PURE PROFITS AND TOBIN'S *q* IN NINE OECD COUNTRIES

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CONTENTS

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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 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	$ROC = NOS/NCS$
Supply 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)	$ROE = \frac{NOS-(i-p)D}{NCS-D}$
Tobin's (average) q for equity	$qe = \frac{MV-D}{NCS-D}$

INTRODUCTION

Judging from booming stock markets in the mid-1980s, expected profitability has improved sharply in most countries since 1982. This paper considers profitability based on financial market expectations. 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 to the supply cost of capital. 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 measured supply cost of capital based on financial market expectations. The main advantage of the valuation ratio is its embodiment of current financial market expectations. However, important limitations are the reliability of market valuation data in countries where capital markets are not broad or well developed and measurement errors with respect to the replacement cost of the capital stock.

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 are presented in a final section.

I. THE VALUATION RATIO – TOBIN'S *q*

A. The theoretical and conceptual relevance of *q*

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, they 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".

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 representative of 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 advantage of the qapproach.

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. What is observed and measured is *average 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. Following major changes to relative prices, the gap between average and marginal q could be pronounced until the capital stock adjusts fully.
- 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.

- Assets such as patents, licences, management skills, a firm's "good will", land and mineral rights are generally excluded from statistical measures of 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.

Investment models inspired by the valuation approach stress the importance of the absolute value of *q* in optimising behaviour. However, data and measurement limitations render estimates of the absolute values of *q* open to statistical error. Hence, movements in the valuation ratio over time are likely to be more statistically reliable than absolute levels, as is the case for most measures of profits.

B. Marginal and tax-adjusted *q*

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.

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's* yield 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

Data for Tobin's average *q,* and a decomposition into two components (the aggregate rate of return to physical capital and the supply cost of capital) are

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											

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	

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. Honma *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)

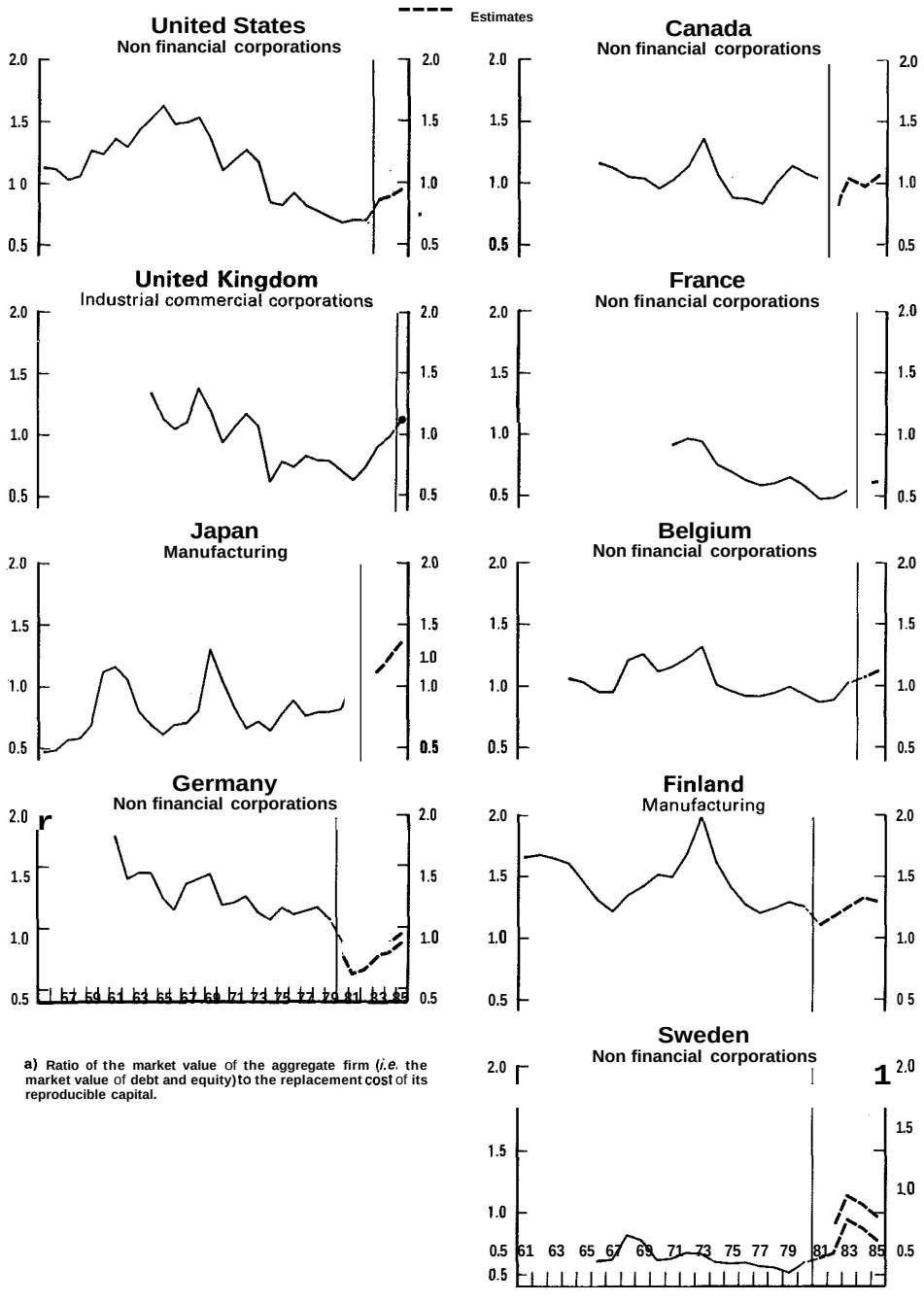
	United States	Japan (1)	Japan (2)	Germany (1)	Germany (2)	France	United Kingdom[a]	Canada[b]	Belgium	Finland	Sweden
1955	8.8										
1956	7.2										
1957	7.3										
1958	6.2										
1959	6.8										
1960	6.5										
1961	6.1				2.4					6.8	
1962	8.0				2.8					5.0	
1963	7.9				2.8					5.4	
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											

