.29	7.47	6.90	7.46	7.30	7.53
Wearing Apparel	7.00	7.23	7.38	6.97	6.34	6.58
Stone, Clay and Other Crude Minerals	9.59	7.59	6.84	6.42	5.86	5.70
Parts of Motor Vehicles	6.75	7.19	7.24	6.52	6.20	5.66
Railroad Equipment	-1.82	0.19	12.33	5.26	19.28	5.58
Pottery, China etc.	6.57	5.84	5.26	4.95	4.58	5.31
Leather and Products	4.89	4.20	3.97	3.97	4.25	5.18
Metal Products	11.55	7.62	9.08	6.28	5.01	4.96
Textiles	8.49	7.93	7.81	6.34	5.10	4.94
Plastic Products, nec.	8.25	8.09	7.21	5.34	4.32	4.45
Petroleum Refineries	2.52	3.02	4.20	4.00	3.81	4.33
Soap and Cleaning Preparations	6.65	5.47	5.13	4.82	4.53	4.24
Other Meat/Dairy/Fish/Fruit/Vegetables	3.67	3.59	3.23	3.73	3.60	3.81
Natural Rubber	2.78	2.23	2.44	2.32	2.54	3.71
Other Agriculture	4.20	4.01	4.12	3.71	4.04	3.70
Scrap	8.13	25.50	0.13	0.86	0.61	3.26
Animal and Vegetable Oils	3.04	2.83	2.08	1.61	2.25	2.80
Wood Products	2.50	2.45	2.50	2.17	2.52	2.70
Residual Petroleum Products	8.61	1.39	1.23	1.96	7.20	1.73
Paper and Paperboard and Products	2.82	3.24	2.84	2.59	1.83	1.68
Printing and Publishing	0.41	2.46	1.36	0.84	1.74	1.67
Shipbuilding and Repairing	1.56	1.48	1.53	1.31	1.63	1.52
Vegetables, Fruits and Eggs - req Refrigeration	0.61	0.72	0.64	0.69	0.86	1.04
Iron and Steel	1.28	1.15	1.25	1.65	0.94	0.98
Grain	0.76	0.72	0.67	0.73	0.60	0.70
Sugar	1.15	0.96	0.82	0.68	0.57	0.55
Briquettes and Coke	0.27	0.21	0.25	0.28	0.26	0.29
Agricultural Machinery	5.12	4.41	-0.77	2.75	1.81	0.03
Crude Fertilizers	-1.12	10.95	3.50	3.03	0.18	0.00
Natural Gas	1.44	0.97	1.64	-	0.21	-0.10
Vegetables and Fruits - non-Refrigerated	-0.43	-0.37	-0.37	-0.29	-0.17	-0.12
Cork and Wood	-0.06	-0.02	-0.39	-0.32	-0.13	-0.13
Beverages	-3.00	-1.45	-1.44	-1.27	-0.23	-0.22
Waste Paper	-0.26	-0.41	-0.44	-0.23	-0.22	-0.30
Animal Feed	-0.86	-0.31	-0.19	-0.10	-0.43	-0.52
Meat/Dairy/Fish Requiring Refrigeration	-1.95	-2.05	-2.18	-1.62	-1.28	-1.37
Oil Seeds	-5.56	-4.11	-4.36	-3.94	-3.49	-7.16
Other Raw Textile Materials	-11.71	-11.60	-10.60	-7.79	-9.59	-8.09
Cotton	-24.57	-10.00	-5.62	-21.88	-8.39	-10.40
Aircraft	-1141.91	-1192.45	-851.05	-1585.12	-1845.80	-2094.38
Coal	-	-	-	-	-	-
Crude Petroleum	-	-	-	-	-	-
Pulp	-	-	-	-	-	-

