The Theory of Transnational Firms: an empirical reassessment

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ABSTRACT *Theories of the transnational firm that stress the profit advantages of international operations in high-technology industries with high entry barriers are not supported for a sample of US-based transnational and domestic firms from Standard & Poor's Compustat database. Replacing the accounting-based profit rate with a measure of economic rate of return, designed to better assess enterprise performance, yields no significant difference in returns to transnational and domestic firms in high-technology manufacturing. Transnational firms do experience profit advantages over domestic firms in the less innovative industries, but this pattern does not fit the theories stressing advantages accruing from intangible assets, entry barriers, and technological accumulation.*

1. Introduction

The theoretical literature on the significance of transnational corporations (TNCs) has suggested that they accrue profit advantages relative to purely domestic firms for a number of reasons, including (1) the internalization of cross-border transactions that are more costly if carried on at arm's length;[1] (2) market power deriving from operations within industries with high barriers to entry;[2] (3) international sourcing of location-specific research-and-development (R&D) initiatives or progress, and 'technological accumulation' via innovative feedback effects from adapting technology in varying geographical environments (Cantwell, 1989, pp. 9–10, ch. 7); (4) geographical diversification which may increase supply and production flexibility and counter the effects of national business cycles and changes in exchange rates and national terms of trade (Caves, 1982, pp. 24–26);[3] and (5) the superior capabilities enjoyed by 'core' firms in a dual economy to pursue competitive intra-firm capital flows to achieve diversification into highly profitable and fast-growing industry subsectors, both in the home country and abroad.[4]

The empirical evidence presented here casts doubt upon the first three explanations, at least to the extent that they predict profit advantages to TNCs based in dynamic technology-intensive industries.[5] Measurement of the economic rate of return (as opposed to the accounting-based profit rate) for 259 US-based TNCs and 323 US domestic firms (SNCs, or single-nation corporations), reveals

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the following: (1) The size of the profitability advantage of TNCs relative to SNCs is diminished by one-third when a conventional accounting-based profit measure is replaced by a measure of the firm's economic rate of return. (2) The diminution of the TNC profit advantage that results from improved measurement occurs solely in the high-technology, fast-growing industries in which TNCs are most concentrated. (3) It is outside the high-technology industries that TNCs maintain a significant profitability advantage over SNCs. (4) The non-high-technology industries as a group are much more profitable for both TNCs and SNCs than are the high-technology industries.

Past efforts to measure the relative performances of TNCs and SNCs have often found a significant contribution to profitability from transnational operations.[6] These results, however, were derived from accounting-based profit measures with fixed assets valued at the historic acquisition cost, or 'book value'. This method distorts asset and profit measures when fixed assets are held during an inflationary period.

This paper demonstrates the results of converting the accounting-based profit rate to a measure of economic rate of return. It is a new approach to measurement of the rate of return at the level of the firm, based upon a variant of the perpetual inventory method.

Section 2 of the paper describes the data. Section 3 describes the method of conversion of accounting-based rate of return to economic rate of return. Section 4 discusses the results of the conversion. Section 5 presents a reassessment of theories of the TNC.

2. The Data and Sample Selection

Standard and Poor's Compustat database for the years 1972–90 is the source of the firm-level financial data utilized here.[7] The sample of manufacturing TNCs and SNCs was drawn by requiring that each firm report sufficient data in all 19 years in order to permit the conversion of fixed asset book values to replacement value. In other words, the sample consists of 582 'successful' TNCs and SNCs in that all were at least 20 years old in 1990, having managed to avoid failure or takeover for at least two decades. Non-manufacturing firms were excluded. In 1989, US manufacturing parents accounted for 60 percent of all US parent firms of foreign affiliates, and those affiliates accounted for 68% of all foreign affiliates of US firms (US DOC, 1991a, Table 2).

For the purpose of this study, the definition of a transnational firm is constrained by the available data. Since 1976, the Financial Accounting Standards Board (FASB) has required firms to report disaggregated sales and assets data corresponding to any of the firm's individual foreign operations that represent 10% or more of the firm's total revenue or 'identifiable assets'.[8] However, these disaggregated geographic data were available to the author only for the years 1985–90. TNCs are here defined as those firms reporting foreign operations (as defined by FASB) for each year in the 1985–90 period. A review of the activities of a 32-firm subsample of the TNC sample in *Moody*'s and *Who Owns Whom* indicated that 91% of this group probably were transnationals as long ago as 1972.[9] SNCs are defined as those firms reporting no foreign operations meeting the 10% threshold during the years 1985–90. This yields a sample of 323 SNCs, some of which undoubtedly have foreign operations that do not meet the threshold reporting requirements.

2.1. Sample Characteristics

Descriptive statistics are employed here to show that (1) TNCs tend to be concentrated in the manufacturing industries that are the most technologically advanced and that have experienced the highest rates of growth in the postwar period; (2) on average, TNCs tend to be five to six times larger than SNCs; and (3) TNCs tend to outperform SNCs with respect to the intensity of utilization of competitive strategies such as R&D, advertising, capital intensity, and capital investment.

