

APPENDIX

nd: non-durables; s: services; ctot: total private consumption;
 g: government consumption.
 nd, s, ctot, g, GNP series are in constant prices and in per capita terms.
 JA: Japan, FR: France, IT: Italy, CA: Canada.

TABLE 1.-- AVERAGE ANNUAL GROWTH RATES (IN %) OF PRIVATE AND GOVERNMENT CONSUMPTION AND OF GNP

	nd	s	ctot	g	GNP
US	0.96	2.36	2.02	0.85	1.72
JA	1.68	3.73	2.98	2.77	3.45
FR	1.66	3.08	2.26	2.26	2.05
UK	0.80	2.83	2.38	1.50	2.11
IT	1.94	3.26	3.00	2.47	2.66
CA	0.92	3.24	2.73	1.58	2.87

NOTE: The sample period is 1971:II-1988:I.
 GNP data for US and Japan from International Financial Statistics; for the remaining countries from OECD Quarterly National Accounts.

TABLE 2.-- AVERAGE ANNUAL RATES OF CHANGE OF BILATERAL REAL EXCHANGE RATES

	JA	FR	UK	IT	CA
US	-.05 (-13.29)	-.024 (-6.29)	-.022 (-6.71)	-.020 (-5.80)	-.009 (-8.21)
JA		.031 (11.57)	.034 (8.94)	.036 (12.72)	.047 (10.76)
FR			.030 (1.05)	.005 (3.11)	.015 (3.47)
UK				.002 (0.84)	.012 (3.28)
IT					.010 (2.71)

NOTE: The sample period is 1971:II-1988:I
 Average rates of change (p.a.) of bilateral real exchange rates in terms of non-durables consumption. In parentheses: t-statistic for the test of the hypothesis that the unconditional expected value of first differences of quarterly log real exchange rates is zero. The t-statistics are corrected for serial correlation (using the Newey & West (1987) method with 10 lags).

TABLE 3.-- SHARES OF TOTAL PRIVATE CONSUMPTION EXPENDITURES (IN %) ACCOUNTED FOR BY NON-DURABLES AND BY SERVICES IN 1971 AND 1987

	non-durables		services	
	1971	1987	1971	1987
US	41.6	35.4	46.8	49.0
JA	36.3	29.5	45.5	50.7
FR	40.2	36.9	34.6	38.8
UK	39.2	30.7	38.6	40.8
IT	45.0	37.9	30.0	31.1
CA	36.6	26.6	41.6	45.1

TABLE 4.-- AUTOCORRELATIONS OF QUARTERLY CONSUMPTION GROWTH RATES

	n=1	n=2	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
US										
nd	.32**	.02	.34**	.09	-.32**	-.16	.01	-.21	-.21**	-.00
s	.01	-.04	.34**	.05	-.20	.27**	-.06	-.18	.18	-.02
JA										
nd	.64**	.54**	.38**	.34**	.17	.13	.07	.17	.07	.12
s	.67**	.56**	.51**	.31**	.11	.03	-.06	-.13	-.25	-.27
FR										
nd	-.37**	-.18	.35**	-.18	-.04	.05	-.09	.03	-.02	-.03
s	-.30**	-.11**	-.07	.08	.06	.10	-.01	-.12	.02	-.03
UK										
nd	-.02	-.06	.01	-.05	.05	.12	.05	-.20	-.11	-.00
s	.19	.20	.29**	.15	.29**	.05	.11	.13	.05	.11
IT										
nd	.67**	.31**	-.14	-.27	-.37	-.21	-.14	-.01	-.12	-.10
s	.39**	.10	-.16**	.17	-.13	-.11	-.23	.09	-.19**	-.10
CA										
nd	-.15	.00	.09	.04	.15	.11	-.07	.03	.09	.16**
s	.17	.17	.12	.27**	.08	.02	.01	-.07	.07**	.01

NOTE: The sample period is 1971:II-1988:I

n: order of autocorrelation.

** : significantly different from zero at 5% level.

Estimates of the standard deviation of autocorrelations were obtained using the Newey & West (1987) method, allowing for 10 lags.