(thousand US\$/ton) source: Global Insight

輸送機関分担と単価に着目した国際貿易の品目間類似性および異質性に関する分析
 / 石倉智樹・柴崎隆一・米本清

表-A. 17 北米発の貿易を対象とした品目別単価差（航空貿易財—全輸送機関）

	1998	1999	2000	2001	2002	2003
Semi-conductors, Electronic Tubes,etc	1180.98	1056.68	848.45	669.70	454.18	347.21
Engines and Turbines	227.10	219.00	218.11	261.18	232.26	267.56
Office and Computing Machinery	62.23	61.81	84.88	92.97	99.56	117.89
Metal and Wood Working Machinery	81.34	95.95	114.10	114.62	116.77	115.56
Watches and Clocks	109.64	106.64	105.46	140.76	145.71	113.06
Other Communications Equipment	90.15	111.44	99.21	93.72	103.56	104.09
Special Industrial Machinery	91.96	106.19	133.96	123.29	106.50	101.68
Electrical Apparatus, nec.	29.98	21.47	62.92	90.23	93.06	95.40
Other Manufacturing, nes.	87.71	76.63	89.30	100.66	87.98	91.56
Drugs and Medicines	98.95	89.69	97.50	81.62	104.44	86.38
Photographic and Optical Goods	76.74	75.06	88.37	94.75	85.49	81.52
Radio and TV	50.15	45.39	47.42	112.38	61.52	74.33
Professional Equipment	91.64	87.98	85.10	88.68	69.66	69.47
Goods not classified by kind	32.32	12.41	54.90	1.20	5.10	69.34
Electrical Industrial Machinery	55.59	61.79	54.95	51.65	51.53	51.02
Machinery and Equipment, nec.	37.33	39.51	44.01	43.17	33.09	37.40
Leather and Products	27.45	27.88	36.67	39.27	21.10	34.74
Organic Chemicals	27.79	26.35	23.68	28.05	23.83	30.46
Electrical Appliances and Houseware	19.21	21.77	28.37	26.32	29.43	29.00
Rubber Products	21.09	21.11	29.06	29.96	24.80	28.43
Metal Products	27.63	26.35	23.04	23.59	23.90	26.13
Chemical Products, nec.	31.21	23.17	25.33	27.40	29.20	23.65
Natural Rubber	17.58	34.33	25.88	17.09	56.88	23.45
Inorganic Chemicals	26.39	18.21	18.95	17.80	20.11	23.06
Other Agriculture	18.14	19.77	20.64	18.61	17.84	21.07
Agricultural Machinery	12.04	19.41	20.07	21.75	16.87	20.60
Plastic Products, nec.	16.72	17.30	19.99	19.68	16.52	20.07
Shipbuilding and Repairing	14.96	14.17	39.21	37.25	4.99	19.88
Railroad Equipment	12.33	18.60	10.90	17.12	14.72	19.16
Glass and Products	27.01	15.56	22.44	38.05	25.70	18.77
Pottery, China etc.	13.48	15.01	16.17	14.25	10.79	18.73
Fertilizers and Pesticides	20.89	19.28	16.78	27.29	19.00	17.93
Synthetic Resins	17.38	14.97	17.53	17.61	15.46	17.44
