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A portfolio of empirical tests evaluating the transfer price performance of "pure" wholesale distributors

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A Portfolio of Empirical Tests Evaluating the Transfer Price Performance of "Pure" Wholesale Distributors

by
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ABSTRACT

A Portfolio of Empirical Tests
Evaluating the Transfer Price Performance of "Pure" Wholesale Distributors

by Robert R. O'Haver

Advisor: Professor David Gabel

In this dissertation I empirically evaluate two* topics that are germane to transfer pricing (i.e., the price by which related corporations exchange property, assets and/or services). These issues pertain to the exchange of tangible property between a manufacturer and related distributor. Typically, in an "inbound" transfer pricing investigation undertaken by Internal Revenue Service economists, the profit and/or rate of return performance of the related U.S. distributor is evaluated against the performance of functionally comparable, but unrelated, distributors. If, for example, the related distributor under review earns less than that of the comparable companies, the transfer price paid by the U.S. distributor to its foreign parent is deemed to be excessive (i.e., the U.S. distributor is giving away too much taxable income to the overseas parent corporation).

The first topic evaluates how useful aggregate Standard Industrial Classification ("SIC") data are for benchmarking (i.e., applying a measure to evaluate the transfer price) purposes. This effort follows and extends upon, the work of other

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* A third topic, which is presented in the appendix of the dissertation due to the inconclusive results, focuses on a pricing methodology known as "profit splits" applied to the licensing, between related entities, of intangible assets. Specifically, I apply event studies, a recent technique popular in the Industrial Organization literature, on actual licensing transactions between unrelated parties to observe the resultant ex-ante profit splits. Due to the small sample, no consistent findings are derived (though the concept has, I believe, enough appeal that more testing should be undertaken as more data become available).

economists who have studied how well-suited SIC classifications are for delineating economic markets. I find that four digit distributor SIC codes possess too much functional diversity to be very useful for transfer pricing analysis. Further, I find there to be significant differences in profits and rates of return between "pure" distributors and distributors that also manufacture and/or are involved in design, research and development, and/or developing marketing intangible assets (e.g., tradenames).

The second topic involves using a constructed data set of financial performance results for "pure" distributors to find the key determinants of their operating profit as well as the incidence of operating loss. Using cross-section and pooled regression techniques, as well as various binary choice models, I find important independent variables to be the growth in sales, level of industry concentration, firm size, and the presence of high operating leverage when sales growth is high. The choice of these variables follows on earlier work by other economists, albeit these other economists have largely focused on manufacturing industries. The import of these results is to document that there are many variables, other than transfer price, which can affect profit (or cause an operating loss) for a U.S. based "pure" distributor of an overseas parent.

Related to this issue is the question, explored by Fisher and others, as to how well accounting rate of return serve as proxy mearsures for economic rates of return. Little empirical work has been done on this topic germane to "pure" distributors. My results suggest that, under certain conditions, these two performance rates can converge for "pure" distributors.

For Laura and our beautiful daughters,
Kirsten and Briana

Acknowledgements: Special thanks are due to my faculty sponsor, Professor David Gabel, for his helpful and timely comments and general guidance in helping me complete this effort. I also extend my gratitude to Professors Lipsey and Heyen for their time, commentary, and interest in both the topic and the dissertation process.

"...the next best thing is to acquire a doctorate there. It's no easy feat. If tradition is followed, it means spending a restless night in the chapel of Santa Barbara in the Old Cathedral, and the next morning undergoing, in the same tomb-filled chapel, a rigorous examination that reminds you Spain is not the home of the Inquisition for nothing. There is a special door for rejected candidates, so they can leave town fast.

But success is sweet. A procession of musicians dressed in medieval garb and playing flageolets leads you into the assembly hall, before the rector of the university, to be invested...All this entitles you to have your name and various honors ceremonially inscribed, in freshly killed bull's blood tastefully mixed with olive oil, on the public walls of the University or the Old Cathedral. It is then considered polite to arrange a bullfight for your fellow students..."

excerpt from the New York Times, May 16, 1993.

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INTRODUCTION

As the role of multinational corporations in the world economy has grown significantly over the past two to three decades, so has the interest of economists and business managers in the topic of transfer pricing (i.e., the prices at which related divisions or companies transact the exchange of goods, assets and/or services). Historically, this interest was motivated by the desire of business managers to have transfer prices that provided proper incentives for intra-company divisions to operate in a manner consistent with firm-wide profit maximization. More recently, while this interest has continued, a significant amount of interest has arisen because of the belief that many multinational companies strategically manipulate transfer prices to shift income to low tax countries, thereby reducing a firm's global tax liabilities and increasing after-tax profits. Indeed, this was a key issue in President-elect Clinton's 1992 election campaign where he referred to estimates of $30 billion in tax revenues lost annually due to transfer price abuses by foreign based multinationals.

