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Purchasing Power Parities for Taiwan: The Basic Data for 1985 and International Comparisons

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Not being a member-country of the United Nations, Taiwan has been excluded from the detailed ("benchmark-country") data collection of the International Comparisons Project (ICP). This article reports the purchasing-power-parity (PPP) data for Taiwan, 1985, that were collected from original sources and were compiled by following the ICP methodology — which is also fully explained in a pedagogical appendix. Comparisons with PPPs for Taiwan based on "short-cut methods" are provided, as are real income comparisons between Taiwan and a set of OECD countries. The article closes with suggestions for further utilization of the micro-ICP data for the purposes of policy analysis.

I. Introduction

One of the obstinate problems that has plagued international economics, at least since the time of the abolition of the gold standard, is making cross-country international comparisons. The problem has become much worse after the collapse of the Bretton Woods and the almost universal adoption of floating exchange rates.

To be more precise, *intertemporal* comparisons of economic activity are rather commonplace among countries. They rely on the United Nations' "System of National Accounts" (SNA) and they allow, e.g., an internationally conformable comparison of rates of growth of GDP and of its components. This, however, does not solve the problem of *real* international ("quantity") comparisons, between countries and over time. For that purpose, expenditure data of various countries need be denominated

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in a common set of prices and in a common currency. This is the purpose of the "International Comparisons Project" that has been sponsored by the United Nations: to construct a "System of *Real* National Accounts" (SRNA), which allows *interspatial* national comparisons, as well.

The System is in effect a pricing exercise. For each country participating in the International Comparisons Project (ICP) prices are collected for hundreds of identically specified commodities (goods and services). These prices are processed so that estimates of price parities emerge for each participant country's currency, at a number of aggregation levels, including an overall purchasing power parity (PPP). The price parities and PPPs are used to convert each participating country's national currency expenditure to a common currency unit, thus making quantity comparisons feasible among the participating countries. The method sounds simple, but this is deceptive. Besides all types of technical issues — like missing commodity specifications, aggregation, index-number problems, and so on — the obvious question is "how about missing countries, like Taiwan?"

Comparisons of real purchasing power across countries have routinely been carried out, at different levels of sophistication, even before the ICP was launched. In Section III of this article some alternative estimates of purchasing power for Taiwan and comparisons with other countries are discussed. They are juxtaposed with more detailed comparisons based on the ICP methodology. Moreover, the broad uses of ICP data are demonstrated by carrying out real income comparisons among countries and by discussing issues of price competitiveness across sectors between Taiwan and other countries.

Section II of the article is the foundation for the analysis in Section III discussed above. It presents the PPP data for Taiwan that were constructed by the authors following the ICP methodology. Besides presenting the PPP data, the purpose of Section II is also instructive: it introduces a number of methodological appendices that explain precisely how PPP data are constructed in the ICP methodology and provide the documentation for the Taiwan series we compiled.

Section IV concludes by suggesting some extensions that can be based on the PPP data.

II. Basic Data for Taiwan

The ICP has so far provided data for a number of "benchmark" countries, varying from 16 to 60, for each of four years, 1970, 1975, 1980, and

1985. Taiwan is not among these countries. The purpose of this section is to report the results of a project carried out by the authors for filling this gap. Every attempt has been made to replicate the ICP procedures so that the results are directly comparable to the extant ICP studies.

The Bureau of Statistics, Directorate General of Budget, Accounting and Statistics, routinely collects data on prices and expenditures for a large number of commodities for various statistical analyses. The task was to compile the raw data for 1985 and supplement them where they presented gaps with more recent data collected by surveys. The data were then transformed into an internationally standardized system and were normalized by the data of Japan for 1985, at the 2000-commodity-category level. Japan, which is a benchmark country of the ICP, was used then to link Taiwan to the other OECD countries that have reported PPPs for 1985.

In principle the same method can be used to provide coverage for other ICP years, such as 1980, 1975, and 1970, for which the bulk of the data required for Taiwan are available. Unhappily, data for these years for ICP benchmark countries at the 2000-commodity-category level have not been secured as yet. As a result, the projections backward for Taiwan are based on a short-cut method that uses price indices instead of commodity prices. This is a rough method and the results should be received with caution.

The generic PPP data consist of expenditure per capita in national currency, real expenditure per capita in international dollars, and of purchasing power parities (prices) expressed in national currency units per international dollar unit. From two of the above three series the third can be derived; so expenditure in national currency divided by PPP prices gives real expenditure ("quantity"). The data are presented in Appendix C and are organized as follows. The "basic" (151 categories) data classification for expenditure and price for 1985 are in Tables C85.1.1 and C85.1.2, respectively. Starting from expenditures, these tables can be aggregated for "global" classification (35 categories) or for any other level of aggregation, as shown in Tables C85.2.1 and C85.2.2, for expenditure and price, respectively. Tables C80.3.1, C80.3.2, and so on for C75, C70, are the projections backward for years 1980, 1975, and 1970. These could be carried out only at the 15-category level and therefore there are only two tables for each of the years, C80.3.1, and C80.3.2, for expenditure and price, respectively, and so on for C75.4.1 and C75.4.2.

Appendix A outlines the methodology, with special emphasis at points where it might differ from the method used in the original study of Kravis, Heston and Summers (1982). The method used for the backward

projections is treated in more detail. A technical Appendix B further illustrates the methodology.

III. Applications

A. Price Parity

Interspatial price comparisons are of vital importance for policy-making. The foreign exchange rate, after all, is just the price of the foreign currency in terms of the domestic (NT$ 24/US$1). It is also an important economic policy control variable. It is therefore imperative to know if currencies are set at their "correct" exchange rate.

The theory of purchasing-power parity — or at least the strong version of Cassel's (1921) PPP doctrine — seems to help in this quest. It holds that the exchange rate between two currencies is in equilibrium when it equalizes the prices of an identical basket of goods and services in both countries. By focusing more on the "identical" than on the "basket" of the above definition, the *Economist* of London has derived the Big Mac PPP, which is used as a signpost for judging the "correctness" of the exchange rate. The rationale is that McDonald's operations are pretty well standardized around the world, and its Big Mac hamburger is produced under strict identical quality-control guidelines. The Big Mac PPP, therefore, can be considered as the exchange rate that leaves hamburgers costing the same in each country. The results of the 1992 comparison (the *Economist,* April 18, 1992) are shown in Table 1. We have inserted Taiwan in the Table, and this provides some interesting insight into international culinary delights — and into the index itself! Taiwan turns out to be not a bad place for the burger-bargain-hunter of the world. Moreover, the table can be used to calculate the price of foreign exchange in terms of PPP, which is P*(PPP/exchange rate) in column (4). Since a ratio more than one implies overvaluation, the comparison suggests that the NT$ is overvalued relative to the U.S. dollar.

We now turn to some alternative PPP comparisons that emphasize more the "basket" characterization, as opposed to the "identical" characteristic.

One obvious use of interspatial PPP comparisons is for determining the post-allowance that supplements salaries for high-ranking international civil servants, national functionaries, and business executives assigned away from their salary post. A number of public and private organizations (including the United Nations International Civil Service Commis-

Table 1

THE "BIG MAC PPP"

Country	Prices in local currency[a] (1)	Implied PPP of the dollar[b] (2)	Actual exchange rate 10/4/92 (3)	P* (col 2/col 3) (4)
Argentina	Peso 3.30	1.51	0.99	1.52
Australia	A$ 2.54	1.16	1.31	0.88
Belgium	BFr 108	49.32	33.55	1.39
Brazil	Cr 3,800	1,735	2,153	0.81
Britain	£ 1.74	0.79	0.57	1.39
Canada	C$ 2.76	1.26	1.19	1.06
China	Yuan 6.30	2.88	5.44	0.53
Denmark	DKr 27.25	12.44	6.32	1.97
France	FFr 18.10	8.26	5.55	1.49
Germany	DM 4.50	2.05	1.64	1.25
Holland	Fl 5.35	2.44	1.84	1.33
Hong Kong	HK$ 8.90	4.06	7.73	0.53
Hungary	Forint 133	60.73	79.70	0.76
Ireland	I£ 1.45	0.66	0.61	1.08
Italy	Lire 4,100	1,872	1,233	1.52
Japan	Yen 380	174	133	1.31
Russia	Rouble 58	26.48	98.95[c]	0.27
Singapore	S$ 4.75	2.17	1.65	1.31
S. Korea	Won 2,300	1,050	778	1.35
Spain	Ptas 315	144	102	1.41
Sweden	SKr 25.50	11.64	5.93	1.96
Taiwan	NT$ 62	28.31	24.63	1.15
Venezuela	Bs 170	77.63	60.63	1.28
United States[d]	$ 2.19	—	—	—

Notes: [a]McDonald's price may vary locally.
[b]Purchasing-power parity: local price divided by dollar price.
[c]Market rate
[d]New York, Chicago, San Francisco and Atlanta.

sion, the U.S. State Department, and at least one British and one Swiss private firm serving international businsses) compile price indexes to serve that purpose. Table 2 presents a selection of such comparisons. The divergence from Table 1 is evident. But so is the purpose of the new index: high-income non-nationals, living usually in capital cities, properly are not concerned with the entire range of prices in the country; nor should they be presumed to reveal through their basket of consumption quantity weights that are representative of a wide portion of the national population. In absolute terms one would expect the cost of living embedded in such indexes to be relatively high, although it is not clear which way the intervening biases might change the relative ranking of countires.

B. Purchasing Power Parity

The original architects of the ICP project have used various methods for extending the PPP comparisons to "non-benchmark countries" which were not included in the detailed national data collection. Taiwan has been consistently included in the resulting Penn World Tables (PWT1 to PWT5) with the time series extending from 1950 to 1988 at the PPP_{GDP}

Table 2

INDEXES OF LIVING COSTS ABROAD, 1991

	UN Index	US Index	Exchange Rate
Japan	151	199	¥ 130.5
Korea	105	126	₩ 720
Thailand	86	99	Bhat 22.65
Philippines	86	88	P 24
Taiwan	116	131	NT$ 27.10
Germany	116	143	DM 1.6
Italy	108	157	Lit 1155
United Kingdom	108	156	£ 0.53
United States	91	100	$ 1

Notes: The United Nations index uses as base New York City, and is dated December 1991.
The United States index uses as base Washington, D.C., and is dated July 1991.
The index for Washington, D.C. with base New York City is 91.
The exchange rate is calculated by taking the average of the July and December 1991 rate.
TAIWAN is missing in the United Nations index, and its value was extrapolated from the US index.

level of aggregation and its four main subaggregates (Summers, Kravis and Heston (1980), Summers and Heston (1984), (1988), (1991)). In the most recent version (PWT5) the method employed consisted of calibrating the indexes compiled for post-allowance supplements (as in Table 2 above) to reflect more fully prices and weights that are representative of the entire country. Thus data are presented for a list of 138 countries. Moreover, the quality rating of the data of both benchmark and non-benchmark countries is judged in the most recent application by a letter grade. The value of PPP_{GDP} for Taiwan from this extrapolation appears in the last row of Table 3. It should be noted that Taiwan is the country that has been accorded the lowest quality-rating in the entire exercise, D minus.[1]

The main body of Table 3 presents the data on PPP_{GDP} for the benchmark OECD and ESCAP countries that participated in ICP, as well as for Taiwan based on the PPP data we produced in Section II above. The value of P^* is also calculated. One thing that the last calculation makes clear is that the ratio of PPP to the nominal exchange rate, P^*, cannot be even remotely considered as an indicator of over/undervaluation.