Each of the sample firms is assigned to a two-digit Standard Industrial Classification (SIC) by Compustat on the basis of its primary product(s).[10] Tables 1 and 2 show the distribution of each sample among the 20 manufacturing SIC categories (20–39). The tables demonstrate that nearly 60% of the TNC sample is concentrated in four industries: machinery, chemicals, electrical equipment, and scientific and professional instruments. Only 36% of the SNC sample is located in these industries, and the most highly concentrated 60% of the SNC sample is spread among eight industries. For comparison, the 1982 and 1987 Censuses of Manufactures show that approximately 25% of all US manufacturing establishments were devoted to machinery, chemicals, electrical equipment, and instruments in the last decade (US DOC, 1986b, 1991b).

The industrial distribution of the TNC sample matches almost exactly the distribution of US manufacturing parents of foreign affiliates throughout the 1980s as reported in the benchmark surveys of foreign direct investment reported by the US Bureau of Economic Analysis (BEA). In 1989, the top four industries in which US manufacturing parent firms were concentrated were machinery, chemicals,

Table 1. Industrial distribution of samples

	TNC Sample		SNC Sample	
Industry	Number	Per cent	Number	Per cent
Machinery, Computers	57	22.0	31	10.0
Chemicals	42	16.2	19	5.9
Electrical Eqpmt	28	10.8	36	11.2
Instruments, Photo Gds, Watches	27	10.4	18	5.6
Fabricated Metals	18	7.0	24	7.4
Transp. Eqpmt	17	6.6	23	7.1
Food	15	5.8	19	5.9
Petrol. Refining	12	4.6	9	2.8
Paper	10	3.9	16	5.0
Stone, Clay, Glass, Concrete	7	2.7	6	1.9
Rubber & Plastics	6	2.3	7	2.2
Misc. Mfrg	6	2.3	7	2.2
Primary Metals	4	1.5	26	8.1
Apparel	2	1.0	16	5.0
Tobacco	2	1.0	2	0.6
Textile Mill Pds.	2	1.0	19	5.9
Lumber & Wood	2	1.0	8	2.5
Furniture & Fixtures	1	0.4	9	2.8
Printing & Publishing	1	0.4	22	6.8
Leather	0	—	6	1.9
Total	259	100.0	323	100.0

Table 2. Industrial distribution of the SNC sample according to concentration rank

Industry	SNC Sample	
	Number	Per cent
Electrical Eqpmt	36	11.2
Machinery, Computers	31	10.0
Primary Metals	26	8.1
Fabricated Metals	24	7.4
Transp. Eqpmt	23	7.1
Printing & Publishing	22	6.8
Food	19	5.9
Chemicals	19	5.9
Textile Mill Pds.	19	5.9
Instruments, Photo Gds, Watches	18	5.6
Paper	16	5.0
Apparel	16	5.0
Petrol. Refining	9	2.8
Furniture & Fixtures	9	2.8
Lumber & Wood	8	2.5
Rubber & Plastics	7	2.2
Misc. Mfrg	7	2.2
Stone, Clay, Glass, Concrete	6	1.9
Leather	6	1.9
Tobacco	2	0.6
Total	323	100.0

electrical equipment, and instruments, and they accounted for over half of US manufacturing parents. Almost 60% of the TNC firms represented here are concentrated in these four industries. In both the 1989 survey and in the TNC sample here, the next three most represented industries are transportation equipment, fabricated metals, and food (US DOC, 1991a; Table 2). The rankings in the 1982 survey are almost exactly the same (US DOC, 1985, pp. 13–14).

The four industries in which the TNC sample is most concentrated were also the four industries receiving the highest number of US patents between 1970 and 1990, accounting for about 70% of patents granted in those years (US DOC, 1992, Table 858). The same four industries were responsible for the first, second, third and seventh (chemicals, electrical equipment, instruments, and machinery, in that order) highest real rates of growth of manufacturing production between 1947 and 1982.[11] These data indicate that US transnationals tend to be concentrated in the most technologically advanced and fastest growing manufacturing sectors, and that the TNC sample employed here matches the characteristics of the US-based TNC population.

The TNC and SNC samples show that transnationals tend to outperform purely domestic firms with respect to a variety of structural and strategic characteristics. Table 3 demonstrates that TNCs are considerably larger than domestic firms with respect to assets, sales and employment,[12] by most measures they have more capital-intensive operations, they invest more in R&D per dollar of sales,[13] they advertise more intensively,[14] and they invest more in plant and equipment per dollar of fixed assets.

Table 3. TNCs versus SNCs: mean performance 1985–90

Variable	Sample	*N*	Mean	SD	*t*
SIZE1	TNC	1523	5017.0	15063.0	12.175
	SNC	1900	762.0	2050.0	
SIZE2	TNC	1523	6074.0	15179.0	14.379
	SNC	1900	961.0	2821.0	
SIZE3	TNC	1523	4838.0	12306.0	13.869
	SNC	1900	861.0	1960.0	
SIZE4	TNC	1523	31.33	69.73	14.928
	SNC	1900	6.92	13.20	
CAP1	TNC	1523	14.45	30.56	1.696
	SNC	1900	12.93	21.97	
CAP2	TNC	1523	0.0951	0.1971	− 2.411
	SNC	1900	0.1174	0.3156	
CAP3	TNC	1523	107.96	177.58	6.067
	SNC	1900	77.64	113.23	
CAP4	TNC	1523	0.7031	0.8336	3.043
	SNC	1900	0.6145	0.8631	
RD	TNC	1330	0.0365	0.0344	15.099
	SNC	1159	0.0181	0.0252	
ADV	TNC	1367	0.0233	0.0408	8.182
	SNC	1605	0.0132	0.0262	
INV1	TNC	1523	2.7912	12.0235	3.676
	SNC	1900	1.5477	7.6396	
INV2	TNC	1523	0.1037	0.0589	3.530
	SNC	1900	0.0960	0.0672	