Interest in the tax dimension of transfer pricing has been largely generated by three factors. First, during the 1980's there was tremendous growth in the level of foreign direct investment between the United States and Europe, and from Japan and Korea into the United States.[1] This increased the incidence or frequency of international transfer pricing arrangements. Secondly, recent U.S. Commerce Department and academic studies (described subsequently in this dissertation) have

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1 An article in The Economist (Aug. 24, 1991, p. 57) noted that "[I]n the five years, 1984 to 1989, the flow of new Foreign Direct Investment rose at an annual rate of 29 percent - three times as fast as that of trade." The article attributes this growth to the prospect of an integrated European market in 1992, the efforts of Japanese companies to dodge rising costs in Japan and growing protectionism abroad, and growth in international services which cannot be traded cross-border as easily as goods.

purported to show that both foreign and U.S. companies use transfer prices to shift income, and thereby reduce their tax liabilities. Third, there were, in 1986, significant changes in the U.S. tax laws that increased the focus (e.g., by expanding the staff of international examiners and economists as well as by promulgating new regulations and eliminating the need for the IRS to monitor and enforce tax shelter abuses) of the Internal Revenue Service (IRS) and the U.S. Department of the Treasury on transfer pricing matters.

The increasing importance and incidence of transfer pricing investigations (both domestically and internationally as the tax authorities in other OECD countries respond to the U.S. initiatives), as well as the heavy reliance on the use of economic analysis in these investigations, underscores the relevance of economic research in this field. This need is enhanced because there are many areas in the transfer pricing regulations where it seems that economic reasoning is not used or used inappropriately.

Given the relevance of transfer pricing, the purpose of this dissertation is to empirically analyze a set of two topics that directly relate to the economic interpretation and application of the U.S. transfer pricing regulations. The goal is to develop a set of results that will help increase the utility and efficiency of the existing regulations.

These two topics specifically relate to "inbound" transfer pricing situations. Inbound cases involve a U.S. based distributor of a foreign parent corporation.[2]

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2 Conversely, "outbound" cases involve a U.S. parent company that sells product or licenses intangible assets abroad through a related subsidiary. "Round trip" cases typically involve a U.S. company that uses an offshore contract manufacturer. It is also worth noting that the separate study of distributors, apart from manufacturers, is particularly useful because the principal-agent dynamics (for distributors versus manufacturers) are likely to be different.

These cases typically involve the transfer of tangible property as opposed to the exchange of services, financial commitments, or the licensing of intangible property (e.g., trade names and/or manufacturing know-how).

The two topics can be briefly sketched as follows:

- Regulators have relied increasingly on income based methods[3] to evaluate whether transfer prices appear to be set appropriately. A common "shortcut" approach of the IRS is to use aggregate industry statistics (usually based on four digit Standard Industrial Classification -- or "SIC" -- codes) of various profitability and rate of return indicators to evaluate whether a a specific distributor, whose transfer prices are under review, is earning an adequate level of profit. If the distributor is observed to be earning less than the SIC code benchmarks, the implication is that the transfer price charged by the foreign parent company is set too high. Such a finding would subject the distributor to retroactive adjustments requiring more tax to be paid (if this occurs, in many cases, it is difficult for the taxpayer to secure a "compensating

Principal agent dynamics refer to the principal (owner or parent firm) setting the transfer price such that the subsidiary has the proper incentive to maximize the principal's present value profit stream. While such a topic is outside the direct scope of this dissertation, it is nonetheless relevant because managers of distribution entities are also, in many cases where these entities are of small size, the owner of business as well.

3 As discussed later in the dissertation, an income based method typically involves identifying comparable (i.e., in terms of functions performed, risks undertaken, assets utilized and other factors) companies relative to at least one of the entities (i.e., the "tested party") under review in a related party transaction. By comparing the actual profit/rate of return performance of the tested party relative to the benchmarked performance of the comparables, the transfer price can be evaluated. The regulations indicate that differences in this comparison suggest inappropriate transfer prices.

adjustment" on taxes paid by the parent corporation in the foreign tax jurisdiction) as well as interest and penalties.

This section of the dissertation will evaluate the degree of functional heterogeneity present for companies otherwise identified under four digit distributor based SIC codes. To the extent that significant heterogeneity exists, this will detract from the level of comparability achieved by these industry groupings and therefore reduce the utility of this "short cut" approach. With these findings, statistical testing is then employed to determine whether there are significant differences between the profitability indicators of the different functional classifications. This will provide an indication as to whether aggregate industry statistics are biased performance measures.

- Another commonly used construct of the IRS is that distributors, due to the fundamental nature of their business as buyers and resellers, should not incur losses. This section of the dissertation evaluates, using a data set comprised of the financial results of publicly traded "pure"[4] distributors over a five year period (1986-1990), the propensity for losses and the associated characteristics (e.g., size and duration of losses, whether the losses were predominantly associated with durable versus non-durable good distributors, and similar characteristics). Based on these findings, limited dependent variable regression (both linear probability and Logit approaches) and multiple discriminant

4 For purposes of this dissertation, the characterization of a "pure" distributor refers to a distributor that functions as a "stand alone" wholesale distributor not otherwise developing or owning significant marketing intangibles (e.g., trade names), nor undertaking manufacturing or research and design functions.

analysis techniques are then used to assess which variables are most important in identifying those distributors with the highest probabilities of earning losses. Models of this type should help the IRS to assess, when a tested party has losses present, the likelihood that these losses may be attributable to non-transfer pricing factors.