Transport Equipment, nec.	16.94	15.87	25.95	17.81	34.28	17.01
Parts of Motor Vehicles	16.58	17.29	10.29	20.33	14.17	15.60
Non-Ferrous Metals	14.77	16.61	22.07	24.33	15.15	15.21
Petroleum Refineries	1.87	3.66	3.82	7.61	6.90	14.99
Non-Metallic Products, nec.	43.46	43.40	36.37	45.93	22.52	14.92
Motor Vehicles	28.66	7.29	9.17	16.08	16.39	14.74
Motorcycles and Bicycles	13.18	14.71	18.76	19.38	16.59	13.98
Soap and Cleaning Preparations	13.18	14.56	16.94	15.03	13.39	13.48
Furniture and Fixtures	17.16	16.20	16.53	21.27	13.56	13.00
Textiles	11.36	11.18	11.26	13.82	12.87	12.44
Printing and Publishing	9.50	8.24	9.76	15.52	12.68	10.92
Other Food	5.60	5.21	5.09	6.72	6.83	9.10
Ores and Scrap	9.63	10.15	17.49	16.84	10.84	6.84
Meat/Dairy/Fish Requiring Refrigeration	5.91	5.44	5.71	5.41	4.93	6.74
Wearing Apparel	3.81	4.02	4.18	4.93	4.97	6.58
Iron and Steel	3.32	3.59	5.51	6.15	5.19	6.45
Stone, Clay and Other Crude Minerals	8.47	7.55	6.17	6.31	6.64	5.06
Beverages	2.36	1.70	1.59	2.11	8.83	5.00
Paints, Varnishes and Lacquers	8.17	5.78	9.17	10.07	9.73	4.52
Residual Petroleum Products	3.04	3.76	2.78	2.76	7.68	4.29
Tobacco	1.33	4.18	-1.85	1.79	5.16	3.63
Paper and Paperboard and Products	2.39	2.19	2.23	2.66	2.66	3.25
Other Meat/Dairy/Fish/Fruit/Vegetables	2.24	1.91	2.43	2.56	2.24	3.10
Wood Products	3.79	1.92	3.32	2.72	2.54	3.00
Vegetables, Fruits and Eggs - req Refrigeration	2.41	2.60	2.81	2.53	2.59	2.53
Animal and Vegetable Oils	1.38	1.18	0.36	1.76	3.24	2.14
Cotton	1.97	1.00	0.71	0.58	1.14	1.98
Animal Feed	2.46	1.81	1.43	2.18	1.49	1.45
Sugar	1.22	1.29	0.75	1.95	1.43	1.17
Cork and Wood	1.21	0.83	1.07	0.83	1.03	1.11
Grain	0.79	0.72	1.00	0.77	1.03	0.99
Oil Seeds	0.58	0.58	0.44	0.51	0.55	0.68
Pulp	0.12	0.72	0.37	0.97	3.04	0.67
Vegetables and Fruits - non-Refrigerated	0.79	1.03	1.03	0.56	0.59	0.47
Natural Gas	12.68	6.21	7.63	6.56	5.70	0.37
Waste Paper	0.20	0.20	0.15	0.16	0.09	0.14
Scrap	2.48	2.23	1.70	0.59	0.53	0.10
Crude Fertilizers	0.00	0.00	0.00	0.00	0.00	0.00
Briquettes and Coke	-	0.01	-	-	1.45	-0.18
Footwear	6.42	7.47	8.76	13.79	2.78	-0.65
Other Raw Textile Materials	-1.72	-2.45	-0.99	-1.16	2.05	-0.96
Aircraft	-417.12	-298.17	-130.93	-264.67	-423.42	-201.63
Coal	0.00	0.18	0.11	-	-	-
Crude Petroleum	-	-	-	-	-	-