At the present level of aggregation the most straightforward application of the PPP indices is in comparing real (per capita) income levels after converting national units into international currency (US$). This should come as no surprise, considering how the concept has evolved and how the index has been compiled. Any other application, such as comparing the cost of living or making conjectures about the appropriate level of the nominal exchange rate would have to rely on micro-ICP information. In Table 3 the OECD and ESCAP countries, along with Taiwan, are ranked by real GDP per capita. In the list of OECD countries Taiwan ranks above Turkey and Portugal and just below Greece while among ESCAP countries it ranks second to Japan! One more vignette from Table 3 appears in the comparison between the nominal-exchange-rate-converted and the PPP_{GDP}-converted per capita incomes. The deviation between the two increases as one moves from the richer to the poorest countries. This is a manifestation of the Ricardo Principle at work — that prices of tradables relative to nontradables decline in the process of development (Yotopoulos (1993)).

C. *Cost-of-Living Comparisons*

The implication in the previous discussion has been that the cost-of-

[1] It should be emphasized that the letter grade is not assigned to the quality of Taiwanese statistics. It just reflects the confidence that the compilers of PWT5 have in the shortcut method they used to bring Taiwan into the system. The grade signals that the PWT5 data for Taiwan should be used with "extreme caution."

Table 3

LINKAGE OF TAIWAN THROUGH JAPAN WITH OECD AND ESCAP COUNTRIES, PPP-GDP, NOMINAL EXCHANGE RATE AND NOMINAL AND REAL INCOMES, 1985

	PPP_{GDP}	Nominal exchange rate	Nominal GDP/cap		Real GDP/cap	P*
			In local currency	In US$		
United States	1.00	1.00	16494	16494	16494	1.00
Canada	1.22	1.37	18618	13590	15261	0.89
Norway	8.63	8.60	120018	13956	13907	1.00
Luxembourg	43.10	59.40	578653	9742	13426	0.73
Sweden	8.15	8.60	103296	12011	12674	0.95
Denmark	9.80	10.60	119865	11308	12231	0.92
Germany	2.48	2.94	30155	10257	12159	0.84
Japan	222.00	238.54	2624133	11001	11820	0.93
Australia	1.24	1.43	14485	10129	11681	0.87
Finland	5.97	6.20	68434	11038	11463	0.96
France	7.27	8.99	83125	9246	11434	0.81
Netherlands	2.55	3.32	28657	8632	11238	0.77
United Kingdom	0.57	0.78	6190	7946	10898	0.73
Austria	16.60	20.70	180892	8739	10897	0.80
Italy	1302.00	1909.00	14104362	7388	10833	0.68
Belgium	44.60	59.40	476350	8019	10680	0.75
New Zealand	1.35	2.02	13600	6733	10074	0.67
Spain	95.30	170.00	723530	4256	7592	0.56
Ireland	0.72	0.95	4844	5121	6700	0.76
Greece	77.30	138.10	454990	3295	5886	0.56
Taiwan	22.61	39.94	128455	3216	5681	0.57
Portugal	66.20	170.40	369067	2166	5575	0.39
Iran	69.18	91.052	319445	3508	4618	0.76
Korea Rep.	459.66	870.02	1828433	2102	3978	0.53
Turkey	153.00	522.00	551616	1057	3605	0.29
Thailand	8.10	27.159	21372	787	2640	0.30
Sri Lanka	5.29	27.163	9792	360	1851	0.19
Philippines	6.30	18.607	11280	606	1791	0.34
Pakistan	3.77	15.928	5053	317	1342	0.24
Bangladesh	6.07	27.995	5038	180	830	0.22
India	4.67	12.369	3499	283	749	0.38
TAIWAN(PWT5)	26.22	28.17			5708	0.93

Notes: P* is defined (PPP)/(Exchange Rate).

Source: OECD, Department of Economics and Statistics, Purchasing Power Parities and Real Expenditures, 1985. Paris: OECD, 1985.
TAIWAN (PWT5) is based on data extrapolated from partial cost-of-living (1985) indicators (Summers and Heston 1991)

living comparisons based on the indexes we presented, from the most partial to the most generic, were specious. Neither the Big Mac, nor the post-allowance exercises were sufficiently representative, while the PPP_{GDP} was too generic an index. The appropriateness and specificity of an index depends obviously on the objective of the investigation. Since micro-ICP data provide prices and expenditures at a conformable "basic" level (151 commodity classification) for the benchmark countries, and Taiwan, in principle any cost index of interest can be compiled on an interspatially comparable basis. The ICP routinely does that for the standard subaggregates of GDP, consumption, capital formation and government.

Table 4 presents (unweighted) price comparisons for "global"-category aggregation for a sample of OECD and ESCAP benchmark countries, plus Taiwan. How can these data be used, and how can they be interpreted? Again a straightforward use would be to compute *real* incomes, in the sense of how much food, or how much clothing a certain nominal income in the local currency would buy, and compare that with the equivalent purchase of another income in another currency. But this seems to be of unclear value, except if we know what the "certain income" is and we honor the caveat that incomes are not used to purchase food, or clothing, alone but get allocated according to income and substitution effects.

Another use of the data in Table 4 is to construct price indices and use them to rank commodity aggregates within a country and to effect comparisons across countries. For such indices a base value is required. The two candidates in the table are the PPP_{GDP} and the exchange rate.

The deviation around the PPP_{GDP} points to some relatively "cheap" commodity aggregates, such as food, rent, medical care, construction, government services, and some "expensive" ones, such as transport equipment and producers' durables for the case of Taiwan.

The column P* has been added to Taiwan, Japan and Korea (and can readily be calculated by the reader for the rest of the countries) to define the index based on the nominal exchange rate. This makes cross-country comparisons easier. If appears that Taiwan has a wide price advantage across all commodities with Japan — with a few notable exceptions such as transport equipment — while the situation is reversed with regard to Korea that has in general lower prices.

Admittedly the last statements above tread on thin ice, sounding closer and closer to the Big Mac PPP of the *Economist.* Such interspatial price comparisons would make better sense if the nominal exchange rates were in "equilibrium." Otherwise they might simply imply that the NT$ is more overvalued than the Korean won!

Table 4

PPP PRICES FOR GLOBAL-CATEGORY AGGREGATION, SELECT COUNTRIES, 1985
(in national currency per US$)

		Germany	Italy	Spain	TAIWAN	TaiwanP*	Japan	Japan P*	Korea	Korea P*	Thailand	Philippines
CONSUMPTION, ICP	1-108	2.104	1079	76.497	21.552	0.54	231.728	0.97	465.951	0.54	7.893	6.114
Food, beverage, tobacco	1-39	1.881	1112	86.109	21.947	0.55	229.682	0.96	492.164	0.57	7.407	5.766
Food	1-33	1.881	1125	91.923	21.283	0.53	244.794	1.03	515.705	0.59	6.602	5.780
Bread, cereals	1-6	1.926	1135	89.963	26.106	0.65	261.104	1.09	472.786	0.54	4.618	5.265
Meat	7-12	1.988	1195	82.496	14.982	0.38	262.423	1.10	555.705	0.64	7.307	6.194
Fish	13-14	1.538	1259	95.090	15.893	0.40	286.976	1.20	624.233	0.72	6.482	4.606
Milk, cheese, eggs	15-17	1.551	1190	109.585	21.446	0.54						
Oils, fats	18-20	1.764	966	94.809	47.119	1.18	121.005	0.51	462.591	0.53	8.349	6.326
Fruits, vegetables	21-26	2.299	1076	95.849	22.032	0.55	274.178	1.15	496.448	0.57	6.337	8.476
Coffee, tea, cocoa	27-29	2.245	1201	107.785	35.302	0.88	271.540	1.14	530.932	0.61	16.745	5.521
Spices, sweets, sugar	30-33	1.935	1562	126.027	33.950	0.85	191.766	0.80	553.182	0.64	13.270	7.711
Beverages	34-37	1.453	973	58.549	35.883	0.90	197.705	0.83	398.195	0.46	12.351	5.651
Tobacco	38-39	2.211	1068	51.222	28.642	0.72	162.245	0.68	404.625	0.47	12.703	5.583
Clothing, footwear	40-51	1.926	1161	108.623	23.669	0.59	208.906	0.88	397.548	0.46	11.615	5.599
Clothing	40-47	1.918	1199	112,239	23.388	0.59	209.976	0.88	388.388	0.45	11.692	6.103
Footwear	48-51	1.963	1052	97.716	25.646	0.64	200.003	0.84	440.390	0.51	9.223	4.303

Table 4 (Continued)

		Germany	Italy	Spain	TAIWAN	TaiwanP*	Japan	Japan P*	Korea	Korea P*	Thailand	Philippines
Gross rent, fuel	52-57	2.688	920	50.684	14.076	0.35	221.031	0.93	588.726	0.68	8.120	10.451
Gross rent	52-53	3.197	829	46.955	12.353	0.31	213.396	0.89	574.960	0.66	8.030	13.399
Fuel, power	54-57	1.933	1261	79.418	32.023	0.80	267.921	1.12	607.459	0.70	8.233	6.613
House furnishings*	58-70	1.849	1165	83.199	24.489	0.61	214.331	0.90	365.335	0.42	8.114	6.331
Furniture, appliances	58-66	2.462	1490	109.740	22.680	0.57	211.067	0.88	331.209	0.38	6.372	9.155
Supplies	67-70	2.421	1525	104.562	28.984	0.73	217.797	0.91	409.652	0.47	9.364	5.236
Medical care	71-77	2.296	1252	87.470	14.353	0.36	232.086	0.97	573.044	0.66	7.543	8.085
Transport, communication	78-89	1.889	1080	84.909	20.385	0.51	228.858	0.96	470.472	0.54	8.302	13.917
Equipment	78-79	1.668	1114	115.226	40.399	1.01	140.232	0.59	547.228	0.63	16.071	20.654
Operation costs	80-83	1.849	1210	81.611	19.238	0.48	216.495	0.91	428.698	0.49	10.354	9.212
Purchased transport	84-87	2.457	846	70.543	15.815	0.40	336.605	1.41	497.683	0.57	7.418	12.945
Communications	88-89	2.290	837	90.624	18.627	0.47	223.165	0.94	365.422	0.42	13.408	8.931
Recreation, education	90-101	2.125	1037	83.385	58.656	1.47	242.625	1.02	501.746	0.58	6.282	3.052
Recreation	90-96	2.640	1610	138.336	31.927	0.80	212.617	0.89	470.507	0.54	11.438	4.321
Education	97-101	2.392	921	70.347	16.534	0.41	282.445	1.18	519.730	0.60	4.793	2.885
Other expenditures	102-107	2.081	1060	72.814	17.793	0.45	259.906	1.09	323.296	0.37	6.747	4.222
Personal care	102-104	2.258	1137	102.063	17.386	0.44	243.631	1.02	430.898	0.50	8.846	6.106
Miscellaneous services	105-107	2.944	1410	91.947	17.383	0.44	263.753	1.11	289.861	0.33	6.252	3.638