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.

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 ***9*** to 1985, based on weighted changes in real equity and long-term bond prices, have been added to Chart A.

The valuation ratio *(q)* is measured using market valuation data and thus directly embodies financial market expectations concerning profitability. The reliability of these measures depends on the depth and efficiency of capital markets. In the United States, the United Kingdom and Canada, financial markets appear to provide reliable, albeit volatile, measures of the market value of firms in aggregate. Capital markets in these countries are characterised by the importance of individual and non-bank institutional investors in relatively broad and deep secondary markets.

In 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 falls in between: 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 continental Europe and Japan have extraordinarily high debt-equity ratios (Table 4). (Table 4 presents estimates of the proportion of debt in total capital at market prices for six countries. They are derived from national accounts and financial market data and should be indicative of general trends.) However, countries with high debt/equity ratios do not always have comparably high income-gearing ratios (Table 5). 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 conversely.

The valuation ratio can be arithmetically decomposed into a rate of return on physical capital and a supply 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. It consists of the entire profit from productive activities (including what will be paid out in interest to creditors) minus an allowance for consumption of fixed capital.

Table 4. **The ratio of debt in total capitalisation non-financial corporate sectors[a]**

Percentages

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

Table 5. **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		(3.37	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.

The supply cost of capital *(CCT)* is 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 rate is often used as the supply price of capital or financial cost of debt and equity capital to firms in aggregate. In the presence of broad and efficient capital markets, this is probably the least ambiguous available measure of the supply cost of capital'.

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^2. 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.

The data for the United States, Japan, Germany, the United Kingdom, Canada, Belgium, Finland and Sweden are from official sources or from published studies. Estimates for France have been made by the Secretariat[3]. 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 (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.

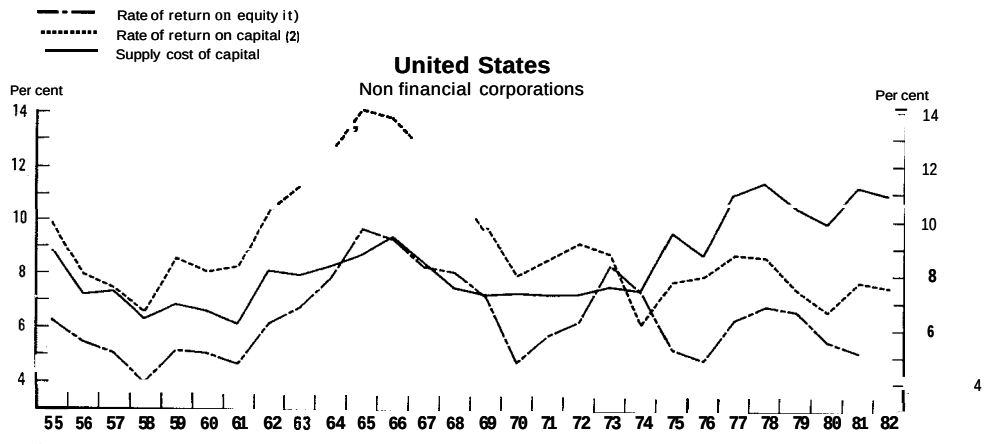
B. Historical developments in *q*

With the exception of Japan, there has been a secular decline or stagnation in the valuation ratio for the countries considered here. The arithmetic decomposition of the valuation ratio suggests that the development of pure profit rates has reflected different developments in the return to and supply cost of capital before and after the first oil shock. The observed decline of pure profit rates during the period 1965-73 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, the supply cost of capital played a neutral or even a cushioning role prior to 1974, that is financial costs of capital tended to remain stable or actually fell (Chart B).