(thousand US\$/ton) source: Global Insight

表-A. 18 欧州発の貿易を対象とした品目別単価差（航空貿易財—全輸送機関）

	1998	1999	2000	2001	2002	2003
Semi-conductors, Electronic Tubes,etc	164.82	138.14	237.30	351.69	419.07	469.66
Other Manufacturing, nes.	191.04	253.03	241.25	161.23	273.16	323.89
Organic Chemicals	204.62	221.10	213.47	187.15	134.76	144.09
Aircraft	107.92	-54.45	-99.92	13.17	102.18	140.54
Radio and TV	88.38	94.12	100.03	80.83	126.26	129.66
Engines and Turbines	70.53	82.31	80.78	74.65	72.96	84.32
Other Communications Equipment	81.72	60.40	64.65	64.58	62.82	65.56
Office and Computing Machinery	42.97	79.73	64.90	63.02	63.66	64.95
Watches and Clocks	63.08	63.20	62.98	62.25	59.88	62.98
Photographic and Optical Goods	38.92	45.51	57.34	43.95	52.35	61.19
Ores and Scrap	76.05	87.11	45.26	139.75	48.38	48.72
Inorganic Chemicals	67.72	69.32	78.02	55.96	32.51	39.49
Leather and Products	33.34	30.47	25.41	36.01	32.78	37.41
Special Industrial Machinery	33.14	41.64	38.01	32.95	31.30	37.16
Railroad Equipment	40.72	32.26	33.29	23.61	28.86	31.51
Machinery and Equipment, nec.	21.53	24.37	22.56	21.67	20.69	24.39
Drugs and Medicines	9.67	15.29	8.52	31.54	23.56	23.92
Electrical Apparatus, nec.	19.24	23.55	22.42	18.94	17.52	21.60
Electrical Industrial Machinery	19.36	20.10	18.93	18.00	17.38	21.42
Pottery, China etc.	18.68	17.91	16.74	17.22	16.28	18.83
Metal and Wood Working Machinery	13.17	16.51	15.43	15.91	15.03	18.32
Transport Equipment, nec.	16.80	15.20	10.47	11.73	11.71	13.44
Tobacco	15.06	16.89	15.09	13.96	12.72	13.23
Non-Metallic Products, nec.	21.98	20.37	18.58	21.90	11.65	13.13
Non-Ferrous Metals	26.69	29.51	37.10	19.44	12.51	13.01
Electrical Appliances and Houseware	13.51	19.78	18.56	15.65	10.80	12.84
Soap and Cleaning Preparations	15.31	14.07	12.31	11.65	10.76	12.37
Footwear	8.30	7.84	9.85	10.78	11.23	11.87
Textiles	19.77	17.24	16.62	17.21	10.72	11.31
Glass and Products	12.46	12.69	12.21	14.65	8.65	9.75
Animal and Vegetable Oils	2.87	3.66	3.89	6.51	6.72	9.25
Chemical Products, nec.	12.70	12.52	12.77	10.87	8.31	8.86
Animal Feed	7.19	6.93	4.91	8.03	7.35	8.62
Professional Equipment	5.14	4.10	5.26	4.67	3.98	8.50
Plastic Products, nec.	10.72	10.12	8.31	8.28	6.96	8.45
Goods not classified by kind	4.09	5.58	10.01	8.20	8.88	7.26
Paints, Varnishes and Lacquers	9.12	7.86	7.22	7.64	6.12	6.60
Rubber Products	8.55	7.12	7.17	7.16	5.15	6.02
Residual Petroleum Products	38.78	-	-	16.82	4.81	5.78
Synthetic Resins	6.81	6.16	5.38	5.27	4.84	5.70
Crude Fertilizers	4.63	4.26	23.90	1.01	4.25	5.43
Beverages	4.14	4.06	4.35	4.57	4.20	5.14
Printing and Publishing	10.94	2.25	8.78	8.40	4.60	5.12
Stone, Clay and Other Crude Minerals	6.31	5.81	4.49	4.48	4.68	5.00
Petroleum Refineries	3.21	2.99	2.54	2.74	3.43	4.38
Other Agriculture	3.29	3.22	4.23	3.24	3.38	4.37
Metal Products	8.46	7.94	7.67	7.20	3.64	4.35
Natural Rubber	5.85	3.52	4.51	5.88	1.13	4.22
Fertilizers and Pesticides	2.32	3.29	4.80	3.86	2.84	4.05
Furniture and Fixtures	4.69	5.41	4.44	5.40	3.14	3.80
Parts of Motor Vehicles	2.84	3.38	3.96	3.72	2.91	3.14
Other Meat/Dairy/Fish/Fruit/Vegetables	3.61	2.83	2.58	2.89	2.40	2.84
Agricultural Machinery	3.16	3.68	4.80	3.41	2.37	2.72
Other Food	2.85	2.43	2.71	2.93	1.89	2.20
Cotton	3.94	1.73	2.09	0.89	1.15	1.94
Wearing Apparel	1.19	0.45	7.23	7.20	1.79	1.89
Paper and Paperboard and Products	5.85	5.66	5.34	5.25	1.70	1.88
Iron and Steel	2.04	1.61	1.74	1.64	1.39	1.55
Meat/Dairy/Fish Requiring Refrigeration	1.09	1.37	1.16	1.32	1.32	1.54
Sugar	1.10	0.82	0.93	0.60	1.42	1.52
Coal	1.67	1.66	1.69	1.69	1.34	1.44
Cork and Wood	4.48	3.11	2.34	2.43	0.99	1.18
Motor Vehicles	-1.39	-3.86	-1.48	-0.13	0.82	1.02
Wood Products	2.41	1.77	1.21	1.01	0.68	0.78
Shipbuilding and Repairing	0.63	2.23	0.58	1.35	0.72	0.63
Grain	0.27	0.61	0.57	0.15	0.55	0.63
Oil Seeds	0.23	1.27	0.41	0.21	0.49	0.54
Vegetables, Fruits and Eggs - req Refrigeration	1.91	2.04	1.78	2.05	0.42	0.38
Motorcycles and Bicycles	2.92	1.06	-0.09	2.68	0.20	0.24
Vegetables and Fruits - non-Refrigerated	0.48	0.66	0.46	0.29	0.11	0.15
Waste Paper	0.02	0.04	0.06	0.05	0.05	0.07
Other Raw Textile Materials	-0.50	-0.44	-0.69	-0.68	-0.58	-0.66
Briquettes and Coke	-	-	-	-	-	-
Crude Petroleum	-	-	-	-	-	-
Natural Gas	-	-	-	-	-	-
Pulp	-	-	-	-	-	-
Scrap	-	-	-	-	-	-

