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Pure Profit Rates and Tobin's q in Nine OECD Countries

James H. Chan-Lee

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No. 34: PURE PROFIT RATES AND TOBIN'S q
IN NINE OECD COUNTRIES

by

James H. Chan-Lee

General Economics Division

April 1986

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This paper extends a previous study of profit trends to consider valuation ratios (Tobin's q) in nine countries. Tobin's q embodies market expectations and is an indicator of expected pure profit rates on the existing capital stock. Since 1982, equity markets have recovered substantially. By end-1985, values of Tobin's q were close to their 1974 levels and close to the symbolic figure of unity. The theoretical and conceptual relevance of q is considered, as well as data and measurement limitations. Real debt and equity costs of finance are considered in the light of buoyant stock markets. The implications of the strong recent recovery in q for investment are also noted.

* * *

Prolongeant l'étude sur l'évolution des profits, ce document analyse les rapports d'évaluation (q de Tobin) dans neuf pays. Le q de Tobin traduit les anticipations de rentabilité du marché et est un indicateur des taux de profit pur anticipés sur le stock de capital existant. Depuis 1982, les marchés boursiers se sont sensiblement redressés. En 1985, les valeurs du q de Tobin retrouvaient presque leur niveau de 1974 et approchaient la valeur symbolique de l'unité. On s'interroge sur la pertinence théorique et conceptuel de q ainsi que sur les limites imposées par les données et les systèmes de mesure. La dette réelle et les coûts de financement des fonds propres sont analysés à la lumière d'un marché boursier en pleine ébullition. Sont aussi mises en évidence les implications sur l'investissement de l'important redressement des valeurs de q constaté récemment.

PURE PROFIT RATES AND TOBIN'S q IN NINE OECD COUNTRIES

by

James H. Chan-Lee*

General Economics Division

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PURE PROFIT RATES AND TOBIN'S q IN NINE OECD COUNTRIES

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Glossary of Terms

(National definitions may differ.)

	Mnemonic or definition
Market value of the aggregate firm, i.e. the market value of debt and equity	MV
Net capital stock, i.e. the nominal capital stock at replacement cost	NCS
Tobin's (average) q or the valuation ratio	$q = \frac{MV}{NCS}$
Net operating surplus, i.e. profits at current prices	NOS
Rate of return on the capital stock or profitability	ROC = NOS/NCS
Cost of capital to the firm or the implicit rate at which financial markets capitalise current profits	CCT = NOS/MV
Rate of return to equity or shareholders where (i-p) is the real rate of interest and D is net debt (some countries add real holding gains)	$ROE = \frac{NOS-(i-p)D}{NCS-D}$
q for equity	$qe = \frac{MV-D}{NCS-D}$

PURE PROFITS AND TOBIN'S q IN NINE OECD COUNTRIES

INTRODUCTION

1. Judging from booming stock markets in the mid-1980s, expected profitability improved sharply in most countries since 1982. This paper considers profitability based on financial market expectations. From a policy perspective, the question whether the recent recovery in profits is sufficient to promote a recovery in investment, and ultimately in employment, can be assessed by comparing expected after-tax rates of return to capital relative to the supply cost of capital. This distinction is key. However, neither the expected rate of return on reproducible capital, nor the true supply cost of capital, is directly observable. The valuation ratio, or Tobin's q, which is the ratio of these two terms can, however, be measured as the ratio of the market value of the firm to the replacement cost of its net reproducible capital. The valuation ratio is thus an indicator of "pure profit rates" -- the difference between the expected rate of return on physical capital and the supply cost of capital. The main advantage of the valuation ratio is its embodiment of current financial market expectations. An important limitation, however, is the reliability of market valuation data in countries where capital markets are not broad or well developed.

2. This paper is divided into four sections. Theoretical and conceptual issues concerning valuation ratios or Tobin's q are considered in Section I. A distinction between marginal and average q is drawn. Historical developments in Tobin's q are described in Section II. Section III discusses other financial cost indicators including real debt and equity costs and the return to equity. Conclusions and implications for policy are presented in a final section. Methodological problems and the accuracy of financial measures of the value of the firm are noted in Annex I.

I. THE VALUATION RATIO -- TOBIN'S q

A. The theoretical and conceptual relevance of q

3. In the formulation proposed by Tobin (1969), investment is a positive function of the ratio of the market valuation of existing assets to the replacement cost of those assets. When the former exceeds the latter, i.e.

when q, the valuation ratio, exceeds unity, there is a clear incentive to invest. Put another way, if financial markets view a firm's future earning capacity favourably, it will value its capital stock above its replacement cost, creating incentives for managers to undertake additional physical investment. This point was emphasized by Keynes and cited by Tobin (1969, p. 237). If q is less than unity, financial investment is more profitable than physical investment. If market valuation of existing assets is persistently below replacement costs, there are incentives for financial takeovers: "it is cheaper to find oil on Wall Street than in the North Sea".

4. Used plant and equipment is infrequently traded since the bulk of capital equipment is specialised or indivisible. The most common way of buying or selling a firm's existing assets is through the trading of a corporation's securities on the stock exchange. An essential feature of the financial market approach is the existence of an active market for a firm's equity and liabilities. In large, well organised financial markets, ownership and claims on the firm change hands frequently. Prices in these markets can be taken as shadow prices for non-traded securities of comparable risk. Prices of securities can be very volatile because they are continually revised in line with new information which affects expectations of the firm's profit prospects. Allowing for these financial market expectations in investment decisions in a consistent manner is the main attraction of the q approach.

5. Because the actual capital stock adjusts slowly, prices of new capital goods and the market's valuation of existing assets can diverge significantly for extended periods. In equilibrium the market valuation of existing assets should equal the current cost of new capital goods, i.e. the valuation ratio should be unity. However, there are a number of reasons why a value of unity will not be realised:

-- First, there is an aggregation problem. We observe and measure <u>average</u> q, or the market valuation of the returns on existing capital relative to the replacement value of the capital stock. The relevant concept for investment theory is marginal q, that is, the expected return on an increment to the capital stock. This can be above unity for specific projects even when average q is below unity for the firm or the economy; indeed, following major changes to relative prices, the gap between average and marginal q could be pronounced until the composition of the capital stock has fully adjusted.

-- q as measured may differ from unity because of taxes. In almost all OECD countries, investment is subsidised by accelerated depreciation schemes or investment grants. These reduce the replacement cost of capital as perceived by firms relative to replacement cost as measured by indices of capital goods prices. The observed equilibrium value of q would therefore tend to a value below unity.

-- Potentially important assets such as patents, licences, a firm's "good will", land and mineral rights are generally excluded from a firm's reproducible capital stock. If these items are relevant to the earning capacity of the firm, their exclusion can raise the equilibrium value of q above unity.

Given measurement problems, movements in the valuation ratio over time are likely to be more informative than absolute levels, as is the case for most measures of profits.

6. At the macroeconomic level, Tobin has suggested that the valuation ratio may be an important indicator of the overall stance of economic policy. This aspect of the theory has received little attention, because of the difficulty of explaining what determines q in an efficient market. The use of q in aggregate investment equations has had mixed results. In general, q appears to explain investment no better or slightly worse than standard neo-classical or accelerator models of investment.

B. Marginal and tax-adjusted q

7. Tobin assumes that, to a reasonable approximation, the market value of an additional unit of capital equals the average market value of the existing capital stock, and therefore marginal q roughly equals average q. Summers (1981), Hayashi (1982) and Hayashi et al. (1984) note that marginal q is not observable, and ask under what conditions marginal and average q will be equivalent. They show that average and marginal q are equivalent i) with a Cobb-Douglas or CES production function embodying constant returns to scale, ii) with competitive markets so that firms are price takers in goods and factor (especially capital) markets, and iii) in the absence of tax wedges between the average and marginal tax on capital.

8. Neither the Hayashi nor the Summers studies for the United States or Japan estimate marginal q. They do, however, modify q to allow for effects of the corporate and personal tax systems. Comparable estimates have been made for the United Kingdom by Flemming et al. (1976). In general, the Summers and the Hayashi tax-adjusted q yields better empirical results in investment equations than estimates based on average q; but the results are still little better or slightly worse than other investment models which make explicit allowance for the effects of demand and capacity utilisation.

II. HISTORICAL DEVELOPMENTS IN TOBIN'S q

A. Data limitations and coverage

9. Data for Tobin's average q, and a decomposition into two components (the aggregate rate of return to physical capital and supply cost of capital) are presented in Tables 1-3 and illustrated in Chart A. Most published data end prior to the marked recovery in world share prices in 1983-84; estimates of q to 1985, based on weighted changes in real equity and long-term bond prices, have been added to Chart A.

10. The valuation ratio (q) is measured using market valuation data and thus directly embodies financial market expectations concerning profitability. The countries are separated into two broad classes on the criterion of depth and efficiency of their capital markets. In a first group consisting of the United States, the United Kingdom and Canada, financial markets appear to provide reliable, albeit volatile, measures of the market

Table 1

VALUATION RATIOS -- TOBIN'S q

	United States	Japan (1)	Japan (2)	Germany (1)	Germany (2)	France	United Kingdom	Canada	Belgium	Finland	Sweden
1955	1.11	0.46									
1956	1.10	0.47									
1957	1.02	0.56									
1958	1.04	0.57									
1959	1.25	0.68									
1960	1.22	1.11									
1961	1.35	1.15			1.73					1.65	
1962	1.28	1.04			1.39					1.67	
1963	1.42	0.79			1.44					1.64	
1964	1.52	0.68			1.44		1.33		1.05	1.60	
1965	1.62	0.60	1.10		1.24		1.12		1.02	1.45	
1966	1.47	0.68	1.09	3.20	1.14		1.04	1.15	0.94	1.30	0.60
1967	1.48	0.69	1.04	4.27	1.35		1.09	1.11	0.94	1.21	0.61
1968	1.52	0.79	1.12	3.63	1.39		1.37	1.04	1.20	1.34	0.81
1969	1.35	1.29	1.17	4.16	1.43		1.19	1.03	1.25	1.41	0.77
1970	1.09	1.04	1.05	2.47	1.18		0.93	0.95	1.11	1.51	0.61
1971	1.18	0.82	1.13	2.50	1.20	0.91	1.06	1.03	1.15	1.49	0.62
1972	1.26	0.65	1.35	3.10	1.25	0.96	1.16	1.14	1.22	1.68	0.67
1973	1.16	0.70	1.10	2.15	1.12	0.93	1.06	1.36	1.31	1.98	0.66
1974	0.83	0.63	1.00	1.66	1.06	0.75	0.61	1.06	1.00	1.61	0.59
1975	0.81	0.77	1.06	1.80	1.16	0.69	0.77	0.88	0.95	1.41	0.58
1976	0.91	0.87	1.05	2.23	1.10	0.62	0.73	0.87	0.91	1.27	0.59
1977	0.80	0.75	1.05	2.11	1.13	0.58	0.82	0.83	0.91	1.20	0.56
1978	0.76	0.78	1.10	1.88	1.16	0.60	0.78	1.01	0.94	1.24	0.55
1979	0.71	0.78	1.14	1.69	1.06	0.65	0.78	1.14	0.99	1.29	0.51
1980	0.67	0.81	1.21	1.28		0.57	0.70	1.07	0.92	1.25	0.59
1981	0.69	1.04	1.20			0.47	0.62	1.02	0.86		
1982	0.69					0.48	0.73		0.88		
1983	0.86					0.54	0.89		1.02		
1984							0.97				
Mean	1.10	0.78	1.12	2.54	1.26	0.67	0.94	1.04	1.03	1.46	0.62
Standard deviation	0.30	0.21	0.08	0.93	0.17	0.17	0.22	0.13	0.13	0.21	0.08

Sources and definitions:

United States: Ratio of market value to asset replacement cost for non-financial corporations, CEA.
Japan (1): Ratio on depreciable assets, manufacturing, EPA.
(2): Tobin's q ratio of firm's value to total assets except land, Wakasugi.
Germany (1): Tobin's q ratio-private enterprises, Essen.
(2): Tobin's q ratio-non-financial corporations, Albach.
France: Non-financial corporate and quasi-corporate enterprises. Secretariat estimates.
United Kingdom: Ratio of the market value of the company sector (all sectors) to the replacement cost (net of tax) of the capital employed, Bank of England.
Canada: Ratio of the market value of the non-financial sector to the replacement cost of the capital employed, Ministry of Finance.
Belgium: Tobin's q, 1975 = 1, Bureau du Plan.
Finland: Tobin's q with own capital at market prices, manufacturing, Koskenkyla.
Sweden: Ratio of market value of firm's securities to the current cost of their fixed assets, company sector, Bertmar.