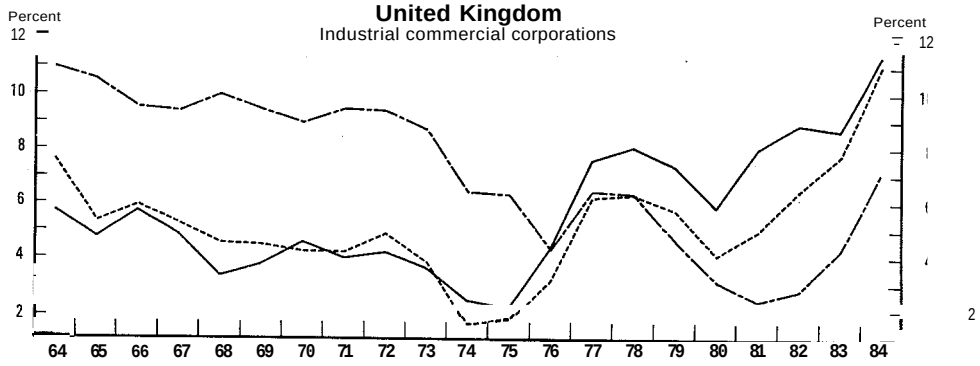
Rates of return declined more rapidly in some countries after 1974, but generally held up better after the second oil price increase than after the first oil shock. But the post-1974 period has witnessed a sharp rise in the supply cost of

CHART B

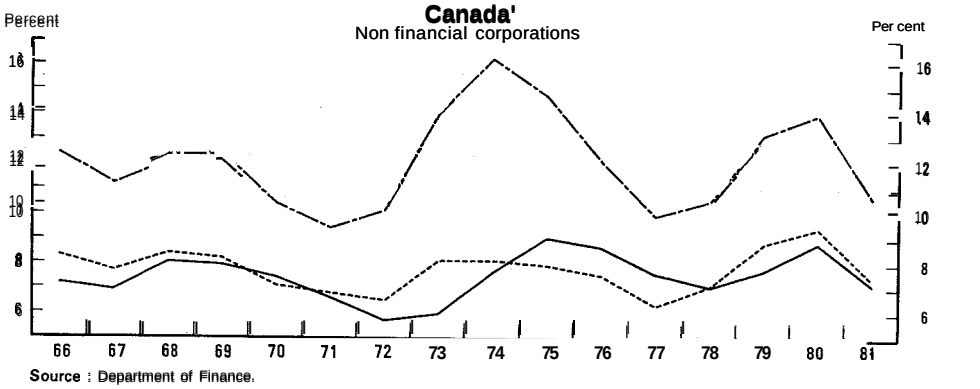
FINANCIAL MARKET INDICATORS



Source : Council of Economic Advisers



Source : Bank of England.