(thousand US\$/ton) source: Global Insight

付録 B 主成分分析の手法について

B.1 主成分分析の代数学的背景

P 種類のデータ変量を持つサンプル数 N の母集団データを想定する。主成分分析の目的は、これらのデータセットの特性を P 未満の数のデータ特性変量へ集約化、すなわちデータ特性の総合指標化を行い、データセットの持つ特徴の理解をより単純化することにある。

$$\Sigma = \begin{pmatrix} s_{11} & s_{12} & \cdots & s_{1P} \\ s_{21} & s_{22} & \cdots & s_{2P} \\ \vdots & \vdots & \ddots & \vdots \\ s_{P1} & s_{P2} & \cdots & s_{PP} \end{pmatrix} \quad (\text{B.4})$$

$$s_{ij} = \frac{1}{N-1} \left[\sum_{k=1}^N (x_{ki} - \bar{x}_i)(x_{kj} - \bar{x}_j) \right] \quad (\text{B.5})$$

表-B.1 多変量を持つデータサンプルの例

	変量1	変量2	...	変量P
標本1	x_{11}	x_{12}	...	x_{1P}
標本2	x_{21}	x_{22}	...	x_{2P}
⋮	⋮	⋮	...	⋮
標本N	x_{n1}	x_{n2}	...	x_{nP}

$$\bar{x}_i = \frac{\sum_{k=1}^N x_{ki}}{N} \quad (\text{B.6})$$

(2)の制約下で z の分散を最大化する問題は、ベクトル表記を用いると、次のように定義される。

$$\begin{aligned} \max_a \quad & \mathbf{a}'\Sigma\mathbf{a} \\ \text{s.t.} \quad & \mathbf{a}'\mathbf{a} = 1 \end{aligned} \quad (\text{B.7})$$

ある標本サンプル n の特性を P 変量の一次結合として表すことを考える。このとき、新たな特性変数を z として表せば、

$$z_n = a_1x_{n1} + a_2x_{n2} + \cdots + a_Px_{nP} \quad (\text{B.1})$$

と表現することができる。ここで、元の P 種の変量により与えられた情報量を、単一変量 z により代表させ、そのことによる情報量損失が最小化される条件は、

$$(a_1)^2 + (a_2)^2 + \cdots + (a_P)^2 = \sum_{p=1}^P (a_p)^2 = 1 \quad (\text{B.2})$$

という制約の下で、各サンプルについて算出された N 組の変量 z の分散が最大化されることである。変量 z の分散 $V\{z\}$ は、

$$V\{z\} = V\{\mathbf{a}'\mathbf{X}\} = \mathbf{a}'V\{\mathbf{X}\}\mathbf{a} = \mathbf{a}'\Sigma\mathbf{a} \quad (\text{B.3})$$

より、係数（行）ベクトル \mathbf{a} と標本サンプルの分散共分散行列 Σ を用いて表すことができる。ここで、分散共分散行列、分散共分散の不偏推定量、各変量の平均値は、以下のように定義されている。

この問題を解くため、以下の Lagrange 関数を定義する。

$$L = \mathbf{a}'\Sigma\mathbf{a} + \lambda \left[1 - \sum_{p=1}^P (a_p)^2 \right] = \mathbf{a}'\Sigma\mathbf{a} + \lambda(1 - \mathbf{a}'\mathbf{a}) \quad (\text{B.8})$$

一階の条件を整理すると、

$$(\Sigma - \lambda\mathbf{I})\mathbf{a} = \mathbf{0} \quad (\text{B.9})$$

という関係が得られる。（ただし、 \mathbf{I} は単位行列である）すなわち、総合評価指標となる新たな特性を定義するための一次結合の係数を求めることは、標本サンプルにおける分散共分散行列の固有方程式を解くことと等価な問題となる。

一般に、主成分分析の対象となるデータサンプルにおいて、 P 種の変量が全て独立であることは考えにくく、変量同士には相関が存在する。このため、(B.9)の固有方程式に対して、最大で P 個の固有値 $\lambda_1, \lambda_2, \dots, \lambda_P$ が存在し、それぞれに対応する固有ベクトルが求められる。また、分散共分散行列の全要素は非負であるため、全ての固有値は正の値となる。

固有値のうち最大の値となる λ_1 に対応する固有ベク

トルは、第1主成分と定義され、元のデータサンプルの特性を一軸へ変換した際に、情報量損失が最も少なく、すなわち総合評価指標として最も説明力を持つ新たな特性変数の方向ベクトル（元変量の一次変換の係数ベクトル）となる。また、固有値 λ_1 は、第1主成分に射影されたデータサンプルの分散と等しくなる。同様に、固有値の大きさが2番目以降のものに対応する固有ベクトルは、第2主成分以下、第3主成分、…と定義され、それぞれの固有値は各主成分に対応する分散を意味することとなる。