Note: Data shown to two decimal points are not statistically significant.

Table 2

RATES OF RETURN ON THE CAPITAL STOCK

(ROC)

	United States	Japan (1)	Japan (2)	Germany (1)	Germany (2)	France	United Kingdom (1)	United Kingdom (2)	Canada (1)	Canada (2)	Belgium	Finland	Sweden
1955	9.8												
1956	7.9												
1957	7.4												
1958	6.5												
1959	8.5												
1960	8.0										9.1	12.5	
1961	8.2				4.2						9.0	12.8	
1962	10.3				3.9						8.7	9.8	
1963	11.2				4.0						8.4	10.0	
1964	12.5				4.3		7.6				8.9	9.5	
1965	14.0	33.3			4.6		5.3				9.1	8.1	
1966	13.7	34.1	13.0	14.2	4.4		5.9		8.3	9.9	7.9	7.3	
1967	12.4	36.9	12.7	14.3	4.5		5.2		7.7	8.6	7.5	6.9	2.6
1968	11.3	39.0	11.8	11.8	4.6		4.5		8.4	9.6	8.3	8.7	3.5
1969	9.7	39.4	13.7	12.7	4.4		4.5		8.2	9.7	8.8	12.6	5.1
1970	7.9	39.5	12.5	10.9	4.8		4.2		7.1	7.2	10.1	10.9	3.1
1971	8.5	34.1	9.3	9.4	3.8	10.7	4.2		6.8	7.7	9.1	7.2	2.4
1972	9.1	32.4	11.5	9.4	3.9	10.8	4.8		6.5	8.5	9.0	7.2	2.1
1973	8.7	32.4	17.4	8.6	4.3	10.8	3.8	11.3	8.1	9.5	9.5	7.5	5.3
1974	6.1	25.0	13.5	7.1	3.9	9.3	1.5	6.6	8.1	9.5	8.6	10.1	8.2
1975	7.7	18.5	4.7	5.6	3.2	7.3	1.6	4.1	7.9	8.8	5.6	5.6	2.7
1976	7.9	20.3	7.8	6.9	4.2	5.9	3.1	4.6	7.5	7.8	5.8	4.8	0.7
1977	8.7	19.7	5.5	6.7	3.1	7.0	6.2	7.8	6.3	6.1	5.5	4.2	-2.9
1978	8.6	21.4	5.6	6.4	3.2	6.9	6.3	7.9	7.1	7.2	5.5	6.9	0.3
1979	7.4	21.2	9.7	6.7	3.4	7.1	5.7	5.4	8.8	8.4	5.5	9.5	1.6
1980	6.6	20.8	10.3	5.1		6.3	4.0	3.8	9.4	8.3	4.6	8.4	1.4
1981	7.7	20.7	6.8			5.4	4.9	3.7	7.3	7.3	3.4	8.0	
1982	7.5					4.9	6.4	5.3			4.2	7.5	
1983						5.1	7.7	7.0				9.7	
1984							11.0						
Mean	9.1	28.7	10.4	9.1	4.0	7.5	5.2	6.1	7.7	8.4	7.5	8.6	2.6
Standard deviation	2.1	8.0	3.6	3.1	0.5	2.2	2.1	2.3	0.8	1.1	2.0	2.3	2.6

Sources and definitions:

United States: After tax, non-financial corporations, CEA.
Japan (1): Pre-tax, manufacturing. Homma et al.
(2): After tax. Total assets except land, Wakasugi.
Germany (1): Pre-tax, private enterprises, Essen.
(2): After tax, non-financial corporations, Albach.
France: Pre-tax, non-financial corporate and quasi-corporate enterprises, Secretariat estimates.
United Kingdom (1): After tax, real, industrial, commercial corporations, Bank of England.
(2): Before tax.
Canada (1): Before tax, total non-financial enterprises, Ministry of Finance.
(2): Before tax, manufacturing.
Belgium: Net after tax non-financial corporations, Bureau du Plan.
Finland: After tax, manufacturing, Koskenkyla.
Sweden: After-tax real rate of return on fixed assets, Bertmar.

Table 3

COST OF CAPITAL

(CCT)

	United States	Japan		Germany		France	United Kingdom	Canada	Belgium	Finland	Sweden
		(1)	(2)	(1)	(2)		(a)	(b)			
1955	8.8										
1956	7.2										
1957	7.3										
1958	6.2										
1959	6.8										
1960	6.5										
1961	6.1				2.4					6.8	
1962	8.0				2.8					5.0	
1963	7.9				2.8					5.4	
1964	8.2				3.0		5.7		8.5	5.4	
1965	8.6	55.6			3.7		4.7		8.9	5.0	
1966	9.3	50.0	11.9	4.4	3.9		5.7	7.2	8.4	4.6	
1967	8.4	53.5	12.3	3.4	3.3		4.8	6.9	8.0	5.0	4.4
1968	7.4	49.4	10.6	3.2	3.3		3.3	8.0	6.9	6.4	5.8
1969	7.2	30.5	11.7	3.1	3.1		3.7	7.9	7.0	8.7	6.3
1970	7.2	38.1	11.9	4.4	4.1		4.5	7.4	9.1	8.0	4.1
1971	7.2	41.7	8.2	3.8	3.2	11.8	4.0	6.6	7.9	5.3	4.1
1972	7.2	50.1	8.5	3.0	3.1	11.2	4.2	5.7	7.4	4.9	3.4
1973	7.5	46.0	15.8	4.0	3.8	11.6	3.6	6.0	7.3	4.7	7.9
1974	7.3	39.6	13.5	4.3	3.7	12.4	2.4	7.6	8.6	7.7	12.4
1975	9.5	24.2	4.5	3.1	2.8	10.6	2.1	9.0	5.8	4.4	4.7
1976	8.7	23.2	7.4	3.1	3.8	9.5	4.3	8.6	6.4	3.7	1.2
1977	10.9	26.3	5.2	3.2	2.7	12.1	7.5	7.6	6.0	3.6	-4.9
1978	11.3	27.5	5.1	3.4	2.8	11.5	8.0	7.1	5.9	5.2	0.5
1979	10.4	27.1	8.5	3.9	3.2	10.9	7.3	7.7	5.5	7.1	3.0
1980	9.9	25.8	8.5	4.0		11.0	5.8	8.8	5.0	7.0	2.6
1981	11.2	20.0	5.7			11.5	8.0	7.1	3.9		
1982	10.9					10.2	8.8		4.8		
1983						9.4	8.6				
1984							11.3				
Mean	8.3	37.0	9.3	3.6	3.2	11.1	5.6	7.5	6.9	5.7	4.0
Standard deviation	1.5	12.1	3.3	0.5	0.5	0.9	2.4	0.9	1.5	2.3	3.9

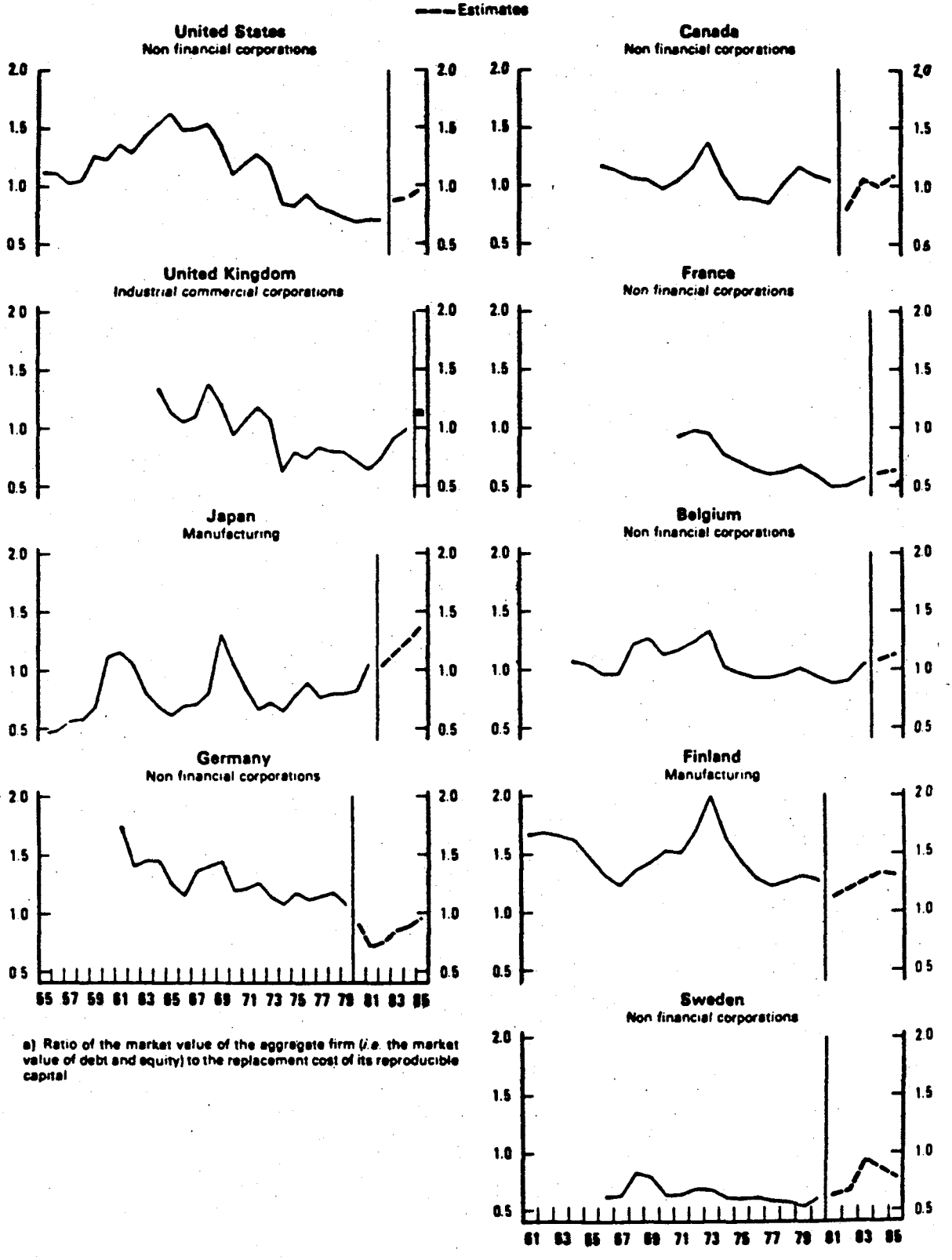
See notes to Table 2.

a. After tax.

b. Non-financial corporations.

