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ARE SERVICES INCOME-ELASTIC? SOME NEW EVIDENCE

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The hypothesis that the demand for services is income-elastic tended to find support in early empirical work. Recent studies however, adopting improved methodologies and better international data (based on PPP exchange rates), have challenged this conventional wisdom. Using an updated, disaggregated dataset covering 60 countries in 1980 this paper re-estimates income and price elasticities of demand for services. It rejects the income-elastic argument overall but confirms a wide range of income elasticity estimates (above and below unity) across different types of services. Estimates are also shown to be sensitive to the *a priori* model of service demand.

1. INTRODUCTION

The economic role of services in the development process has become increasingly debated in the last decade or so as new datasets and analytical methods have produced challenges to the conventional wisdom regarding a number of "service-related" stylized facts. Prominent in this debate has been the question of whether the demand for services is income-elastic. Early work (for example, Kuznets, 1957; Fuchs, 1968) apparently established that the share of GDP accounted for by service activities tended to rise with GDP per capita, and led to the argument that services are income-elastic in demand. A rising share of services in GDP at the expense of *industrial* activities in the later stages of development was also regarded as a result of income-elastic demand for services (see Gemmell, 1982).

This conventional wisdom has been challenged recently from two sources. Firstly, data from the UN International Comparison Project (ICP) suggested that, across countries, the share of services in total expenditure (or GDP) remains approximately constant in association with increases in GDP per capita when these shares are calculated using *real* (i.e. purchasing power parity (PPP) based), rather than *nominal*, exchange rates (see Kravis, Heston and Summers (KHS) 1978, 1982, 1983; Kravis and Lipsey, 1983; Summers, 1985). Secondly, the *a priori* arguments themselves have been challenged. Bhagwati (1984), for example, reminded us that the process of economic growth might be associated with a tendency for some commodities to substitute for services in households' consumption bundles in addition to the converse substitutions stressed in the traditional literature.

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This nominal/real share evidence is consistent with two alternative elasticity hypotheses:

(i) Services have an income elasticity greater than unity and a negative own-price (positive cross-price) elasticity of demand, with the two effects approximately cancelling each other out as per capita income and relative service prices rise together.

(ii) Services have an income elasticity not significantly different from unity and a zero (or highly inelastic) price response.

Recent estimates of (aggregate) service elasticities using the ICP dataset tend to challenge the "income-elastic" hypothesis without producing conclusive results. For example, KHS (1983), found a range of elasticity estimates above and below unity from cross-section and time-series data. Summers (1985) found services in aggregate to have an income elasticity of almost exactly unity, while Bergstrand (1991) and Falvey and Gemmell (1991) found service income elasticities in aggregate to be statistically greater than, but numerically close to, unity.

Services, however, comprise a very heterogeneous set of activities, more so probably than agricultural or industrial activities. If income elasticities for individual services are similarly dispersed—and Summers (1985) finds some evidence that they are—then "aggregate" (i.e. average) elasticity estimates for services may be misleading. Not enough is yet known about the income elasticity of individual services, essentially because of a lack of data of sufficient quality and detail. Summers (1985) is the only study to explore the issue for service disaggregations using appropriate PPP data. However, he was restricted to six service subsectors in the Phase III ICP data set covering only 34 countries in 1975.

This paper extends Summers' analysis by investigating income (and price) elasticities of demand for service activities using the Phase IV ICP dataset which covers 60 countries in 1980, and allows us to examine eleven service sub-sectors. We find that, in this extended dataset, the real service share *falls* significantly in association with increases in GDP per capita, but we confirm Summer's finding that services overall have an income elasticity of approximately unity. This however obscures a wide range of income elasticity estimates (above and below unity) across different types of services which appear to be sensitive to the *a priori* model of service demand.