TABLE 5.-- AUGMENTED DICKEY-FULLER TESTS FOR UNIT ROOTS IN QUARTERLY LOG CONSUMPTION

	k=0	k=1	k=2	k=3	k=4	k=5	k=6
US							
nd	-1.58	-2.29 §	-2.12	-3.65 **	-3.07 ‡	-2.55 §	-2.33
s	-1.68	-1.78	-1.80	-2.32 §	-2.27	-1.92	-2.35
c	-1.36	-1.98	-1.97	-3.32 *	-2.97 ‡	-2.23 §	-2.33
JA							
nd	-2.80 ‡	-3.07 ‡	-3.85 **	-3.80 **	-3.83 **	-3.11 ‡	-3.01 ‡
s	-2.84 ‡	-2.80 §	-3.94 **	-5.02 ***	-4.85 ***	-4.24 ***	-3.69 **
c	-3.26 *	-3.07 ‡	-4.03 **	-4.79 ***	-4.44 ***	-3.66 **	-3.13 ‡
FR							
nd	-4.62 ***	-3.60 **	-2.74 §	-3.13 ‡	-3.16 ‡	-3.23 *	-2.85 ‡
s	-2.98 ‡	-2.65 §	-1.35	-1.35	-1.54	-1.90	-2.07
c	-3.28 *	-2.86 ‡	-2.49	-2.38 §	-2.29	-2.47 §	-2.29
UK							
nd	-2.56	-2.53 §	-2.68 §	-2.64 §	-2.38	-2.51 §	-2.97 ‡
s	1.68	1.42	1.06	0.46	0.32	-0.22	-0.07
c	0.41	-0.08	-0.38	-0.54	-0.29	-1.12	-1.18
IT							
nd	-1.29	-3.32 *	-2.86 ‡	-1.80	-2.70 §	-1.77	-3.02 ‡
s	-1.80	-2.75 §	-2.36	-2.36 §	-3.51 **	-2.38 §	-2.88 ‡
c	-1.38	-3.33 *	-2.80 ‡	-2.11	-2.78 §	-2.08	-2.48
CA							
nd	-3.02 ‡	-2.61 §	-2.53	-2.28 §	-2.22	-2.24 §	-2.86 ‡
s	-1.62	-1.72	-1.99	-1.99	-2.19	-2.47 §	-2.40 §
c	-2.32	-2.01	-2.11	-2.00	-1.99	-2.34 §	-2.86 ‡

NOTE: The sample period is 1971:II-1988:I.

nd: per capita consumption of non-durables.

s: per capita consumption of services.

c: per capita consumption of non-durables plus services.

The test results are for logs of the variables indicated in the first column.

k: the number of lagged Δz terms included on right-hand side of (2.2); 1971:II-1988:I is the sample period used for k=0; for k>0, the beginning of the sample period is shifted forward, e.g., for k=1, the sample period is 1971:III-1988:I.

***, **, *, ‡ and § indicate rejection of null-hypothesis $\phi=0$ at 1%, 5%, 10%, 20% and 50% significance levels respectively.

For 50 observations, the critical values for the Augmented Dickey-Fuller test are -4.15, -3.50, -3.18, -2.81 and -2.60 at the 1%, 5%, 10%, 20% and 50% levels respectively (the 1%, 5% and 10% critical values are taken from table 8.5.2 of Fuller (1976); The 20% and 50% critical values were obtained by Monte Carlo simulations (5000 replications) of random walks with $N(0,1)$ innovations).

TABLE 6.-- AUGMENTED DICKEY-FULLER TESTS FOR UNIT ROOTS IN BILATERAL REAL EXCHANGE RATES

	k=0	k=1	k=2	k=3	k=4	k=5	k=6
US-JA	-1.45	-2.36	-2.14	-2.02	-1.67	-1.62	-1.44
US-FR	-1.53	-2.10	-1.95	-2.03	-1.89	-2.17	-2.25
US-UK	-1.54	-1.94	-1.83	-1.98	-2.14	-1.61	-2.21
US-IT	-0.66	-1.82	-1.92	-2.04	-1.72	-1.98	-1.79
US-CA	-0.87	-1.36	-1.60	-2.02	-2.21	-2.32	-2.16
JA-FR	-2.12	-3.41 *	-3.26 *	-3.71 **	-2.69 §	-2.40	-2.39
JA-UK	-1.62	-2.53	-2.34	-2.36	-2.04	-1.82	-1.73
JA-IT	-2.15	-3.55 **	-3.04 ‡	-3.66 **	-2.61 §	-2.26	-2.16
JA-CA	-1.52	-2.35	-2.16	-2.14	-1.77	-1.94	-1.80
FR-UK	-2.13	-2.23	-2.33	-2.60 §	-2.46	-2.46	-2.51
FR-IT	-1.76	-1.89	-1.70	-1.94	-1.56	-1.85	-2.00
FR-CA	-1.49	-2.09	-1.93	-2.13	-1.90	-2.42	-2.48
UK-IT	-1.42	-1.70	-1.24	-1.41	-1.83	-1.08	-1.33
UK-CA	-1.43	-1.84	-1.82	-1.98	-2.12	-1.72	-2.21
IT-CA	-1.04	-2.16	-2.18	-2.42	-2.07	-2.49	-2.35

NOTE: The sample period is 1971:II-1988:I.
The bilateral real exchange rates are defined in terms of non-durables.

k: the number of lagged Δz terms included on right-hand side of (2.2);
1971:II-1988:I is the sample period used for k=0; for k>0, the beginning
of the sample period is shifted forward, e.g., for k=1, the sample period
is 71:III-88:1.

***, **, *, ‡ and § indicate rejection of null-hypothesis $\phi=0$ at 1%,
5%, 10%, 20% and 50% significance levels respectively.

For 50 observations, the critical values for the Augmented Dickey-Fuller
test are -4.15, -3.50, -3.18, -2.81 and -2.60 at the 1%, 5%, 10%, 20% and
50% levels respectively (the 1%, 5% and 10% critical values are taken from
table 8.5.2 of Fuller (1976); The 20% and 50% critical values were obtained
by Monte Carlo simulations (5000 replications) of random walks with N(0,1)
innovations).