Chart A

VALUATION RATIOS (a)



a) Ratio of the market value of the aggregate firm (*i.e.* the market value of debt and equity) to the replacement cost of its reproducible capital

value of the aggregate firm. Capital markets in these countries are characterised by the importance of individual and non-bank institutional investors in relatively broad and deep secondary markets.

11. In a second group of continental European countries (Germany, France, Belgium, Finland and Sweden) capital markets are dominated by the commercial banking system, equity markets are relatively underdeveloped and individual stock ownership is limited. Japan is included in the second group: although the equity market is quite large and households hold a sizeable part of their portfolios in equities, corporate bond finance is relatively small and the bulk of long-term debt finance is intermediated through the banking system. By "Anglo-Saxon" standards, firms in this second group of countries have extraordinarily high capital-gearing ratios with consequences for income gearing (Table 4). In the absence of broad equity markets where the shares of a representative group of companies are traded among large numbers of actual or potential investors, changes in equity prices may contain relatively little information about underlying assessments of profitability. Under these circumstances, market valuation measures may have a relatively high "noise" content. Many countries measure debt at book value, introducing a bias to debt/equity ratios -- upward in periods of rising interest rates, and vice-versa. (Table 5 presents estimates of debt/equity ratios at market prices for six countries. They are derived from national accounts and financial market data and should be indicative of general trends.)

12. The valuation ratio can be decomposed into a rate of return on physical capital and a cost of capital using ex post national accounts profits data. The rate of return on the reproducible physical capital stock (ROC) is defined as net operating surplus divided by the net capital stock at replacement cost (ROC = NOS/NCS). Net operating surplus measures the pool of funds available in an economy to reward savings and investment -- what is usually at issue when "profitability" enters macroeconomic discussions. As such, it includes both profits from productive activity and net interest payments, and is net of depreciation at current cost. This measure of the return to capital is quite robust with respect to the methodological and conceptual problems related to measuring the replacement value of the capital stock (1).

13. Total capital costs (CCT) are defined as net operating surplus divided by the market value of the firms' debt and equity (CCT = NOS/MV). It measures the rate at which financial markets capitalise the earnings capacity of firms on the basis of current profits. This (both debt and equity) is often used as the supply price of capital or financial cost of capital to the aggregate firm. In the presence of broad and efficient capital markets, this is probably the least ambiguous measure of the supply cost of capital available (2).

14. The main conceptual limitation with decomposing q is that unobserved "expected" profits should appear in the denominators of ROC and CCT. An alternative, but equally arbitrary, method of decomposing q is to derive expected profitability as the product of UCC (the user cost of capital) and q (3). However, this method assumes that any deviation between UCC and CCT is necessarily a change in expected profitability. It thus has no theoretical advantage over the simpler efficient market hypothesis of static expectations.

15. The data for the United States, Japan, Germany, the United Kingdom, Canada, Belgium, Finland and Sweden are from official sources or from

Table 4

INCOME GEARING RATIOS (a)

	Average 1960-1969	Average 1970-1979	1980	1981	1982	1983	1984
United States	0.11	0.23	0.32	0.35	0.41	0.32	..
Japan	..	0.51	0.54	0.54	0.54	0.57	..
Germany	0.12	0.22	0.26	0.33	0.33	..	..
France	0.21	0.41	0.53	0.71	0.78	0.76	0.63
United Kingdom	..	0.40 (b)	0.42	0.35	0.30	0.21	..
Italy	..	0.97	0.91	1.19	1.15	..	..
Canada	..	0.37	0.40	0.57	..	..	..
Belgium	0.18	0.18	0.27	0.33	0.29	..	..
Finland	0.26	0.69	0.64	0.73	0.69	0.54	..
Netherlands	..	..	0.36	0.37	0.36	0.35	..
Norway	..	..	0.30	0.31	0.35	0.33	..
Portugal	..	..	0.87	1.05	..	..	..
Sweden	..	1.20	0.80	1.17	0.85	0.60	..

a. Net interest paid by non-financial corporations divided by net operating surplus.
b. Average 1974 to 1979.

Note: Due to different measurement techniques and coverage, data are not comparable between countries.

Source: OECD National Accounts except for the United Kingdom, Canada and Belgium.

Table 5

THE RATIO OF DEBT IN TOTAL CAPITALISATION
NON-FINANCIAL CORPORATE SECTORS (a)

(percentages)

	1960s	1970s	1980	1981	1982	1983
United States	60-69	70-79				
	0.21	0.33	0.36	0.35	0.38	0.32
Japan		70-79				
		0.53	0.45	0.44	0.49	0.45
Germany	60-69	70-79				
	0.58	0.74	0.76	0.75	0.68	0.63
France		71-79				
		0.48	0.43	0.51	0.51	0.50
United Kingdom	63-69	70-79				
	0.18	0.21	0.19	0.16	0.18	0.14
Canada	66-69	70-79				
	0.30	0.35	0.29	0.28		

a. At market prices.

Source: U.K. and Canadian estimates are from the Bank of England and Ministry of Finance respectively. Figures for other countries are Secretariat estimates based on the capitalisation of net interest and dividend payments.

published studies. Estimates for France have been made by the Secretariat. Where available, data are presented both pre- and post-tax. Pre-tax profits are relevant as a measure of productive efficiency and the long-run rate of transformation of present into future output through investment in physical capital (cf. Feldstein, 1983). After-tax profits are relevant to decisions between present and future consumption, although corporate tax data are generally quite poor indicators of marginal tax rates.

16. Annex I discusses methodological issues including data coverage, sources and measurement problems. A description of national measures of valuation ratios and the Secretariat's estimates for France are available on request.

B. Historical developments in q

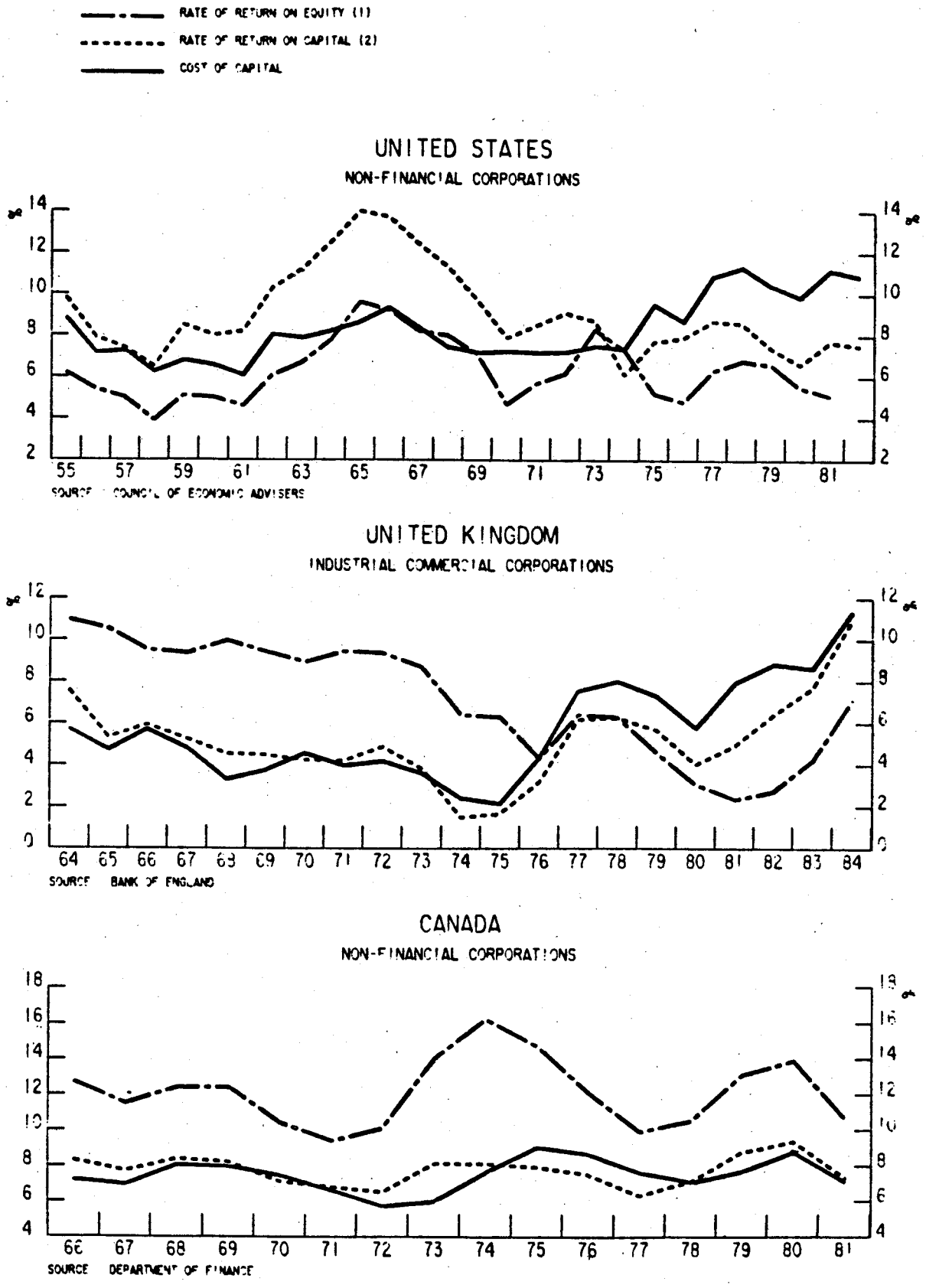
17. With the exception of Japan, there has been a secular decline or stagnation in the valuation ratio for the countries considered here. The decomposition of the valuation ratio suggests that the development of pure profit rates reflected different developments in the return to and cost of capital before and after the first oil shock. The observed decline of pure profit rates during the period 1965-74 is associated with falling returns on physical capital. Indeed, the drop in rates of return on fixed capital in most countries started well before the first oil shock. In most of the countries surveyed, capital costs played a neutral or even a cushioning role prior to 1974, that is the supply cost of capital tended to remain stable or actually fell (Chart B).

18. Rates of return declined more rapidly in some countries after 1974, but generally held up better after the second oil price increase than after OPEC I. But the post-1974 period has witnessed a sharp rise in the supply cost of capital for a number of countries and this is reflected in declines in the valuation ratio. This increase in the supply cost of capital has often been attributed to rising U.S. real interest rates and their effects on interest rates and equity markets in other countries in an era of floating exchange rates. However, the rise in ex post real interest rates in the United States after 1974 generally lagged the rise in the cost of capital. Hence other factors such as changes in investors' inflation expectations, and perhaps a heightening of perceived financial risk related to the weak balance-sheet position of firms, must also have been important.

19. By 1985, the sharp rise in world stock markets may have raised q ratios in the countries surveyed, by 20 to 40 per cent from their 1982 recession lows (cf. Chart A). The recovery in equity prices has far exceeded the modest rise in long-term bond prices. The differential recovery in q ratios, between countries, has been importantly influenced by the degree of financial indebtedness, as well as the rise in equity prices. In North America, the rise in equity and long-term bond prices moved in parallel, although the rise in equity prices was stronger. In Europe, there was a more marked rise in equity markets, but the rise in q continues to be restrained by high debt/equity ratios and the slow rise in long-term bond prices. Given the particularly marked surge in equity prices towards the end of 1985, valuation ratios in many countries may now be close to their 1974 levels, but still below their historical peaks.