Using regression analysis this section also seeks to identify which factors are most important is assessing benchmark levels of profit based upon the use of "comparable" companies. This section also involves an evaluation of whether traditional, or accounting based, measures of profitability effectively measure economic profitability for distributors. While significant criticism has been leveled by Fischer and McGowan, among others, relative to the use of these measures in evaluating manufacturing companies, little analysis has been rendered in this regard relative to distributors. Because profit measures for distributors do not generally suffer from the same level of measurement problems typically associated with manufacturers (e.g., the effects of differences between book and economic values of plant, property and equipment are diminished for distributors because most of their assets are current in nature), accounting measures may more accurately measure the underlying economic rate of return.

These topics, which I believe are issues that continually surface yet have been addressed with little empirical support, comprise Section III of this dissertation. Relative to each topic there is a statement of the problem, summary of the relevant literature, and description of the analysis. Preceding these sections, Section I summarizes, as background information, the salient features of the U.S. transfer

pricing regulations and landmark Tax Court rulings germane to the use of economic analysis in determining appropriate transfer prices. Section II summarizes the general economics' literature relevant to the theory of transfer pricing and related topics (e.g., the role of transaction cost savings, risk sharing and similar topics). Both of these sections provide important background to the analyses undertaken in Section III. Section IV summarizes the primary conclusions of these analyses.

I. U.S. TRANSFER PRICE REGULATIONS AND LANDMARK TAX COURT RULINGS

BASIC CONCEPTS AND METHODOLOGIES

In 1968, the U.S. Treasury Department promulgated regulations providing rules for intercompany transactions involving the exchange of tangible property, intangible property, and services. Proposed changes to the regulations were issued in 1992 and adopted, with some modifications, in 1993. These regulations reaffirmed the arm's-length standard, which requires a transfer price to reflect the price that unrelated entities would have negotiated under conditions similar to those under review.

This standard provides for the use of comparable *transactions* to establish and support transfer prices. The basic transactional method, for both tangible and intangible property exchanges, was known as the Comparable Uncontrolled Price ("CUP") method.[5] This method applies where one of the controlled taxpayers engages in a highly similar transaction with an unrelated entity, whereby the price negotiated with this unrelated party can serve as the benchmark (if the transaction terms, functional and market conditions were highly similar, of if adequate adjustments could be made to achieve this similarity) to set the transfer price. This has been known as an internal CUP. Alternatively, if this type of CUP did not exist, *ex*ternal CUPs could be sought. This latter type of CUP would involve looking to the industry generally to observe the price on highly similar transactions (relative to

5 This method is still referred to as the CUP method when used to evaluate tangible property exchanges. However, for intangible property exchanges, the comparable transaction approach is referred to as the Comparable Adjusted Transaction method.

the transactions under review by the IRS) between unrelated entities, whereby neither entity was a party to the transfer pricing transaction under review.

If CUPs could not be found, the tangible property regulations next provided for two additional methods -- the Resale Price Method ("RPM") and the Cost Plus Method ("CPM"). The Resale Price method, which is to be used if the U.S. taxpayer under review is a distributor (largely the subject of this dissertation), or if the U.S. entity otherwise adds little value to the product before resale, is a hybrid of the transactional and comparable company based approaches. The transactional aspect would involve searching for comparable transaction for which the observed price can*not* be used as a benchmark (because it fails the CUP comparability criteria), but for which the gross profit margin (or percentage mark-up of sales price over purchase cost) could be used as a benchmark. Consider the following example. A U.S. subsidiary of a French parent company imports *high* quality saw blades, manufactured by the parent, into the U.S. market for resale to furniture makers and serious hobbyists; it also sources *low* quality saw blades from *unrelated* suppliers to sell into the construction market (where theft rates and other factors mandate that these blades be of lower quality). Due to quality, and hence price, differences the price on the transaction associated with the blade purchases from the unrelated supplier (construction market) could not be used as a CUP benchmark relative to the purchases of high quality blades from the French parent. However, if certain comparability conditions (e.g., the degree of market competition) are satisfied relative to the purchase from both related and unrelated suppliers, then the percentage *mark-ups* could be used as a benchmark because differences in quality *may* not significantly affect this measurement variable.

The other element of the hybrid RPM method is to try to identify "comparable" companies to reference their mark-up rates (i.e., sales divided by cost of goods sold minus one) as a benchmark to what the U.S. distributor under review should be earning. To the extent the distributor under review is earning less than the benchmark, then it is indicated by the IRS that the transfer price should be lowered until this benchmark is achieved. In this approach, functional comparability is emphasized. For example, if the comparable companies perform more "below the line" functions (e.g., warranty repair, advertising, or other such services) vis-a-vis the distributor under review, then it can be expected that these companies will have higher mark-up rates to provide enough gross profit to cover, and earn a return thereon, these incremental costs. If this is the case, the observed mark-ups will serve as an inappropriate benchmark so that this approach cannot be relied upon. In recognition of this, there has been action by practitioners in the transfer pricing field to use an "expanded" RPM method where the mark-up on cost of goods sold plus operating expenses is used.