2. Service Shares and Incomes Elasticites

Summers (1985) estimated the following three service equations:

$$\ln (E_s/Y) = \alpha_1 + \beta_1 \ln RY + u_i \tag{1}$$

$$\ln (RE_s/RY) = \alpha_2 + \beta_2 \ln RY + u_i \tag{2}$$

$$\ln RE_s = \alpha_3 + \beta_3 \ln RY + \gamma_3 \ln (P_s/P_{\text{gdp}}) + u_i \tag{3}$$

E_s is expenditure per capita on services and Y is GDP per capita, both converted to \$ at *nominal* exchange rates; RE_s and RY are respectively "real" expenditure per capita on services and "real" GDP per capita (i.e. converted to \$ using category-specific PPP exchange rates). P_s and P_{gdp} are the (domestic) price of services and GDP respectively, and u_i is a random error term. The nominal

and real shares of services rise with GDP per capita if $\beta_1 > 0$ and $\beta_2 > 0$ respectively, and services may be deemed to be income-elastic in demand if $\beta_3 > 1$. Real expenditures (RE) here are equivalent to quantities—in national accounting terms—and thus equation (3) may be viewed as a simple demand function. However, it may be objected that this is not fully specified since the right-hand-side omits potentially relevant "taste" variables. A more complete, specification is therefore:

$$\ln RE_s = \alpha_4 + \beta_4 \ln RY + \gamma_4 \ln P_s + \delta_4 \ln P_c + \varepsilon_4 \mathbf{Z} + u_i \tag{4}$$

where $\mathbf{Z}$ is a vector of "taste" variables. Notice that in (4) service and commodity prices (P_s, P_c) appear separately allowing testing of the homogeneity condition $\delta_4 = -\gamma_4$.[1] Equations (3) and (4) can be used to estimate the income elasticities of aggregate or *individual* services with P_c a "composite" of commodity *and* other service prices in the latter case. Before estimating these equations, the data require some introduction.

The data we use, which are from Phase IV of the ICP (UN-CEC, 1986) include per capita consumption expenditures (nominal and real) for 30 separate consumption expenditure items (and 11 sub-aggregates) across 57 countries in 1980.[2] Of these, there are seven service expenditures and four expenditure items which are known (from the more disaggregated Phase III dataset) to contain both services and commodities.[3] We ran separate regressions for the seven service expenditure categories (housing, health, purchased transport, communications, recreation services, education, and government), and for the four "mixed" categories—fuel and power, "other household goods and services" (mainly domestic services), transport operating costs, and "miscellaneous goods and services" (see Appendix). Estimates for services as a whole, including and excluding these "mixed" categories, were also obtained.

Real Service Shares

Table 1 presents estimates from equations (1) and (2) discussed above. Summers' (1985) estimates are shown for comparison. This reveals a number of interesting features.

(i) The real share of services in aggregate declines significantly in association with increases in GDP per capita (falling by over 10 per cent as GDP doubles). This contrasts with Summers' finding of a small and statistically insignificant decline in the earlier, more limited, sample.

(ii) Five service subsector shares show tendencies to decline with increasing GDP per capita, of which three decline significantly: education, government and "other household goods and services."

[1]Since P_s is included in P_{gdp}, P_s/P_c (or P_s and P_c) provide a more accurate relative price measure.

[2]Three Eastern European countries are omitted: Poland, Hungary, and Yugoslavia.

[3]The data are discussed in more detail in Falvey and Gemmell (1991) and a service breakdown is given in the Appendix. Though the Phase III dataset is more disaggregated than the Phase IV series—and thus avoids "mixed" service/commodity groupings—the larger number of countries and improved methodology of the Phase IV data render this preferable for present purposes. In fact, Summers' (1985) Phase III evidence is *less* disaggregated than that presented below.