Notes:
Definitions of performance and strategy variables
SIZE1 total assets at book value ($ millions)
SIZE2 total assets at replacement cost ($ millions)
SIZE3 sales ($ millions)
SIZE4 employment (thousands)
CAP1 capital intensity as the ratio of fixed assets (book value) to employment
CAP2 capital intensity as the ratio of fixed assets (book value) to sales
CAP3 capital intensity as the ratio of fixed assets (replacement cost) to employment
CAP4 capital intensity as the ratio of fixed assets (replacement cost) to sales
RD research and development intensity as the ratio of R&D expenditures to sales
ADV advertising intensity as the ratio of advertising expenditures to sales
INV1 investment intensity as the ratio of capital expenditures to fixed assets (book value)
INV2 investment intensity as the ratio of capital expenditures to fixed assets (replacement cost)

3. Conversion of Accounting Profit (PROFB) to Economic Rate of Return (PROFR)

The conventional measure of accounting profit demonstrates the return to the firm's assets valued at their historical acquisition cost (or 'book value'). The income counted is exclusive of net interest costs and tax-based depreciation charges. This measure (PROFB here) is an inadequate tool for testing different theoretical explanations of TNC performance advantages, since performance addresses the cost and/or revenue-stream results from the firm's choice and organization of assets. The following adjustments must first be made.[15]

(1) The return on assets that are measured at book value is seriously distorted when fixed assets are held during an inflationary period. Accurate measurement of

current performance must be based on the current or 'replacement' value of assets. The firm's decision to retain a long-lived asset involves the opportunity cost of forgoing the conversion of that asset (at current value) into another with a different revenue stream. Comparing current inflated income to the historic cost of an asset fails to incorporate the cost of the firm's decision to retain the asset, and gives an inaccurately inflated view of the firm's current performance.

(2) Measurement of performance must include the portion of the firm's return that is paid to the owners of its debt. In this way, rate of return reflects operating results instead of the firm's capital structure, which is a strategic variable. Therefore, net interest payments by the firm must be included as part of its net income.

(3) Allowable depreciation charges are defined by the tax code, and as such, reflect policy decisions instead of the actual decline in the revenue stream accruing to each asset (or economic depreciation). Subtracting tax-based depreciation from income distorts measurement of the true operating performance of the firm. For a more accurate measure, the firm's tax-based depreciation charges must be added back into income, which is then reduced by an estimate of the rate of economic depreciation of its assets.

(4) The after-tax rate of return, again, reflects policy decisions which may differ across industries and national borders. In order to measure performance accurately, the pre-tax rate of return is examined.[16]

The result of adopting the adjustments described above is a better measure of the economic rate of return (PROFR here).

Of course, if firms' profit objectives are in actuality addressed to the untransformed PROFB measure, then the prescribed adjustments would be misleading. This is unlikely for a number of reasons. To seek a high rate of return measured as a percentage of assets valued at historic cost would lead an enterprise to retain older assets purely for the purpose of appearances. Current inflated revenues would yield the appearance of a higher return when measured against book-valued assets. In a competitive industry, operating results will be more relevant to the enterprise's survival and future access to capital than a more cosmetic indicator of performance.

Secondly, targeting PROFB would lead an organization to minimize the volume of interest payments it makes, since interest is subtracted from revenue in PROFB. Undoubtedly, some firms pursue this goal. But this remains a decision about the appropriate capital structure of the firm, which will depend in part on the cost of capital to the firm from all sources. The answer cannot be assumed to be the same for all enterprises. Furthermore, one way to ensure that debt service remains a small percentage of the firm's total return is to attain operating success, which is more accurately measured by the economic rate of return, PROFR.

Finally, firms undoubtedly pursue large depreciation charges since these reduce tax liability on incoming revenue. Large depreciation charges reduce reported net income, and therefore, reported accounting profit. It does not seem promising to conclude from this tax-related goal that organizations deliberately pursue low rates of return. It is more likely that firms pursue low taxes and high real returns. PROFR, therefore, is the appropriate measure of the firm's competitive performance, while PROFB (or its numerator) is the figure reported to the taxing authority and consequently incorporates a smaller reported income.[17]

The method followed for calculating the replacement value of the firm's fixed assets is a variation on the perpetual inventory method, often used in deriving Tobin's q or valuing aggregate national assets.[18] Replacement value in the base

year (1972 here) is set equal to book value. Thereafter, the value of fixed assets from each preceding year is multiplied by a factor representing the annual change in the capital goods price index,[19] depreciated on the basis of industry-specific depreciation rates from BEA data,[20] and augmented by the value of the firm's capital expenditures and net acquisitions.[21] Other categories of assets are adjusted for inflation and depreciation where appropriate.[22]

After these adjustments, replacement asset values for the early years must be discarded because of the bias introduced by the large proportion of base-year book values in the total asset figure. In order to eliminate entirely the distortion due to the base-year figures, it would be desirable to eliminate the first 18 to 20 years of observations (Stevens, 1989). The time series used here is not long enough to permit this; instead, 13 years have been discarded, leaving six years (1985–90) of panel data.