Table 4 (Continued)

		Germany	Italy	Spain	TAIWAN	TaiwanP*	Japan	Japan P*	Korea	Korea P*	Thailand	Philippines
CAPITAL FORMATION	109-146	2.004	1429	104.411	26.979	0.68	193.180	0.81	424.311	0.49	10.898	11.823
Domestic capital formation	109-145	2.287	1322	112.694	24.701	0.62	201.636	0.85	422.891	0.49	10.990	11.954
Producer durables	123-144	1.822	1160	109.557	36.069	0.90	170.874	0.72	504.412	0.58	13.759	7.315
Nonelectrical machinery	130-138	1.795	1154	103.931	84.526	2.12	182.682	0.77	444.098	0.51	19.815	9.066
Electrical machinery	139-142	2.041	1152	105.334	22.139	0.55	170.758	0.72	475.645	0.55	27.583	5.116
Transport equipment	123-129	1.662	1183	125.092	43.168	1.08	145.781	0.61	737.722	0.85	27.939	35.956
Other	143-144	1.674	1116	104.458	22.184	0.56	187.959	0.79	409.056	0.47	5.458	7.053
Construction	109-122	1.936	1111	82.331	18.465	0.46	224.961	0.94	382.863	0.44	9.465	18.111
Residential	109-110	2.196	1063	71.529	19.255	0.48	243.455	1.02	320.497	0.37	9.929	27.121
Nonresidential	111-118	1.853	1082	77.303	18.017	0.45	227.000	0.95	327.326	0.38	9.277	12.363
Other	119-122	1.641	1275	100.730	18.007	0.45	213.073	0.89	494.270	0.57	9.270	25.446
Export minus import	146-146	2.069	1346	120.025	39.933	1.00	142.998	0.60	522.636	0.60	16.326	11.240
GOVERNMENT	147-151	2.299	1038	76.559	18.700	0.47	374.716	1.57	583.049	0.67	6.208	3.536
Compensation	147-150	2.445	1017	75.109	16.570	0.41	523.372	2.19	727.183	0.84	5.344	2.448
Commodities	151-151				21.845	0.55	227.917	0.96	464.694	0.53	8.046	6.363
GROSS DOMESTIC PRODUCT	1-151	2.069	1087	79.603	22.610	0.57	221.939	0.93	459.534	0.53	8.093	6.296
Exchange rate (per US$)		2.94	1909	170	39.940		238.54		870.02		27.16	18.61

Notes: Data for the ESCAP countries are in local currency per Hong Kong dollar. For conversion into US$ the factor 4.68 was used.

IV. Conclusions and Extensions

The United Nations' System of National Accounts (SNA) was intended originally to quantify the outcomes of economic activity within a country. In less than forty years since its introduction it has received universal acceptance. It has also turned into an indispensable instrument of macro-economic policy.

Similarly, the System of Real National Accounts (SRNA) was initially intended to provide real income interspatial comparisons across countries. It has fully achieved this either through direct computation of PPPs, or through extrapolation from the information of benchmark countries.

The SNRA can still be perfected. The SNA originates from the production, consumption, or the income side. The SRNA has so far been compiled fully from the cosumption side only. Some progress is being made in collecting the data also from the production side (Maddison (1983), Maddison and van Ark (1989), van Ark (1990)). Extensions to the income side are still uncharted.

The SNRA, in the form of PPPs, is recently enjoying broad acceptance (*The Economist,* May 15, 1993). It has yet, however, to be effectively used as a tool for policy-making. Given the cross-country perspective that the SNRA represents, a logical application may exist at the realm of international trade and exchange rates.

The quest for real exchange rates has intensified as the variability in nominal exchange rates has increased. Ultimately real exchange rates are prices of tradables to nontradables, appropriately normalized. They have been estimated in various ways in the literature (Edwards (1989), Yotopoulos (1993)). They all rely on *changes* in indices that represent the prices of tradables and nontradbles. As such they suffer a major problem: the direction of change, a derivative, cannot indicate where one is going unless the starting point is also known. An increase in the price of tradables, for example, does indeed indicate that the real exchange rate has depreciated; but it does not necessarily imply that it is also undervalued. An equilibirum exchange rate would have to obtain in the beginning of the period for that to occur.

The PPPs provide prices for all commodities in GDP, tradables and nontradables, appropriately normalized by the international prices of the same commodities. In principle one should be able to derive an index of the two that is independent of the origin. The subsidiary question of the relationship between the nominal and the real exchange rate arises. Does

an equilibrium nominal exchange rate also imply equilibrium of the real exchange rate? The empirical answer is still in the realm of speculation, but the intuition about it is intriguing.

Nominal exchange rates are formed in the market for tradables, a subset of GDP. Real exchange rates involve the GDP proper, both tradables and nontradables. There is no a priori reason that equilibrium in the market of tradables implies also equilibrium in the market of nontradables — except if there is separability between the two. The Ricardo Principle suggests this may not be the case.[2]

Equilibirum in the nominal exchange rate can always be achieved by a sufficiently deep devaluation which transforms enough nontradables to tradables to close the foreign account. But the real issue is at what cost are these trdables produced? Under the plausible assumption of the Ricardo Principle — that it is more expensive in terms of domestic resource cost to produce tradables, the less developed the country is — balancing the foreign account (i.e., imposing *price* closure) may not be warranted by the foregone amount of nontradables. Not all trade is necessarily comparative advantage trade — say, when a developing country starts from exporting sugar and copra, and it evolves into exporting its teak forests next, to be followed by its nurses and its doctors! In the latter case equilibrium in the nominal exchange rate might have been brought about by disequilibrium in the real exchange rate: making (by devaluation) the prices of tradables "too expensive" in terms of domestic currency, so that "too many" resources have shifted to the sector — resources which could have been better employed, instead, in producing nontradables. This issue deals with incomplete markets in foreign exchange for developing countries (Yotopoulos (1993)). It is relevant at present only as an intriguing extension of the use of PPPs as tools for policy analysis.

2 David Ricardo (reprint 1963: 76) was the first to observe that prices of nontradables relative to tradables tend to be cheap in LDC's and they tend to increase as incomes grow. The convers is true for prices of tradables. This observation, which has intuitive appeal, was founded by Ricardo on productivity differentials in the production of tradables and nontradables which change systematically in the process of development. Others have refined the Principe (Taussig (1928): Ch.5, Harrod (1939): Ch. 4, Usher (1963): Balassa (1964): Baghwati (1984)) and have added relative factor proportions as its foundation.

Appendices

Appendix A

The attempt to bring Taiwan into the system of the International Comparisons Project (ICP) had to overcome imposing data requirements. The help of various agencies, professional specialists, and colleagues in collecting the data, coordinating the effort, and helping with developing a consistent methodology is gratefully acknowledged.

The Directorate General of Budget, Accounting and Statistics, Executive Yuan (DGBAS), was the primary source of data for Taiwan. The Bureau of Statistics, and especially its Director, Dr. Duan Wei, collaborated fully in providing the micro data for the Taiwan economy from the Bureau's files. The Bureau also assumed the cost of collecting additional survey data for the completion of the project. The survey to collect prices for producers' durable commodities that did not exist in the Bureau's files was carried out by a team composed of Ms. Tsay Meei-Nar and Mr. Tsay Hung-Kun, who coordinated the effort and Ms. Hsu Der-Rong and Mr. Chang Yeong-Mien. Mr. Hsu Jan-Yau, Senior Specialist of the Bureau, directed the survey.

The local associates in this Project, Dr. An-Chi Tung, Institute of Economics, Academia Sinica, Dr. Bih Jane Liu, Associate Professor of Economics, National Taiwan University, and Dr. Yun-Peng Chu, Sun Yat-Sen Institute for Social Sciences and Philosphy, Academia Sinica, were involved in the data collection and coordination of the project in Taiwan. They, and the project, benefitted from the advice of Professor Chi Schive, National Taiwan University.

Among the colleagues whose contributions with data and method were invaluable are Dale W. Jorgenson of Harvard University, and Alan Heston of the University of Pennsylvania, John C. O'Connor and Sultan Ahmad of the World Bank, and William Seltzer, Director, Statistical Office of the United Nations.

Last and not least, the Project was funded by a grant from the Chiang Ching-kuo Foundation to the Center of Economic Policy Research, Stanford University (Principal Investigator Professor Pan A. Yotopoulos). The Foundation's enabling support is gratefully acknowledged.

A. Data, Aggregations, and Reference Country, 1985

The "basic" 151 ICP commodity, classifiction for Taiwan is constructed

by reference to the 2000-commodity disaggregation of Japan, 1985 (Table C85.1.1).

The Taiwan data were processed with slightly different methodologies in four groups: consumption commodities (1-108), construction (109-122), producers' durables (123-144), and government compensation (147-151).

Consumption commodities consist of 108 categories in the basic ICP 151-commodity classification. The data files of the Bureau of Statistics for 1985 provided prices for 443 consumption commodities. Of these 187 commodities had full comparability with the Japanese commodity classification. The data for the rest of the commodities were excluded because of unmatching or dubious specification. The 187 commodities were aggregated into 83 categories. Of the remaining 24 categories, 16 were supplied from information existing in the 83 categories, such as the average of two close substitutes to provide the third, or from substitution of the price of a similar category.[3]

For construction (14 categories), the approach is a modification of the standard ICP methodology to accommodate the lack of Taiwan data comparable to the standardized ICP data set classification. Data of "project cost" that reflect well-specified individual construction projects were not available for Taiwan. Instead, macro data were obtained for 1985 from the Government Agency that issues construction permits for the City of Taipei. The data are cost per square foot for 7 broad construction categories (family dwelling, office building, school building, etc.) and can be matched with the same categories for Japan (Statistics Bureau, Management and Coordination Agency, *Japan Statistical Yearbook 1990*). Such data are available from the same agency for all Taiwan since 1990. The data for the rest of Taiwan for 1985 were extrapolated from this source. The balance of the 7 construction categories were estimated by using the set of the 7 prices, according to the proximity of their characteristics.