TABLE 1

NOMINAL AND REAL SERVICE SHARE REGRESSIONS

	Real Shares:[a] Present Sample	Summers (1985)	Nominal Shares:[b] Present Sample	Summers (1985)
Services:				
1. Housing	0.280*	0.197*	0.152*	0.244*
2. Health	0.456*	0.420*	0.609*	0.486*
3. Purchased transport	−0.064	0.060	−0.047	0.086
4. Communications	0.596*		0.424*	
5. Recreation	0.136	−0.395*	0.419*	0.123*
6. Education	−0.344*		0.210*	
7. Government	−0.198*	−0.219*	−0.001	0.073
8. Total Services	−0.113*	−0.036	0.090*	0.178*
"Mixed":				
9. Fuel & Power	−0.112	—	−0.021	—
10. Other household goods & services (G&S)	−0.340*	—	−0.085*	—
11. Transport Operating costs	0.497*	—	0.434*	—
12. Misc. G&S[c]	0.542*	0.231*	0.440*	0.333*
13. Total Services & "Mixed"	−0.066*	—	0.121*	—

Notes: * = significantly different from zero at 5 percent. Estimation is by OLS (with a constant term, not shown). $n = 57$ observations (except Communications and Recreation, where $n = 54$).

[a] β_2 from: $\ln (RE_s/RY) = \alpha_2 + \beta_2 \ln RY + u_i$.

[b] β_1 from: $\ln (E_s/Y) = \alpha_1 + \beta_1 \ln RY + u_i$.

[c] The Summers (1985) category here is "other consumption services." "Misc. G&S" also includes small expenditures on "toilet articles" and "other personal care goods" (see Appendix).

(iii) Summers examined combined transport/communications (T&C) and education/recreation service sub-sectors. It is clear from Table I however that patterns differ for *real* shares within each of these two categories. Approximate constancy (observed by Summers) for T&C appears to be composed of a declining or constant share for "purchased transport" but significant real share increases for communications. A similar diversity emerges for education and recreation.

(iv) The results for government confirm recent evidence from other studies of constant or rising nominal, but falling real, shares of government services in GDP (see Gemmell, 1993).

Income Elasticities

As noted in Section 2, income elasticity estimates may be obtained from regressions on equations (3) or (4). In order to compare our results with Summers (1985) we first ran regressions on (3), (i.e. omitting the vector, **Z**). The results reported in Table 2 were obtained using ordinary least squares (OLS) and Seemingly Unrelated Regression (SUR) methods, and both consistently produce very similar results.[4] Income elasticity estimates in columns *(1)* and *(2)* may be compared with those obtained by Summers (1985), in column *(3)*.

[4] Reported income elasticities are from regressions imposing the homogeneity restriction, $\delta_4 = -\gamma_4$, discussed further below. Elasticity estimates are not sensitive to this restriction.

TABLE 2

SERVICE INCOME ELASTICITIES

Estimation method:	Income Elasticities Full Sample: OLS (1)	SUR (2)	Summers (1985) (OLS) (3)	Sub-samples: $n=24$ SUR[a] (4)	$n=33$ SUR[a] (5)
Services:					
1. Housing	1.186[+]	1.202[+]	1.219[+]	1.190[+]	1.204[+]
2. Health	1.582[+]	1.583[+]	1.458[+]	1.539[+]	1.598[+]
3. Purchased transport	0.955	0.956	1.076	1.059	0.852
4. Communications	1.315[+]	1.334[+]		1.483[+b]	1.255
5. Recreation	1.410[+]	1.470[+]	0.794[+]	1.424[+b]	1.570[+]
6. Education	0.959	1.007		0.896	1.018
7. Government	1.071	1.048	0.912	1.049	1.067
8. Total Services	0.979	—	0.977	0.967	0.998
"Mixed":					
9. Fuel & power	0.967	0.968	—	1.142[++]	0.775[+]
10. Other household G&S	0.986	0.975	—	1.077	0.884
11. Transport operating costs	1.418[+]	1.428[+]	—	1.405[+]	1.362[+]
12. Misc. G&S	1.441[+]	1.457[+]	1.301[+]	1.310[+]	1.436[+]
13. Total services & "mixed"	1.013	—	—	1.011	1.005

Notes: +(++)=significantly different from unity at 5 per cent (10 per cent); all estimates are significantly different from zero at 5 per cent (10 per cent).