For the entire sample, by the year 1985, the remaining portion of 1972 assets (which have been depreciated and inflated by the capital goods price index in each year), on average, constitutes 8% of total assets, and 15% of fixed assets. For transnationals, the figures are 7 and 13%; for SNCs, 9 and 17%. To the degree that these 1972 values are distorting, they cause total assets to be somewhat undervalued in the years 1985–90, and the effect is more pronounced for SNCs.[23]

Having obtained the replacement value of total assets (RTA), it is possible to construct a measure of the economic rate of return (PROFR), with RTA serving as the denominator. The numerator for PROFR is:

$$\text{PROFRNUM} = \text{PTI} + \text{TAXDEP} - \text{EDEP} + \text{NINT} \tag{1}$$

where PTI is reported pretax income (net of debt service and depreciation charges), TAXDEP is the tax-based depreciation excluded from pretax income, EDEP is the estimated value of real economic depreciation, calculated from BEA industry-specific rates, and NINT is net interest paid. The differences between PROFR and PROFB are then as follows:

$$\text{PROFR} = (\text{PTI} + \text{TAXDEP} - \text{EDEP} + \text{NINT})/\text{RTA} \tag{2}$$

$$\text{PROFB} = \text{PTI}/\text{BTA} \tag{3}$$

where BTA is the book value of total assets.

4. Conversion to PROFR: results and significance

The results of converting PROFB to PROFR are displayed in Table 4.[24] For the years 1985–90, mean TNC PROFB exceeds mean SNC PROFB by 24%. By comparison, mean TNC PROFR exceeds mean SNC PROFR by 16%. This one-third reduction in the size of the difference in means results from the fact that the adjustment to PROFR raises the mean TNC rate of return by 5%, and raises the mean SNC return by 12%. There are three somewhat offsetting forces that combine to produce this result.

The largest single component of the increase in the profit measure results from the inclusion of net interest paid in the numerator. The NINT adjustment alone raises the TNC profit rate by 34% and the SNC rate by 43%.[25] However, this adjustment to the numerator is largely offset by the depreciation adjustment, which, when implemented alone, lowers the TNC profit rate by 28% and the SNC rate by 37%. The depreciation adjustment lowers the rate of return because, even though the tax-based depreciation rate may be larger in many cases than the BEA's

Table 4. Mean PROFR versus PROFB: 1985–90

Variable	Sample	*N*	Mean	SD	*t*
PROFR	TNC	1523	0.0844	0.0904	3.569
	SNC	1900	0.0727	0.1021	
PROFB	TNC	1523	0.0803	0.1019	4.981
	SNC	1900	0.0650	0.1233	

Table 5. Mean PROFB versus PR2: 1985–90

Variable	Sample	*N*	Mean	SD	*t*
PROFB	TNC	1523	0.0803	0.1019	3.981
	SNC	1900	0.0650	0.1233	
PR2	TNC	1523	0.0855	0.1206	3.720
	SNC	1900	0.0690	0.1271	

estimates used here, the BEA rate is here applied to assets valued at replacement cost, which are of greater value than the book-valued assets to which the tax-based rate is applied.

These two numerator adjustments tend to cancel each other, leaving a rather small aggregate effect. Table 5 displays the differences between PROFB and a rate of return measure with numerator adjustments only, PR2.

The net effect of adjusting the numerator alone is to raise the TNC mean rate of return by 5.73%, and the SNC mean return by 6.31%. This adjustment accounts for only 13% of the size of the decline in the TNC-SNC mean profit spread that results from converting from PROFB to PROFR. In other words, the numerator adjustments alone do not substantially alter the difference in means between the two samples.

Therefore, it is the denominator adjustment to reflect replacement values of assets that largely accounts for the one-third shrinkage of the TNC profit advantage when moving from PROFB to PROFR. Implementation of the denominator adjustment alone causes a 6.4% drop in average TNC rate of return, and only a 2.3% drop in average SNC rate of return. The effect on TNCs is almost three times as large as that on SNCs. The reason for this large difference is discussed in the next section of the paper.

4.1. Industry Effects

Despite improved measurement, TNC profit superiority in the aggregate is confirmed here, although the size of the difference is shaved by one-third. It is the industry-by-industry breakdown of these results that challenges conventional theory about TNCs. Examination of the results in Table 6 reveals that all of the loss of TNC superiority is concentrated in the four industries in which TNCs are most likely to be found. The table shows only the 13 industries for which the sample includes more than two TNCs and two SNCs.

Using the accounting-based measure PROFB, TNC mean profitability is greater than that of SNCs in the top four industries in which TNCs are located,