TABLE 7.-- A MONTE CARLO STUDY ON THE PARK TEST STATISTIC

	n=0	n=5	n=10	n=20	n=30	n=50	n=60
$\rho=0$	.13	.07	.18	.44	.67	.86	.97
$\rho=0.25$	.38	.09	.10	.37	.62	.92	.96
$\rho=0.50$	.49	.13	.22	.32	.68	.97	.94
$\rho=0.75$	.706	.250	.199	.449	.725	.949	.967
$\rho=1$	.97	.64	.47	.57	.83	.99	1.00

NOTE:

The table shows the proportions of draws in which, using the 10% critical values for the asymptotic distribution of the Park statistic, the hypothesis is rejected that x and y are cointegrated. 'n' is the lag length used to correct for serial correlation in constructing the Park test statistic (t , t^2 and t^3 are used as superfluous regressors).

The table is based on the following process:

$x_t = x_{t-1} + \varepsilon_t$; $y_t = x_t + h_t$, $h_t = \rho * h_{t-1} + \eta_t$ for $t=1, \dots, 70$ (and $x_0 = h_0 = 0$), where ε and η are $N(0,1)$ white noises. Hence $\{x\}$ follows a random walk; $\{x\}$ and $\{y\}$ are cointegrated if $|\rho| < 1$. 100 draws of the $\{x\}$ and $\{y\}$ processes were simulated for $\rho=0, 0.25, 0.50, 0.75, 0.95$ and 1 .

TABLE 8.-- PARK (1990) COINTEGRATION TESTS

	(1) Single Good Model		(2) One Country-specific Consumption Good		(3) Two Country-specific Consumption Goods	
US-JA	.33		.69	(P)	.00	
	.02		.02	(P)	.00	
			.05	(P)	.21	(P)
					.08	
					.32	
US-FR	.41		.61		.36	(P)
	.08		.27	(P)	.10	
			.03	(P)	.70	(P)
					.38	(P)
				.26	(P)	
US-UK	.38		.63		.34	(P)
	.04		.03		.02	
			.09		.12	(P)
					.00	
				.03	(P)	
US-IT	.24	(P)	.35	(P)	.30	(P)
	.08	(P)	.21	(P)	.43	
			.03	(P)	.26	
					.55	(P)
				.22	(P)	
US-CA	.82		.26	(P)	.21	(P)
	.04		.02	(P)	.07	(P)
			.13	(P)	.03	(P)
					.12	(P)
				.12	(P)	
JA-FR	.04		.03		.17	(P)
	.17		.16		.12	(P)
			.16		.15	(P)
					.20	(P)
				.23	(P)	
JA-UK	.21		.03		.00	(P)
	.03	(P)	.02	(P)	.67	(P)
			.11	(P)	.10	(P)
					.00	
				.19		
JA-IT	.02		.02	(P)	.42	(P)
	.10		.11		.06	(P)
			.27	(P)	.19	(P)
					.04	
				.68	(P)	

TABLE 8.-- continued

	(1) Single Good Model	(2) One Country-specific Consumption Good	(3) Two Country-specific Consumption Goods
JA-CA	.14 .09	.04 .29 .73	.15 .03 .07 .69 .46
FR-UK	.15 .07	.54 (P) .08 (P) .09 (P)	.11 .84 (P) .40 .04 .09
FR-IT	.21 .66	.23 (P) .72 .09 (P)	.57 (P) .05 (P) .02 (P) .25 (P) .11 (P)
FR-CA	.81 .12	.82 (P) .11 .24 (P)	.55 (P) .16 .55 (P) .61 (P) .43 (P)
UK-IT	.01 (P) .28	.04 .06 .13	.61 .99 (P) .02 .14 .18
UK-CA	.17 .07	.05 .02 .11 (P)	.40 .30 (P) .01 .86 (P) .94 (P)
IT-CA	.87 .15	.69 .10 .03 (P)	.46 .10 (P) .63 (P) .10 (P) .16 (P)

NOTE: Sample period: 1971:II-1988:I (quarterly data).

The table reports p-values for test of null hypothesis of cointegration.

(1) Tests of the single good model: test whether $\ln(c^i)$ and $\ln(c^j)$ are cointegrated (see (2.5)); c: non-durables plus services.

TABLE 8.-- continued

(2) Tests of the model with one country-specific consumption good: test whether $\ln(c^i)$, $\ln(c^j)$ and $\ln(R^{i,j})$ are cointegrated (see (2.7)); c : non-durables plus services, $R^{i,j}$: real exchange rate in terms of 'c'.

(3) Tests of the model with two country-specific consumption goods: test whether $\ln(nd^i)$, $\ln(s^i)$, $\ln(nd^j)$, $\ln(s^j)$ and $\ln(RND^{i,j})$ are cointegrated (see (2.10 a)); nd : non-durables, s : services, $RND^{i,j}$: real exchange rate in terms of non-durables.

As the outcome of the Park test can depend on which 'x' variable is used on the left-hand side in the cointegrating regression (2.3), test results are reported for all possible choices for the left-hand side variable. The first two columns in the table indicate the country pair to which the test statistics provided in the remaining columns pertain. Let i and j denote the first and the second country listed for a given country pair (e.g. for US-JA, $i=US$ and $j=Japan$). For the single good model, the first line of test statistic provided for a given country pair uses $\ln(c^i)$ on the left-hand side of (2.3), while the second line uses $\ln(c^j)$ as the left-hand side variable. For the model with one country-specific good, $\ln(c^i)$ and $\ln(c^j)$ and $\ln(R^{i,j})$ are used as left-hand side variables for the 1st, 2nd and 3rd test statistics respectively. For the model with two country-specific goods, $\ln(nd^i)$, $\ln(nd^j)$, $\ln(s^i)$, $\ln(s^j)$ and $\ln(R^{i,j})$ are used as left-hand side variables for the 1st, 2nd, 3rd and 4th test statistic respectively.