Still the problem of comparable quality of construction between Taiwan and Japan at this broad level of aggregation is bothersome. One would expect the stricter code requirements in Japan to be reflected in higher quality of Japanese construction. We performed sensitivity analysis with various quality differentials between Taiwanese and Japanese construction, and an example is given in Appendix B. We concluded that a

[3] The last 8 categories of consumption commodities (four medical, two education, rent, and automobiles) were derived by using the standard ICP methodology that involves quantity comparisons with quality adjustment (Kravis, Kenessey, Heston and Summers (1975), ch. 6).

50% quality differential favoring Japan is the closest arbitrary assumption we can make. This assumption, however, can be readily reversed by the reader by dividing by 2 the PPPs of construction categories 109-122 in Tables C85.1.2 and C85.2.2.

For producer durables (22 categories) the 1985 data files of the Bureau of Statistics had insufficient specification and therefore were unusable. Instead, 106 items with ICP specifications were priced in May, 1991 by the personnel of the Bureau of Statistics and the authors in a special survey. The 1991 prices were deflated by the appropriate (four) components of the Wholesale Price Index to derive the 1985 prices. After careful review, 57 of the 106 prices were selected and used to construct 13 commodity categories. For the balance of 9 commodities the extant information was extrapolated according to proximity of commodity characteristics.

For government compensation (4 categories), compensations for 11 government jobs were constructed from monthly wage data, and were adjusted appropriately to become consistent with government employee compensation (in all forms) that is provided in National Income Accounts.

The expenditure per capita data for Taiwan (Table C85.1.1) are based on the GDP data and its main components for 1985 as compiled by the Bureau of Statistics. The disaggregation into 151 categories makes use of information made available by the Bureau of Statistics, most importantly the weights used in constructing the consumer price index and the wholesale price index.

The data on Japanese expenditure per capita come from the OECD 1985 data set which comprises 196 expenditure categories. These have been regrouped into the 151 standard ICP classification categories.

As already mentioned, Taiwan's PPPs for 151 categories were constructed as NT$ per Japanese yen, by reference to the prices of Japan's 2000-commodity-category level for 1985. Price data collected for the ICP for various countries are normalized at the regional level to derive real expenditure for each country at "international dollars." We used Japan's real expenditure data from the OECD regional group, which are expressed in Austrian shillings. Taiwan's real expenditure, therefore, was linked through Japan to OECD countries and it is also expressed in Austrian shillings. For the purposes of Table 3 it was further linked to the U.S. dollar, as will be explained in Appendix B, which provides a detailed description of the methodology.

B. Backward Projections, 1980, 1975, 1970

Taiwan data are available for the years 1970, 1975, and 1980, more or less for the same commodity categories as described above for 1985. However, detailed data for a benchmark country at the 2000 commodity classification level are not available for these years. We could not construct, as a result, the PPPs for Taiwan at the basic 151 category ICP classification.

We have used a short-cut method for projecting backwards that involves price indices of Japan and Taiwan. We aggregate the 151 commodity classification PPPs for 1985 so that they correspond to specific price indices that are available. We then use the following formula to reconstruct the previous years' PPPs for the respective commodity groups:

$$PPP_{1970} = PPP_{1985} \times (TaiwanP_{1970} / TaiwanP_{1985}) / (JapanP_{1970} / JapanP_{1985})$$

The price indices used, that are reflected in the commodity groupings in the respective tables, are the following: 7 indices are used for consumer goods, 1 for construction, 6 for producers goods, 1 for balance of trade, and 1 for government compensation. Roughly the same indices were used as Japanese deflators (Statistics Bureau, Management and Coordination Agency, *Japan Statistical Yearbook 1990,* pp. 483, 490).

C. Caveats

The most bothersome component of the PPP calculations for Taiwan, 1985, is construction. The assumption we have employed on quality adjustment relative to Japan may seem arbitrary, but it was simple, and necessary. Appendix C provides an example of sensitivity analysis on this assumption.

The treatment of construction remains possibly an important shortcoming of our estimates. There is no way for remedying it, except by the painstaking collection of "project cost" data according to the detailed methodology adopted by the United Nations. While this cannot be done for historical data, it can conceivably be done in the near future so that there is better conformity of the Taiwanese data with the data from the 1990 round of the ICP.

Appendix B

The purpose of this Appendix is to illustrate step-by-step and with an

example the methodology employed in calculating PPPs for Taiwan. Furthermore, this Appendix will illustrate the logical sequence of going from Table C85.1.2 which is in NT$ per yen, to Table C85.1.1 and real expenditure in Austrian shillings, and finally to Table 3 and comparisons of real per capita incomes in U.S. dollars.

For ease of reference the example that follows is based on data that can be found in Kravis, Heston and Summers (1982), *World Product and Income: International Comparisons of Real Gross Product,* (Baltimore, MD: The Johns Hopkins University Press). All page references are to that source.

The objective is to derive PPPs for the ICP standard classification of 151 categories (4 digit level) and for GNP and its components.

1. For deriving the PPP of any single commodity category, we need detailed price data of item(s) (6 digits) in that category. The PPP of the category is equal to the geometric average of the prices of these items expressed as ratios to those of the reference country.

Example:

	$Rice_1$	$Rice_2$	$Rice_3$
Japan (Yen)	200	180	150
Taiwan (N.T.$)	20	20	15

PPP (Rice): $(N.T.\$/Yen) = (20/200)^{1/3}\ (20/180)^{1/3}\ (15/150)^{1/3}$

2. With the 151 PPPs, together with expenditure data for the 151 categories for both countries, we can proceed to do the binary comparison. The ICP comparison is basically quantity comparison based on expenditure ratio and price ratio (PPP).

Example: The comparison between Japan and U.S. in 1975 becomes:

(2a) PPP (rice): Yen/U.S.$ = 309 (p. 213 App. Table 6-3)

(2b) Per capita expenditure on rice

Japan: Yen 19863 (p. 205 App. Table 6-1)

U.S.: $3.7

(2c) Binary quantity comparison

Q ratio (Japan vs. U.S.) = Exp. ratio/Price ratio (PPP)

= (19863/3.7)/309

= 17.37

The intuitive interpretation of such ratio is that the average Japanese consumes 17 times more rice than does the average American, when the price factor is eliminated through PPP.

3. However, to achieve comparability across categories and countries,

we have to standardize using "real expenditure":

Real expenditure = "Notional quantity" × International price

(3a) Notional Q = value of Q at U.S. price
Japan: 19863/309 = 64
U.S.: 3.71/1 = 3.7
Japan/U.S.: = 64/3.7 = 17.37 (same as 2c)
(3b) International price for rice is 1.09. (p. 213, App. Table 6-3)

International prices come from calculations using the Geary-Khamis method as described in pp. 89-90. In the binary comparison we are doing, the step is skipped and we take the international prices from App. Table 6-3, aware of the slight loss of comprehensiveness from not including Taiwan's data in generating international prices. The compromise seems acceptable due to the insignificance of Taiwan's data in worldwide comparison.

(3c) Real expenditure for rice:
Japan: 64×1.09 = 70.3
U.S.: 3.7×1.09 = 4 (p. 221, App. Table 6-5)
Japan/U.S.: 70.3/4 = 17.37 (same as 2c, 3a)

4. For PPPs of GNP as a whole and for other levels of aggregation, we start from the real expenditure data for 151 categories in App. Table 6-5.

(4a) From App. 6-5, we can aggregate 151 categories into any level of aggregation for a given country simply by adding the desired categories. The result is the Summary Table 6-5 in pp. 184-187. For Japan, the GDP (adding 151 categories) is 4906 in terms of real expenditure valued at international prices. The comparable figure for U.S. is 7176, as seen in p. 187.

(4b) From Summary Table 6-5, we can express all levels of aggregations in all countries in percentage terms, taking U.S. as 100. The result is Summary Table 6-4 in pp. 180-183.

(4c) To get PPPs for any level of aggregation, the trick involves modifying the process in paragraph 2 above. There, the Q ratio is given by dividing price ratio (PPP) into expenditure. Here, the PPP for any level will be derived by dividing the Q ratio into the expenditure ratio. We have aggregated Q ratios in Summary Table 6-4. We also have aggregated expenditures in Summary Table 6-1 in pp. 164-167 (which is aggregation of App. Table 6-1 in pp. 200-207).

Example for PPP_{GDP} (Japan vs. U.S.):
Expenditure ratio/Q ratio

= (1327937 Yen/7176 $)/0.684 (pp. 167, 184)
= 271 (yen/$) (p. 179)

5. In the case of Taiwan, the following steps were taken:

(5a) Taiwan's PPP for 151 categories were constructed from the 2000-commodity classification data by averaging the components for both Taiwan and Japan and expressing them in NT$ per yen.

For example, the PPP for category 1, rice, is 0.1026 NT$ per yen (Table C85.1.2)

(5b) Taiwan's real expenditure for category 1, rice, was derived by way of Japan's real expenditure on rice that was expressed in Austrian shillings in the OECD regional grouping:

$PPP(\text{rice})_{NT\$/yen}$ = (nominal expenditure $\text{ratio}_{NT\$/yen}$)/
(real expenditure $\text{ratio}_{shl/shl}$)
0.1026 = (2067/27080)/(Taiwan's real expenditure/1316.2)

and solving for the unknown:

Taiwan's real expenditure (rice) = 979.5 shilings (Table C85.1.1)

(5c) To conform to the international comparison expressed in "international dollars" in Table 3 we derive first P* for Taiwan:

P* = (PPP/nominal exchange rate)
= (0.0946)/(39.94/238.54) = 0.57

(5d) Real GDP for Taiwan in terms of international dollars is in turn derived by dividing the nominal GDP of Taiwan in U.S. dollars by P*:

real GDP = (3216/0.57) = 5681 int'l $.

Appendix C

The purpose of this Appendix is to provide the rationale for the assumption we made that there is a 50% differential in the quality of construction in favor of Japan. The example is intended to illustrate how sensitive is the calculation of the PPP for construction to the assumption, and how this in turn affects the P* (Table C85.2.2).

The PPP for the aggregate GDP, and any of its subaggregates (construction, or capital formation) is defined as

PPP = (Nominal Expenditure Ratio T_j)/(Real Expenditure Ratio T_j)

where the subscripted T indicates that Taiwan's expenditure is referenced

to Japan's.