Table 6. Profitability comparison by industry

Industry	TNC (*N*)	SNC (*N*)	*t* test
Machinery, Computers			
PROFR	0.0515 (329)	0.0485 (182)	0.3942
PROFB	0.0438 (329)	0.0418 (182)	0.1978
Chemicals			
PROFR	0.1083 (249)	0.1104 (114)	− 0.1497
PROFB	0.1154 (249)	0.0985 (114)	1.3027
Electrical Eqpmt			
PROFR	0.0580 (168)	0.0599 (216)	− 0.1897
PROFB	0.0431 (168)	0.0353 (216)	0.6167
Instruments			
PROFR	0.0907 (159)	0.0800 (106)	0.7934
PROFB	0.0825 (159)	0.0375 (106)	2.3574
Fabricated Metals			
PROFR	0.0972 (101)	0.0646 (140)	2.7491
PROFB	0.0872 (101)	0.0689 (140)	1.4158
Transp. Eqpmt			
PROFR	0.1011 (97)	0.0895 (135)	0.8787
PROFB	0.0883 (97)	0.0758 (135)	1.0320
Food			
PROFR	0.1092 (90)	0.0890 (114)	1.7436
PROFB	0.1265 (90)	0.0939 (114)	2.3499
Petrol. Refining			
PROFR	0.0429 (72)	0.0229 (43)	1.9774
PROFB	0.0583 (72)	0.0295 (43)	1.7326
Paper			
PROFR	0.1122 (60)	0.0927 (92)	1.9894
PROFB	0.1360 (60)	0.1143 (92)	1.8315
Stone, Clay, etc.			
PROFR	0.0469 (42)	0.0175 (36)	1.2382
PROFB	0.0504 (42)	0.0405 (36)	0.2561
Rubber & Plastics			
PROFR	0.1991 (36)	0.0638 (42)	5.1064
PROFB	0.1729 (36)	0.0598 (42)	4.9156
Misc. Manufacturing			
PROFR	0.1389 (36)	0.1108 (38)	1.1020
PROFB	0.1015 (36)	0.0771 (38)	0.9799
Primary Metals			
PROFR	0.0363 (24)	0.0367 (156)	− 0.0328
PROFB	0.0344 (24)	0.0376 (156)	− 0.1670

but is significantly superior only in chemicals and instruments. Converting to PROFR eliminates the significance of TNC profit superiority in those two industries, and reverses TNC superiority in electrical equipment, although the TNC and SNC means are not significantly different in that industry in either measure. That is, the effect of converting to PROFR is to eliminate TNC profit superiority or its significance in three of the four industries in which TNCs are found most often: the high-technology, fastest-growing industries. In the remaining industries, the choice of measurement instrument does not significantly affect the relative position of TNCs and SNCs. In five industries (food, fabricated metals, petroleum refining, paper, and rubber and plastics), TNCs are significantly more profitable regardless of the measure employed. In four industries (transportation equipment, stone clay glass cement, miscellaneous manufacturing, and primary metals), TNC

and SNC profit rates are not significantly different regardless of the measure employed.

Moreover, the high-technology industries, with significant barriers to entry, are not the most profitable industries for either TNCs or SNCs. Table 7 shows that, of the four most technologically advanced industries, chemicals is only the fifth most profitable industry for TNCs, and instruments, electrical equipment, and machinery are eighth, ninth, and tenth. For SNCs (Table 8), chemicals and instruments are only the fourth and eighth most profitable industries, and machinery and electrical equipment are not even in the top ten. Table 9 divides all manufacturing industries into two groups: the top four innovative industries, and all others. Both TNC and SNC mean PROFRs are much higher in the residual group.

4.2. Industry Effects: interpretations

Examination of industry-wide capacity utilization data may provide a partial explanation. US Federal Reserve figures show that average capacity utilization over the period 1967–93 was about 2% higher for the residual group of industries than for the innovative group (FRB, 1995, p. 23). Capacity utilization, therefore, could be considered to provide some explanation for the average higher profit rates in the non-innovative industries. Yet, the SNCs in the residual group are distributed among industries such that average capacity utilization is significantly higher for them than for TNCs in the group,[26] while TNC rates of return are significantly higher. Industry-wide average capacity utilization does not help to explain TNC surpassing performance in this group.

In the innovative group, there is no significant difference between TNC and SNC average capacity utilization on the basis of distribution of firms among industries. Whether or not this explains insignificantly different profit rates among these enterprises is difficult to determine on the basis of industry-level capacity utilization data. There are only four industries represented in this group, and their average capacity utilization rates are very similar. Capacity utilization data are not available at the level of the firm.

What appears to be more determinative of profit rates than average capacity utilization is the degree of variability of capacity utilization rates over the business cycle. For the entire sample, average capacity utilization rates are significantly correlated with PROFR, but the correlation coefficient is a tiny 4%.[27] The ratio of low-to-average (LTA) capacity utilization is more highly correlated with PROFR, with a coefficient of 10%.[28] Furthermore, TNCs are distributed among industries such that their LTA capacity utilization rates are significantly higher than those experienced by SNCs.[29] This is consistent with Schmalensee's (1989b, p. 355) finding that large firms experience smaller variations in output over the business cycle. Here, for the whole sample, the low variability of capacity utilization rates for TNCs appears to raise profitability more than the higher average capacity utilization rates achieved by SNCs. However, once again, there is no significant difference between TNCs and SNCs in the innovative group with respect to LTA capacity utilization rates.

It is useful to examine the measurable sources of the unpredicted results with respect to the innovative group of industries. Table 9 shows that, in these industries, the conventional PROFB measure yields an almost 45% rate of return superiority for TNCs over SNCs; after conversion to PROFR, that superiority is

Table 7. Top ten most profitable industries for TNCs: 1985–90

Industry	TNC PROFR	SNC PROFR
1. Rubber	0.1991	0.0638
2. Msc. Mfrg	0.1389	0.1108
3. Paper	0.1122	0.0927
4. Food	0.1092	0.0890
5. Chemicals	0.1083	0.1104
6. Transp. Eqpt.	0.1011	0.0895
7. Fab. Mtls.	0.0972	0.0646
8. Instruments	0.0907	0.0800
9. Electr. Eqpt.	0.0580	0.0599
10. Machinery	0.0515	0.0485