For the single good model, '(P)' indicates that coefficients of canonical cointegrating regressions (3.4) imply that the restriction $(\sigma^i-1)/(\sigma^j-1) > 0$ is rejected and that one fails to reject the hypothesis that $(\sigma^i-1)/(\sigma^j-1) = 0$ at 5% level.

For model with one country-specific consumption good, '(P)' indicates that preference parameters recovered from coefficients of canonical cointegrating regressions violate the restriction $\sigma^k < 1$ and that one fails to reject the hypothesis that $\sigma^k - 1 = 0$ at the 5% significance level for $k=i$ and/or $k=j$.

For the model with two country-specific consumption goods, '(P)' indicates that preference parameters recovered from coefficients of canonical cointegrating regressions violate one of the following restrictions: $\sigma^i + \mu^i < 1$, $\sigma^i * \mu^i > 0$, $\sigma^j + \mu^j < 1$, $\sigma^j * \mu^j > 0$ and that in addition this violation is 'significant', (when $\sigma + \mu < 1$ is violated, then '(P)' indicates that the hypothesis $\sigma + \mu - 1 = 0$ is rejected at the 5% level, when $\sigma * \mu > 0$ is violated, then '(P)' indicates that the hypothesis $\sigma * \mu = 0$ is rejected at the 5% level).

TABLE 9. -- CRITICAL VALUES FOR THE PHILLIPS & OULIARIS (1990) \hat{Z}_α AND \hat{Z}_τ
TEST STATISTICS

		(a) \hat{Z} statistic					
Size		0.01	0.05	0.10	0.20	0.50	0.80
n=1		-35.41	-27.08	-23.19	-18.69	-12.29	-7.36
n=2		-40.34	-32.22	-27.78	-23.36	-15.89	-9.69
n=4		-53.61	-42.45	-37.73	-32.58	-23.76	-16.69
		(b) \hat{Z}_τ statistic					
Size		0.01	0.05	0.10	0.20	0.50	0.80
n=1		-4.36	-3.80	-3.51	-3.15	-2.53	-1.90
n=2		-4.64	-4.15	-3.84	-3.50	-2.85	-2.17
n=4		-5.36	-4.74	-4.46	-4.13	-3.50	-2.90

NOTE:

n is the number of x-variables on the right-hand side of the cointegrating regression (3.3).

The null-hypothesis of no cointegration is rejected if the value of the test statistic falls below the chosen critical value.

Phillips & Ouliaris provide 1%, 5% and 10% critical values for the \hat{Z}_α and \hat{Z}_τ test statistics (see tables Ic and IIc of their paper). I obtained 20%, 50% and 80% critical values using Monte Carlo simulations.

TABLE 10.-- PHILLIPS & OULIARIS (1990) TESTS OF NO-COINTEGRATION HYPOTHESIS

	(1) Single Good Model		(2) One Country-specific Consumption Good		(3) Two Country-specific Consumption Goods	
	\hat{Z}_α	\hat{Z}_t	\hat{Z}_α	\hat{Z}_t	\hat{Z}_α	\hat{Z}_t
US-JA	-11.25 -8.72	-2.95 § -2.04	-11.16 -11.39 -9.70	-2.81 -2.42 -2.03	-13.10 -8.37 -19.12 -12.98 -13.01	-2.67 -1.88 -3.46 -2.66 -2.60
US-FR	-30.69 * -13.90 §	-4.37 * -2.69 §	-43.74 *** -13.45 -22.49 §	-5.57 *** -2.64 -3.51 ‡	-22.70 -56.94 *** -20.48 -31.85 § -15.51	-3.80 § -6.97 *** -3.75 § -4.53 * -2.92
US-UK	-6.11 -9.24	-1.26 -2.14	-5.08 -9.20 -7.26	-1.10 -2.13 -1.93	-15.05 -21.37 -23.98 § -6.66 -13.66	-2.95 -4.02 § -3.91 § -1.23 -2.75
US-IT	-6.80 -8.69	-1.87 -2.06	-5.36 -9.54 -8.00	-1.54 -2.18 -1.70	-10.57 -9.68 -13.92 -10.97 -8.61	-2.61 -2.17 -3.02 -2.46 -1.83
US-CA	-8.33 -9.47	-2.50 -2.17	-8.02 -8.82 -9.21	-2.30 -2.03 -2.01	-29.30 § -60.22 * -23.92 § -43.91 ** -32.24 §	-4.53 * -6.88 *** -4.35 ‡ -5.52 *** -4.12 §
JA-FR	-23.22 * -11.82	-3.64 * -2.79 §	-24.55 ‡ -13.61 -11.60	-3.73 ‡ -3.08 § -2.58	-22.83 -54.02 *** -31.45 § -42.94 ** -15.97	-3.52 § -6.75 *** -4.65 * -5.43 *** -3.41
JA-UK	-5.06 -11.04	-1.07 -2.93 §	-6.00 -11.04 -8.36	-1.24 -2.92 § -2.13	-12.65 -29.78 § -12.73 -14.00 -11.57	-2.37 -4.27 ‡ -2.43 -2.21 -2.59
JA-IT	-11.62 -14.94 §	-2.58 § -3.44 ‡	-11.26 -14.75 -8.06	-2.52 -3.26 -2.08	-10.58 -15.19 -20.66 -13.69 -9.08	-2.40 -3.19 -3.78 § -2.68 -2.77