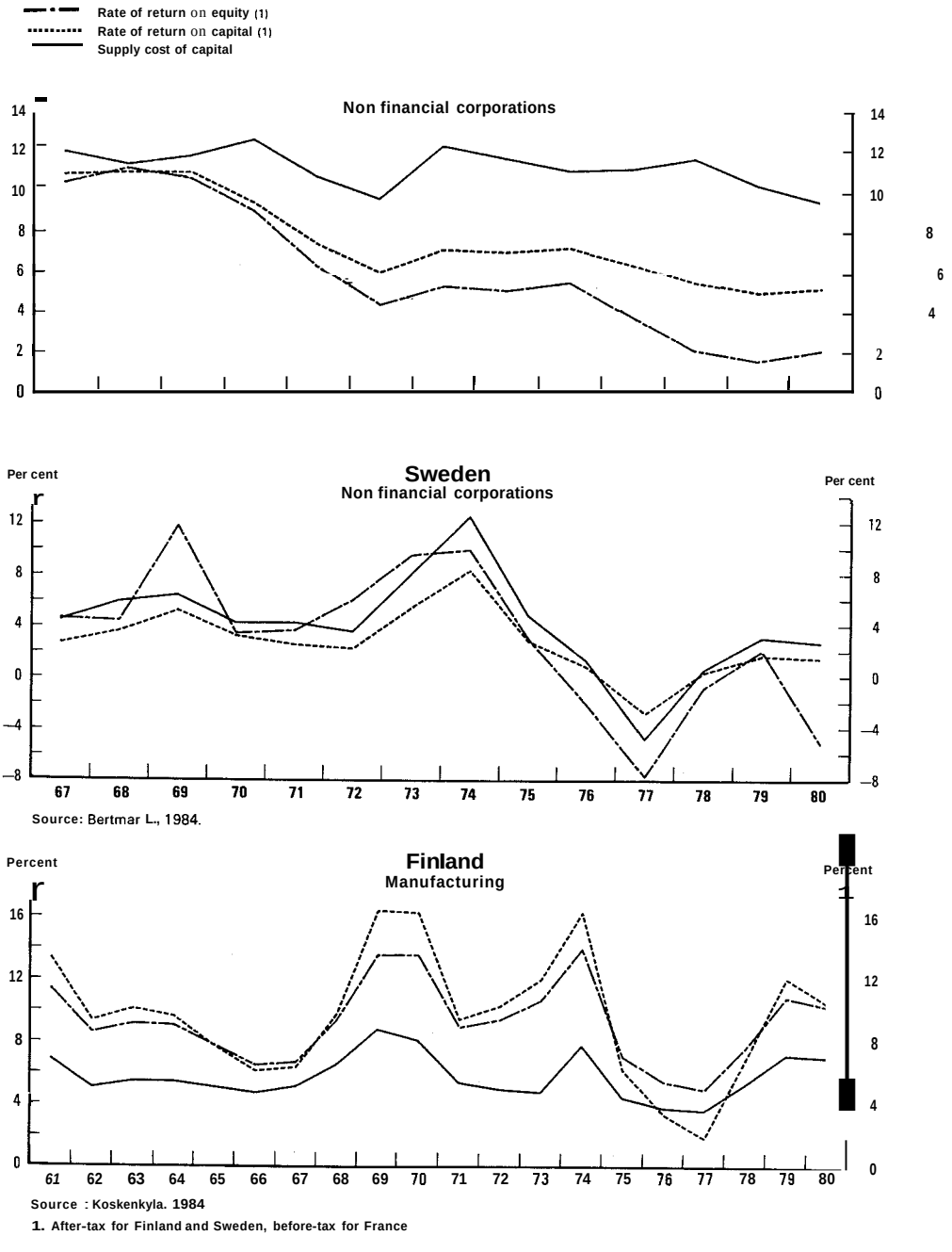


Source : Department of Finance.

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)

FINANCIAL MARKET INDICATORS



Source: Bertmar L., 1984.

Source : Koskenkyla. 1984

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

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 supply cost of capital. Hence other factors, such as changes in investors' inflation expectations and a heightening of perceived financial risk related to the weak balance-sheet position of firms, must also have been important.

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 (Chart A). The recovery in equity prices has far exceeded the 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, though still below their historical peaks.

III. OTHER FINANCIAL COST INDICATORS

Tobin's q is the ratio of the total returns to physical capital to the total supply costs of capital. Total returns are those accruing to bond and shareholders; similarly the supply 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 (Modigliani and Miller, 1958). 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 the total supply cost of capital and the behaviour of returns to equity in relation to total returns on capital.

A. Real debt and equity costs

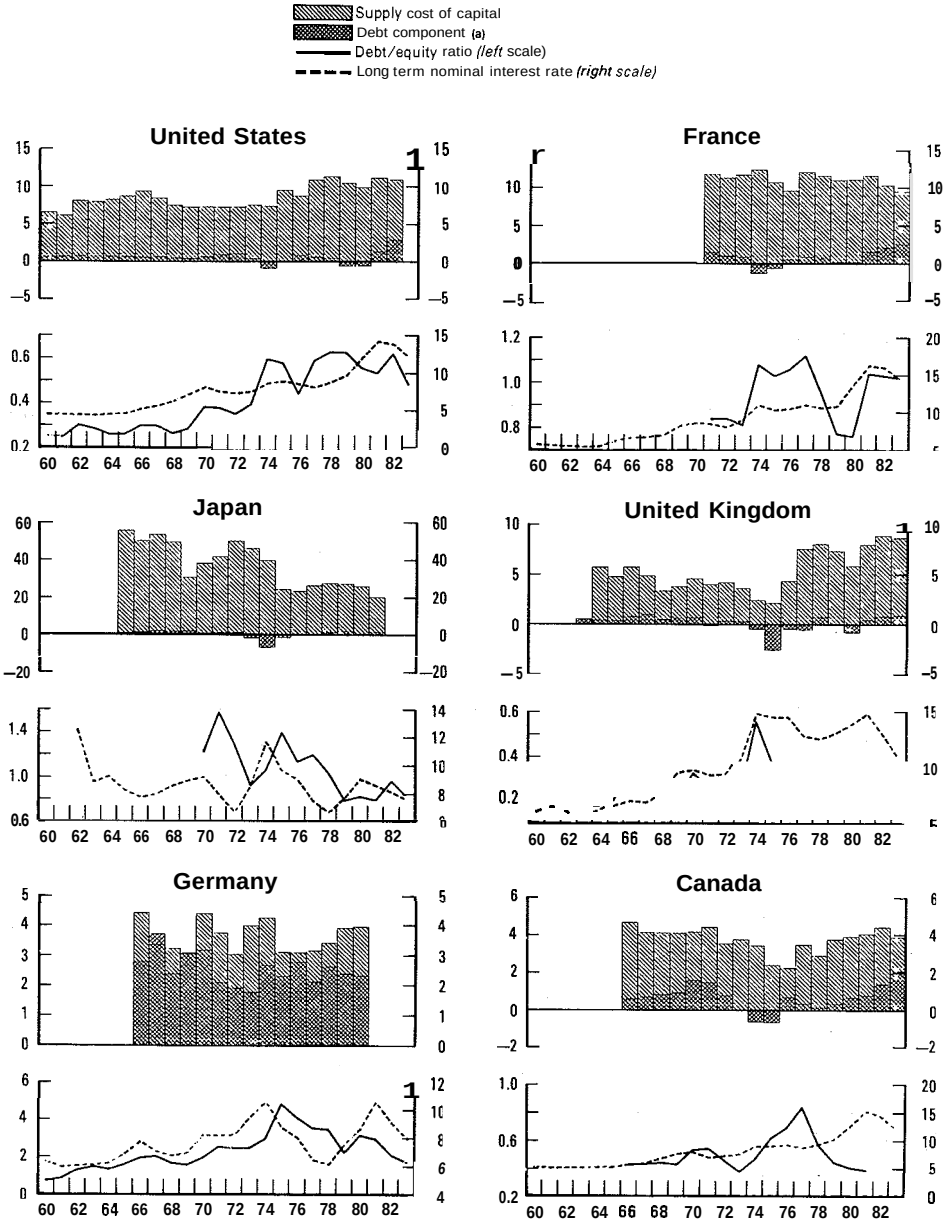
When real debt and equity costs differ, both sources of finance should be analysed by measuring their opportunity cost. In a situation where equity markets are buoyant but real interest rates remain high, the latter will overstate the true supply cost of financial capital. Under usual conditions when 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 the total supply cost of capital. (Estimates of debt and equity cost components for six countries are shown in Chart C). 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 (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.