Chart B

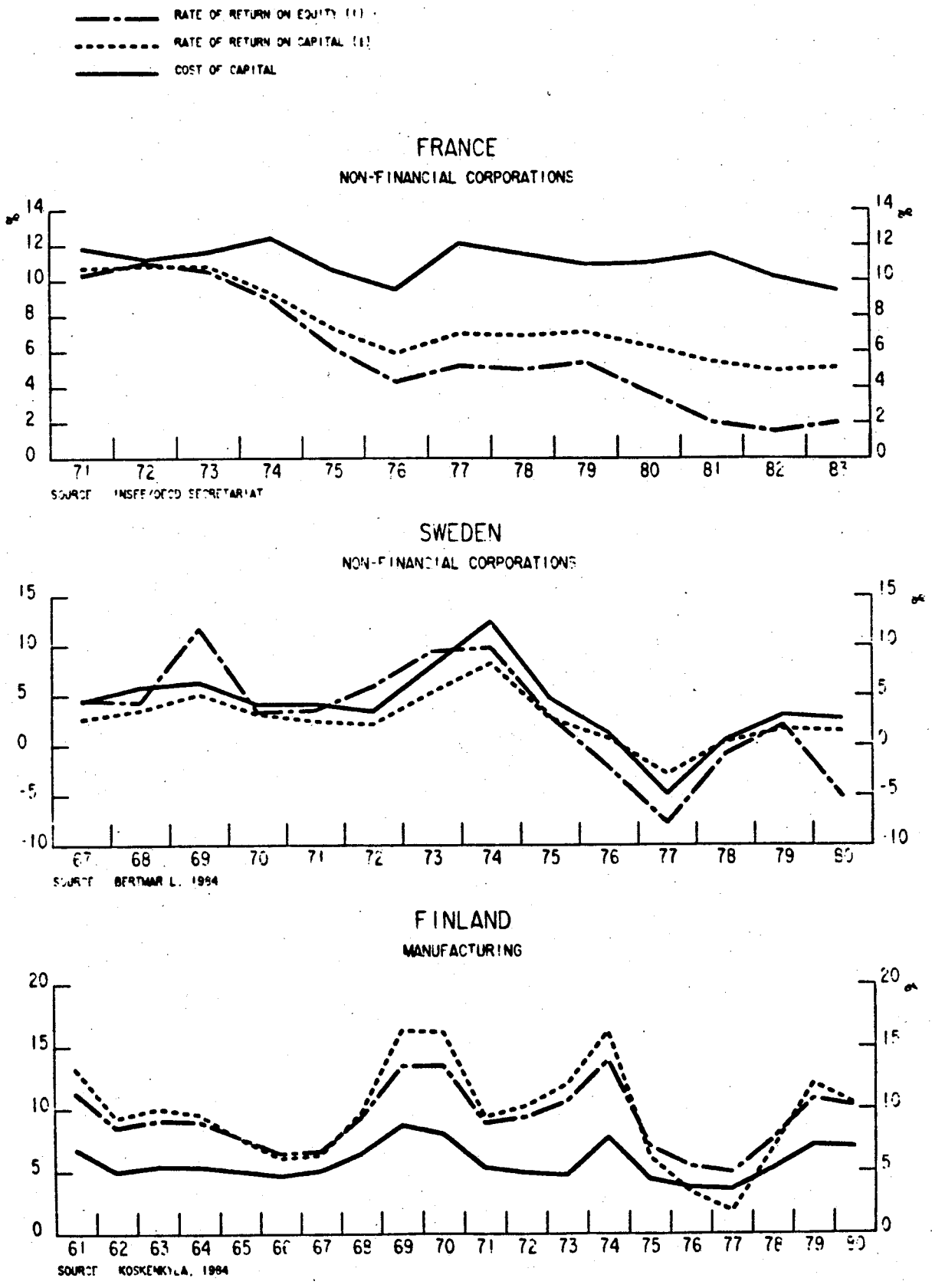
FINANCIAL MARKET INDICATORS



1. After-tax for the United States; before-tax for other countries.

2. After-tax for the United States and the United Kingdom; before-tax for Canada.

Chart B (continued)



1. After-tax for Finland and Sweden; before-tax for France.

III. OTHER FINANCIAL COST INDICATORS

20. Tobin's q is the ratio of the total returns to physical capital to the total costs of capital. Total returns are those accruing to bond and shareholders; similarly the cost of capital is an average of debt and equity costs. In a text-book neo-classical world, q would tend towards unity, and financial arbitrage would ensure that the costs of debt and equity finance would either tend to equalise, or one financing source would cease to be used. Observed financing costs bear little resemblence to this model. This may, in part, reflect economic phenomena: the different tax treatment of debt versus equity finance, risk characteristics of debt and equity instruments, incomplete and potentially costly information, and other sources of market inefficiency. But data problems are severe, so the interpretation of results is inevitably hazardous. The following two sections consider, respectively, relationships between the cost of bond finance (proxied by a measure of ex post real long-term interest rates) and total capital costs, and the behaviour of returns to equity in relation to total returns on capital.

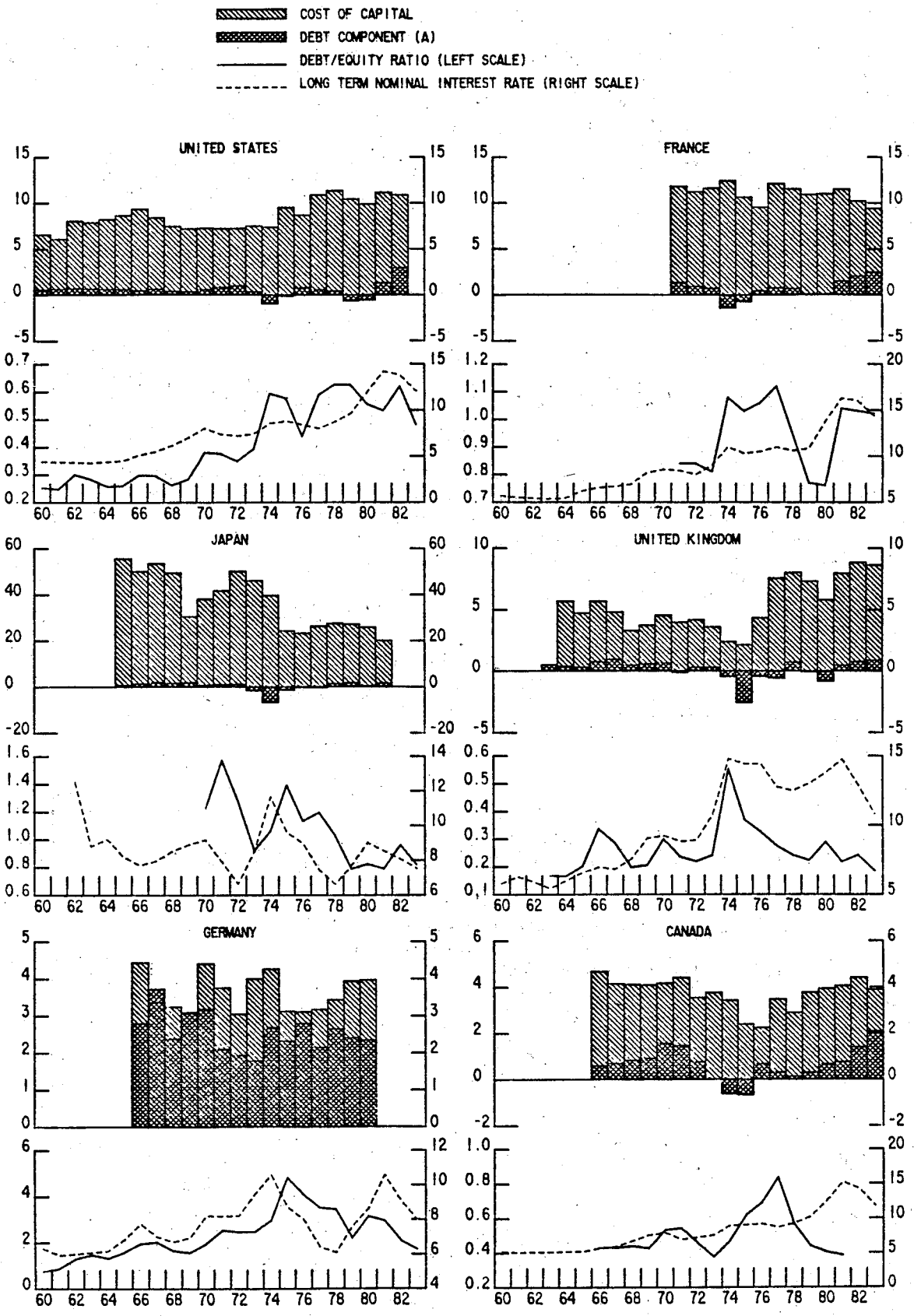
A. Real debt and equity costs

21. When real debt and equity costs differ, both sources of finance should be analysed by measuring their opportunity cost. In a situation where equity markets are buoyant but real interest rates remain high, the latter will overstate the true supply cost of financial capital. Under usual conditions when higher risk equity returns are above the return on debt, the real interest rate will understate the cost of funds to the extent that financing investment entirely by debt raises the risk premium on a firm's debt. Total financial capital costs can be thought of as a weighted average of the cost of real debt and the cost of equity, where the weights are given according to the debt/equity composition of total liabilities. Real after-tax debt costs are usually proxied by some measure of real interest rates. Given this measure, and adjustments for changes in debt/equity ratios, the cost of equity is implicitly determined as the residual from a comparison of debt and total capital costs. (Estimates of debt and equity cost components for six countries are shown in Chart C) (4). Most of the national studies, and those shown in Charts D and E, calculate real interest rates by using a simple average of past inflation (see Atkinson and Chouraqui, 1985). All national estimates of post-tax real interest rates simply apply standard corporate tax rates and make no allowance for the possibility that tax deductions could be unusable because of insufficient profits.

22. A comparison between pre-tax real long-term interest rates and the cost of capital for the United States and the United Kingdom, in particular, reveals large differences, which become particularly striking in 1974-75 and 1979-80 (cf. Chart D). During both periods, ex post real interest rates became negative as inflation accelerated while total capital costs increased. If real interest rates are calculated using, for example, OECD inflation forecasts for expected inflation, the drop in real interest rates is less pronounced. Only if expected inflation was very stable and unresponsive to actual inflation developments, would the gap between ex ante real interest rates and total capital costs be significantly reduced. It is only towards 1981-82 that the gap between real interest rates and capital costs tends to close, with a continued rise in the former series.