[a]Estimation by OLS in lines 8 and 13.

[b]$n=21$ (Communications), 22 (Recreation).

Our income elasticities in columns *(1)* and *(2)* can be seen to be broadly similar to the Summers' estimates in *(3)*. They also strongly suggest however that Summers' estimate close to unity for "transport and communications" obscures a composition of "purchased transport" (mainly public transport) which is in *inelastic* (or unit elasticity) demand and an *elastic* demand for "communications."[5] Similarly Summers' *inelastic* estimate for "recreation and education" (which seems counter-intuitive) is shown in this extended dataset to be composed of *elastic* recreation services and an education elasticity very close to unity. This latter result suggests that the declining real share of expenditure observed for education (see Table 1) as GDP per capita rises, results more from price effects than from a low income elasticity of demand. A similar phenomenon is observed for government services.

Two other services—housing and health—which are often thought of as necessities meeting "basic" needs, are shown in all three estimates to be income-elastic. Though some spending on these services may well be essential at low income levels, consumers with higher incomes seem to be willing to spend proportionately more on both housing and health services (the latter being achieved in most countries mainly via tax payments). Finally, the 57 country sample used here contains 24 countries matching those in Summers' 1975 sample. To assess

[5]"Transport operating costs" also appear, from Table 2, to be income elastic. The main service in this "mixed" category is likely, in most countries, to be "automobile repairs."

the importance of sample composition, columns *(4)* and *(5)* report results for the 1980 data split into two sub-samples: the Summers' 24 countries, and the remaining sub-sample of 33 countries. It is clear from the table that results are very similar across the two sub-samples—only for "fuel & power" would an "elastic/inelastic" conclusion differ between them.

Price Elasticities

Price elasticity estimates were first obtained using equation (4) above (but omitting the vector, **Z**), and testing the homogeneity restriction on prices, namely: $\delta_4 = -\gamma_4$. This restriction was supported by the data in all but three of the thirteen service categories. Results based on equation (3), (with P_c in place of P_{gdp}) are therefore reported in Table 3, but conclusions are substantively unaffected using unrestricted estimates of δ_4, γ_4. Price elasticity estimates from the ICP dataset must, however, be treated with caution because these data are constructed in a way which, in some instances, might bias elasticity estimates toward (minus) unity.[6] Nevertheless, the price elasticities reported in Table 3 always take the expected (negative) signs and are significantly different from zero in all cases. Services as a whole appear to be highly price *in*elastic and, unlike Summers, we do obtain a statistically significant estimate. (This difference may result from Summers' use of P_{gdp} as a proxy for P_c). Though services in aggregate are price-*inelastic*, five or six of the eleven individual service categories appear to have *elastic* (own) price responses (though only two significantly exceed unity).

Table 4 summarizes the results for service shares, and income and price elasticities from Tables 1–3. While the entries in the table are only approximate some conclusions are possible. It is clear, for example, that for services *as a whole* the small fall in its real GDP share as GDP per capita rises results from a combination of unitary income elasticity and a significant, but inelastic, price response. For service subsectors, the five groups with significantly rising GDP shares (housing, health, communications, transport operations, and miscellaneous G&S) also reveal *income elastic* responses while a *unit income elasticity* conclusion is probably appropriate for the others (except recreation services). Price elasticities are less easy to categorize but there is little clear evidence of *elastic* responses with the possible exception of communications and "other household G&S." (The tendency for price elasticity estimates in Table 3 to bunch around (minus) unity may result from the data construction discussed above).