TABLE 10.-- continued

	(1) Single good model		(2) One country-specific consumption good		(3) Two country-specific consumption goods	
	\hat{Z}_α	\hat{Z}_t	\hat{Z}_α	\hat{Z}_t	\hat{Z}_α	\hat{Z}_t
JA-CA	-7.25	-1.87	-11.23	-2.44	-9.65	-1.99
	-11.19	-2.50	-11.40	-2.53	-33.11 ‡	-4.60 *
			-11.48	-2.49	-14.21	-2.82
				-21.61	-3.68 §	
				-11.99	-2.65	
FR-UK	-3.85	-0.84	-5.30	-1.12	-43.56 **	-6.36 ***
	-18.85 ‡	-3.35 ‡	-25.23 ‡	-3.83 ‡	-28.80 §	-4.48 *
			-11.43	-2.49	-31.20 §	-4.32 ‡
				-11.52	-1.95	
				-14.65	-2.83	
FR-IT	-8.86	-2.13	-8.90	-2.15	-41.52 *	-6.09 ***
	-22.38 ‡	-3.72 *	-36.47 **	-4.75 ***	-10.57	-2.35
			-18.09 §	-3.18 §	-49.35 **	-6.06 ***
				-16.93	-3.09	
				-30.80 §	-4.25 ‡	
FR-CA	-20.72 ‡	-3.54 *	-12.23	-2.80	-39.38 *	-5.67 ***
	-32.35 **	-4.61 *	-36.79 **	-5.11 ***	-31.89 §	-4.59 *
			-16.40 §	-3.08 §	-39.91 *	-5.28 **
				-31.98 §	-4.75 **	
				-17.01	-3.05	
UK-IT	-6.67	-1.84	-7.25	-1.91	-20.86	-3.67 §
	-5.14	-1.09	-10.17	-1.85	-13.24	-2.74
			-12.61	-2.59	-6.08	-1.38
				-10.86	-2.41	

TABLE 10.-- continued

NOTE:

Sample period is 1971:II-1988:I (quarterly data).

***, **, *, †, §, ‡: rejection of null hypothesis of no cointegration at 1%, 5%, 10%, 20%, 50% and 80% levels respectively.

Columns labeled '(1) Single Good Model': tests of hypothesis that $\ln(c^i)$ and $\ln(c^j)$ are not cointegrated (c: non-durables plus services)

Columns labeled '(2) Model With One Country-specific Consumption Good': tests of hypothesis that $\ln(c^i)$, $\ln(c^j)$ and $\ln(R^{i,j})$ are not cointegrated (c: non-durables plus services).

Columns labeled '(3) Model With Two Country-specific Consumption Goods': tests of hypothesis that $\ln(nd^i)$, $\ln(s^i)$, $\ln(nd^j)$, $\ln(s^j)$ and $\ln(RND^{i,j})$ are not cointegrated (nd: non-durables; s: services).

As the outcome of the Park test can depend on which 'x' variable is used on the left-hand side in the cointegrating regression (2.3), test results are reported for all possible choices for the left-hand side variable. The first two columns in the table indicate the country pair to which the test statistics provided in the remaining columns pertain. Let i and j denote the first and the second country listed for a given country pair (e.g. for US-JA, i=US and j=Japan). For the single good model, the first line of test statistic provided for a given country pair uses $\ln(c^i)$ on the left-hand side of (2.3), while the second line uses $\ln(c^j)$ as the left-hand side variable. For the model with one country-specific good, $\ln(c^i)$ and $\ln(c^j)$ and $\ln(R^{i,j})$ are used as left-hand side variables for the 1st, 2nd and 3rd test statistics respectively. For the model with two country-specific goods, $\ln(nd^i)$, $\ln(nd^j)$, $\ln(s^i)$, $\ln(s^j)$ and $\ln(R^{i,j})$ are used as left-hand side variables for the 1st, 2nd, 3rd and 4th test statistic respectively.

TABLE 11.-- REGRESSIONS OF CONSUMPTION GROWTH RATES ON LAGGED CONSUMPTION GROWTH RATES

	\bar{R}^2		$\hat{\rho}$			r		
US-JA	.07	.35	.03	(-.45	.51)	.16	(-.08	.38)
US-FR	.03	.06	.74	(-.13	.96)	.30	(.05	.51)
US-UK	.06	.02	.11	(-.71	.80)	.27	(.01	.50)
US-IT	.28	.27	.27	(-.22	.65)	-.04	(-.27	.18)
US-CA	.04	.13	.37	(-.25	.78)	.06	(-.17	.30)
JA-FR	.32	.03	.23	(-.31	.66)	.22	(.18	.42)
JA-UK	.29	.00	.57	(-.33	.93)	.24	(.41	.05)
JA-IT	.32	.39	.64	(.00	.90)	.27	(.01	.49)
JA-CA	.28	.10	.53	(-.03	.84)	.11	(-.09	.31)
FR-UK	.14	.00	.33	(-.31	.77)	.25	(.08	.40)
FR-IT	.07	.26	-.01	(-.39	.36)	.00	(-.17	.17)
FR-CA	.02	.01	.43	(-.57	.91)	.13	(-.12	.37)
UK-IT	.03	.34	.68	(.12	.91)	.19	(.04	.34)
UK-CA	.00	.07	.10	(-.56	.68)	.20	(-.07	.46)
IT-CA	.27	-.01	.27	(-.47	.79)	.30	(.07	.49)