Chart C

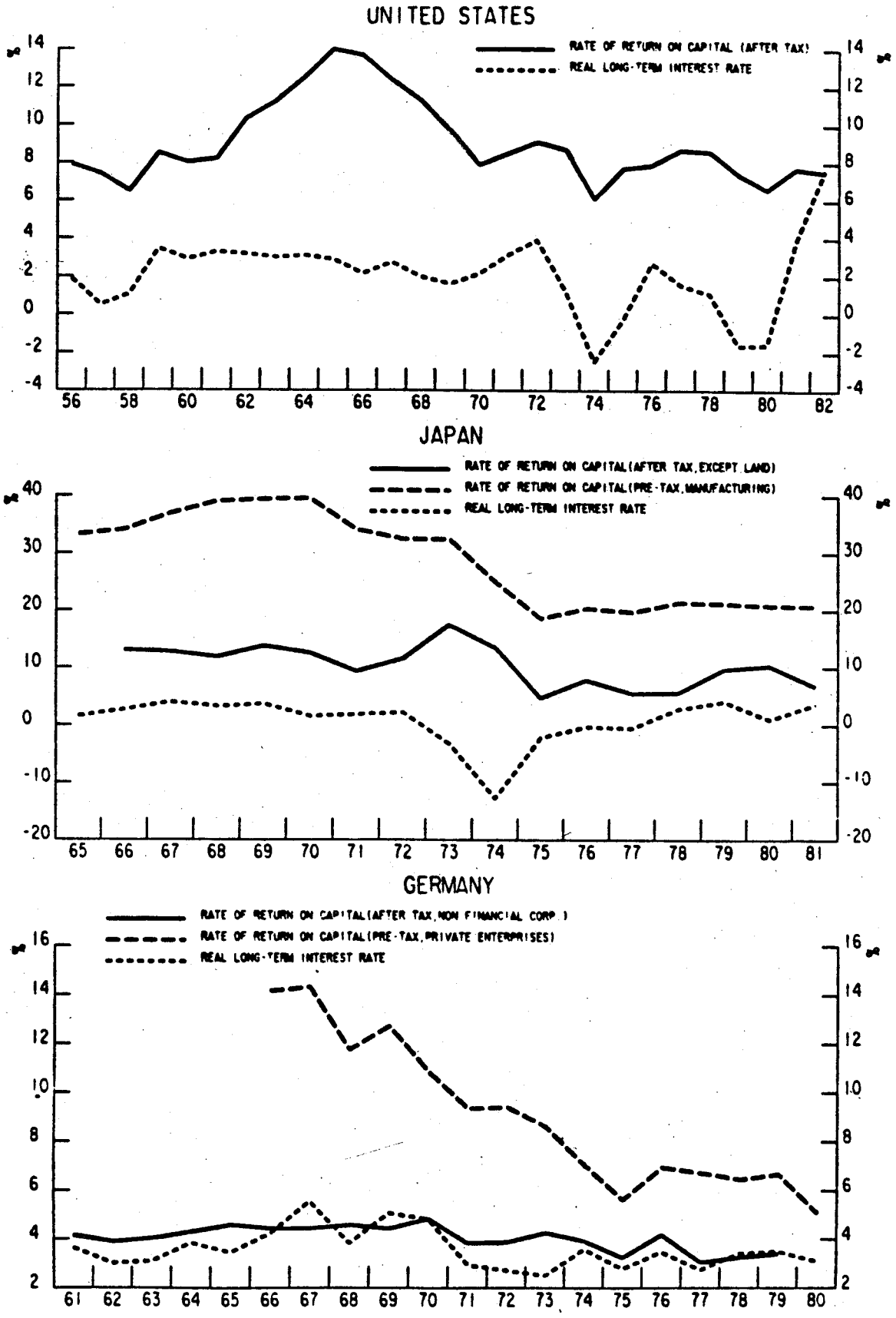
REAL DEBT AND EQUITY COSTS



a. Real debt costs are calculated as the share of debt in total capital multiplied by ex post real long-term interest rates.

Chart D

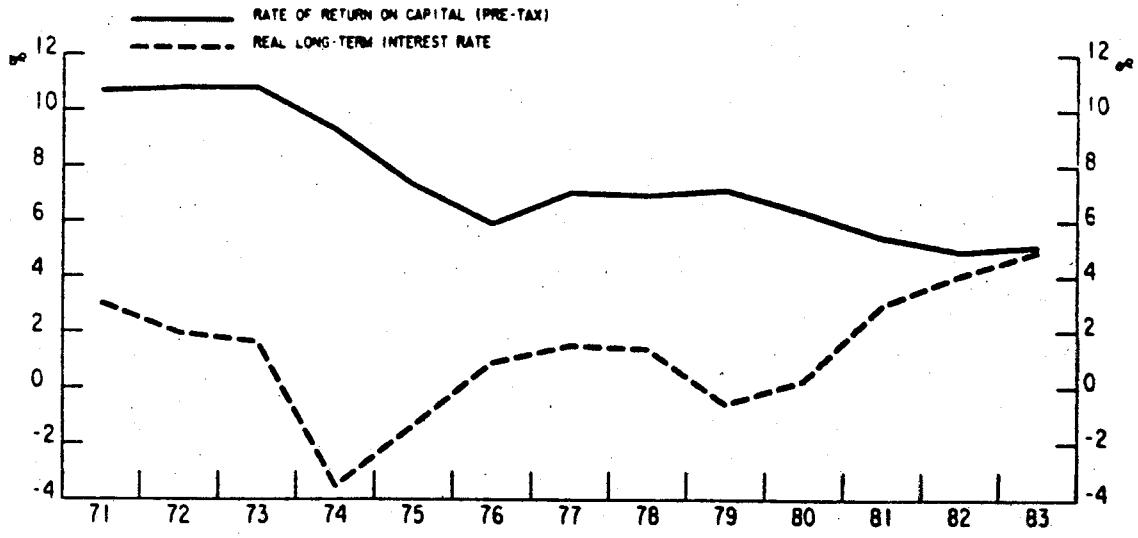
PROFITABILITY AND INTEREST RATES



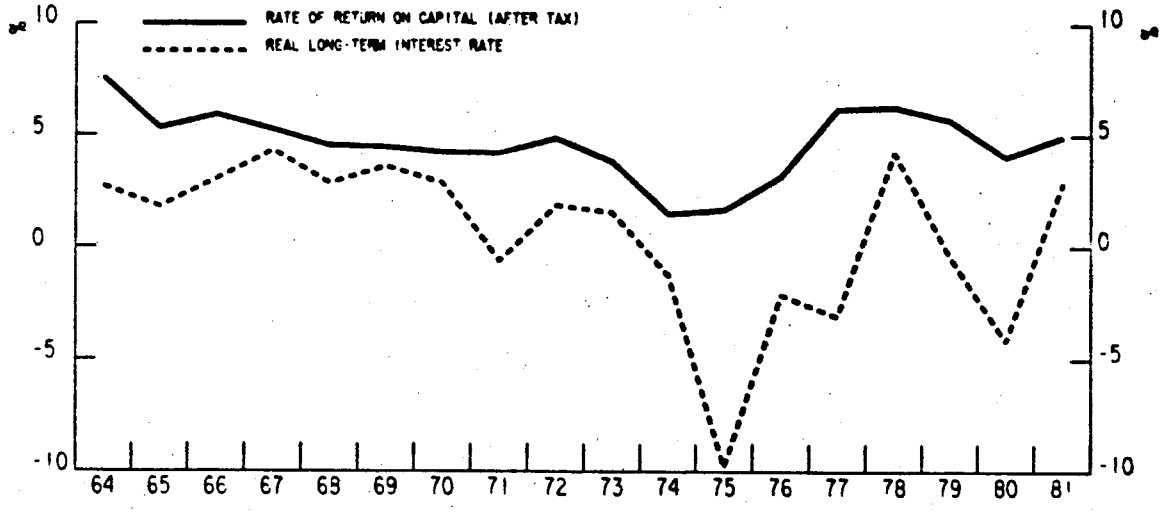
Note: The real long-term interest rate is defined as the long-term interest rate minus the actual rate of inflation.

Chart D (continued)

FRANCE



UNITED KINGDOM



CANADA

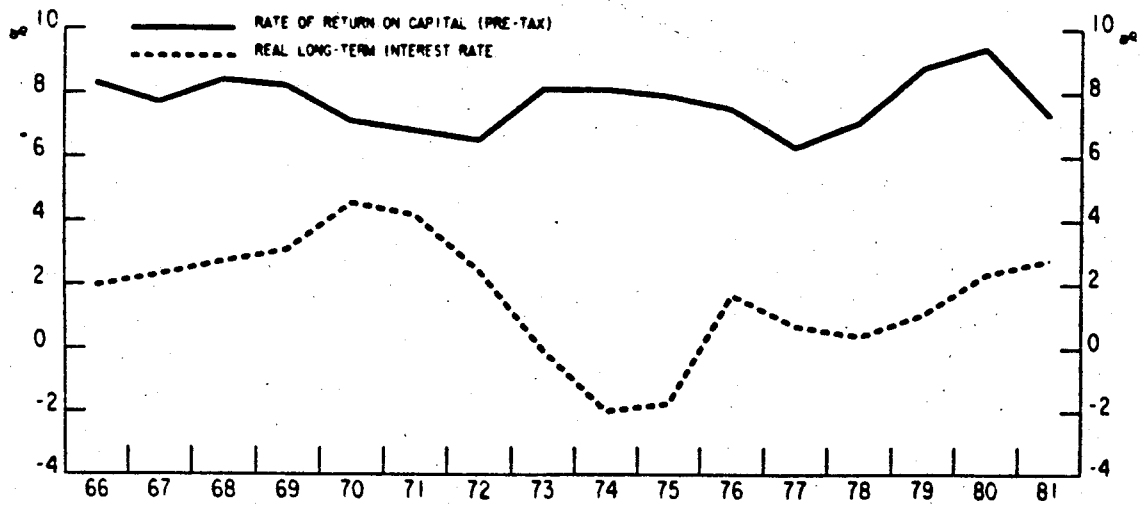
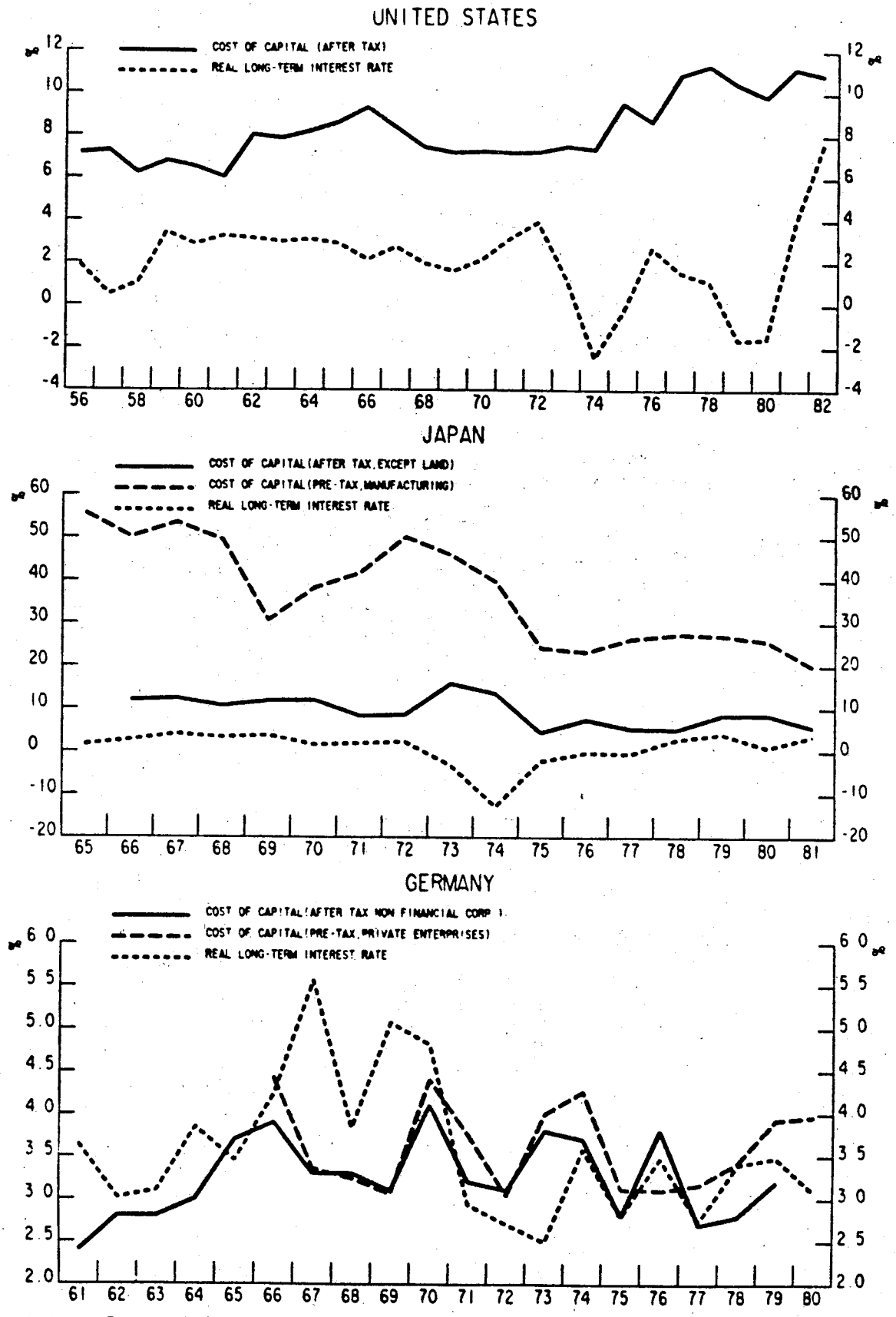