[6]The ICP real service data are generally constructed by gathering independent information on *either* the prices, *or* the quantities, of services consumed. Expenditure data then allow the "residual" (quantities or prices) to be derived. As a result, any error in measurement of the collected data (say, prices) leads to an equal and opposite error in the measurement of quantities. This will tend to bias price elasticity estimates towards (minus) unity. Correlation of this error with income levels could also bias income elasticity estimates; for example, if quantity measures do not adequately account for the alleged tendency for service quality to be higher in higher income countries. We are grateful to a referee for this point.

TABLE 3

SERVICE PRICE ELASTICITIES

Estimation method:	Price Elasticities — Full Sample: OLS (1)	Full Sample: SUR (2)	Summers (1985) OLS (3)	Sub-samples: $n=24$ SUR[a] (4)	Sub-samples: $n=33$ SUR[a] (5)
Services:					
1. Housing	-0.73^{*++}	-0.61^{*+}	-0.47^{*+}	-0.57^{*+}	-0.79^{*}
2. Health	-0.82^{*}	-0.83^{*}	-0.59^{*+}	-0.72^{*}	-0.90^{*}
3. Purchased transport	-1.11^{*}	-1.18^{*}	-0.61^{*+}	-0.92^{*}	-1.03^{*}
4. Communications	-1.63^{*+}	-1.52^{*+}		-0.99^{*b}	-1.88^{*+}
5. Reaction	-0.97^{*}	-1.18^{*}	-0.37^{*+}	-1.55^{*b}	-1.11^{*}
6. Education	-0.55^{*+}	-0.63^{*+}		$-0.46^{*}+$	-0.66^{*+}
7. Government	-1.36^{*}	-1.25^{*}	-0.45	-1.40^{*}	-1.18^{*}
8. Total services[c]	-0.32^{*+}	—	-0.06	-0.24^{**+}	-0.46^{*+}
"Mixed":					
9. Fuel & power	-0.86^{*}	-0.88^{*}	—	-1.06^{*}	-0.92^{*}
10. Other household G&S	-1.28^{*++}	-1.23^{*++}	—	-1.55^{*+}	-0.99^{*}
11. Transport operat. costs	-1.24^{*}	-1.09^{*}	—	-1.94^{*+}	-0.34
12. Misc. G&S	-0.99^{*}	-0.83^{*}	-0.68^{*+}	-1.64^{*+}	-0.75^{*}
13. Total services & "mixed"	-0.28^{*+}	—	—	-0.34^{*+}	-0.29^{**+}

Notes: *(**) = significantly different from zero at 5 per cent (10 per cent); +(++) = significantly different from unity at 5 percent (10 percent).

[a]Estimation is by OLS in lines 8 and 13.

[b]$n=21$ (Communications), 22 (Recreation).

[c]Note that the Summers (1985) relative price variable is P_s/P_{gdp} rather than P_s/P_c. Estimation for sub-samples in lines 4 and 5 is by OLS.

3. OTHER INFLUENCES ON THE DEMAND FOR SERVICES

To the extent that these regressions omit relevant variables from the demand for services, income and price elasticity estimates may be biased.[7] Studies of structural change during the development process have recognized that factors other than income are likely to affect the changing patterns of demand for services and commodities (though almost all these studies ignore the role of relative price changes). These are likely to include social and demographic, as well as economic, factors. Population size, population dependency (the ratio of non-working-age to working-age population), and urbanization rates have been shown to exhibit systematic changes associated with development, and are likely to interact in quite complex ways with changes in the overall demand for services and commodities. Such demographic changes cannot be assumed to be exogenous. However, any endogeneity is likely to be much less severe when examining the demand for *individual* services. Care must be taken when interpreting apparent evidence of (assumed exogenous) demographic effects on service demands, however.

[7]See Maddala (1992, pp. 161–3). The consequences of such omitted variable problems for interpretation of parameter estimates in the context of cross-section regressions have been highlighted recently by Levine and Renelt (1991, 1992).