The CPM is similar to the hybrid nature of the RPM except that the CPM does not focus on the distributor, but rather on the controlled taxpayer that performs the manufacturing function. However, if the U.S. taxpayer functions as a distributor and the RPM is found not applicable, the CPM is often not practical because the foreign parent of the U.S. distributor is not necessarily compelled to provide information on its manufacturing costs. Additionally, comparability (and data availability) with respect to manufacturers is particularly difficult to achieve which hinders the applicability of this approach.

If these methods cannot be followed (where the CUP method is usually given the highest priority, if sufficient comparability exists, followed by the RPM and CPM)

the regulations then leave open the possibility of applying any other method that can be reasonably supported.

The most common approach (referred to as the Comparable Profit method under the currently proposed changes to the U.S. transfer pricing regulations) is a more comprehensive comparable company analysis. This analysis again seeks to identify companies that possess high functional comparability, operate in similar markets facing similar competitors, offer similar products and sell to similar customers under similar terms, face similar business risks. The analysis is more comprehensive because measures of profitability, other than the RPM mark-up, are used. These expanded measures typically include operating margin, return on assets, and return on invested capital using either book or fair market asset values. The regulations permit also adjustments to these results for differences between the subject company and the comparable companies relative to inventory methods, asset turnover rates, and similar factors.

Still other approaches can be applied. Two of the most common are the use of benchmark internal rates of return ("IRR") and the previously described "profit splits." The IRR approach involves first determining an appropriate risk adjusted rate of return for the controlled taxpayer under review to earn. Then using management projections of the *net* cash flows to be generated, coupled with current dollar information on the controlled taxpayer's total investment in the assets generating the cash flow stream, the transfer price is set such that the resultant IRR equals the benchmarked rate. While this approach is desirable in that it focuses on an economic rate of return over time, the associated data requirements make it often difficult to apply in practice. This is because either forecasts of the future net cash flow stream, current value estimates of the initial and continuing investment

and a specific risk adjusted, benchmark rate of return are usually not simultaneously available.

THE WHITE PAPER

The 1986 Tax Act introduced the "commensurate with income" standard for setting transfer prices on the licensing of intangible property. This standard requires that payment for intangible property be commensurate with the income attributable to the intangible. The legislative history of the Act states that this change was intended to assure that the division of income between related parties reasonably reflects the economic activities undertaken by each. This new standard was motivated by the difficulty in finding good comparable transactions, particularly with respect to high profit and relatively unique intangibles, such as those often found in the pharmaceutical industry.

Part of the 1986 Act also authorized the IRS to conduct a comprehensive study of the U.S. transfer pricing regulations to determine what additional changes should be made. This study, issued jointly by the IRS and the Treasury Department in 1988, is known as the White Paper. While the primary focus of the White Paper was on intangible asset exchanges, it also discussed the need to account for the embedded value of intangible assets (e.g., trade names) for tangible property exchanges. The White Paper also found that there were many situations where transaction based methods were being applied, but that the requisite level of comparability was not present to allow a truly meaningful comparison. Accordingly, the White Paper emphasized that there was an increased need, on both tangible and intangible property exchanges, to test transfer prices under comparable company or income based approaches.

The White Paper emphasized micro-economic principles (i.e., a firm's income can be apportioned relative to the factors of production used to generate income). The White Paper did not identify exactly how this was to be determined but presumably it should be based on the value of the marginal product multiplied by the amount of the factor input used. Specifically, the White Paper advocated two methods: the Basic Arm's Length Return Method (BALRM) and BALRM Plus. The BALRM conceptually set forth to allocate income between related entities involved in a controlled transaction by assigning industry average rates of return to each company's asset base. Any residual earnings would then accrue to that entity that developed the valuable intangible asset conveyed in the transaction.

The BALRM-Plus method involved this same methodology but further stipulated that when both entities to a controlled transaction contributed valuable intangibles, then the residual earnings, after assigning profit to both entities based on the value of their respective factors of production, be divided according to the relative value of the intangibles contributed by each party to the transaction.

CURRENT REGULATIONS

The White Paper's findings came under significant criticism by U.S. and foreign taxpayers. In response, in 1992, the Treasury and IRS released proposed changes to the U.S. transfer pricing regulations, and in 1993 these changes were largely adopted. One of the biggest changes in the 1992 version was the increased prominence given to the use of income based or comparable company approaches. The proposed regulations require a six step income based approach, known as the Comparable Profit Method ("CPM"), to be used to "verify" the results of any

transaction based approached that did not offer exceptionally high levels of comparability. Alternatively, CPM could be used as a stand-alone approach should transaction based approaches not be available.

Unlike previous comparable company approaches, the CPM would provide for the use of other profit level indicators to generate an interval of "constructed operating income" results (i.e., the pro forma operating income of the entity under review is constructed using various profit level benchmarks derived from the selected comparable companies) which would be compared against the actual operating income of the entity under review. Further, the CPM also provided for a three year averaging of the tested entity's actual income results to help "smooth out" distortions caused by unusual circumstances in any one year.