Chart E

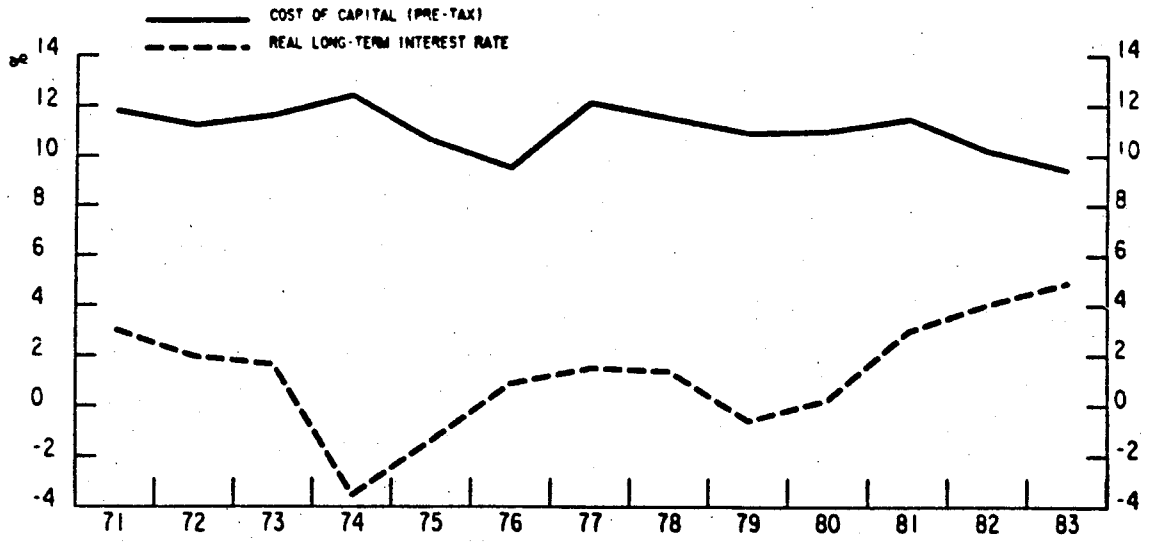
CAPITAL COSTS



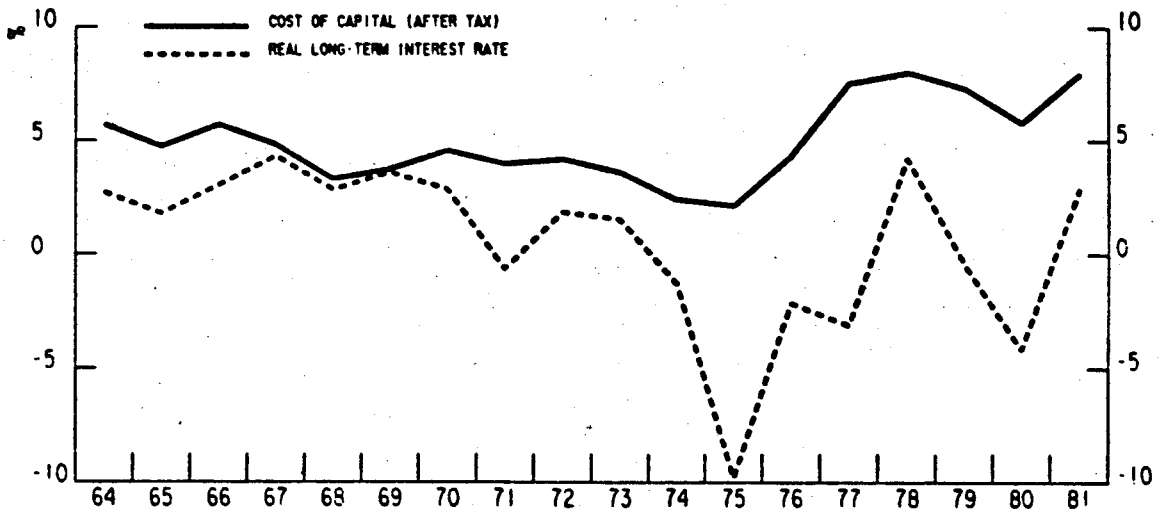
Note: The real long-term interest rate is defined as the long-term interest rate minus the actual rate of inflation (see Tables 2 and 3 for the definition and coverage of the cost of capital).

Chart E (continued)

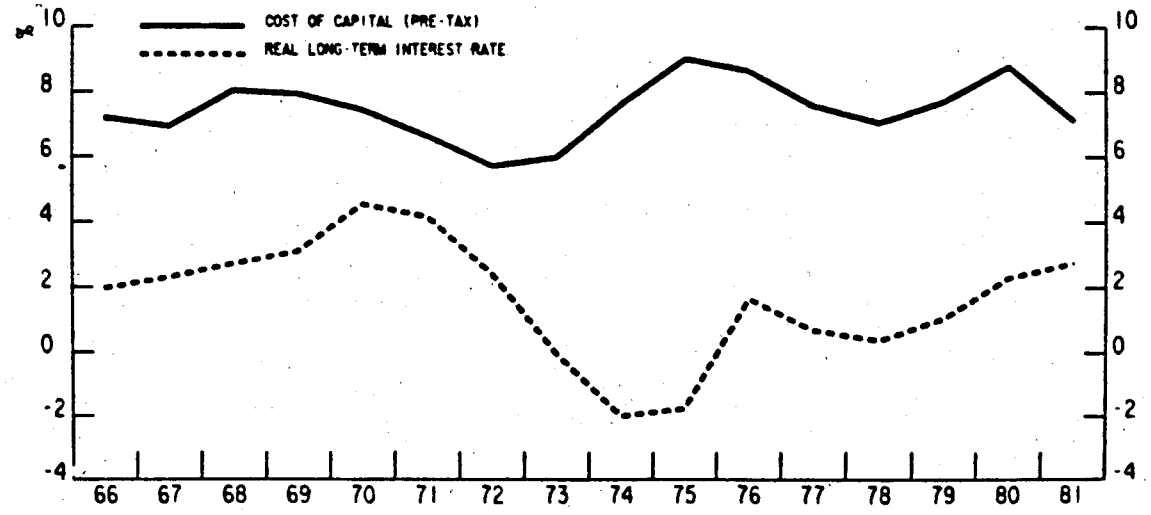
FRANCE



UNITED KINGDOM



CANADA



23. One hypothesis advanced to explain the increase in total capital, and equity costs in particular, during the 1970s is that the two oil shocks depressed expectations of productivity of the existing capital stock (Baily (1981)). Hence, the apparent sharp rise in the cost of capital (or the explicit capitalisation rate attached to current profits), was a rational reaction to heightened obsolescence rather than, say, to a tightening of monetary policy. By this argument, the cost of funds to undertake new investments would not have risen. In addition, the fall in energy prices since 1982 should have had a symmetrical damping effect on the cost of equity funds, and this is observable in the recent narrowing of the gap between total capital costs and real interest rates.

B. The rate of return to equity -- how have common shareholders fared?

24. There are two approaches to calculating the pre-tax rate of return to equity (ROE). The first accumulates dividends received plus increases in the market value of outstanding shares relative to the current value of these shares. The second approach takes a macroeconomic measure of profits, excluding real interest payments, relative to the net worth of the aggregate firm. Apart from measurement error, the two indicators will yield the same results if the market value of equity is equivalent to the net worth of the firm. (Net worth of the firm is measured as net capital stock at replacement cost minus net debt.) In other words, the two indicators yield identical results when a given amount of retained earnings produces an equal discounted present value of dividends leaving Tobin's q for equities (defined in the glossary) consistently close to unity. The measures of ROE in Chart B use some variant of the second approach.

25. The evolution of rates of return to equity (ROE) and the return to capital (ROC) is illustrated in Chart B. A comparison of the measures of these two concepts shows how shareholders' returns to net worth have fared relative to the return on physical capital. As a matter of arithmetic, ROE should exceed ROC when ROC pre-tax exceeds the real rate of interest, and conversely (5). Even though this condition has generally been true over the past 15 to 20 years (cf. Chart D), returns to equity-holders or net worth have fared quite poorly relative to ROC throughout most of this period. This puzzling result must be due to measurement error. In particular, it must infer that the measures of real interest rates used in the Charts are different from those in national estimates of returns on shareholders' equity (6). Thus the information content of the charts is more to be found in the relative movements of the time-series than in their levels.

26. As noted above the rate of return to capital was subject to a trend decline from the mid-1960s to 1975 in the majority of countries surveyed (Canada was the main exception). At the same time, corporations shifted towards higher debt/equity ratios which would cushion somewhat the decline in ROE if, as seems plausible, ROC exceeded real interest rates over this period. Such a strategy would also have been favoured by the tax deductibility of nominal interest costs, expectations of continued high growth, and the sluggish adjustment of investors' inflation expectations. Nevertheless, the performance of ROE was generally poor.

27. The 1973-74 oil shock marked a watershed. Equity prices weakened, driving debt/equity ratios up significantly. Debt/equity ratios continued to

rise after 1975, except in the United Kingdom, in the face of sluggish economic growth, high inflation and stagnant equity prices. ROE performed poorly over the period 1973-1982 and new share issues dried up. Corporate borrowing was increasingly short-term. Highly-leveraged corporate balance sheets with debt of relatively short maturity proved vulnerable to sharp changes in interest rates (cf. Table 5). Debt/equity ratios remain high, especially in continental Europe, although the exact degree may be overstated by book-value data.