NOTE:

Regressions use quarterly data for the period 1971:IV-19881:I. For each country pair i,j, the table considers regressions of $\Delta \ln(c_t^i)$ and $\Delta \ln(c_t^j)$ on a constant, $\Delta \ln(nd^i)$, $\Delta \ln(s^i)$, $\Delta \ln(nd^j)$, $\Delta \ln(s^j)$ lagged two and three periods ($c_t^i = nd_t^i + s_t^i$; nd: non-durables; s: services).

\bar{R}^2 : Adjusted R^2 . The first (second) \bar{R}^2 statistic reported for a given pair of countries uses as the left-hand side variable the consumption growth rate of the first (second) country listed for that pair.

$\hat{\rho}$: Sample correlation coefficient between fitted values of $\Delta \ln(c_t^i)$ and $\Delta \ln(c_t^j)$ from regressions.

(): 95% confidence intervals (calculated using the methods of Cumby & Huizinga (1991) and Newey & West (1987), allowing for 10 autocorrelations).

r: cross-country correlation of actual consumption growth rates. (): 95% confidence intervals (calculated using the method of Newey & West (1987), allowing for 10 autocorrelations).

TABLE 12.--- VELU ET AL. (1986) TESTS: INCOMPLETE ASSET MARKETS MODEL WITH A SINGLE CONSUMPTION GOOD

(a) p-values for Test of the Hypothesis That rank(Ψ)=n-1

	h=0	h=1	h=2	h=3	h=4
US-JA	.00	.03	.00	.00	.00
US-FR	.06	.09	.11	.19	.04
US-UK	.45	.44	.32	.46	.05
US-IT	.00	.01	.00	.00	.00
US-CA	.08	.24	.14	.12	.07
JA-FR	.00	.01	.00	.00	.00
JA-UK	.25	.49	.77	.84	.31
JA-IT	.00	.00	.00	.00	.00
JA-CA	.03	.24	.04	.12	.16
FR-UK	.10	.11	.19	.39	.18
FR-IT	.00	.00	.00	.00	.00
FR-CA	.03	.15	.02	.06	.09
UK-IT	.12	.34	.59	.69	.38
UK-CA	.42	.69	.19	.20	.06
IT-CA	.08	.37	.10	.27	.04

(b) Estimates of $(\sigma^i - 1)/(\sigma^j - 1)$

	h=0	h=1	h=2	h=3	h=4
US-JA	12.60 (29.72)	37.24 (251.20)	52.50 (600.99)	-21.00 (100.27)	-4.14 (5.63)
US-FR	-1.80 (1.00)	-2.77 (2.15)	-1.66 (0.55)	-1.59 (0.51)	-1.28 (0.45)
US-UK	-1.45 (0.80)	-1.59 (1.24)	-0.64 (0.52)	-0.54 (0.47)	0.00 (0.65)
US-IT	3.31 (3.50)	6.41 (12.53)	-2.27 (2.10)	-3.69 (5.65)	-6.63 (16.97)
US-CA	-0.97 (1.07)	-1.22 (1.57)	-0.81 (0.50)	-0.61 (0.51)	-0.31 (0.44)
JA-FR	0.14 (0.26)	0.23 (0.27)	0.11 (0.26)	-0.02 (0.25)	-0.19 (0.23)
JA-UK	-0.41 (0.27)	-0.45 (0.27)	-0.44 (0.27)	-0.49 (0.26)	-0.64 (0.29)
JA-IT	-0.66 (0.24)	-0.76 (0.22)	-0.78 (0.20)	-0.78 (0.20)	-0.81 (0.18)
JA-CA	-0.38 (0.21)	-0.37 (0.21)	-0.50 (0.23)	-0.48 (0.22)	-0.48 (0.22)
FR-UK	-0.48 (0.61)	0.35 (0.66)	0.08 (0.48)	0.01 (0.48)	0.33 (0.85)
FR-IT	2.31 (2.26)	3.82 (6.51)	-4.04 (7.79)	12.46 (64.57)	-25.29(137.5)
FR-CA	0.41 (0.70)	0.17 (0.42)	-0.03 (0.63)	0.01 (0.68)	-0.09 (0.85)
UK-IT	-1.46 (1.03)	-1.16 (0.60)	-0.96 (0.40)	-0.98 (0.40)	-0.87 (0.31)
UK-CA	-0.81 (0.58)	-0.72 (0.58)	-3.26 (6.64)	-25.29(507.61)	-9.32(219.75)
IT-CA	-0.47 (0.33)	-0.42 (0.30)	-0.37 (0.31)	-0.49 (0.30)	-0.68 (0.30)

NOTE: Standard Deviations in Parentheses.