しかし、この方法でデータを分析すると、元の変量の単位によってデータの分散が変動するため、データ単位によって分析結果も影響されることとなる。このため、元変量のデータを標準化、すなわち、平均値0、分散1となるような変換を施した後に主成分分析を適用することで、単位による影響を除去することが可能となる。具体的には、

$$x_{np}^* = \frac{x_{np} - \bar{x}_p}{\sqrt{S_{pp}}} \quad (\text{B.10})$$

と変数変換することとなる。このような変数変換を行うことと等価な方法として、分散共分散行列 Σ の代わりに、相関行列

$$\mathbf{R} = \begin{pmatrix} 1 & r_{12} & \cdots & r_{1p} \\ r_{21} & 1 & \cdots & r_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ r_{p1} & r_{p2} & \cdots & 1 \end{pmatrix} \quad (\text{B.11})$$

r_{ij} : 変量 i と変量 j の相関係数

を用いて同様の計算を行う方法がある。この方法は、相関行列による主成分分析と呼ばれており、本論でもこちらの方法を用いることとしている。

B.2 主成分の採択基準

主成分分析の目的は、当初の変量データで表されていた特性を、より少ない変量指標へと変換し、データが持つ特徴をより理解しやすくすることである。したがって、適切に情報量を集約するために、選択する主成分の数を決定する必要がある。一般に、主成分分析においては、上述の分析で得られた固有値と、寄与率と呼ばれる指標が、その判断材料となる。その理解のために、主成分

析の直感的イメージを図示する。

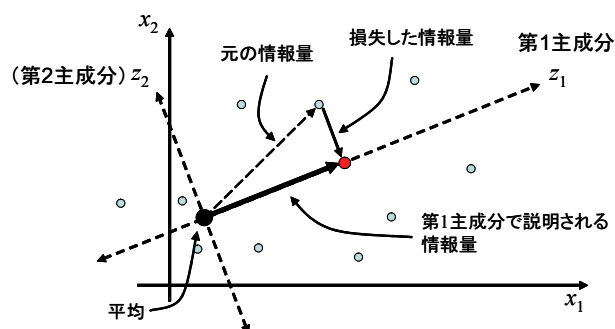


図-B.1 主成分分析のイメージ

図-B.1は、2変量である元データを、第1主成分 z_1 で定義される1変量へと集約した場合を示している。2変量データから固有方程式を解くと、2つの固有値とそれらに対応する固有ベクトルが得られる。第1主成分は、射影されたデータサンプルの分散が最大となるような方向ベクトルであり、その分散が対応する固有値であることは、先述のとおりである。第2主成分は、第1主成分と直行する方向ベクトルであり、同様に、対応する固有値が、第2主成分方向におけるデータの分散を意味している。元の2次元変量によるデータの情報を第1主成分のみで表すことは、第2主成分により表される情報を除去することと同義であるので、採択する主成分を選択することは、失われる情報を最小にとどめると解釈することもできる。

相関行列による主成分分析では、元の変量の分散が1と定義されているので、算出された主成分の分散が1未満、すなわち固有値が1未満である主成分は、元の変量以上の情報量を持つことはない。したがって、固有値が1以上であることが、主成分採択における一つの条件となる。また、主成分分析においては、主成分がデータをどれだけ説明できているかを表す尺度として、以下で定義される、各主成分の寄与率という指標が用いられる。

$$C_i = \frac{\lambda_i}{\sum_{j=1}^p \lambda_j} \quad (\text{B.12})$$

C_i : 第 i 主成分の寄与率

第1主成分の寄与率から第 i 主成分までの寄与率の和を、累積寄与率と呼ぶ。累積寄与率は、主成分の採択によって、損失せずに残った情報量の割合を意味する値である。このため、累積寄与率が極度に低くならない程度

の主成分数を選択するということが主成分分析における判断基準であるが、客観的な閾値は存在せず、分析者の主観に依存する。したがって、本論においても、分析結果の参考値として示すこととし、主成分の採択基準としては利用しないこととした。