28. Financial market based measures of profits have improved with the recovery in economic activity since late 1982. Stock markets reached new records (in nominal terms) almost everywhere in 1984-85. The return to equity has no doubt also recovered during this period, given widespread indications of improved company profits. The data are not available, however, to distinguish the extent to which increased ROE, the rate at which future dividends are discounted by the market, can explain the rise in share prices; or, alternatively, if this rise is primarily a recovery in market expectations of future profits, and hence future dividends, i.e. an increase in q for equities. However, given the substantial recent rise in stock-market prices relative to national accounts profitability and continuing high income-gearing ratios, it seems that equity prices have recovered vis-à-vis ROE as measured above.

IV. CONCLUSIONS

29. In many countries, Tobin's q -- an indicator of the pure profit rate -- declined or stagnated from the mid-1960s until 1982. Since 1982, equity markets have recovered substantially. By end-1985, values of Tobin's q were perhaps close to their 1974 levels. Although still below historical peaks, Tobin's q may now be close to or even exceed the symbolic figure of unity. The pronounced recovery in expected profitability of the existing capital stock -- compared with realised profitability -- may be indicative of a sustained expected recovery in pure profit rates. Judging from previous historical relations, buoyant pure profit rates may be a sufficient condition for a recovery in investment. In many of the countries surveyed, the recovery in pure profit rates appears to anticipate a stronger recovery in investment than that implied by neo-classical models based on expected real output growth and user cost of capital measure -- where profits mainly determine the timing of investment. However the sustainability of investment may depend importantly on a decline in real long-term interest rates, especially in countries with highly indebted corporate sectors.

NOTES

1. Simulations with perpetual inventory models in the United Kingdom and Belgium indicate that, following a short step adjustment, the medium-term trend in profit rates is not substantially altered by alternative service-life assumptions. See Central Statistics Office (1984) and Bureau du Plan (1985).

2. A limitation in decomposing q in this manner is that net operating surplus, and hence ROC and CCT, includes a return to factor as well as economic profits.

3. The user cost of capital concept (UCC) embodied in INTERLINK and other macroeconomic models is a transformation of real long-term interest rates, prices of investment goods, depreciation rates, tax credits and the corporate tax rate. In contrast to CCT, which is an explicit financial market capitalisation rate, UCC is strongly influenced by the trend in investment goods prices. For a description see Helliwell et al., 1985.

4. Debt/equity ratios at market prices for the United States, Japan, Germany and France are based on national accounts and financial market data.

5. This relation can be seen as follows:

$$ROE = (NOS - (i-p)D)/(NCS-D),$$

$$= \left(\frac{NOS}{NCS} - \frac{(i-p)D}{NCS}\right).\frac{NCS}{NCS-D},$$

$$= \left(ROC - \frac{(i-p)D}{NCS}\right).\frac{NCS}{NCS-D}.$$

From which it follows that

$$ROE - ROC = [ROC-(i-p)].\frac{D}{NCS-D}$$

where D is net debt. If ROC = i-p, then ROE=ROC; for ROE to exceed ROC requires ROC greater than i-p, and vice-versa. The conditions for post-tax rates of return are even more favourable from the point of view of gearing, viz. ROC(1-t) exceeds (1-t)i-p. In other words increased gearing will generally be favourable to equity holders, so long as financial risk is contained.

6. It appears that some national estimates are not based on completely consistent formulae concerning true economic returns to equity.

Annex I

FINANCIAL MEASURES OF PROFITS

1. Concepts, definitions and measurement problems of alternative profit indicators were dealt with extensively in Chan-Lee and Sutch (1985a) Part II and Annex I. The discussion below is limited to the problems of measurement, alternative data sources and sample coverage. The market value of firms and the replacement cost of reproducible assets, including profits can be viewed from three perspectives depending on the purpose of the analysis:

-- Total profits as perceived by firms;

-- Profits accruing to equity holders;

-- National accounts profits based on integrated production accounts.

The focus of the analysis and the perception of profits will largely determine data sources. The focus here is on profitability, cost of capital and returns to equity holders in aggregate. The links between company and national accounts concepts are outlined below.

A. Company versus national accounts data sources

2. This paper has a macroeconomic focus. The estimates are confined to the non-financial or the manufacturing sectors due to conceptual problems in measuring operating surpluses for the financial sector. The aggregate profits and rates of return reported here are based on consistent national accounts data sources. The exceptions are the two German studies (where difficulties in defining the corporate sector in national accounts have prompted the use of company accounts) and the Swedish and Finnish studies where a mix of national accounts and company balance sheet data are used. The main advantages in using national accounts concepts and aggregate data are the difficulties of deriving meaningful measures of economic profits and rates of return from specific company accounts. Apart from obvious differences due to levels of aggregation, the data sources differ for two reasons.

i) Coverage: national accounts profits data are a production concept; they measure the productive efficiency of transforming inputs to output. In contrast, profits as perceived by firms include property income accruing from all sources including, for

example, rent, patents, licences, royalties as well as holding gains (1). A reconciliation for differences in coverage between company and national accounts is theoretically straightforward, but expensive in time and data requirements.

ii) Historical versus current-cost accounting: this is the principal reason for divergences between company book profits and national accounts profits. The conversion of individual firms' profits and capital stock data to a current-cost basis using aggregate price indices is not straightforward. Inflation adjustments at the level of the firm, for example, require detailed data for specific capital goods and inventory deflators. A principal advantage of aggregate profits data is that they are at current cost; the reliability of such estimates rises with large samples. Inflation adjustments, although arbitrary, for individual firms are clearly necessary. Indeed, at the heights of the squeeze on profits and record bankruptcies in 1979 to 1982, many companies were reporting historical-cost profits and rates of return on book assets comparable to the golden age of the 1960s! It would be surprising if firms actually believed that inflated "paper profits" were true economic profits. Yet, numerous firms maintained their dividend payments and distributed real capital during this period, perhaps in the belief that the profits decline was temporary.

3. Aggregate analyses based on company accounts can be very sensitive to sample size (see Brainard et al. (1980) for an example of the wide differences obtained for q ratios due to sampling differences). Calculations of inflation-adjusted rates of return to equity holders and physical assets or net worth for major firms are done routinely by financial analysts and stockbrokers. Financial analysts, however, rarely undertake analyses of aggregate profit developments using company accounts because of sampling problems due to mergers, bankruptcies, etc. (see, however, Wakasugi et al. (1984)).

4. To calculate rates of return or financial valuation ratios the sample coverage of the numerator and denominator should be the same. This means that sectoral composition of aggregate profits (non-financial business, corporate sector, manufacturing, etc.) should be as consistent as possible with the concept of capital used in the denominator. There is rarely a problem in defining sectoral profits as these are based on integrated production accounts. There are, however, more complex coverage problems with respect to capital stock estimates and the market value of corporate securities. Sector estimates of capital stock use have become increasingly blurred by the expansion of leasing (2). The existence of multi-branched or multinational corporations also complicates sector partition of actual capital employed. Similar problems apply to corporate securities data. Finally, capital stock measures are a domestic concept whereas the financial valuation measure is in principal a national concept.

5. The data presented in the main body of the paper are national accounts net operating surpluses for the non-financial corporate and manufacturing sectors, where available.

B. Conceptual and measurement problems of the capital stock?

6. There are unresolved methodological and theoretical questions concerning the replacement cost of the capital stock. Unlike the concept of profits, which are based on standard national accounts definitions, estimates of a firm's reproducible assets use widely different assumptions concerning average service lives and depreciation rates between industry and country (see Chan-Lee and Sutch (1985a), pp. 86-93 for a detailed discussion of capital stock measurement issues). Three measurement problems are treated briefly below: the inclusion of inventories, working capital and land; the problems introduced by inflation and the difficulties introduced by technical change. Problems with respect to measuring economic depreciation and scrapping were dealt with extensively in the earlier study.

i) Inclusion of inventories, working capital and land

7. One reason for differences between estimates of rates of return is coverage concerning inventories, working capital and land. As these factors contribute to the production process and net operating surplus they should theoretically be included in the measure of capital. But as the focus of the analysis is on fixed reproducible assets, inventories, working capital and especially land are generally excluded. It is not clear, of course, whether financial markets base their valuation of the firm on fixed reproducible assets or total assets.

8. As can be seen from Table I.1, the ratio of inventories and working capital to net capital stock is relatively important. Their inclusion would tend to lower the level of reported rates of return on capital by about a third. However, a systematic trend would only be introduced if there has been a substantial drop in stock and working capital relative to total capital over time. Comparing the 1970s to the 1960s these ratios appear comparatively stable. A small decline appears to have occurred in Canada and the United States, especially for working capital. This drop would have cushioned the trend fall in rates of return. Indeed, the use of an augmented capital stock concept heightens the importance of declining capital productivity as an explanatory factor for falling rates of return noted in the first profits study.

9. In many countries inventory data is of uncertain quality. The required nominal inventory levels are rarely available and are built up from census benchmarks by accumulating changes in inventories. Census benchmarks are revised infrequently and changes in inventories (which are second differences) are plagued with statistical errors and data revisions (3). In other words, it is difficult to isolate stock changes from purely statistical measurement errors between expenditure and output definitions of output.

10. Working capital estimates have similar statistical problems. Estimates of cash and demand deposits are generally reliable, but there is a growing tendency for large firms to place their working capital in money market instruments (4). Changes and absolute levels of trade credits outstanding are subject to the same difficulties as estimates of stock changes. Comparable calculations of short-term claims cannot be made for Germany, because the definition of short-term claims and liabilities is different from other countries (maturity periods of up to four years).

Table I.1

INVENTORIES AND WORKING CAPITAL AS A PER CENT OF NET CAPITAL STOCK

	Average	Non-financial corporations			Manufacturing		
		Inventories	Working capital	Inventories & working capital	Inventories	Working capital	Inventories & working capital
United States	1960-65	0.37	0.14	0.51	-	-	-
	1966-70	0.37	0.14	0.51	-	-	-
	1971-75	0.36	0.12	0.48	-	-	-
	1976-80	0.37	0.12	0.49	-	-	-
	1981	0.36	0.10	0.46	-	-	-
Canada	1966-81	0.21	0.15	0.36	0.27	0.14	0.41
	1966-69	0.20	0.18	0.38	0.26	0.18	0.44
	1970-79	0.21	0.15	0.36	0.27	0.14	0.41
	1980-81	0.21	0.12	0.33	0.29	0.10	0.39
Belgium	1960-82	0.29	0.18	0.47	0.28	0.15	0.43
	1966-69	0.31	0.18	0.49	0.27	0.15	0.42
	1970-79	0.28	0.18	0.46	0.28	0.15	0.43
	1980-82	0.28	0.18	0.46	0.30	0.17	0.47
Finland	1960-83	0.25	-	-	0.38	0.24 (b)	0.63 (b)
	1960-69	0.30	-	-	0.43	0.28	0.71
	1970-79	0.21	0.12 (a)	0.32 (a)	0.35	0.21	0.56
	1980-83	0.22	0.14 (c)	0.36 (c)	0.36	0.23 (c)	0.58 (c)

a. Average 1974-79.
b. Average 1960-80.
c. Average 1980-82.

Table I.1 continued

INVENTORIES AS A PER CENT OF NET CAPITAL STOCK

	Average	Non-financial corporations	Manufacturing	Industry and transport	Manufacturing and mining
United Kingdom	1973-83	0.22	0.35	0.22	-
	1973-79	0.24	0.37	0.23	-
	1980-83	0.20	0.33	0.19	-
Germany	1965-80	0.25	0.41	-	-
	1965-69	0.27	0.41	-	-
	1970-79	0.24	0.41	-	-
	1980	0.23	0.45	-	-
Japan (a)	1965-81	-	0.27	-	-
	1965-69	-	0.29	-	-
	1970-79	-	0.26	-	-
	1980-81	-	0.25	-	-
Sweden	1971-82	-	-	-	0.21
	1971-79	-	-	-	0.22
	1980-82	-	-	-	0.20

a. Inventories as a percentage of gross capital stock.