It is relevant to the foregoing discussion to note that in addition to these proposed changes, Congressman Rosentowski is supporting current legislation that would require taxes for inbound companies, to be computed on a minimum income level associated with some (unspecified) industry "norm" level. This is relevant as it highlights the use of an industry aggregate benchmarking approach, which is one of the topics evaluated in this dissertation.

SALIENT TAX COURT RULINGS

The use of economic analysis in transfer price disputes has often, although not always, been a significant part of recent Tax Court rulings. Consequently, these rulings have influenced which methods are being used by applied economists practicing in the field. A brief review of these rulings, illustrating how these methods have actually been applied, follows.

Eli Lilly & Co. v. Commissioner (1985)[6]

This case involved the transfer of relatively unique intangible assets -- high profit patents and manufacturing "know-how," -- from Lilly, the U.S. parent corporation, to a manufacturing subsidiary in Puerto Rico (a low tax jurisdiction) in exchange for stock. The IRS argued that the use of a stock transfer as consideration was inappropriate, because a true arm's length exchange would require the income associated with the intangibles to be allocated back to the U.S. company.

The case is notable from an economic perspective because while a CUP approach, albeit with numerous adjustments, could be applied to one of the years under audit, comparable transactions could not be found for the other years. Consequently, the court relied upon an ad hoc profit split approach largely devoid of economic analysis. Essentially, the court choose an arbitrary percentage split of profits between the parent and subsidiary and set the transfer price so that this split would be achieved. Other cases, Searle, Hospital Corp. of America, and Ciba-Geigy, all involved similar difficulties with respect to sourcing comparable transactions and all involved use of a profit split approach, albeit without meaningful economic analysis to determine what the appropriate profit split benchmark should have been in each case.

E.I. DuPont de Nemours & Co. v. United States (1979)[7]

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6 84 T.C. 996

7 608 F.2d 455 (Ct. Cl.)

This dispute involved a U.S. parent establishing a Swiss distributor whereby the transfer price was structured in such a way so that the Swiss company would capture seventy-five percent of the combined profits. Swiss tax rates were much lower than U.S. rates. The analysis presented in the court proceeding involved comparability of third party resale price margins (i.e., the mark-up over cost of goods sold that other independent distributors were able to earn). This case is of note because (i) it involved an income or comparable company based approach and (ii), a great deal of emphasis was placed by the court on comparability criteria, particularly for product similarity and associated marketing efforts, functions performed, and the existence of parallel geographic market conditions.

The theory behind a comparable company approach is that companies represent bundles of transactions. So if a specific transaction, and its ancillary terms, cannot be identified, the next best solution is deemed to be the use of the overall results of the company. There are difficulties with this conceptual bridge in the sense that the comparability criteria in the regulations do not adequately provide a mechanism to adjust for differences in how companies undertake this bundling process.

The DuPont case also introduced the use of two specific ratios for transfer pricing analysis. The first was the Berry Ratio, named after an IRS economist. This ratio, which is often cited in transfer pricing cases involving distributors, is defined as gross profit divided by operating expenses. The second ratio that was used was the rate of return on capital. This ratio was used to argue that since the rate of return earned by DuPont's Swiss distributor greatly exceeded the range of such rates found for a wide cross section of other distributors, then this indicated that too low a transfer price was being paid by the Swiss to distributor to its parent company.

Also of note in this, and similar cases (PPG Industries, Ross Glove, Edwards, and Nissho Iwai American Corp.), is that courts have rejected the use of industry statistics (e.g., data from the IRS's Source Book of Statistics of Income), as useful indicia for income based approaches to setting transfer prices. In so doing, courts have been reluctant to accept such data in the absence of a specific showing that the companies included in the statistics are comparable to the entity under review. Notwithstanding, the IRS and some taxpayers continue to rely upon industry statistics for benchmarking purposes because of the difficulty and/or effort required to identify specific comparable companies.

Bausch & Lomb Inc. v. Commissioner (1989)[8]

The controversy in the Bausch and Lomb case involved the licensing of intangible assets between a U.S. parent and a related Irish contract manufacturer of contact lenses. There were no comparable transactions that could be identified to apply a transaction based approach, nor were there any comparable companies that could be identified to which to apply an income based approach. Consequently, the court turned to another approaches.

The approach chosen by the court was to select, albeit without a great deal of supporting analysis, a risk adjusted rate of return benchmark which could be used in conjunction with an Internal Rate of Return (IRR) calculation, using available management projections for the Irish facility coupled with its capital costs, to determine the arm's length royalty rate. In this exercise, the transfer price (i.e., a

8 92 T.C. 525.

licensing fee because the properties being exchanged were intangible assets) was set so that the computed IRR approximated the benchmarked rate of return. This was the first case where the IRR method was explicitly used.

Sundstrand Corp. v. Commissioner (1991)[9]

Sundstrand also involved a U.S. parent and a foreign (Singapore) manufacturer whereby there were intercompany exchanges of tangible and intangible assets. It is worth noting that Ireland, Singapore and Puerto Rico have attractive tax advantages for U.S. parents relative to their location choice of manufacturing facilities. From an analytical standpoint this case is notable because (i) it further underscored the relatively stringent criteria that must be satisfied in using comparable *transaction* approaches, (ii) it identified the issue of location savings for the first time[10], and (iii), hinted at the use of bargaining theory to address the location savings issue.