TABLE 4

SUMMARY OF SERVICE SHARE AND ELASTICITY RESULTS

	(1) Real Service Share	*(2)* Service Income Elasticity	*(3)* Service Price Elasticity
Services:			
1. Housing	Rising	Elastic	Inelastic
2. Health	Rising	Elastic	Unity (inelastic?)
3. Purchased transport	Constant	Unity	Unity (elastic?)
4. Communications	Rising	Elastic	Elastic
5. Recreation	Constant?	Elastic	Unity (elastic?)
6. Education	Falling	Unity	Inelastic
7. Government	Falling	Unity	Unity (elastic?)
8. Total services	Falling	Unity	Inelastic
"Mixed":			
9. Fuel & power	Constant	Unity	Unity (inelastic?)
10. Other household goods & services (G&S)	Falling	Unity	Elastic?
11. Transport operat. costs	Rising	Elastic	Unity
12. Misc. G&S	Rising	Elastic	Unity (inelastic?)
13. Total services & "mixed"	Falling	Unity	Inelastic

Notes: Entries are based on regression parameters (and standard errors) from results in Tables 1–3. Entries in column *(1)* indicate how real service shares change in association with increases in GDP per capita. Entries in parentheses in column *(3)* indicate the more likely alternative to an elasticity of unity.

Examining possible impacts of "taste" variables on service demands is constrained both by the limited degree of theorizing on *a priori* relationships of this sort and by data availability. Our analysis is therefore necessarily circumspect and, until supported by further work, our conclusions should be treated as preliminary. The two main objectives of this section are: (i) to establish which, if any, of the variables suggested by *a priori* theorizing (in addition to income and prices) appear to be relevant to real expenditures on particular services; and (ii) to consider the impact of including relevant "taste" variables on income elasticity estimates.

Demographic variables (population size and age composition, urbanization) may be expected to have *ceteris paribus* effects on some services. To the extent that there are scale economies in consumption, *per capita* expenditure on relevant services would be anticipated to be less in countries with larger populations. Conversely for scale diseconomies (crowding). Services with a high degree of publicness (in the Samuelsonian sense) can be expected to demonstrate such consumption economies, especially when publicly provided. In our present disaggregation, government services and education are possible candidates. Some scale effects may also be expected in housing though it is less clear whether larger populations would generate "crowding" effects producing larger per capita expenditures, or scale economies generating lower expenditures. This could be related to the degree of urbanization, or age composition, of the population.

Urbanization is likely to affect demand for transport and communication services, with urbanized societies requiring more sophisticated distribution and communication networks for their functioning. It is known that such services are also particularly related to the degree of *industrialization*, both as intermediate and final services.[8] Urbanization and industrialization are, of course, likely to be highly correlated; we experiment with both variables as (alternative) proxies for these inter-related processes. Age dependency can be expected to affect services consumed disproportionately by the young or the old—education and health. Finally, income *inequality* might be expected to increase demand for "luxury" services (e.g. recreation, domestic service) by high income households in societies with relatively low average incomes (and can facilitate the *supply* of such services as "domestic service" from the large numbers of low income households).

In testing for these "taste" effects, data on population size, dependency ratios, urbanization (proportion of the population in urban areas), and "industrialization" (share of agriculture in output or employment) are available for 56 of our original 57 countries (54 countries in the case of communication and recreation services). Two inequality measures—the Gini concentration ratio and the ratio of the income shares of the top 20 per cent to the bottom 40 per cent of households—are available, but for only 34 countries. The inequality data are from a variety of country studies over a wide range of dates mainly in the 1970s and must therefore be regarded as fairly crude proxies. Results reported in Table 5 therefore concentrate on the 56 country sample, but tests of the inclusion of inequality effects are discussed for the smaller sample. Table 5 results are generally those for which a combination of t-tests and F-tests suggested statistically significant effects (at 10 per cent or better).