Table 8. Top ten most profitable industries for SNCs: 1985–90

Industry	SNC PROFR	No. SNC firms
1. Furniture	0.1211	9
2. Printing	0.1158	22
3. Msc. Mfrg.	0.1108	7
4. Chemicals	0.1104	19
5. Paper	0.0927	16
6. Transp. Eqpt.	0.0895	23
7. Food	0.0890	19
8. Instruments	0.0800	18
9. Textiles	0.0671	19
10. Apparel	0.0666	16

Table 9. Mean PROFR and PROFB for two industry groups

Top four innovative industries					
Variable	Sample	*N*	Mean	SD	*t*
PROFR	TNC	905	0.0752	0.0871	1.146
	SNC	618	0.0693	0.1129	
PROFB	TNC	905	0.0702	0.1027	3.427
	SNC	618	0.0492	0.1353	
All other industries					
Variable	Sample	*N*	Mean	SD	*t*
PROFR	TNC	618	0.0980	0.0936	5.115
	SNC	1282	0.0743	0.0965	
PROFB	TNC	618	0.0952	0.0990	4.158
	SNC	1282	0.0726	0.1164	

Table 10. TNC and SNC average annual real growth rates of sales

Entire sample		Top four innovative inds	
1972–1988		1972–1988	
TNC	12.2%	TNC	15.2%
SNC	8.7	SNC	15.2
1985–1990		1985–1990	
TNC	7.4%	TNC	5.8%
SNC	6.7	SNC	7.9

reduced to less than 10% and is no longer significant. By comparison, in the residual group, the conversion slightly widens an over-30% TNC margin.

The measurable reasons for the dramatically different results in the two industry groups are basically two: (1) In the innovative industries, conversion of asset values to replacement cost causes TNC total assets in the 1985–90 period to increase by 22% above their book value, while SNC assets increase by only 9%. The TNC rate of return is thus lowered substantially compared with that of SNCs. The reason for the much larger effect on TNCs is that between 1972 and 1985, the average TNC rate of capital expenditures plus net acquisitions was 30% greater than that for SNCs, creating a relatively larger asset base to which the capital goods price index was applied. By comparison, in the residual industry group, the TNC rate of capital additions in 1972–85 was only 10% greater than that for SNCs. This does not work to diminish the TNC profitability margin in this second case because of another offsetting effect. (2) The rate of leverage (here measured as the ratio of net interest paid to replacement value of total assets) is significantly higher for SNCs than for TNCs in the top four industries, thus further squeezing the margin between TNC and SNC economic rates of return. This effect accounts for almost 40% of the decline in the TNC margin in this group when moving from PROFB to PROFR. By comparison, in the residual industry group, TNCs are significantly more highly leveraged, thus slightly improving the TNC margin enjoyed over SNCs in those industries.[30]

These comparisons show that, in the technologically advanced industries, SNCs obtained similar operating returns to those of TNCs, but took on significantly more debt to do so. At the same time, TNCs acquired assets at a much higher rate than did SNCs, but did not utilize or organize them in a manner to improve rate of return. However, if the acquired assets require a long period of time before their contributions to rate of return materialize, then the late 1980s might be considered an aberration from trend.

One way to put this historical period in perspective is to compare TNC and SNC average annual real sales growth rates in the years 1985–90 with growth rates over the last two decades. Table 10 presents the data.

Between 1972 and 1988, real average annual sales growth by the entire TNC sample was 40% greater than sales growth by the SNCs, although the difference in means is not statistically significant. During the years 1985–90, annual sales growth fell for both TNCs and SNCs, and the TNC margin over SNCs was

greatly reduced. In the four industries in which the TNCs are most concentrated, the sales growth rate for both TNCs and SNCs was superior to that of the rest of the sample in 1972–88, but there was no difference in performance between TNCs and SNCs. In 1985–90, TNC sales growth in the top industries slipped below that of the rest of the TNC sample and below that of SNCs inside and outside the top industries. Meanwhile, the SNC firms in the innovative group managed to maintain higher growth rates than the rest of the SNC sample.

These sales data indicate that, on average, all firms presided over a slowdown in the rate of growth of sales in the latter half of the 1980s. Nevertheless, TNCs in the innovative industries performed the worst, and SNCs in the innovative industries performed the best. However, during the same short period, TNCs in the top four industries were adding capital assets at a rate almost four times greater than all other firms in the sample. The scissors effect for innovative TNCs created by the largest slowdown in sales and the fastest pace of capital accumulation must have contributed to a depression in the rate of return during these years.[31] The question, again, is whether this period represents an aberration from trend, which will be reversed as newly acquired assets yield higher revenues or lower costs, or a new trend.

5. Conclusions

This paper has demonstrated the construction of a measure of economic rate of return at the level of the firm as a function of fixed assets valued at replacement cost (PROFR); this measure should capture relative performance more accurately than an accounting-based measure of return (PROFB). Adoption of this measure shaves the performance superiority of TNCs relative to SNCs by about one-third for the period 1985–90, although the TNC superiority remains highly significant. However, the narrowing of the gap in measured TNC and SNC mean performance is achieved entirely in the high-technology, fast-growing industries in which TNCs are most concentrated. Conversion to PROFR wipes out significant TNC profit superiority in these industries. A significant TNC advantage is maintained in the less innovative industries.