The definition of P* follows (and the "exchange rate deviation index" is defined as 1/P*):

P* = (PPP)/(Nominal Exchange rate)

Consider as an example nominal expenditure on construction in Taiwan relative to Japan in the ratio 100/500, and the ratio of relative prices 1/4. The real expenditure ratio is equal to 4/5, and the construction PPP is 5/20. Suppose that the quality of Japanese construction is twice that of Taiwanese, because of the existence of stricter codes, more exacting standards of workmanship, and so on. This amounts to having a new relative price ratio equal to 1/2, and a construction PPP equal to 5/10. Should quality adjustment be omitted, the result is downward bias of the PPP.

Should construction happen to be a significant share of GDP (9.7% in 1985, Table C85.2.1), its PPP assumes a significant weight in determining the PPP_{GDP}. As a result, without quality adjustment the PPP_{GDP} is further biased downwards, which means that P* is biased downwards.

Table C85.2.2 reports the results for capital formation (which includes construction) for 1985 with the quality improvement adjustment. The PPP of capital formation is 0.11 and that for GDP is 0.09. This compares with the respective values of 0.08 and 0.08 without the quality adjustment. Although the difference appears small, it has a significant effect on P* which is 0.68 and 0.56 for capital formation and GDP, respectively, after quality adjustment, and 0.46 and 0.45 without the adjustment. The higher value of P* is more likely for Taiwan, given the stylized facts of PPP comparisons.

Table C85.1.1

PER CAPITA EXPENDITURE (IN NATIONAL CURRENCY) AND REAL EXPENDITURE (IN INTERNATIONAL DOLLARS), TAIWAN AND JAPAN, BASIC CATEGORIES, 1985

	1 Taiwan (N.T.$)	2 Japan (Yen)	3 Taiwan (Int'l. $)	4 Japan (Int'l. $)
1 Rice	2067	27080	979.5	1316.2
2 Meal, other cereals	61	785	25.1	34.3
3 Bread	335	7592	141.4	315.0
4 Biscuits, cakes, etc.	548	12003	205.7	681.3
5 Cereal preparations	22	8418	7.5	336.9
6 Macaroni, spaghetti	539	165	211.2	7.6
7 Fresh beef, veal	429	10574	152.0	310.5
8 Fresh lamb, mutton	14	372	5.0	30.2
9 Fresh pork	3257	10764	2391.9	482.6
10 Fresh poultry	1800	3420	1545.9	262.3
11 Other fresh meat	212	6882	109.8	408.1
12 Frozen and salted meat	763	2842	676.6	153.1
13 Fresh and frozen fish	2792	18629	2702.4	1139.2
14 Canned fish	19	38844	7.9	2545.3
15 Fresh milk	183	7807	36.7	347.3
16 Milk products	482	5601	175.1	339.4
17 Eggs, egg products	622	3371	664.7	339.3
18 Butter	19	677	2.6	29.9
19 Margarine, edible oil	519	124	124.9	5.8
20 Lard, edible fat	100	2445	38.6	130.9
21 Fresh tropical fruits	998	14457	527.3	671.7
22 Other fresh fruits	1336	578	922.8	35.1
23 Fresh vegetables	2357	1677	1381.9	91.6
24 Fruit other than fresh	113	19769	51.7	1129.7
25 Vegetables other than fresh	1188	8228	576.0	422.2
26 Tubers, including potatoes	42	2503	31.4	167.2
27 Coffee	22	2867	6.3	162.8
28 Tea	179	4684	50.5	144.1
29 Cocoa	22	1470	4.5	60.3
30 Sugar	135	1462	58.3	64.3
31 Jam, syrup, honey	42	1124	16.8	34.0
32 Chocolate, ice cream	352	17414	265.6	1148.3

Table C85.1.1 (Continued)

	1 Taiwan (N.T.$)	2 Japan (Yen)	3 Taiwan (Int'l. $)	4 Japan (Int'l. $)
33 Salt, spices, sauces	401	26386	162.7	2316.9
34 Nonalocoholic beverages	346	11640	206.7	610.3
35 Spirits	150	11194	22.6	494.4
36 Wine, cider	451	8567	97.4	428.2
37 Beer	770	10905	149.9	229.2
38 Cigarettes	1016	21405	948.2	2032.9
39 Cigars, tobacco, snuff	1016	2379	603.2	143.8
40 Clothing materials	383	3767	239.9	242.0
41 Men's clothing	603	15626	414.3	1255.6
42 Women's clothing	1113	15622	944.9	1269.8
43 Boys' and girls' clothing	550	15630	805.1	1392.0
44 Men's and Boys' underwear	84	15626	63.4	1255.6
45 Women's and girls' underwear	368	15622	176.6	1269.8
46 Haberdashery, millinery	186	3767	112.4	242.0
47 Clothing rental and repair	114	306	56.3	26.6
48 Mens' footwear	188	2924	183.4	253.2
49 Women's footwear	212	3899	182.9	230.1
50 Children's footwear	251	2924	191.1	356.6
51 Footwear, repairs	114	116	56.3	10.1
52 Rents	12226	225215	16332.4	15784.5
53 Indoor repairs and upkeep	1381	900	2158.2	93.7
54 Electricity	1566	33011	893.9	3033.9
55 Gas	391	16456	170.6	771.3
56 Liquid fuels	391	7237	442.6	879.9
57 Other fuels, ice	391	256	178.5	12.6
58 Furniture, fixtures	648	5956	695.6	268.9
59 Floor coverings	67	1727	69.7	94.9
60 Household textiles, etc.	233	11863	144.6	850.6
61 Refrigerators, freezers	232	2528	55.8	120.6
62 Washing appliances	225	900	250.8	94.5
63 Cooking appliances	138	3916	119.9	413.1
64 Heating appliances	247	8426	280.8	1236.2
65 Cleaning appliances	89	884	57.5	71.5
66 Other household appliances	226	6262	180.6	400.0
67 Household utensils	133	5882	115.2	344.2
68 Nondurable household goods	334	23619	267.3	1787.2

Table C85.1.1 (Continued)

	1 Taiwan (N.T.$)	2 Japan (Yen)	3 Taiwan (Int'l. $)	4 Japan (Int'l. $)
69 Domestic services	307	1115	165.3	106.2
70 Household services	307	10665	197.7	1215.6
71 Drugs, medical prparations	470	7972	536.1	686.5
72 Medical supplies	470	479	357.5	32.7
73 Therapeutic equipment	114	1578	53.2	76.5
74 Physicians' service	1389	62024	3503.2	6129.8
75 Dentists' service	330	21462	851.1	2650.6
76 Nurses' services	964	17861	950.2	2803.7
77 Hospitals	553	43470	1124.4	3609.6
78 Personal automobiles	571	20645	174.7	2468.5
79 Other personal transport	423	2668	523.7	299.9
80 Tires, tubes, accessories	38	1413	26.5	133.2
81 Automobile repairs	359	13416	282.4	799.7
82 Gasoline, oil, grease	573	24998	429.8	1852.0
83 Parking, tolls,e tc.	573	8393	581.2	533.5
84 Local transport	778	31607	1074.9	2312.2
85 Rail transport	137	14639	128.5	1129.0
86 Bus transport	328	1454	319.7	75.1
87 Air transport	134	8079	138.6	936.2
88 Postal communication	45	2330	59.8	161.2
89 Telephone, telegraph	894	12160	1003.1	1117.9
90 Radio, televisions, phonographs	617	15077	605.7	1837.6
91 Durable recreational equipment	247	11219	100.0	1203.6
92 Other recreational equipment	476	16530	515.5	1563.9
93 Public entertainment	345	4849	265.7	198.6
94 Other recreation, culture	598	49881	309.9	5080.3
95 Books, papers, magazines	693	14721	357.1	1163.4
96 Stationary	239	2280	208.8	197.5
97 First- and second-level teachers	2954	5634	438.9	57.2
98 College teachers	2356	5634	350.0	57.2
99 Physical facilities for education	1340	5634	220.8	57.2
100 Educational books, supplies	27	5634	2.2	57.2
101 Other educational expenditures	472	5634	38.0	57.2
102 Barber and beauty shops	666	19471	791.5	1092.7
103 Toilet articles	593	13408	349.7	903.9

Table C85.1.1 (Continued)

	1 Taiwan (N.T.$)	2 Japan (Yen)	3 Taiwan (Int'l. $)	4 Japan (Int'l. $)
104 Other personal care goods	392	14928	569.8	1608.7
105 Restaurants, cafes	2528	89443	2353.7	5179.1
106 Hotels, logdings	185	26138	417.1	1624.6
107 Other services	513	92145	1153.8	11575.4
108 Expenditure of residents abroad	0	7427	0.0	513.9
109 One- and two-family dwellings	1872	82438	991.8	3754.7
110 Multifamily dwellings	1872	22582	1237.4	1283.2
111 Hotels	574	22582	379.5	1283.2
112 Industrial buildings	574	35961	168.6	1548.5
113 Commercial buildings	574	27745	449.3	2062.3
114 Office buildings	574	27745	449.3	2062.3
115 Educational buildings	574	15192	599.7	828.4
116 Hospital buildings	574	15192	599.7	828.4
117 Agricultural buildings	574	1805	498.2	118.4
118 Other buildings	574	1805	498.2	118.4
119 Roads, streets, highways	1328	69369	847.5	3346.6
120 Transport and utility lines	1328	62074	1260.6	4454.7
121 Other construction	1328	31248	879.8	1565.1
122 Land improvement	88	31248	58.1	1565.1
123 Locomotives	368	587	109.0	67.9
124 Other railway vehicles	368	587	109.0	67.9
125 Passenger automobiles	368	23457	83.1	2069.7
126 Trucks, buses, trailers	368	23457	83.1	2069.7
127 Aircraft	188	2809	31.9	186.5
128 Ships, boats	188	5105	46.5	494.4
129 Other transport equipment	557	3048	143.4	306.3
130 Engines, turbines	202	1278	47.5	70.6
131 Tractors	18	1278	4.3	70.6
132 Other agricultural machinery	18	1278	16.3	70.6
133 Office machinery	107	35572	111.1	2698.6
134 Metalworking machinery	497	15432	486.8	1045.3
135 Construction, mining machinery	263	7939	132.9	729.8
136 Special industrial machinery	372	15564	551.2	1478.0
137 General industrial machinery	315	19525	274.7	1430.9
138 Service industrial machinery	315	19525	125.7	1430.9

Table C85.1.1 (Continued)

	1 Taiwan (N.T.$)	2 Japan (Yen)	3 Taiwan (Int'l. $)	4 Japan (Int'l. $)
139 Electrical transmission equipment	1118	26303	866.0	2219.9
140 Communication equipment	783	22437	486.9	2091.7
141 Other electrical equipment	2718	20455	496.2	559.7
142 Instruments	815	10029	340.3	892.9
143 Furniture, fixtures	244	2553	217.2	225.7
144 Other durable goods	1617	18670	1383.2	1467.6
145 Increase in stocks	261	20983	191.5	1409.6
146 Exports minus imports	17732	80914	10033.3	8414.1
147 Unskilled blue collar	2624	54466	2393.3	4128.8
148 Skilled blue collar	866	54466	855.1	4128.8
149 White collar	612	54466	596.1	4128.8
150 Professional	3325	54466	4277.9	4128.8
151 Commodities of government	5021	57638	3595.5	3772.0
GDP	128455	2611455	100665.3	193497.7

Notes: Columns 1, 2 are per capita expenditure in national currencies, 1985. Reference in Appendix Table 6-1 in Kravis, Heston & Summers (1982).
Columns 3, 4 are real expenditure in international dollar prices, which for OECD countries is the Austrian shilling. Reference in Appendix Table 6-5 in Kravis, Heston & Summers (1982).