A comparison between pre-tax real long-term interest rates and the supply cost of capital for the United States and the United Kingdom reveals large differences, which become particularly striking in 1974-75 and 1979-80 (Chart D). During both periods, ex *post* real interest rates became negative as inflation accelerated while the supply cost of capital 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 the supply cost of capital be significantly reduced. It is only towards 1981-82 that the gap between real interest rates and the supply cost of capital tends to close, with a continued rise in the former series.

One hypothesis advanced to explain the increase in the supply cost of 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 supply 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

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.

of equity funds, and this is observable in the recent narrowing of the gap between the supply cost of capital and real interest rates.

B. The rate of return to equity

There are two approaches to calculating the pre-tax rate of return to equity (ROE). In the first, accumulated dividends received plus the increase in the market value of outstanding shares are divided by the current value of these shares. The second approach provides a macroeconomic measure of profits. Profits excluding real interest payments are divided by the net worth of firms in aggregates. In the absence of measurement error, the two indicators will yield the same results if the market value of equity is the same as the net worth of the firm, i.e. the 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.

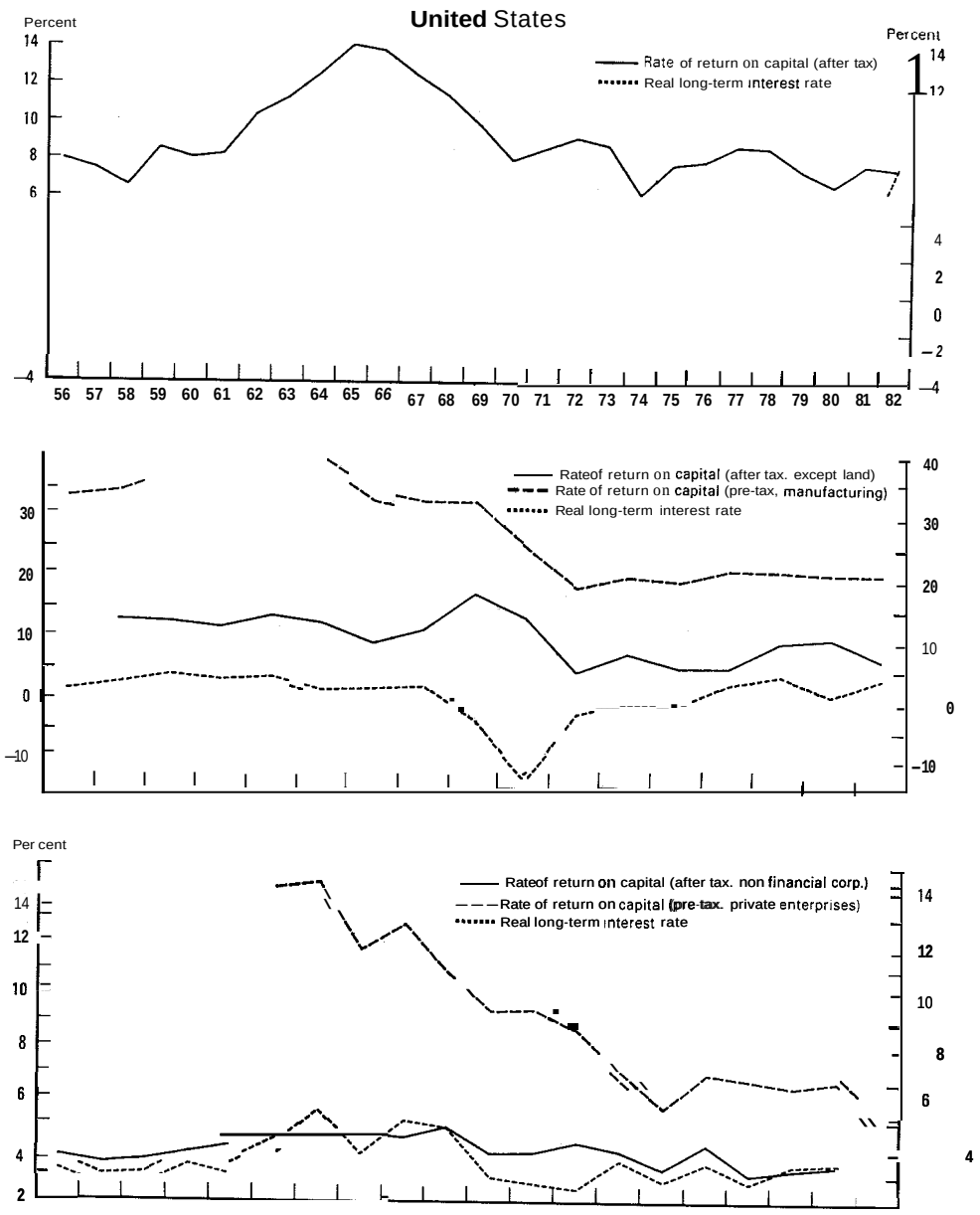
The evolution of the rate of return to equity (ROE) and the return to capital *(ROC)* is illustrated in Chart B. The comparison shows how shareholders' returns to net worth have fared relative to the return on physical capital. As a matter of arithmetic, ROE should exceed ROC when ROC pre-tax exceeds the real rate of interest, and conversely[4]. Even though this condition has generally been true over the past 15 to 20 years (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[5]. Thus the information content of the charts is more to be found in the relative movements of the time-series than in their levels.