As expected, the three industrialization/urbanization proxies are highly correlated with each other and with real GDP per capita (correlation coefficients between 0.76 and 0.92 (in absolute value)); the dependency ratio is moderately correlated with these (between 0.68 and 0.89) and population is effectively uncorrected with all other variables. The data reveal that high dependency rates are especially associated with relatively low income countries, where the source is a high proportion of children, rather than elderly.

Table 5 confirms most *a priori* expectations, but also produces some unanticipated effects. Population effects, for example, appear significantly negative for government services confirming some "sharing economies," and also for services as a whole. The results for housing suggest the *possibility* of positive effects from population and/or dependency variables though these are not always significant. If accepted, they suggest that more populous societies spend more (per head) on housing than less populous societies (implying some "crowding" effects) and societies spend more per head when dependents are more strongly represented in the population.

Given the high correlations noted above it is not surprising that *ceteris paribus* effects of urbanization or industrialization are not strongly evident. The share of

[8]Stigler (1956) for example showed that transport and distribution services expanded in association with manufacturing activities (in the U.S.). While much of this will take the form of *intermediate* services, some will appear as final-use services and, in principle, should be included in our (final) expenditure data.

TABLE 5

SERVICE DEMAND EQUATIONS INCLUDING "TASTE" VARIABLES[a]

		(1) Income per capita	(2) Own-price[b]	(3) Cross-price	(4) Population	(5) Urbanization	(6) Dependency	(7) Income inequality[c]	(8) Adj. R^2
Services:									
1.	Housing	1.402*+	−0.74*	0.59*	0.056	—	1.305**	—	0.91
2.	Health	2.071*+	−0.84*	0.40	—	—	2.668*	—	0.82
3.	Purch. trans.	0.417**+	−1.15*	1.63	—	—	−2.983*	—	0.69
4.1	Communic.	0.971*	−1.66*	1.78*	—	0.650	—	—	0.84
4.2	Communic.	1.469*+	−1.85*	1.94*	—	—	—	1.071**	0.91
5.1	Recreation	1.422*+	−0.94*	−0.33	—	0.562**	—	—	0.80
5.2	Recreation	1.360*	−1.06*	−0.07	—	1.066*	—	0.853**	0.87
6.	Education	1.022*	−0.54*	0.61*	—	—	0.550	—	0.83
7.	Government	0.926*	−1.20*	1.73	−0.088*	—	—	—	0.84
8	Services (1-7)	1.026*	−0.53*	0.61*	−0.043*	—	—	—	0.96
"Mixed"[d]									
9.	Fuel & power	0.699*+	−0.93*	1.04*	—	—	−1.644**	—	0.78
10.1	Other household G&S	1.012*	−1.26*	1.14*	−0.069**	—	—	—	0.81
10.2	Other household G&S	1.078*	−1.21*	1.07*	−0.073	—	—	0.768**	0.85
12.	Misc. G&S	1.289*+	−1.28*	0.77*	0.115*	−0.260**[e]	—	—	0.93
13.	Services (1-12)	0.965*	−0.41*	0.40*	−0.028**	−0.102*[e]	—	—	0.98

Notes: *(**) = significantly different from zero at 5 percent (10 percent): + = income elasticity significantly different from unity at 5 per cent; $n = 56$ (except: lines 4.2, 5.2: $n = 34$; line 10.2: $n = 36$; lines 8, 13: $n = 57$).

[a]Constant terms (not shown) are included in all regressions.

[b]Results reported here do not impose own/cross price elasticity equality. Imposing the equality constraint leaves results substantially unaffected.

[c]Inequality measured as the ratio of the income shares of top 20 per cent to the bottom 40 per cent of households (see Todaro, 1989, p. 156).

[d]No taste variables were found to have any significant impact on transport operating costs.