B.3 因子負荷量

各主成分 z_i と、元の変量 x_j の相関係数は、因子負荷量と呼ばれる。相関行列による主成分分析の場合には、因子負荷量 $r(z_i, x_j)$ は、

$$r(z_i, x_j) = \sqrt{\lambda_i} \cdot a_{ij} \quad (\text{B.13})$$

と定義される。すなわち、因子負荷量は、各主成分に対して、元の各変量がどれだけ影響しているかの度合いと、影響度が正であるか負であるか、を意味する値である。したがって、算出された各主成分がどのような意味を持つ軸として解釈することができるか、という点について、得られた因子負荷量が判断材料となる。因子負荷量の絶対値が大きな変量は、対応する主成分との相関が高く、当該変量の持つ情報量の多くが主成分に反映されていると考えることができる。

付録 C クラスタ分析の結果

表-C.1 (航空分担率/財単価) と財単価の2変数によるクラスタ分析(4.2節)の結果

グループ		グループの特性
1	Aircraft	航空機, 財単価が大きい
2	Stone, Clay and Other Crude Minerals	石材等, 重量が大きい(航空分担率/単価が大きい)
3	Non-Metallic Products, nec.	非鉄金属製品等, 重量が大きい(航空分担率/単価が大きい)
4	Chemical Products, nec. Inorganic Chemicals Ores and Scrap Organic Chemicals	航空分担率/単価が大きい
5	Drugs and Medicines Office and Computing Machinery Other Communications Equipment Photographic and Optical Goods Professional Equipment Semi-conductors, Electronic Tubes, etc Watches and Clocks	財単価が大きい
6	Agricultural Machinery Animal and Vegetable Oils Animal Feed Beverages Briquettes and Coke Coal Cork and Wood Cotton Crude Fertilizers Crude Petroleum Electrical Apparatus, nec. Electrical Appliances and Houseware Electrical Industrial Machinery Engines and Turbines Fertilizers and Pesticides Footwear Furniture and Fixtures Glass and Products Goods not classified by kind Grain Iron and Steel Leather and Products Machinery and Equipment, nec. Meat/Dairy/Fish Requiring Refrigeration Metal and Wood Working Machinery Metal Products Motor Vehicles Motorcycles and Bicycles Natural Gas Natural Rubber Non-Ferrous Metals Oil Seeds Other Agriculture Other Food Other Manufacturing, nes. Other Meat/Dairy/Fish/Fruit/Vegetables Other Raw Textile Materials Paints, Varnishes and Lacquers Paper and Paperboard and Products Parts of Motor Vehicles Petroleum Refineries Plastic Products, nec. Pottery, China etc. Printing and Publishing Pulp Radio and TV Railroad Equipment Residual Petroleum Products Rubber Products Scrap Shipbuilding and Repairing Soap and Cleaning Preparations Special Industrial Machinery Sugar Synthetic Resins Textiles Tobacco Transport Equipment, nec. Vegetables and Fruits - non-Refrigerated Vegetables, Fruits and Eggs - req Refrigeration Waste Paper Wearing Apparel Wood Products	その他