Sample period used for h=0 is 1971:II-1988:I. For h>0, the beginning of the sample period is shifted forward, e.g., for h=1, the sample period is 1971:III-1988:I.

h: the Velu et al. (1986) test uses lagged values of the nx1 vector X_{t+1} as instruments: $X_{t+1} = \Psi'Z_t + \epsilon_{t+1}$, where $Z_t = (X_t', X_{t-1}', \dots, X_{t-h}')'$ and

TABLE 12.-- continued

$$X_{t+1} = (\Delta \ln(c_{t+1}^i), \Delta \ln(c_{t+1}^j))'$$

The Velu et al. method requires the vector X to have zero mean. As the X variables used in the empirical work do not have zero means, the analysis was conducted using deviations of all variables from their respective sample means. This does not affect the asymptotic properties of the Velu et al. test statistics.

'i' denotes the first country listed for a given pair of countries.

TABLE 13. -- VELU ET AL. (1986) TESTS: INCOMPLETE ASSET MARKETS MODEL WITH ONE COUNTRY-SPECIFIC CONSUMPTION GOOD

(a) p-values for Test of the Hypothesis That $\text{rank}(\Psi)=n-1$

	h=0	h=1	h=2	h=3	h=4
US-JA	.17	.40	.17	.17	.29
US-FR	.06	.08	.30	.07	.06
US-UK	.61	.55	.80	.89	.75
US-IT	.00	.00	.01	.02	.05
US-CA	.07	.32	.25	.25	.35
JA-FR	.02	.19	.33	.24	.00
JA-UK	.30	.72	.88	.92	.49
JA-IT	.00	.00	.01	.00	.00
JA-CA	.11	.53	.34	.47	.61
FR-UK	.62	.27	.41	.62	.40
FR-IT	.00	.01	.00	.00	.00
FR-CA	.06	.05	.03	.05	.09
UK-IT	.31	.45	.76	.69	.62
UK-CA	.92	.91	.85	.92	.94
IT-CA	.08	.51	.22	.34	.14

(b) Estimates of Preference Parameters for h=4.

	σ^i	σ^j
US-JA	-5.63 (2.39)	-0.34 (2.04)
US-FR	-14.30 (13.76)	-7.44 (9.94)
US-UK	2.84 (2.64)	4.99 (2.72)
US-IT	-1.01 (2.19)	2.57 (2.05)
US-CA	1.02 (2.10)	-2.13 (3.57)
JA-FR	-0.16 (2.34)	7.87 (6.25)
JA-UK	8.81 (9.25)	13.06 (12.63)
JA-IT	-7.32 (5.76)	-7.50 (7.35)
JA-CA	-7.13 (6.22)	-12.43 (10.35)
FR-UK	-3.31 (7.08)	8.51 (19.00)
FR-IT	-2.57 (2.68)	1.06 (1.71)
FR-CA	-2.47 (11.06)	-14.97 (17.75)
UK-IT	8.92 (7.99)	10.13 (9.80)
UK-CA	3.31 (2.41)	-3.38 (2.83)
IT-CA	-5.49 (11.76)	-8.04 (12.13)

NOTE: Standard Deviations in Parentheses.

Sample period used for h=0 is 1971:II-1988:I. For h>0, the beginning of the sample period is shifted forward, e.g., for h=1, the sample period is 1971:III-1988:I.

TABLE 13.-- continued

h: the Velu et al. (1986) test uses lagged values of the $n \times 1$ vector X_{t+1} as instruments: $X_{t+1} = \Psi' Z_t + \epsilon_{t+1}$, where $Z_t = (X_t', X_{t-1}', \dots, X_{t-h}')'$, where $X_{t+1} = (\Delta \ln(c_{t+1}^i), \Delta \ln(c_{t+1}^j), \Delta \ln(R_t^{i,j}))'$.

The Velu et al. method requires the vector X to have zero mean. As the X variables used in the empirical work do not have zero means, the analysis was conducted using deviations of all variables from their respective sample means. This does not affect the asymptotic properties of the Velu et al. test statistics.

'i' denotes the first country listed for a given pair of countries.