Source Data for Japan from World Bank data files.

Table C85.1.2

PURCHASING POWER PARITIES PER JAPANESE YEN, 1985

	1 Taiwan	2 Int'l. $
1 Rice	0.1026	0.84
2 Meal, other cereals	0.1065	1.23
3 Bread	0.0981	1.04
4 Biscuit, cakes, etc.	0.1513	1.12
5 Cereal preparations	0.1175	1.18
6 Macaroni, spaghetti	0.1175	1.06
7 Fresh beef, veal	0.0829	0.96

Table C85.1.2 (Continued)

	1 Taiwan	2 Int'l. $
8 Fresh lamb, mutton	0.2252	0.85
9 Fresh pork	0.0611	0.97
10 Fresh poultry	0.0893	0.69
11 Other fresh meat	0.1146	1.31
12 Frozen and salted meat	0.0608	1.09
13 Fresh and frozen fish	0.0632	1.10
14 Canned fish	0.1597	0.73
15 Fresh milk	0.2212	1.12
16 Milk products	0.1667	1.07
17 Eggs, egg products	0.0942	1.19
18 Butter	0.3236	1.13
19 Margaine, edible oil	0.1942	1.01
20 Lard, edible fat	0.1381	1.04
21 Fresh troical fruits	0.0880	0.91
22 Other fresh fruits	0.0880	0.67
23 Fresh vegetables	0.0932	0.85
24 Fruit other than fresh	0.1245	1.06
25 Vegetables other than fresh	0.1058	1.07
26 Tubers, including potatoes	0.0980	1.28
27 Coffee	0.1992	0.86
28 Tea	0.1087	1.49
29 Cocoa	0.1992	0.49
30 Sugar	0.1020	0.91
31 Jam, syrup, honey	0.0754	1.32
32 Chocolates, ice cream	0.0875	0.87
33 Salt, spices, sauces	0.2165	1.08
34 Nonalocoholic beverages	0.0878	0.92
35 Spirits	0.2941	0.77
36 Wine cider	0.2315	1.02
37 Beer	0.1080	0.87
38 Cigarettes	0.1017	1.27
39 Cigars, tobacco, snuff	0.1017	1.40
40 Clothing materials	0.1027	1.05
41 Men's clothing	0.1170	1.02
42 Women's clothing	0.0958	1.09
43 Boys' and girls' clothing	0.0609	1.12
44 Men's and boys' underwear	0.1062	1.02

Table C85.1.2 (Continued)

	1 Taiwan	2 Int'l. $
45 Women's and girls' underwear	0.1695	1.09
46 Haberdashery, millinery	0.1064	1.05
47 Clothing rental and repair	0.1770	1.18
48 Men's footwear	0.0885	1.02
49 Women's footwear	0.0683	1.06
50 Children's footwear	0.1600	0.93
51 Footwear, repairs	0.1770	1.24
52 Rents	0.0525	1.47
53 Indoor repairs and upkeep	0.0666	1.06
54 Electricity	0.1610	0.83
55 Gas	0.1073	1.01
56 Liquid fuels	0.1073	1.09
57 Other fuels, ice	0.1073	1.15
58 Furniture, fixtures	0.0421	0.77
59 Floor coverings	0.0526	1.22
60 Household textiles, etc.	0.1155	1.04
61 Refrigerators, freezers	0.1984	0.93
62 Washing appliances	0.0943	0.92
63 Cooking appliances	0.1215	0.92
64 Heating appliances	0.1292	0.97
65 Cleaning appliances	0.1247	0.86
66 Other household appliances	0.0799	0.97
67 Household utensils	0.0673	0.96
68 Nondurable household goods	0.0945	1.06
69 Domestic services	0.1770	1.05
70 Household services	0.1770	0.98
71 Drugs, medical preparations	0.0754	1.44
72 Medical supplies	0.0896	1.08
73 Therapeutic equipment	0.1038	1.23
74 Physicians' services	0.0392	0.75
75 Dentists' services	0.0479	0.64
76 Nurses' services	0.1592	0.70
77 Hospitals	0.0409	0.99
78 Personal automobiles	0.3906	0.84
79 Other personal transport	0.0908	0.94
80 Tires, tubes, accessories	0.1368	1.09

Table C85.1.2 (Continued)

	1 Taiwan	2 Int'l. $
81 Automobile repairs	0.0757	1.29
82 Gasoline, oil, grease	0.0988	1.14
83 Parking, tolls, etc.	0.0627	1.05
84 Local transport	0.0530	1.22
85 Rail transport	0.0825	1.07
86 Bus transport	0.0530	1.67
87 Air transport	0.1120	0.53
88 Postal communication	0.0517	0.99
89 Telephone, telegraph	0.0819	1.30
90 Radios, televisions, phonographs	0.1242	0.98
91 Durable, recreational equipment	0.2646	0.95
92 Other recreational equipment	0.0874	0.96
93 Public entertainment	0.0532	0.93
94 Other recreation, culture	0.1965	1.05
95 Books, papers, magazines	0.1534	1.05
96 Stationary	0.0989	1.26
97 First- and second-level teachers	0.0684	1.16
98 College teachers	0.0684	1.16
99 Physical facilities for education	0.0616	1.16
100 Educational books, supplies	0.1261	1.16
101 Other educational expenditures	0.1261	1.16
102 Barber and beauty shops	0.0472	1.37
103 Toilet articles	0.1143	1.01
104 Other personal care goods	0.0741	1.22
105 Restaurants, cafes	0.0622	0.88
106 Hotels, lodgings	0.0275	1.24
107 Other services	0.0559	0.73
108 Expenditure of residents abroad	0.1671	1.05
109 One- and two-family dwellings	0.0859	1.18
110 Multifamily	0.0859	1.03
111 Hotels	0.0859	1.03
112 Industrial buildings	0.1466	0.80
113 Commercial buildings	0.0950	0.88
114 Office buildings	0.0950	0.88
115 Educational buildings	0.0522	0.97
116 Hospital buildings	0.0522	0.97
117 Agricultural buildings	0.0756	0.80

Table C85.1.2 (Continued)

	1 Taiwan	2 Int'l. $
118 Other buildings	0.0756	0.80
119 Roads, streets, highways	0.0756	0.90
120 Transport and utility lines	00756	0.69
121 Other construction	0.0756	0.82
122 Land improvement	0.0756	0.82
123 Locomotives	0.3906	1.35
124 Other railway vehicles	0.3906	1.35
125 Passenger automobiles	0.3906	0.93
126 Trucks, buses, trailers	0.3906	0.93
127 Aircraft	0.3906	0.99
128 Ships, boats	0.3906	0.95
129 Other transport equipment	0.3906	0.75
130 Engines, turbines	0.2353	0.83
131 Tractors	0.2353	0.83
132 Other agricultural machinery	0.0624	0.82
133 Office machinery	0.0732	0.92
134 Metalworking machinery	0.0692	0.90
135 Construction, mining machinery	0.1818	0.94
136 Special industrial machinery	0.0641	0.81
137 General industrial machinery	0.0841	0.81
138 Service industrial machinery	0.1838	0.88
139 Electrical transmission equipment	0.1089	0.99
140 Communication equipment	0.1499	0.92
141 Other electrical equipment	0.1499	0.99
142 Instruments	0.2132	0.95
143 Furniture, fixtures	0.0994	0.95
144 Other durable goods	0.0919	1.01
145 Increase in stocks	0.0914	0.92
146 Exports minus imports	0.1671	1.13
147 Unskilled blue collar	0.0831	1.13
148 Skilled blue collar	0.0767	1.13
149 White collar	0.0778	1.13
150 professional	0.0589	1.05
151 Commodities of government	0.0914	

Notes: Reference in Appendix Table 6-3 in Kravis, Heston & Summers (1982). PPPs are in NT$ per yen.

Source: International price from World Bank data files.

Table C85.2.1

PER CAPITA EXPENDITURE (IN NATIONAL CURRENCY) AND REAL EXPENDITURE (IN INTERNATIONAL DOLLARS), TAIWAN AND JAPAN, GLOBAL CATEGORIES, AND IN GDP AGGREGATES, 1985

		1 Taiwan (N.T.$)	2 Japan (Yen)	3 Taiwan (share)	4 Japan (share)	5 Taiwan (Int'l $)	6 Japan (Int'l $)
CONSUMPTION, ICP	1-108	73799	1502086	57.5%	57.5%	63659	116822
Food, beverage, tobacco	1-39	25717	337103	20.0%	12.9%	16288	19602
Food	1-33	21968	271014	17.1%	10.4%	14260	15664
Bread, cereals	1-6	3571	56043	2.8%	2.1%	1570	2691
Meat	7-12	6475	34854	5.0%	1.3%	4881	1647
Fish	13-14	2811	57473	2.2%	2.2%	2710	3685
Milk, cheese, eggs	15-17	1286	16778	1.0%	0.6%	877	1026
Oils, fats	18-20	638	3247	0.5%	0.1%	166	167
Fruits, vegetables	21-26	6034	47212	4.7%	1.8%	3491	2518
Coffee, tea, cocoa	27-29	223	9021	0.2%	0.3%	61	367
Spices, sweets, sugar	30-33	931	46386	0.7%	1.8%	503	3564
Beverages	34-37	1718	42305	1.3%	1.6%	477	1762
Tobacco	38-39	2031	23784	1.6%	0.9%	1551	2177
Clothing, footwear	40-51	4167	95829	3.2%	3.7%	3427	7803
Clothing	40-47	3403	85965	2.6%	3.3%	2813	6953
Footwear	48-51	764	9864	0.6%	0.4%	614	850

Table C85.2.1 (Continued)