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.

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,

CHART D

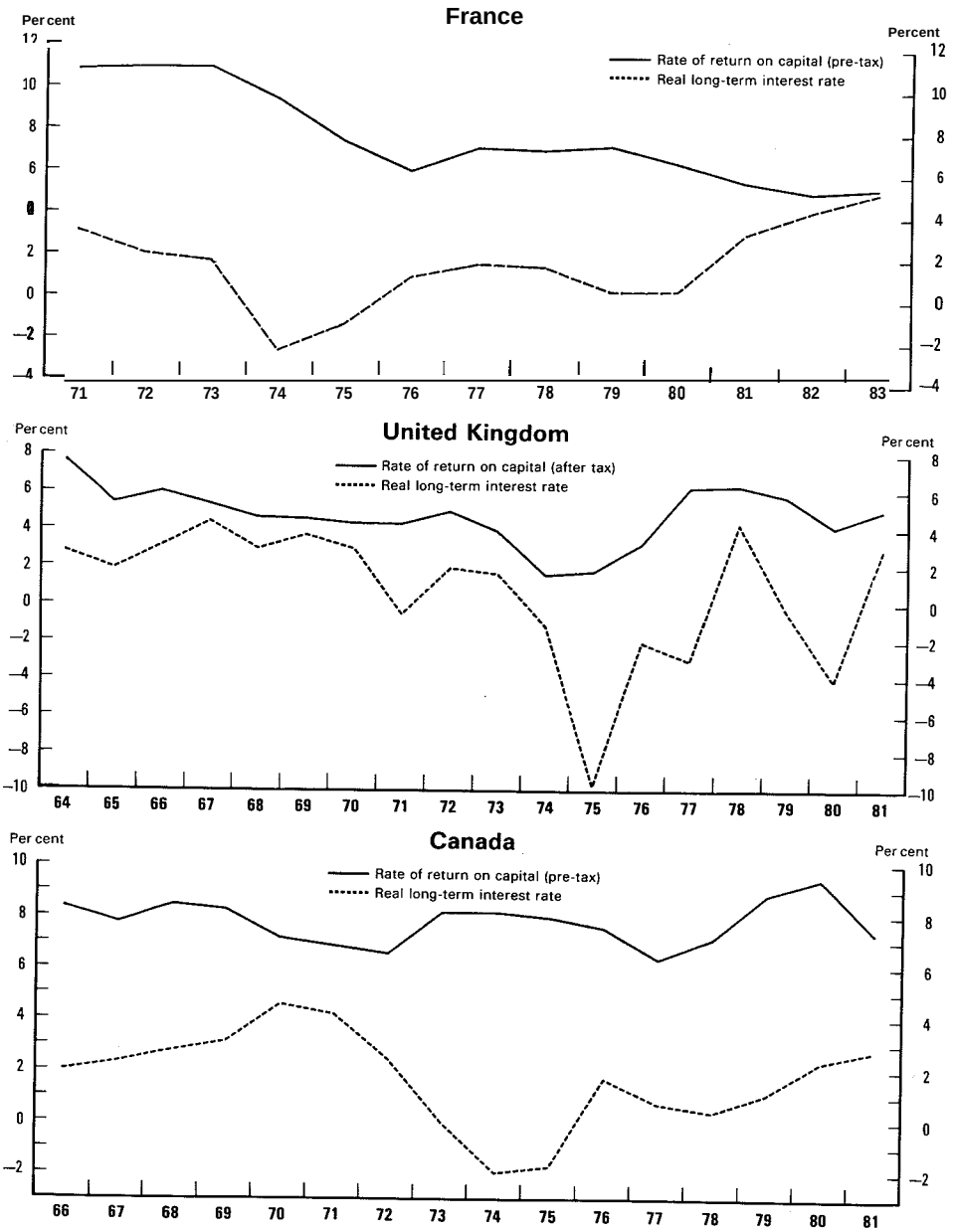
PROFITABILITY AND INTEREST RATES



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

CHART D (continued)