輸送機関分担と単価に着目した国際貿易の品目間類似性および異質性に関する分析
 / 石倉智樹・柴崎隆一・米本清

表-C.2 主成分分析結果を用いたクラスター分析（4.4節）の結果（各年の比較）

グループ	1998	2000	2003	備考
1	Aircraft	Aircraft	Aircraft	航空機
2	Office and Computing Machinery Semi-conductors, Electronic Tubes,etc	Office and Computing Machinery Semi-conductors, Electronic Tubes,etc	Office and Computing Machinery Other Communications Equipment Semi-conductors, Electronic Tubes,etc	航空分担率:高 財単価:高 金額規模:大
3	Crude Petroleum	Crude Petroleum	Crude Petroleum	原油
4	Coal Iron and Steel Natural Gas Ores and Scrap Petroleum Refineries	Coal Iron and Steel Natural Gas Ores and Scrap Petroleum Refineries	Coal Iron and Steel Natural Gas Ores and Scrap Petroleum Refineries Machinery and Equipment, nec. Motor Vehicles	航空分担率:低 財単価:低 金額規模:大 重量規模:大
5	Drugs and Medicines Electrical Apparatus, nec. Electrical Industrial Machinery Engines and Turbines Goods not classified by kind Machinery and Equipment, nec. Motor Vehicles Other Communications Equipment Other Manufacturing, nes. Photographic and Optical Goods Professional Equipment Special Industrial Machinery Textiles Watches and Clocks Wearing Apparel	Drugs and Medicines Electrical Apparatus, nec. Electrical Industrial Machinery Engines and Turbines Goods not classified by kind Metal and Wood Working Machinery Other Communications Equipment Other Manufacturing, nes. Photographic and Optical Goods Professional Equipment Special Industrial Machinery Watches and Clocks Wearing Apparel	Drugs and Medicines Electrical Apparatus, nec. Electrical Industrial Machinery Engines and Turbines Goods not classified by kind Other Manufacturing, nes. Photographic and Optical Goods Professional Equipment Special Industrial Machinery Watches and Clocks Wearing Apparel	航空分担率:高 財単価:高
6	Agricultural Machinery Animal and Vegetable Oils Animal Feed Beverages Briquettes and Coke Chemical Products, nec. Cork and Wood Cotton Crude Fertilizers Electrical Appliances and Houseware Fertilizers and Pesticides Footwear Furniture and Fixtures Glass and Products Grain Inorganic Chemicals Leather and Products Meat/Dairy/Fish Requiring Refrigeration Metal and Wood Working Machinery Metal Products Motorcycles and Bicycles Natural Rubber Non-Ferrous Metals Non-Metallic Products, nec. Oil Seeds Organic Chemicals Other Agriculture Other Food Other Meat/Dairy/Fish/Fruit/Vegetables Other Raw Textile Materials Paints, Varnishes and Lacquers Paper and Paperboard and Products Parts of Motor Vehicles Plastic Products, nec. Pottery, China etc. Printing and Publishing Pulp Radio and TV Railroad Equipment Residual Petroleum Products Rubber Products Scrap Shipbuilding and Repairing Soap and Cleaning Preparations Stone, Clay and Other Crude Minerals Sugar Synthetic Resins Tobacco Transport Equipment, nec. Vegetables and Fruits - non-Refrigerated Vegetables, Fruits and Eggs - req Refrigeration Waste Paper Wood Products	Agricultural Machinery Animal and Vegetable Oils Animal Feed Beverages Briquettes and Coke Chemical Products, nec. Cork and Wood Cotton Crude Fertilizers Electrical Appliances and Houseware Fertilizers and Pesticides Footwear Furniture and Fixtures Glass and Products Grain Inorganic Chemicals Leather and Products Machinery and Equipment, nec. Meat/Dairy/Fish Requiring Refrigeration Metal Products Motor Vehicles Motorcycles and Bicycles Natural Rubber Non-Ferrous Metals Non-Metallic Products, nec. Oil Seeds Organic Chemicals Other Agriculture Other Food Other Meat/Dairy/Fish/Fruit/Vegetables Other Raw Textile Materials Paints, Varnishes and Lacquers Paper and Paperboard and Products Parts of Motor Vehicles Plastic Products, nec. Pottery, China etc. Printing and Publishing Pulp Radio and TV Railroad Equipment Residual Petroleum Products Rubber Products Scrap Shipbuilding and Repairing Soap and Cleaning Preparations Stone, Clay and Other Crude Minerals Sugar Synthetic Resins Textiles Tobacco Transport Equipment, nec. Vegetables and Fruits - non-Refrigerated Vegetables, Fruits and Eggs - req Refrigeration Waste Paper Wood Products	Agricultural Machinery Animal and Vegetable Oils Animal Feed Beverages Briquettes and Coke Chemical Products, nec. Cork and Wood Cotton Crude Fertilizers Electrical Appliances and Houseware Fertilizers and Pesticides Footwear Furniture and Fixtures Glass and Products Grain Inorganic Chemicals Leather and Products Meat/Dairy/Fish Requiring Refrigeration Metal and Wood Working Machinery Metal Products Motorcycles and Bicycles Natural Rubber Non-Ferrous Metals Non-Metallic Products, nec. Oil Seeds Organic Chemicals Other Agriculture Other Food Other Meat/Dairy/Fish/Fruit/Vegetables Other Raw Textile Materials Paints, Varnishes and Lacquers Paper and Paperboard and Products Parts of Motor Vehicles Plastic Products, nec. Pottery, China etc. Printing and Publishing Pulp Radio and TV Railroad Equipment Residual Petroleum Products Rubber Products Scrap Shipbuilding and Repairing Soap and Cleaning Preparations Stone, Clay and Other Crude Minerals Sugar Synthetic Resins Textiles Tobacco Transport Equipment, nec. Vegetables and Fruits - non-Refrigerated Vegetables, Fruits and Eggs - req Refrigeration Waste Paper Wood Products	航空分担率:低 財単価:低