[e]Percent of labour force in agriculture.

agriculture in GDP is never significant while the agricultural labor force share reveals a significant effect (at 10 per cent) only for miscellaneous goods and services. For services as a whole however (especially when "mixed" activities are included) an industrialization effect is evident. Urbanization has the expected positive sign for communications, though it is not significant at conventional levels. Significant urbanization effects do however appear for recreation services. Though this was not so readily anticipated it is perhaps not surprising that, *ceteris paribus*, more urbanized societies should demonstrate greater demands for recreation (or at least for recreation involving monetary expenditures).

Age dependency effects were expected for education and, especially, for health services since usage of the latter tends to be dominated by *both* young and old.

Table 5 confirms expected positive signs both for education and health though the parameter estimate is statistically significant only in the case of health. Significant negative effects are also observed for transport, and fuel and power, but it may be that the dependency variable is proxying other effects here. It is noteworthy, for example, that these two services are the only ones in Table 5 which are significantly income-*inelastic*; the dependency variable may therefore be picking up some of the tendency of the development process more generally to produce substitutions away from "essential" services such as public transport and utilities.

Introducing income inequality variables confirms our earlier expectation that expenditures on recreation services and "other household goods and services" (where domestic service is strongly represented) are higher in countries with more unequal income distribution. Inequality generally remains significant even with the inclusion of other "taste" variables. Similar effects *may* also occur with communication services though when these are tested against a model including urbanization, this dominates the inequality variable.[9]

Finally, comparing Tables 2 and 5, it is clear that income elasticity estimates are sometimes sensitive to model specification. Purchased transport for example has income elasticity estimates that range from 0.42 to 0.96 depending on the inclusion of "taste" variables. Communication services are income elastic when only income and price terms are included, but estimates vary when additional variables enter—in some cases, income elasticity estimates become less than, though close to, unity. Recreation is consistently found to be income-elastic, but not significantly so once urbanization and inequality effects are allowed for (with the latter supported by an *F*-test). For services *as a whole* however elasticities are consistently found to be close to (and not significantly different from) unity across different equation specifications.

4. Concluding Comments

These results serve to emphasize Summer's (1985) conclusion concerning the importance of using service- and commodity-specific PPP exchange rates when assessing international differences in the real share of services in GDP and the income elasticity of demand for individual, or groups of, services. We have also argued that income elasticity estimates can be crucially dependent on the specification of the model from which these are obtained. Results in Section 3 confirm that potential biases in income coefficients when other relevant economic and demographic variables are omitted can be empirically important for some services.

For services as a whole it appears that a falling real expenditure share as GDP per capita rises is consistent with an income elasticity close to unity and an inelastic price response. Moreover, income elasticity conclusions for services in aggregate are not substantially altered when additional significant effects on demand are established. *Individual* services clearly display quite different income elasticities suggesting that, if higher income per capita produces a tendency for some services to substitute for commodities, it also appears to produce converse substitutions.

[9]See Falvey and Gemmell (1994) for further details.

Appendix

Service and "mixed" (service and commodity) expenditure categories are listed below. The 11 Service categories are from UN–CEC (1986) and the more disaggregated services which follow are from KHS (1982). The latter are not available for the UN–CEC (1986) sample.

Services:

1. Housing (gross rent)—rents; indoor repair and upkeep.
2. Health services—physicians' services; dentists' services; nurses' services; hospitals.
3. Purchased transport—local transport; rail, bus & air transport.
4. Communications—postal communications; telephone, telegraph.
5. Recreation services—public entertainment; other recreation, culture.
6. Education—1st & 2nd level teachers; college teachers; other educational expenditures.
7. Government—blue collar workers; white collar workers; professionals; commodities of government.

"Mixed" Goods & Services:

8. Fuel & power—electricity & gas; liquid fuels; other fuels, ice.
9. Other household goods—nondurable household goods & service; domestic services; household services
10. Transport operating costs—tyres/tubes/accessories; auto repairs; gasoline, oil, grease; parking, tolls, etc.
11. Misc. goods; other services; other personal care goods.

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