Westreco, Inc. v. Commissioner (1992)[11]

This case, which was decided in favor of Westreco (a subsidiary that performed certain research services for its overseas parent, Nestle), highlighted the need for in-depth analysis of the functions undertaken, risks incurred (e.g., quality

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9 96 T.C. No. 12

10 Location savings refer to cost savings (e.g., utility subsidiaries, low labor rates, ...) that may be enjoyed by locating a subsidiary in other countries relative to constructing a plant, or otherwise establishing a business presence, in the U.S. After quantifying the extent of these savings, an important issue becomes whether the parent or the subsidiary should receive the benefit of these savings. To a large extent this outcome should, in an arm's length sense, depend on the relative bargaining strengths of each entity.

11 Docket No. 24078-88.

control, demand variability, cost overruns, changes in scope which could not be recovered in higher fees, and "downstream market risk" in terms of a flat fee arrangement with the client rather than a licensing or profit sharing arrangement), and assets utilized (e,g, patents) in selecting comparable companies to use under the RPM, CPM or fourth method approaches. In so doing, the court noted that the defendant economic expert's use of Standard Industrial Classification (SIC) code groupings to identify comparable companies was inadequate.

This case again emphasized the role of bargaining (referencing Chandler's [20] published discussion of his analysis). Specifically, the court focused on the plaintiff economist's testimony that Westreco would not have been able to bargain for a higher profit because (i) Westreco required basic research from the parent as an "input" to its research, (ii) other subsidiaries of the parent could readily provide the research function being provided by Westreco and (iii) Westreco had to depend on further process engineering and marketing by the parent's other subsidiaries before Westreco's research could be commercially viable.

These cases are summarized here to underscore the relevance of economic analysis to the setting of appropriate transfer prices. In particular, the result of these cases, along with the regulations, give greater reliance to the use of non-transactional approaches. The focus of this dissertation is on testing the appropriateness of common methods that the IRS uses to apply non-transactional (e.g., comparable company benchmarking) approaches.

II. TRANSFER PRICE LITERATURE REVIEW

The objectives of this section are twofold. First, to outline the microeconomic theory which provides a foundation for designing normative transfer pricing rules. Second, to illustrate how other aspects (e.g., bargaining theory, risk, and transaction costs) of the industrial organization literature are applicable to designing appropriate transfer pricing rules. These objectives provide context for the empirical analysis to follow and also yield a few reasons as to why the arm's length standard, as embodied in the current transfer pricing regulations, may be inconsistent with the actual profit maximizing behavior of firms.

GENERAL THEORY

Hirshleifer [32] wrote the seminal paper[12] on transfer pricing in 1956. Hirshleifer's "goal" was to set transfer prices so that total (i.e., as opposed to divisional) firm profits are maximized. This is important, as will be discussed subsequently, because the outcome under this goal can differ from that which would result under an arm's-length standard.

Hirshleifer assumed the role of technological and demand independence between two divisions within the same company. Technological independence indicates separate and distinct cost functions. Demand independence means that any external sales by either division do not reduce the external demand for the product of the other.

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12 Hirshleifer acknowledges two other contemporaneous papers by Cook [22] and Dean [23].

Using these conditions and graphical analysis, Hirshleifer examined three cases. The first case assumed no intermediate (external) market for sales by the manufacturing division and a competitive market for the final product sold by the distribution division. The best solution here was for the firm to set the output level such that the sum of the marginal costs of both divisions equalled the final price. This could be done by a central management decision or by having either division internalizing the costs of the other division into its objective function. For example, the manufacturing division could supply the distribution division a schedule of what output levels would be produced under various transfer prices. The distributor would then seek that level of output where the final price in its external market, less the transfer price, equaled the distributor's marginal cost. This case assumes full information and certainty. It also assumes that neither division misrepresents its costs nor takes advantage of its monopolistic buying or selling positions. Accordingly, under this assumption of competition, the theoretical outcome is also the arm's length outcome.

The second case involved a competitive intermediate and final market but where the manufacturing division could sell to unrelated distributors, or the distribution division could purchase the product from unrelated suppliers. Not surprisingly, the appropriate transfer price was found to be the market price in the intermediate market, because at a different price one or the other division would not have an incentive to engage in an intercompany transaction. This result was also found to hold even if competition in the final market was imperfect. This provides a foundation for using CUP-type pricing rules.

The final case was characterized by an imperfectly competitive intermediate market. If the demand independence condition is still used, then the firm acts as if

it were a discriminating monopolist selling into two different distribution markets.[13] Demand independence means that sales by one division does not reduce the level of demand facing the other division. From a centralized decision making perspective, the solution would be to equate the joint marginal cost of production with the net (i.e., after reducing the marginal revenue for the cost of distribution) marginal revenue in each market. This solution assumes full information at the disposal of the centralized decision making body. So far, this solution involves only setting the output level; the price solution is a transfer price equal to the manufacturing division's marginal cost at that output level.