These results, plus the fact that average rate of return is lower for both TNCs and SNCs in the highly innovative industries, cast doubt upon the sufficiency of three theories of the TNC: (1) 'internalization' theory, which predicts that TNCs will achieve higher rates of return by avoiding arm's-length cross-border transactions with respect to their intangible assets, such as technological advantages; (2) market power theory, which predicts that firms in industries with substantial barriers to entry, such as high R&D requirements, will achieve greater rates of return; and (3) 'technological accumulation' theory, which predicts advantages from access to international innovation streams and feedback effects. The first two theories address advantages to be derived from a variety of intangible assets or barriers to entry. Here, the theories are tested only as applied to technological intensity.

The fourth and fifth theories referenced in the Introduction, based on the benefits to be derived from geographical and industrial diversification, require further examination, since the degree of diversification may be the important analytical distinction. The author is proceeding to gather diversification data on the TNC and SNC samples examined here.

Some evidence is presented that the rate-of-return results presented may be a function of the historical period analysed, during which TNC performance relative to that of SNCs may have suffered compared with the previous 15 years. Further investigation is warranted on this score.

The results obtained raise two interrelated questions: (1) why do TNCs tend to concentrate in the industries that apparently yielded no advantages to international operations, relative to SNCs, in the latter half of the 1980s? (2) Do firms in fact pursue objectives other than high rates of return? If so, TNCs in the technologically intensive industries may be more successful than SNCs after all. But this would create another challenge to the internalization, market power, and technological accumulation theories, which address themselves to profit advantages. These two questions are interrelated because enterprise pursuit of other objectives could help to explain how these objectives are most likely to be achieved in the innovative industries where TNCs cluster.

Alfred Chandler (1990, pp. 8, 39–40), the well-known historian of the 'modern industrial enterprise', has documented the successful methods adopted by these enterprises in the struggle for profits and market share in this century. He has described a two-pronged competitive approach: one aspect involved the appropriation of cost and revenue advantages deriving from the successful exploitation of technological and managerial innovation; the second targeted the appropriation of new markets and market share.[32] The latter presented the opportunity to exploit successful innovations over a wider geographical area. The ultimate goal, Chandler (1990, p. 15) argues, was the promotion of the long-run health and growth of the enterprise.

This description of what has occurred historically suggests the need for a dynamic theory to address the objectives shaping the long-run development of the firm's competitive strategies and advantages. Such a theory could explain the circumstances under which long-run goals lead the firm to subordinate short-run profit performance to the expansion of market share. A dynamic theory could help to explain why TNCs are crowded into a set of industries presenting opportunities to be harvested in the future. Such nascent opportunities could derive from expected industry growth rates and from mastery of technological innovation requiring costly capital investments in the present. The emphasis in a dynamic theory would be on actions undertaken by the enterprise to shape its competitive environment, rather than on mere reactive responses to the existing environment (Lazonick 1991). Recent work on a modern version of classical competition theory, which provides a foundation for the fifth theory of TNCs mentioned in the Introduction, appears to provide a promising beginning.[33] This theory stresses the importance of intra-firm capital flows designed to take advantage of growth centers through diversification, and to gear investment strategy to the shaping of industry cost structures. But this must be the subject of another paper.[34]

Notes

1. 'Internalization' theory suggests that common administrative control over plants located in different countries achieves lower costs or higher revenue productivity by avoiding the cost of market failure that characterizes arm's length transactions concerning intangible assets. Such assets are most likely to be found in industries in which research-and-development (R&D) intensity, capital intensity, and advertising intensity are relatively high (Caves, 1982, ch. 1).
2. The theory of market power is applied to TNCs because of the tendency of these firms to be concentrated in industries with high barriers to entry. These barriers, like intangible assets, are

most likely to be found in industries with high R&D, capital and advertising intensities (Ibid., 1982, ch. 4; Hymer, 1970; Hymer, 1976, ch. 1). The simple theory presents no basis upon which to differentiate relative performance within these industries between TNCs and single-nation corporations (SNCs). However, the theory of strategic groups addresses intra-industry differentiation based upon strategic variations with respect to technology, product differentiation and diversification, and managerial organization (Porter, 1979, p. 214; Bowring, 1986, p. 5). This approach to intra-industry differentiation could be applied to the TNC-SNC relationship within high-barrier industries (Caves, 1982, p. 109; Kapler, 1993, p. 32).