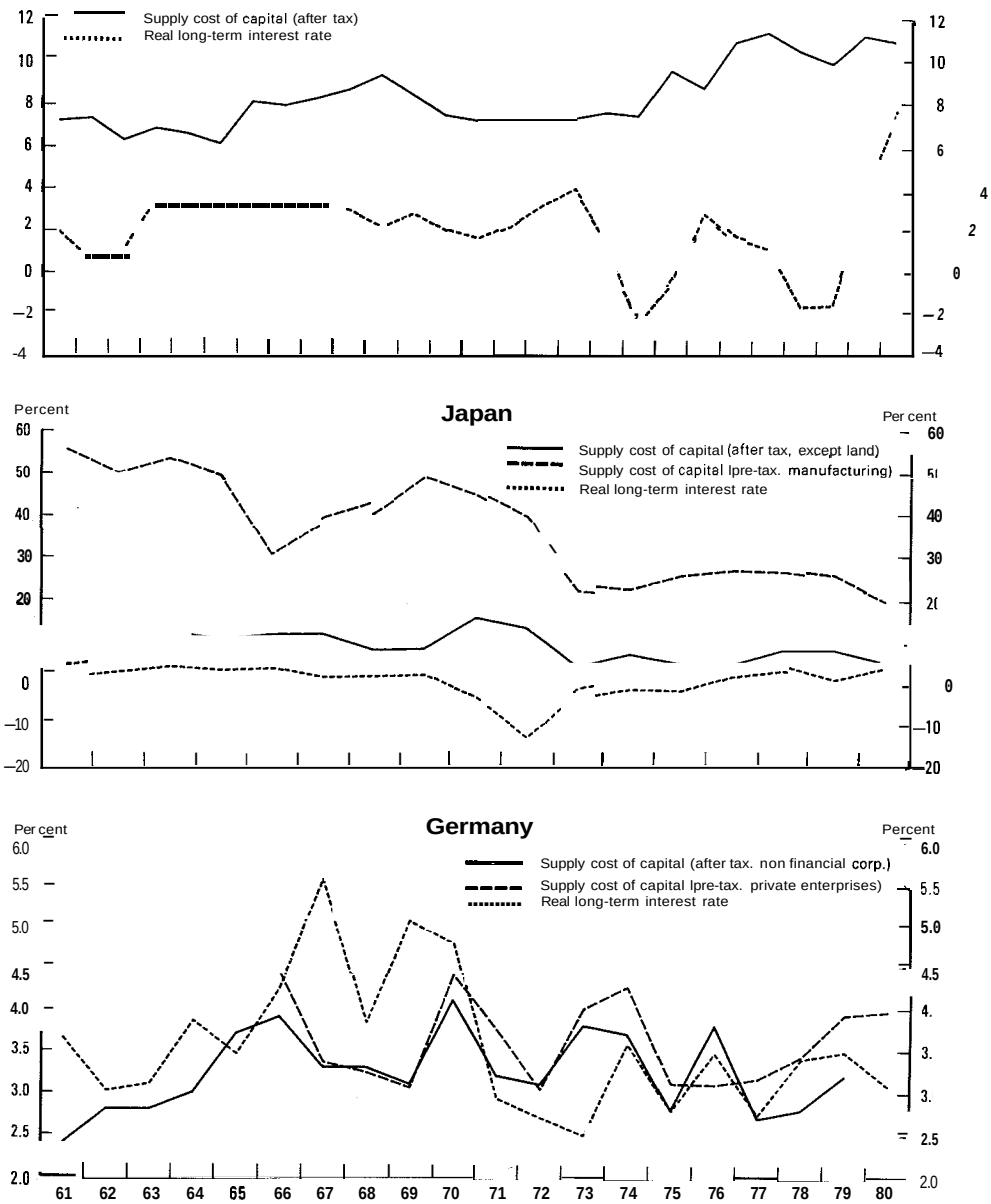
PROFITABILITY AND INTEREST RATES



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

CHART E

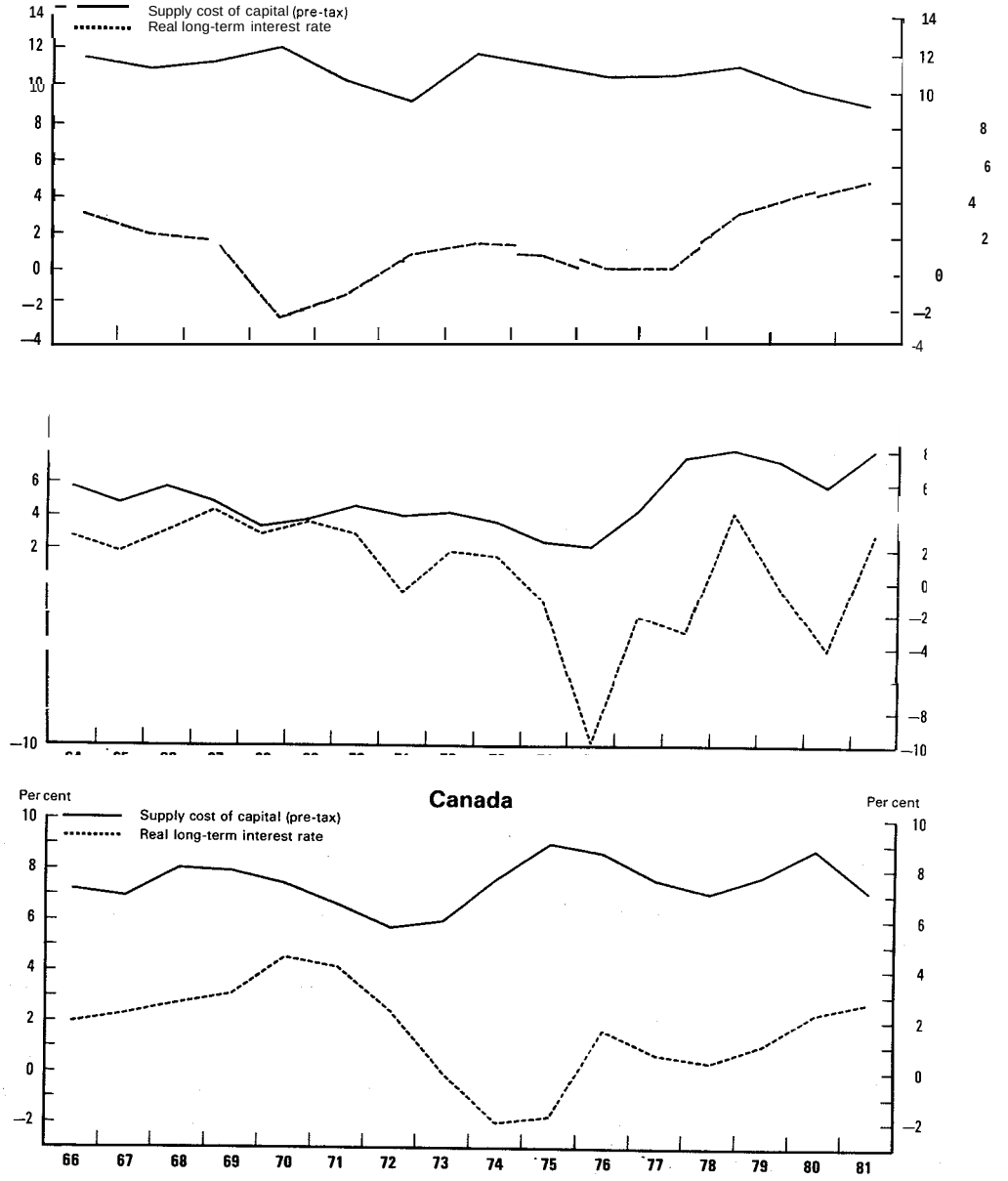
SUPPLY CAPITAL COSTS



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)

SUPPLY 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).

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 (Table 4). Debt/equity ratios remain high, especially in continental Europe, although the exact degree may be overstated by book-value data.

Measures of profits based on financial market data have improved with the recovery in economic activity since late 1982. Stock markets reached new records (in nominal terms) almost everywhere in 1985 and early 1986. 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-a-vis** *ROE* as measured above.

CONCLUSIONS

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 early 1986, values of Tobin's ***q*** were perhaps at 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 an expected sustained recovery in pure profit rates. In many of the countries surveyed, the recovery in pure profit rates appears to anticipate ***a*** stronger recovery in investment than that implied by investment models based on expected real output growth and user cost of capital measures – 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. A limitation in decomposing q in this manner is that net operating surplus, and hence ***ROC*** and CCT, includes a return to factor (capital) as well as economic profits.

2. 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).

3. A description of national measures of valuation ratios and the Secretariat's estimates for France are available on request. Methodological issues and measurement problems are discussed in Chan-Lee (1986), Annex I.

4. This relation can be seen as follows:

$$\begin{aligned} ROE &= (NOS - (i-p)D) / (NCS - D), \\ &= \left[\frac{NOS}{NCS} - \frac{(i-p)D}{NCS}\right] \cdot \frac{NCS}{NCS - D,} \\ &= \left[ROC - \frac{(i-p)D}{NCS}\right] \cdot \frac{NCS}{NCS - D.} \end{aligned}$$

   From which it follows that

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

   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.

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

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