If an autonomous (i.e., not involving central management but rather negotiated between the divisions) transfer price rule is to be used under these conditions, the distribution division would need to accurately convey its net marginal revenue schedule (the curve found by taking the difference between the marginal revenue curve faced by the related distributor in its external market less its marginal distribution costs) to the manufacturing division. The manufacturing division would then set the transfer price according to the rule described in the preceding paragraph. Of note, is that the transfer price would be below the price

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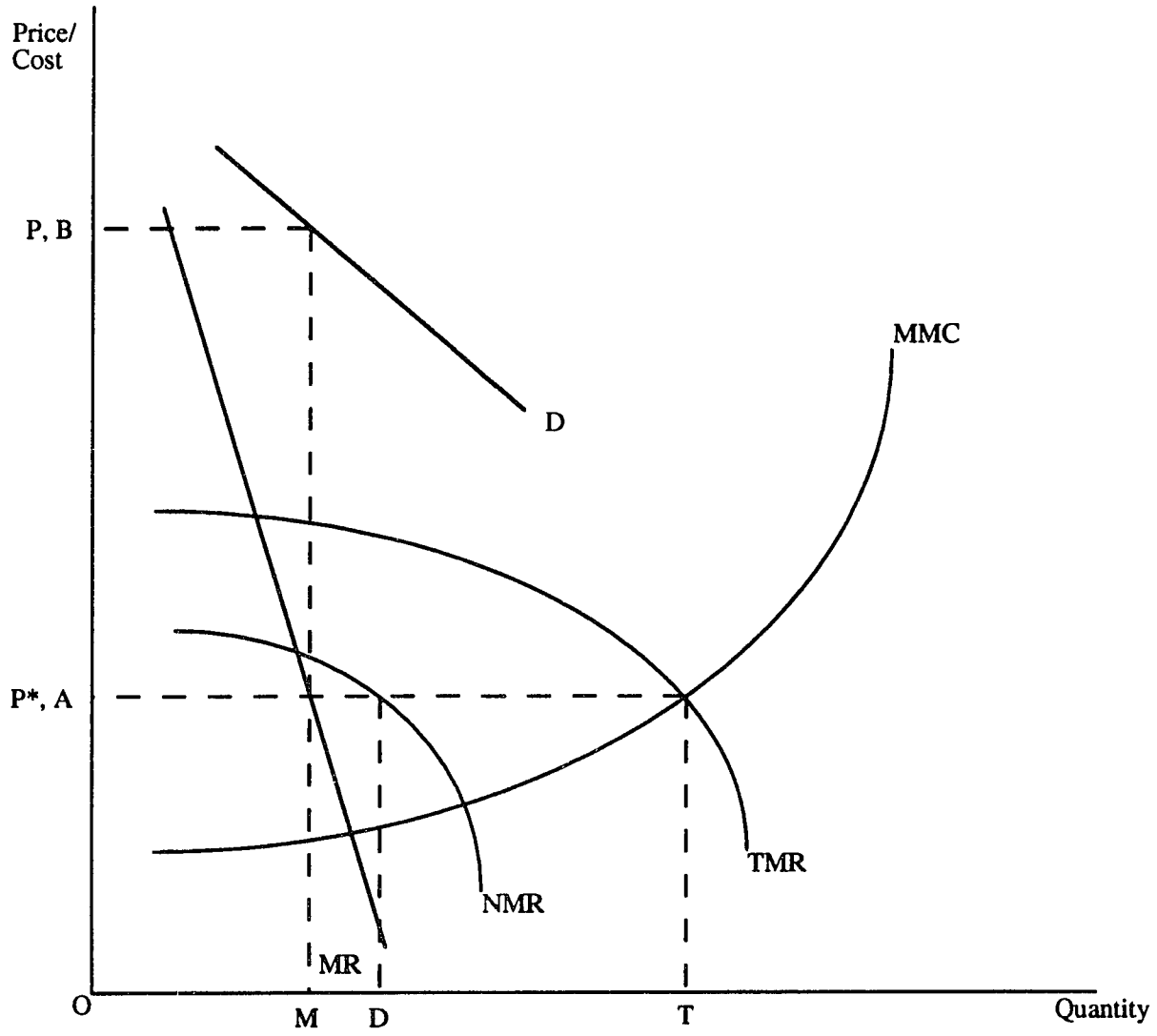
13 As discussed by Pappas and Hirschey [44], among other microeconomists, in their discussion of cost plus pricing, the optimal profit maximizing markup is a function of the degree of demand elasticity for the market in which the product is being sold:

$$\text{Optimal Markup} = \left(\frac{1}{1 + \frac{1}{Ep}} \right) - 1$$

Thus, markets characterized as possessing less elastic demand (i.e., less substitutes are available) should enjoy higher mark-ups. This is relevant to Hirshleifer's discussion of setting transfer prices as would a discriminating monopolist. It is also relevant to the use of the cost plus methodology of the U.S. transfer pricing regulations. These regulations do not explicitly mention the need to evaluate differences in market structure when comparing the mark-up earned on a controlled transaction versus that earn by an unrelated manufacturer selling to an unrelated distributors. The above rule suggests that such a comparison should be made.