		1 Taiwan (N.T.$)	2 Japan (Yen)	3 Taiwan (share)	4 Japan (share)	5 Taiwan (Int'l $)	6 Japan (Int'l $)
Gross rent, fuel	52-57	16346	283075	12.7%	10.8%	20176	20576
Gross rent	52-53	13608	226115	10.6%	8.7%	18491	15878
Fuel, power	54-57	2738	56960	2.1%	2.2%	1686	4698
House furnishings	58-70	3186	83743	2.5%	3.2%	2601	7003
Furniture, appliances	58-66	2105	42462	1.6%	1.6%	1855	3550
Supplies	67-70	1081	41281	0.8%	1.6%	745	3453
Medical care	71-77	4289	154846	3.3%	5.9%	7376	15989
Transport, communication	78-89	4853	141802	3.8%	5.4%	4743	11818
Equipment	78-79	994	23313	0.8%	0.9%	698	2768
Operation costs	80-83	1544	48220	1.2%	1.8%	1320	3318
Purchased transport	84-87	1377	55779	1.1%	2.1%	1662	4453
Communications	88-89	938	14490	0.7%	0.6%	1063	1279
Recreation, education	90-101	10365	142727	8.1%	5.5%	3413	11531
Recreation	90-96	3215	114557	2.5%	4.4%	2363	11245
Education	97-101	7150	28170	5.6%	1.1%	1050	286

Table C85.2.1 (Continued)

		1 Taiwan (N.T.$)	2 Japan (Yen)	3 Taiwan (share)	4 Japan (share)	5 Taiwan (Int'l $)	6 Japan (Int'l $)
Other expenditures	102-107	4876	255533	3.8%	9.8%	5635	21985
Personal care	102-104	1650	47807	1.3%	1.8%	1711	3605
Miscellaneous services	105-107	3226	207726	2.5%	8.0%	3925	18379
CAPITAL FORMATION	109-146	42208	833869	32.9%	31.9%	25289	56388
Domestic capital formation	109-145	24476	744855	19.1%	28.5%	15255	47974
Construction	109-122	12406	446984	9.7%	17.1%	8918	24819
Residential	109-110	3743	105019	2.9%	4.0%	2229	5038
Nonresidential	111-118	4592	148027	3.6%	5.7%	3642	8850
Other	119-122	4071	193938	3.2%	7.4%	3046	10931
Producer durables	123-144	11809	276888	9.2%	10.6%	6146	21745
Transport equipment	123-129	2405	59050	1.9%	2.3%	606	5262
Nonelectrical machinery	130-138	2109	117390	1.6%	4.5%	1750	9025
Electrical machinery	139-142	5434	79224	4.2%	3.0%	2189	5764
Other	143-144	1861	21223	1.4%	0.8%	1600	1693
Export minus import	146-146	17732	89014	13.8%	3.4%	10033	8414
GOVERNMENT	147-151	12448	275500	9.7%	10.5%	11718	20287
Compensation	147-150	7428	217862	5.8%	8.3%	8122	16515
Commodities	151	5021	57638	3.9%	2.2%	3595	3772

Table C85.2.1 (Continued)

		1 Taiwan (N.T.$)	2 Japan (Yen)	3 Taiwan (share)	4 Japan (share)	5 Taiwan (Int'l $)	6 Japan (Int'l $)
GROSS DOMESTIC PRODUCT	1-151	128455	2611455	100.0%	100.0%	100665	193498
Exchange rate		0.1671					
AGGREGATES							
Consumption	1-108	73799	1502086	57.5%	57.5%	63659	116822
Capital formation	109-146	42208	833869	32.9%	31.9%	25289	56388
Government	147-151	12448	275500	9.7%	10.5%	11718	20287
Gross domestic product	1-151	128455	2611455	100.0%	100.0%	100665	193498

Notes: Columns 1, 2 are per capita expenditure in national currencies. Reference in Summary Multilateral Table 6-1, Kravis, Heston and Summers (1982).

Columns 3, 4 are percentage distribution of expenditures in national currencies. Reference in Summary Multilateral Table 6-2, Kravis, Heston and Summers (1982).

Columns 5, 6 are real expenditure per capita in "international dollar" prices, which for OECD countries is the Austrian shilling.

Table C85.2.2

PURCHASING POWER PARITY PER JAPENSES YEN AND P* FOR TAIWAN, 1985

		1 N.T.$	2 P*
CONSUMPTION, ICP	1-108	0.0902	0.54
Food, beverage, tobacco	1-39	0.0918	0.55
Food	1-33	0.0890	0.53
Bread, cereals	1-6	0.1092	0.65
Meat	7-12	0.0627	0.38
Fish	13-14	0.0665	0.40
Milk, cheese, eggs	15-17	0.0897	0.54
Oils, fats	18-20	0.1971	1.18
Fruits, vegetables	21-26	0.0922	0.55
Coffee, tea, cocoa	27-29	0.1477	0.88
Spices, sweets, sugar	30-33	0.1420	0.85
Beverages	34-37	0.1501	0.90
Tobacco	38-39	0.1198	0.72
Clothing, footwear	40-51	0.0990	0.59
Clothing	40-47	0.0978	0.59
Footwear	48-51	0.1073	0.64
Gross rent, fuel	52-57	0.0589	0.35
Gross rent	52-53	0.0517	0.31
Fuel, power	54-57	0.1340	0.80
House furnishings	58-70	0.1024	0.61
Furniture, appliances	58-66	0.0949	0.57
Supplies	67-70	0.1213	0.73
Medical care	71-77	0.0600	0.36
Transport, communication	78-89	0.0853	0.51
Equipment	78-79	0.1690	1.01
Operation costs	80-83	0.0805	0.48
Purchased transport	84-87	0.0602	0.40
Communications	88-89	0.0779	0.47

Table C85.2.2 (Continued)

		1 N.T.$	2 P*
Recreation, education	90-101	0.2454	1.47
Recreation	90-96	0.1336	0.80
Education	97-101	0.0692	0.41
Other expenditures	102-107	0.0744	0.45
Personal care	102-104	0.0727	0.44
Miscellaneous	105-107	0.0727	0.44
CAPITAL FORMATION	109-146	0.1129	0.68
Domestic capital formation	109-145	0.1033	0.62
Construction	109-122	0.0772	0.46
Residential	109-110	0.0806	0.48
Nonresidential	111-118	0.0754	0.45
Other	119-112	0.0753	0.45
Producer durables	123-144	0.1509	0.90
Transport equipment	123-129	0.3536	2.12
Nonelectrical machinery	130-138	0.0926	0.55
Electrical machinery	139-142	0.1806	1.08
Other	143-144	0.0928	0.56
Export minus import	146-146	0.1671	1.00
GOVERNMENT	147-151	0.0782	0.47
Compensation	147-150	0.0693	0.41
Commodities	151	0.0914	0.55
GROSS DOMESTIC PRODUCT	1-151	0.0946	0.57
Exchange rate		0.1671	
AGGREGATES			
Consumption	1-108	0.0902	0.54
Capital formation	109-146	0.1129	0.68
Government	147-151	0.0782	0.47
Gross domestic product	1-151	0.0946	0.57

Notes: The PPPs are expressed in NT$ per Yen. The ratio of PPP to the exchange rate is P*, and its inverse is the "exchange rate deviation" index.

Table C80.3.1

EXPENDITURE PER CAPITA IN NATIONAL CURRENCY AND EXPENDITURE SHARES, TAIWAN AND JAPAN, GDP AGGREGATES, 1980

		Taiwan (N.T.$)	Japan (Yen)	Taiwan (share)	Japan (share)
CONSUMPTION	1-108	45990	907826	0.55	0.45
Food, beverage, tobacco	1-39	18698	198666	0.22	0.10
Clothing, footwear	40-51	2456	106880	0.03	0.05
Gross rent & house furnishings	52-70	12354	291673	0.15	0.14
Medical care	71-77	1823	26500	0.02	0.01
Transport, communication	78-89	1913	134979	0.02	0.07
Recreation and education	90-101	5995	111362	0.07	0.06
Other expenditures	102-107	2750	29307	0.03	0.01
CAPITAL FORMATION	109-146	27305	956903	0.29	0.44
Construction	109-122	11946	187527	0.14	0.09
Transport equipment	123-129	2477	195897	0.03	0.10
Nonelectrical machinery	130-138	3046	176801	0.04	0.09
Electrical machinery	139-142	6051	197805	0.07	0.10
Other	143-144	2115	74403	0.03	0.04
Export minus import	146	-997	64557	-0.01	0.03
GOVERNMENT	147-151	10411	155384	0.12	0.08
Compensation	147-150	5849	119582	0.07	0.06
Commodities	151	4562	35802	0.05	0.02
GROSS DOMESTIC PRODUCT	1-151	83706	2020113	1.00	1.00
AGGREGATES					
Consumption	1-108	45990	907826	0.55	0.45
Capital formation	109-146	27305	956903	0.33	0.47
Government	147-151	10411	155384	0.12	0.08
Gross domestic product	1-151	83706	2020113	1.00	1.00

Table C80.3.2

PURCHASING POWER PARITY PER JAPANESE YEN, AND REAL PER CAPITAL EXPENDITURE IN INTERNATIONAL DOLLARS, 1980

				Real per Capita Expenditure	
		Taiwan (N.T.$)	Taiwan (P*)	Taiwan (Int'l $)	Japan (Int'l $)
CONSUMPTION	1-108	0.0635	0.40	3895.7	4885.0
Food, beverage, tobacco	1-39	0.0893	0.56	1111.3	1054.5
Clothing, footwear	40-51	0.1064	0.67	83.7	387.7
Gross rent & house furnishings	52-70	0.0612	0.39	693.9	1002.2
Medical care	71-77	0.0503	0.32	883.9	646.3
Transport, communication	78-89	0.0837	0.53	82.5	487.5
Recreation and education	90-101	0.2285	1.44	135.8	576.3
Other expenditures	102-107	0.0720	0.45	904.6	964.4
CAPITAL FORMATION	109-146	0.0517	0.33	1765.5	3199.0
Construction	109-122	0.0811	0.51	1545.4	1967.8
Transport equipment	123-129	0.3453	2.17	11.1	303.3
Nonelectrical machinery	130-138	0.0920	0.58	97.9	522.5
Electrical machinery	139-142	0.1753	1.10	61.5	352.4
Other	143-144	0.0913	0.58	41.8	134.2
Export minus import	146	0.1592	1.00	7.9	-81.2
GOVERNMENT	147-151	0.0554	0.35	313.1	258.8
Compensation	147-150	0.0521	0.33	121.9	129.9
Commodities	151	0.0859	0.54	191.2	128.9
GROSS DOMESTIC PRODUCT	1-151	0.0579	0.36	5974.3	8342.8
AGGREGATES					
Consumption	1-108	0.0635	0.40	3895.7	4885.0
Capital formation	109-146	0.0517	0.33	1765.5	3199.0
Government	147-151	0.0554	0.35	313.1	258.8
Gross domestic product	1-151	0.0579	0.36	5974.3	8342.8
Exchante rate		0.1588			

Note: International dollar prices are in Austrian shillings.