3. Diversification has been found to lower the variability of the firm's rate of return, and much empirical literature has demonstrated a significant negative relationship between variability of returns and rate of return (Kapler, 1993, pp. 117–118).
4. Jenkins (1987, p. 47); Clifton (1977, pp. 146–148); Cantwell (1991, p. 49–50); Kapler (1993, p. 57, ch. 2). This approach derives from a modern version of the classical theory of competition, named by one author the 'internationalization of capital' theory (Jenkins, 1987). This theory is treated more extensively by Kapler (1993, ch. 2, and 1995).
5. The fourth and fifth explanations are the subject of the author's current research.
6. See, for example, Benvignati (1987, p. 449); Lipsey *et al.* (1983, pp. 14–15); Bergsten *et al.* (1978, pp. 239–242); Vernon (1971, pp. 8–9). See Kapler (1993, ch. 3) for more references. For evidence that transnationality is negatively or insignificantly related to rate of return on equity, see Rugman (1981, p. 138–142); Landefeld *et al.* (1992, p. 79).
7. Compustat reports firm-level financial data for all publicly traded US industrial firms and for non-publicly traded US firms with sales of $200 million or more.
8. FASB Statement No. 14 (FAS 14). See FASB (1990, pp. 149–153). The identifiable assets of a foreign segment 'are those tangible and intangible enterprise assets that are used by the ... segment, including (i) assets that are used exclusively by that industry segment and (ii) an allocated portion of assets used jointly by two or more industry segments ... . Assets maintained for general corporate purposes (i.e. those not used in the operations of any ... segment) shall not be allocated to [the] segments' FASB (1990, pp. 148–149). FASB allows the reporting firms to choose to aggregate foreign operations into individual segments on the basis of product line, or common geographic area, or other criteria.
9. *Moody's Industrial Manual*, various years; *Who Owns Whom: North America*, various years.
10. This approach is somewhat misleading as to the nature of the firm's operations in cases of diversification, but is an unfortunate necessity where line of business or establishment data are not available. Compustat reports business segment data on many of its firms. The author's current research is focused on analysis of these segment data for the firms that are the subject of this paper.
11. These are establishment data, thus largely free of the conglomeration problem afflicting manufacturing classifications based on firm-level assignment. The fourth, fifth, and sixth fastest growing manufacturing industries have been rubber, transportation equipment, and paper (US DOC, 1986a, Table 6.2).
12. TNC values are for consolidated foreign and domestic operations.
13. R&D expenditures are missing for 14% of the TNC sample and 40% of the SNC sample.
14. Advertising expenditures are missing for 12% of the TNC observations and 17% of the SNC observations.
15. The adjustments described in the text follow the approach adopted by Feldstein & Summers (1977, p. 211) and in Bergsten *et al.* (1978, p. 240). Schmalensee cites other works adopting this approach (1989a, p. 960).
16. Nevertheless, the after-tax rate of return for this sample gives the same pattern of results as that obtained from analysis of the pre-tax measure.
17. If societies' objectives can be characterized as achieving maximum returns on scarce assets, then PROFR is the most appropriate measure to gauge success at the firm level. However, rate of return at the firm level is not a reliable guide to welfare conclusions since enterprise success can be achieved by employing assets in such a way as to reduce returns to competitor firms.
18. See Feldstein & Summers (1977, p. 211); Lindenberg & Ross (1981); Smirlock *et al.* (1984, p. 1051); Stevens & Lipsey (1988); and Eisner & Pieper (1988).
19. The capital goods price index is calculated from BEA data supplied to the author. These data were prepared for inclusion in the (1987 base year) *National Income and Product Accounts*, and made available to the author on floppy disks in July 1992.
20. The rate of economic depreciation is derived from BEA's estimated annual depreciation charges for fixed non-residential equipment and structures 1972–90 for each two-digit and some three-digit SIC codes, and assigned to the sample firms on the basis of their principal product(s). These were

obtained from BEA's (1987 base year) data for its *Fixed Reproducible Tangible Wealth* series, and were supplied to the author by BEA computer printout dated 30 January 1992.

21. This method only partially takes into account the effect of exchange rate fluctuations on TNC asset prices, and therefore leads to an inflation of measured TNC rate of return by underestimating the value of assets and overestimating the value of revenues net of depreciation. Due to the high value of the dollar in the early 1980s, foreign acquisitions and capital expenditures during that period enter the perpetual inventory equation at abnormally low values (in dollars) relative to the late 1980s, thus diminishing TNC fixed asset replacement values in the period 1985–90 (the analysis period adopted in this paper). This also has the effect of inflating revenues net of depreciation for the 1985–90 period since the rate of depreciation is applied to a low dollar value of fixed assets.
22. A detailed appendix describing all the adjustments made to each category of asset is available from the author upon request.
23. This effect results in an overestimation of SNC rate of return for the period 1985–90, which should offset at least somewhat the overestimation of TNC rate of return due to exchange rate fluctuations.
24. Some firms have missing values in some years. Missing observations account for 2% of the possible observations for each of the TNC and SNC samples.
25. On average, TNCs and SNCs in this sample have almost identical leverage rates (ratio of net interest paid to book-valued assets). However, as PROFB indicates, since SNCs have significantly lower pretax revenues per dollar of assets, adding the leverage rate to the profit measure causes a greater increase in the SNC rate of return.
26. The difference in means is significant at the level of 1%. The mean capacity utilization rate for the two groups of firms is nevertheless very similar, with 81% for TNCs and 82% for SNCS.
27. The correlation coefficient for PROFR is significant at the level of 5%. The correlation coefficient for PROFB is 9%, and is significant at the level of 1%.
28. The Federal Reserve supplies the 'low' capacity utilization rate for the cyclical trough of 1990–91 (FRB, 1995, p. 23). The low-to-average rate is simply the ratio of this cyclical low to the average rate for 1967–93. The correlation coefficient with PROFR is significant at the level of 1%. The correlation coefficient associated with PROFB is also 10% and significant at the level of 1%.
29. The TNC mean is 94.12, the SNC mean is 93.41, and the difference is significant at the level of 1%.
30. These leverage differences would provide fruitful grounds for further investigation.
31. Conceivably, these events might not depress rate of return if costs were to be cut proportionately. However, the profit volume of the innovative TNCs shrank absolutely during this period, indicating that costs were not cut proportionately.
32. See also Wilkins (1974, p. 412).
33. See the sources cited in Note 4.
34. See Kapler (1995) for some preliminary empirical work on the significance of intra-firm capital flows.

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