11. For these statistical reasons, as well as problems of sectoral coverage, net rate of return data used in this paper often exclude inventory and working capital data. This appears justified as the principal focus here is on rates of return on fixed reproducible assets. Inventory holdings are generally more short-term or passive decisions in nature. However, there have been important shifts in cash management and portfolio management of firms in particular. The data shown in Table I.1 are, however, indicative of the magnitude of adjustments which would be involved if the capital stock estimates were to be augmented. In general, it does not appear that these adjustments would alter basic trends.

12. The place of land in capital stock estimates is an unresolved theoretical question and is treated differently between countries. Land is admittedly required as a productive input. But, the denominator of valuation ratios is the market value of reproducible assets, and hence land is usually omitted. When included (as in the Canadian and the Federal Reserve's estimates) it typically carries a comparatively small or token weight. The main exception is the EPA's estimates for Japan, where land is valued at two or three times the value of total fixed assets. Valuation ratios using land values of this magnitude completely mask the essential rationale of valuation ratio estimates and is omitted in the data shown for Japan and for the other countries surveyed.

ii) Inflation, inventory valuation adjustments and depreciation

13. The interaction of inflation and historic cost accounting results in important discrepancies between accounting rates of return and economic concepts of profits. The interaction of inflation and the tax system makes an assessment of after-tax rates of return measures uncertain, especially for specific projects unless special allowances are made for type of investment, sources of finance, etc. In the presence of inflation, profits measured at historic cost include two elements, the operating surplus and a revaluation gain. By contrast, profits at current costs are essentially the same as the operating surplus, i.e. the surplus generated by physical production. As the economic concept of profit is the desirable one from the point of view of efficient tax systems, it is easy to understand the rationale for current-cost accounting techniques in an inflationary environment. Inflation adjustments based on current-cost accounting are uncontroversial on theoretical or practical grounds. Historic-cost accounting is, however, required for tax purposes in all OECD countries, although there have been modest attempts to reduce the worst distortions by stock relief in a few countries (the United States and the United Kingdom). There seems to be continuing resistance to its introduction, perhaps, however, because of the reluctance of individual firms to report lower profits than its competitors, despite obvious tax advantages.

14. Due to FIFO (first-in-first-out) accounting procedures, inventory valuation adjustments (IVA) can be large, especially in periods of rapid inflation. As noted, standard national accounts (SNA) profits are based on current costs while almost all company accounting profit data use historic-cost concepts. IVA could be totally eliminated by LIFO (last-in-first-out) accounting techniques. It is quite surprising that in countries where LIFO is permitted, that so few firms use it, thereby voluntarily paying tax on essentially paper profits or real capital.

15. National accounts depreciation data have virtually nothing in common with company accounts. Company accounts are based on historic cost and reflect permissible depreciation rates allowed by tax legislation (investment incentives, tax grants, accelerated depreciation, regional incentives, etc.) which are openly manipulated as an instrument of policy. Company depreciation allowances thus have no relation with true economic depreciation (i.e. the actual reduction in the economic value of an asset). Hence, if company accounts data are used, the simple expedient of adjusting book depreciation by the ratio of historic to current cost, while helpful, is not a complete solution. It will only be accurate if permissible (accelerated) depreciation rates by chance coincide with true economic depreciation (5). On the other hand, it can be argued that permissible depreciation (converted to current cost) is a more logical concept of profits than national accounts estimates from the point of view of the formation of investors' expectations, as it explicitly allows for the tax system and inflation. Thus, while the adoption of current cost accounting would be a first positive step, the problem of taxing economic profits rather than capital will not be resolved as long as depreciation rates are regarded as a policy instrument rather than a variable which attempts to measure true economic decay.

16. Standardised national accounts depreciation estimates, while open to numerous conceptual shortcomings, are simple and consistent. These are calculated directly from current price capital stock data, estimated by the perpetual inventory method. Depreciation rates are based on necessarily arbitrary service life assumptions by industry, sector and type of asset and straight-line depreciation formulae. Except for cars and trucks there are few active second-hand markets for used capital goods, making it difficult to objectively judge the accuracy of these estimates. In the absence of detailed information, the use of a simple formula is more clear and logical than complex systems of declining balance, etc. As noted above, it is also somewhat assuring that quite large and/or erratic changes in service life assumptions are needed to make important changes in profit rate trends. Finally, the widely different service life assumptions used between countries or industries for ostensibly similar types of assets are puzzling. This again underlines the hazards of making inter-country comparisons of rates of return.

iii) Technical progress

17. In theory current price net capital stock data (NCS) represent the replacement cost of a given mix of assets. In practice, current measurement conventions do not reflect the current cost of putting a given number of efficiency units in place, but instead measures the current cost of the same amount of resources as was previously used to produce capital goods. "Costless" technical progress is ignored; the possibility of offsetting technical progress is only considered in the event of a price increase. This problem is most apparent when dealing with the costing of computers; but is also applicable to other capital goods albeit to a lesser extent.

18. In the United States where business computers made up 8 per cent of producers durable equipment in 1982, the national accounts constant price estimates used a deflator which reflects no change in prices. The convention of no price change was adopted many years ago on the assumption that price increases matched quality changes. In the mid-1970s, however, technical breakthroughs led to greatly improved quality as well as lower prices. In the light of these measurement biases the Bureau of Economic Analysis (BEA) has

introduced improved deflation for computer purchases using variants of hedonic indices (which are already applied in the quality change analysis of consumer durables). In their absence, this would imply that the level and growth of NCS is being consistently under-represented and rates of return correspondingly overstated. It is difficult to gauge how serious this bias is in the absence of direct measures of technical change. However, recent revised national accounts report slightly lower real investment: the effects of improved deflation techniques being more than offset by the change in base-period weights from 1972 to 1980.

C. How accurate are financial measures of the value of the firm?

19. In estimating financial valuation ratios, some objective form of valuation or capitalisation of the net worth of the firm is needed. The method proposed by Tobin and Brainard (1977) is straightforward. It consists of capitalising net interest (and dividend payments) of firms using assumed maturity of corporate debt for the sector in question and representative interest rates (and dividend yields). These are convenient simplifications. In particular, the netting out of interest payments is strictly correct only if short-term assets match liabilities and the maturity structure of business debt and yield curves remain stable over time. These conditions do not hold in practice. The business sector is usually a net holder of short-term financial claims. The maturity structure of debt has also been substantially shortened and yield curves have shown significant shifts over the past decade. Similar simplifications are used in many countries in evaluating the market value of equity because of difficulties in separating dividends paid on preferred versus common shares. In countries with developed capital markets, the question is how important are these statistical simplifications in practice? This question cannot be easily answered as there are no other available measures to accurately gauge measurement error (6).

20. As regards the market value of corporate debt, von Furstenberg (1977) is one of the few studies to carefully work out the quality distribution of bonds and the appropriate maturity of U.S. long-term debt. Using Moody's Bond Record, he finds that the weighted average grade of corporate bond yield was slightly higher (A-) than assumed (Baa) in all previous work. Similarly, by solving for average maturity from interest paid and hypothetical yield curves, he notes that the maturity of corporate debt lengthened greatly in the second half of the 1960s, but shortened in the first half of the 1970s. (Judging by the rising share of short-term debt in total U.S. corporate debt the trend continued into 1985 first quarter.) Despite the more sophisticated measurement technique used, it is striking that his estimates differ insignificantly from the unpublished Federal Reserve Board estimates from 1961 to 1976. This comparison may imply that in broad efficient capital markets (the United States, the United Kingdom and Canada) simple assumptions may not be unrepresentative because of market arbitrage.

21. Unfortunately, the same rationale cannot be applied when capital markets are so thin that quoted prices are dominated by a few large traders or an insignificant proportion of share capital or corporate debt is actively traded. However, there seems no alternative except to use these data with the clear knowledge of their small sample size. In many countries, foreign capital controls, interest rate ceilings, etc. have inhibited the development of the corporate debt market. In the Japanese and Finnish studies for

example, debt is quoted at book value because little is known concerning the terms of private debt placement and/or interest rates have been administratively controlled until quite recently. As noted in the main text, the probable overstatement of debt/equity ratios appears quite important. Finally, estimates of q based on the ratio of ex post profitability to the cost of capital are an alternative when direct capitalisation techniques are limited by data (e.g. the Essen study for Germany). However, it is a less appealing approach, as ex ante profits -- which are key to the calculation -- cannot be measured when q is decomposed.

D. Concluding comments on conceptual and measurement issues

22. The financial market indicators considered above are based on the explicit assumption that markets are efficient. In the absence of tax wedges, uncertainty, adjustment costs and limited information, the proposed measures of rates of return and aggregate capital costs would closely shadow one another over time. In this stylised world, Modigliani-Miller (1958) conditions would hold and a firm's financing cost would be independent of its capital structure. Put another way, a firm could not reduce its total financing costs by raising its gearing ratio. Increasing debt exposure would not lower overall financial costs because efficient markets would discount the firm's share and bond prices due to the greater risk of bankruptcy. In short, the market valuation of a firm's earning capacity would be based on the real earning capacity of the firm, independent of the financial structure of the firm.

23. Despite the logic of such arguments, real debt and equity costs of finance have diverged significantly for decades. This feature of corporate finance was examined in detail in McKee (1985) where capital costs were calculated for 19 countries. Estimates were made for equipment and structures and alternative sources of finance with allowance for the tax system using the methodological approach of King and Fullerton (1984). The main difficulty with this technique is its requirements of detailed information concerning the tax system. The estimates are prone to important measurement error as complex tax legislation is collapsed into one or two catch-all parameters. A principal advantage of the financial market valuation approach to measuring capital costs is that even the most complex changes in tax legislation are captured in market capitalisation rates. This approach is most relevant for individual firms or those in similar activities and capital structures, but can also be applied at higher levels of aggregation. While changes in capital costs and implicit capitalisation rates can be observed and measured relative to rates of return, they cannot be easily explained. This is inevitable because movements in valuation ratios are dominated by changes in common share and bond prices (the replacement cost of the reproducible capital stock is essentially dominated by trend). Changes in asset prices are by definition a random walk in efficient financial markets.

24. A description of national measures of valuation ratios and the Secretariat's estimates for France are available on request.

NOTES

1. Real holding gains which are a result of relative price changes are not reported in national accounts. While relevant to the individual firm, they are likely to net out at higher levels of aggregation.

2. It appears that while life insurance companies and other financial institutions are owners of physical assets, they are leased to companies in the non-financial sector. The airline industry is an example.

3. In a few countries (France) implied stock/output ratios do not appear credible either over time or by comparison with countries with similar economic structures.

4. On the other hand, a recent survey of U.S. household's holdings of cash and coin indicated that over $130 billion in cash could not be accounted for. This discrepancy is attributed to foreign precautionary demand and the underground economy.

5. This is a major limitation with analysis based on company accounts. This approach was adopted in the German studies and several U.S. studies cited in Brainard (1980).

6. Another problem is the noise in equity prices. For example, U.S. research has shown that the standard deviation of share prices is up to 5 to 13 times greater than that implied by a Capital Asset Pricing Model (Shiller (1981)).

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