TABLE 14.--GMM TESTS OF THE INCOMPLETE ASSET MARKETS MODEL WITH A SINGLE CONSUMPTION GOOD

	$\hat{\gamma}$		J	p-value	J'	p-value
US-JA	0.33	(0.16)	10.82	.69	18.28	.95
	0.71	(0.17)	13.57	.48		
US-FR	0.68	(0.17)	19.36	.15	19.46	.92
	0.39	(0.14)	9.53	.79		
US-UK	-0.02	(0.09)	12.56	.56	19.23	.93
	0.52	(0.21)	14.13	.44		
US-IT	-0.01	(0.23)	14.49	.41	18.93	.94
	0.06	(0.13)	15.42	.34		
US-CA	-0.14	(0.21)	13.00	.52	19.11	.93
	-0.28	(0.22)	11.26	.66		
JA-FR	0.63	(0.22)	9.02	.82	17.29	.96
	0.25	(0.12)	10.94	.69		
JA-UK	0.22	(0.11)	11.10	.67	18.48	.95
	1.05	(0.25)	7.60	.90		
JA-IT	1.66	(0.32)	11.91	.61	18.55	.94
	0.37	(0.07)	10.83	.69		
JA-CA	0.85	(0.19)	9.90	.76	16.32	.97
	0.62	(0.15)	9.82	.77		
FR-UK	-0.06	(0.10)	13.98	.45	18.50	.94
	-0.36	(0.25)	12.72	.54		
FR-IT	0.47	(0.25)	12.63	.55	17.39	.96
	0.23	(0.09)	13.28	.50		
FR-CA	0.22	(0.11)	9.77	.77	17.50	.96
	0.51	(0.19)	10.79	.70		
UK-IT	-0.29	(1.00)	7.12	.92	19.48	.92
	0.01	(0.08)	13.42	.49		
UK-CA	-0.44	(0.40)	7.91	.89	18.42	.95
	-0.14	(0.21)	9.90	.76		
IT-CA	0.37	(0.05)	11.37	.65	17.62	.96
	1.79	(0.33)	10.60	.71		

TABLE 14.-- continued

NOTE: The sample period is 71:IV-88:I (quarterly data). The table reports tests of the model with incomplete asset markets and a single consumption good. The tests are use the Generalized Method of Moments, exploiting the orthogonality condition $E\gamma' * X_{t+1} * Z_t = 0$. The table tests condition (7.5'):

$$\Delta \ln(c_{t+1}^k) = \bar{\mu} + \bar{\gamma} * \Delta \ln(c_{t+1}^h) + \bar{\eta}_{t+1}, \quad (A.1)$$

where $\bar{\gamma} = (\sigma^k - 1) / (\sigma^h - 1)$ and $\bar{\eta}_{t+1}$ has mean zero and is orthogonal to all instruments in the period t information set.

The following instruments are used: $\Delta \ln(nd^k)$, $\Delta \ln(nd^h)$, $\Delta \ln(s^k)$, $\Delta \ln(s^h)$, r_{nd}^k , r_{nd}^h , r_s^k , r_s^h , lagged two and three periods. Here r_{nd} and r_s are ex post real short term interest rates in terms of non-durables and services respectively.

The first column in the table indicates the country pair. Let i and j denote the first and the second country listed for a given country pair (e.g. for US-JA, i=US and j=Japan). For a given country pair, the first line with test statistics uses $\Delta \ln(c^i)$ on the left-hand side of (A.1), while the second line uses $\Delta \ln(c^j)$ on the left-hand side of (A.1).

$\hat{\gamma}$ is the GMM estimate of γ (standard deviation in parentheses).

J: Hansen's (1982) J-statistic for test of the hypothesis that the residual $\bar{\eta}_{t+1}$ (see (A.1)) is orthogonal to the instruments. If the orthogonality conditions hold, the J-statistic is asymptotically χ^2 with 14 degrees of freedom. 'p-value' is the p-value of the J statistic.

J': This statistic tests the joint hypothesis that consumption growth rates for a given pair of countries are orthogonal to instruments.

Specifically, the statistic tests whether $\omega_{t+1}^k = (\Delta \ln(c_{t+1}^k) - \mu^k)$ and $\omega_{t+1}^h = (\Delta \ln(c_{t+1}^h) - \mu^h)$ are orthogonal to the instruments for some constants μ^k and μ^h . Under the hypothesis that ω_{t+1}^k and ω_{t+1}^h are orthogonal to the instruments, the J' statistic is asymptotically χ^2 with 30 degrees of freedom.

The real interest rates which are used as instruments are computed on the basis of short term interest rates from International Financial Statistics (US: see line 60C in IFS, Japan: 60B, France: 60B, UK: 60C, Italy: 60B, Canada: 60C).

TABLE 15.-- CROSS-COUNTRY CORRELATIONS OF DETRENDED TOTAL PRIVATE CONSUMPTION

	JA	FR	UK	IT	CA
(a) Cross-country Correlations of Quarterly Growth Rates of Total Private Consumption.					
US	.22 (-.01 .44)	.27 (-.00 .50)	.24 (-.08 .51)	.02 (-.23 .28)	.26 (.07 .43)
JA		.25 (.04 .44)	.30 (.17 .43)	.55 (.34 .70)	.22 (-.03 .46)
FR			.21 (-.02 .43)	.17 (-.04 .37)	.23 (.02 .42)
UK				.10 (-.02 .21)	.17 (-.08 .40)
IT					.22 (-.03 .45)
(b) Cross-country Correlations of Linearly Detrended Logs of Quarterly Total Private Consumption.					
US	.12 (-.10 .33)	.19 (-.33 .62)	.52 (.05 .80)	-.18 (-.48 .17)	.39 (.02 .66)
JA		.59 (.21 .82)	.18 (-.10 .44)	.66 (.45 .80)	.58 (.17 .82)
FR			-.15 (-.41 .12)	.63 (.42 .77)	.64 (.23 .85)
UK				-.09 (-.37 .20)	.01 (-.37 .38)
IT					.38 (.04 .63)

NOTE: The figures in parentheses are 95% confidence intervals (based on estimates of the standard errors of the sample correlation coefficients which were obtained using the method of Newey & West (1987), allowing for 10 autocorrelations). Sample period is 1971:I-1988:I (1971:II-1988:I for statistics based on growth rates).