Table C75.4.1

EXPENDITURE PER CAPITA IN NATIONAL CURRENCY AND EXPENDITURE SHARES, TAIWAN AND JAPAN, GDP AGGREGATES, 1975

		Taiwan (N.T.$)	Japan (Yen)	Taiwan (share)	Japan (share)
CONSUMPTION	1-108	22076	824902	0.60	0.62
Food, beverage, tobacco	1-39	9426	214790	0.26	0.16
Clothing, footwear	40-51	1268	61263	0.03	0.05
Gross rent & house furnishings	52-70	5543	166691	0.15	0.13
Medical care	71-77	706	73400	0.02	0.06
Transport, communication	78-89	666	72110	0.02	0.05
Recreation and education	90-101	2731	119830	0.07	0.09
Other expenditures	102-107	1736	113869	0.05	0.09
CAPITAL FORMATION	109-146	9891	435368	0.28	0.32
Construction	109-122	4669	283789	0.13	0.21
Transport equipment	123-129	1073	33423	0.03	0.03
Nonelectrical machinery	130-138	2127	46745	0.06	0.04
Electrical machinery	139-142	1923	35530	0.05	0.03
Other	143-144	1558	30897	0.04	0.02
Export minus import	146	−1195	556	−0.03	0.00
GOVERNMENT	147-151	4543	67690	0.12	0.05
Compensation	147-150	2819	53672	0.08	0.04
Commodities	151	1724	14018	0.05	0.01
GROSS DOMESTIC PRODUCT	1-151	36511	1327960	1.00	1.00
AGGREGATES					
Consumption	1-108	22076	824902	0.60	0.62
Capital formation	109-146	9891	435368	0.27	0.33
Government	147-151	4543	67690	0.12	0.05
Gross domestic product	1-151	36511	1327960	1.00	1.00

Table C75.4.2

PURCHASING POWER PARITY PER JAPANESE YEN, AND REAL PER CAPITA EXPENDITURE IN INTERNATIONAL DOLLARS, 1975

				Real per Capita Expenditure	
		Taiwan (N.T.$)	Taiwan (P*)	Taiwan (Int'l $)	Japan (Int'l $)
CONSUMPTION	1-108	0.0782	0.63	1001.4	2925.2
Food, beverage, tobacco	1-39	0.0812	0.66	424.5	785.2
Clothing, footwear	40-51	0.0997	0.81	54.9	264.3
Gross rent & house furnishings	52-70	0.0567	0.46	295.6	504.0
Medical care	71-77	0.0398	0.32	81.0	335.3
Transport, communication	78-89	0.0807	0.65	32.6	285.3
Recreation and education	90-101	0.2225	1.80	40.0	390.2
Other expenditures	102-107	0.0730	0.59	72.8	348.3
CAPITAL FORMATION	109-146	0.0695	0.56	585.6	1791.3
Construction	109-122	0.0627	0.51	237.6	905.7
Transport equipment	123-129	0.2561	2.08	18.9	150.6
Nonelectrical machinery	130-138	0.0765	0.62	192.6	323.7
Electrical machinery	139-142	0.1467	1.19	81.9	222.0
Other	143-144	0.0855	0.69	100.1	169.7
Export minus import	146	0.1133	0.92	-45.6	2.4
GOVERNMENT	147-151	0.0545	0.44	234.4	190.3
Compensation	147-150	0.0479	0.39	150.8	137.5
Commodities	151	0.0778	0.63	83.5	52.8
GROSS DOMESTIC PRODUCT	1-151	0.0741	0.60	1821.3	4906.7
AGGREGATES					
Consumption	1-108	0.0782	0.63	1001.4	2925.2
Capital formation	109-146	0.0695	0.56	585.6	1791.3
Government	147-151	0.0545	0.44	234.4	190.3
Gross domestic product	1-151	0.0741	0.60	1821.3	4906.7
Exchange rate		0.1234			

Note: International dollar prices are in Austrian shillings.

Table C70.5.1

EXPENDITURE PER CAPITA IN NATIONAL CURRENCY AND EXPENDITURE SHARES, TAIWAN AND JAPAN, GDP AGGREGATES, 1970

		Taiwan (N.T.$)	Japan (Yen)	Taiwan (share)	Japan (share)
CONSUMPTION	1-108	9258	372983	0.60	0.54
Food, beverage, tobacco	1-39	3953	120064	0.26	0.18
Clothing, footwear	40-51	532	34012	0.03	0.05
Gross rent & house furnishings	52-70	2325	85961	0.15	0.13
Medical care	71-77	296	29620	0.02	0.04
Transport, communication	78-89	279	14647	0.02	0.02
Recreation and education	90-101	1145	44618	0.07	0.07
Other expenditures	102-107	728	42803	0.05	0.06
CAPITAL FORMATION	109-146	3936	277429	0.22	0.36
Construction	109-122	1291	135935	0.08	0.20
Transport equipment	123-129	499	16670	0.03	0.02
Nonelectrical machinery	130-138	589	35696	0.04	0.05
Electrical machinery	139-142	532	27135	0.03	0.04
Other	143-144	431	23586	0.03	0.03
Export minus import	146	–8	9092	–0.00	0.01
GOVERNMENT	147-151	2259	33176	0.15	0.05
Compensation	147-150	1357	23920	0.09	0.03
Commodities	151	902	9256	0.06	0.01
GROSS DOMESTIC PRODUCT	1-151	15454	683588	1.00	1.00
AGGREGATES					
Consumption	1-108	9258	372983	0.60	0.55
Capital formation	109-146	3936	277429	0.25	0.41
Government	147-151	2259	33176	0.15	0.05
Gross domestic product	1-151	15454	683588	1.00	1.00

Table C70.5.2

PURCHASING POWER PARITY PER JAPANESE YEN, AND REAL PER CAPITA EXPENDITURE IN INTERNATIONAL DOLLARS, 1970

		Taiwan (N.T.$)	Taiwan (P*)	Real per Capita Expenditure	
				Taiwan (Int'l $)	Japan (Int'l $)
CONSUMPTION	1-108	0.0784	1.42	509.6	1608.7
Food, beverage, tobacco	1-39	0.0707	0.64	210.7	452.8
Clothing, footwear	40-51	0.1096	0.98	26.1	182.7
Gross rent & house furnishings	52-70	0.0649	0.58	119.9	287.8
Medical care	71-77	0.0311	0.28	67.3	209.1
Transport, communication	78-89	0.0747	0.67	14.9	58.5
Recreation and education	90-101	0.2986	2.68	13.9	161.4
Other expenditures	102-107	0.0758	0.68	56.8	253.0
CAPITAL FORMATION	109-146	0.0885	0.80	173.8	1083.8
Construction	109-122	0.0516	0.46	83.6	454.6
Transport equipment	123-129	0.2528	2.27	9.9	83.7
Nonelectrical machinery	130-138	0.0745	0.67	38.7	174.8
Electrical machinery	139-142	0.1296	1.16	16.6	109.5
Other	143-144	0.0810	0.73	24.9	110.3
Export minus import	146	0.0935	0.84	0.0	0.0
GOVERNMENT	147-151	0.0577	0.52	168.1	142.5
Compensation	147-150	0.0499	0.45	122.0	107.2
Commodities	151	0.0747	0.67	46.1	35.3
GROSS DOMESTIC PRODUCT	1-151	0.0753	0.68	851.4	2834.9
AGGREGATES					
Consumption	1-108	0.0784	0.70	509.6	1608.7
Capital formation	109-146	0.0885	0.80	173.8	1083.8
Government	147-151	0.0577	0.52	168.1	142.5
Gross domestic product	1-151	0.0753	0.68	851.4	2834.9
Exchange rate		0.1113			

Note: International dollar prices are in Austrian shillings.

References

Balassa, B., "The Purchasing Power Parity Doctrine: A Reappraisal," *Journal of Political Economy*, 72, December 1964, 584-596.

Bhagwati, J.N., "Why Are Services Cheaper in the Poor Countries?" *Economic Journal*, 94, June 1984, 279-286.

Cassel, G., *The World's Monetary Problems*, New York: E.P. Dutton and Co., 1921.

Harrod, R.F., *International Economics*, London: Nisbet and Co., Cambridge University Press, 1939.

Kravis, I.B., A. Heston and R. Summers, *International Comparisons of Real Product and Purchasing Power*, Baltimore, MD: The Johns Hopkins University Press, 1978.

_____, _____ and _____, *World Product and Income: International Comparisons of Real Gross Product*, Baltimore, MD: The Johns Hopkins University Press, 1982.

Kravis, I.B., Z. Kenessey, A. Heston and R. Summers, *A System of International Comparisons of Gross Product and Purchasing Power*, Baltimore, MD: The Johns Hopkins University Press, 1975.

Maddison, A., "A Comparison of Levels of GDP per Capita in Developed and Developing Countries, 1700-1980," *Journal of Economic History*, 43, March 1983, 27-41.

_____ and B. van Ark, "International Comparisons of Purchasing Power, Real Output and Labor Productivity: A Case Study of Brazilian, Mexican, and U.S. Manufacturing, 1975," *Review of Income and Wealth*, 35, March 1989, 31-55.

O.E.C.D., *Purchasing Power Parities and Real Expenditures, 1985*, Department of Economics and Statistics, 1985.

Ricardo, D., *On the Principles of Political Economy and Taxation*, London: J. Murray, (Reprint, Homewood Ill: Richard D. Irwin, 1963), 1917.

Summers, R., I.B. Kravis, and A. Heston, "International Comparisons of Real Product and Its Composition: 1950-77," *Review of Income and Wealth, 26*, March 1980, 19-66.

_____ and A. Heston, "Improved International Comparisons of Real Product and Its Composition: 1950-80," *Review of Income and Wealth, 30*, June 1984, 207-262.

_____ and _____, "A New Set of International Comparisons of Real Product and Price Levels: Estimates for 130 Countries, 1950-85," *Review of Income and Wealth*, 34, March 1988, 1-25.

_____ and _____, "The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950-1988," *The Quarterly Journal of Economics*, May 1991, 327-368.

Taussig, F.W., *International Trade,* New York: Macmillan, 1928.

Usher, D., "The Transport Bias in Comparisons of National Income," *Economica,* May 1963.

van Ark, B., "Comparative Levels of Manufacturing Productivity in Postwar Europe: Measurement and Comparison," *Oxford Bulletin of Economics and Statistics,* 52, November 1990, 343-374.

Yotopoulos, P.A., "Purchasing Power in Taiwan: International Comparisons, Policy Implications, and Some Analytical Considerations," in Chung-Hua Institution for Economic Research (ed.), *Conference on Pricing Problems in Taiwan, Proceedings,* Workshop Series on Taiwan's Domestic Economy, vol. 5, Taipei: Chung-Hua Institution for Economic Research (in Chinese and English), 1992.

———, "Trade and Development in the Real World: A Purchasing Power Parity Approach," book manuscript, 1993.