EXHIBIT 1. Hirshleifer's Setting of the Transfer Price Assuming Demand and Technological Independence and an Intermediate External Market Characterized by Imperfect Competition



Note: OM+ OD = OT
P* = transfer price per unit (i.e., marginal cost to distributor)
P = external market price
OM = quantity sold to external market
D = external demand in the intermediate market
MR = marginal revenue curve associated with external demand in the intermediate market
MMC = manufacturing division's marginal cost
NMR = net marginal revenue of the distributing division (i.e. after deducting its own cost)
TMR = sum of MR and NMR

Reproduced from: Breit, Hochman and Saueracher. Readings in Microeconomics, p.144.

charged on sales to outsiders in the intermediate market. This is depicted in Chart 1, where the transfer price, P*, is OA. Total output produced by the manufacturing segment (under a centralized decision maker seeking to maximize firm-wide profits) is OT, where MMC equals TMR. This results in a transfer price of P*. Given P*, then the quantity sold to the related distributor is OD -- where the related distributor's net marginal revenue equals the transfer price. OM is equal, as the residual, to total output produced — OT — less that level of output bought by the related distribtutor — OD). The external price, P, is then set equal to OB (determined by locating on the demand curve the price that corresponds to the output -- OM). To achieve this same division of output result, rather than a central decision maker determining the relative output, the transfer price could be set at P*, so that the distributor would equate its marginal purchase cost (P*) to its net marginal revenue and thereby purchase quantity OD. Note that with a transfer price of P* the related distributor is contributing to the manufacturer's profit.

The result, P*<P, is important because the CUP methodology implies that P* should be set to P. In so doing, the CUP methodology largely ignores the importance of market structure in the intermediate market (along with the demand independence assumption). Hence, if the standard of setting the transfer price is set to achieve firm wide profit maximization then the logic of the transaction based methodology (e.g., Resale Price) in the transfer pricing regulation fails. This is an important distinction, because it highlights a key difference between the arm's length standard and the objective of firm-wide profit maximization, that has not adequately been discussed in the subsequent transfer pricing literature (particularly when "comparable' transactions exist in different geographic markets).

If the demand independence assumption is dropped, an additional internal sale to a distributor would be expected to lead to a reduction of external demand otherwise facing the unrelated distributors who also purchase from the manufacturer. In the short run, where economic profits may still exist because entry is incomplete, Hirshleifer indicates, although he does not formally explore, there may be incentive by a monopolistic producer to sell in an intermediate market at a subsidized price (thereby increasing the quantity sold to the related distributor and reducing the quantity sold to outside distributors) to the related distributor so as to increase total firm profits.

Dropping the technological independence assumption is not explored in detail. However, Hirshleifer does note that for a vertically integrated firm, with conditions of technological dependence and cost complementarities, there are reasons why a manufacturing or related distribution entity will not trade with external entities in the market. This is relevant to transaction costs, discussed subsequently, and is further indicative of why the arm's length standard may be inappropriate.

Part of the relevance of Hirshleifer's analysis hinges on whether an appropriate standard to be used for taxing purposes needs to be consistent with a standard that provides incentives for maximization of <u>total</u> firms (pre-tax) profits. Berry, Bradford & Hines [9] note in discussing Hirshleifer, that the arm's length standard is wrong for tax purposes, because its object is to determine taxable (i.e., consistent with the functions employed, risks undertaken and intangibles contributed) income, not to design the internal management incentives of an integrated firm.

TRANSACTION COSTS

There has developed a fairly rich literature as to why firms vertically integrate. Coase [21] considered why some firms contracted externally for certain services versus vertically integrate. He found that where transaction costs are high, firms economize on these costs by vertically integrating. Williamson [65, 66] added greater definition as to what are transaction costs. Using behavioral assumptions of "bounded rationality" and "opportunism," Williamson discussed the risk of expropriation as a type of transaction cost. This risk increases when parties to a transaction need to make specific investments with implicit high exit costs. In making these investments, "asset specificity" is created, whereby significant future gains may be earned if expropriation does not occur. The presence of asset specificity increases the incentive to vertically integrate.

An example of asset specificity in a transfer price context would be the situation of a U.S. distributor of French champagne. The distributor, like the producer, needs to make an investment in building the brand name (e.g., through advertising) in the distributor's local market. Unless the distributor has some guarantee as to an ongoing relationship with the manufacturer, the distributor may be loathe to take the risk associated with making a significant investment. This is a significant reason why the alcoholic beverage industry is characterized by wide-spread vertical integration between manufacturers and distributors.

Williamson also identifies conditions of uncertainty and high transactional frequency as creating increased transactions costs; hence, these conditions create greater incentive to economize on these costs through vertical integration.

Other economists have explored the role of transaction cost relative to multinational corporations.[14] Buckley and Casson [13] identified conditions that provide incentives for "internalization or vertical integration." These include (1) activities that involve significant time lags for which future markets cannot be used to eliminate the timing risk, (2) a monopolistic market for the intermediate product but where traditional price discrimination cannot be pursued, (3) situations where there exists bilateral monopoly such that an undetermined and unstable bargaining situation develops, (4) asymmetric information, and (5) opportunities to exploit tax and/or tariff reductions through coordinated activity.

Buckley and Carson applied their work to multinationals with the simple reasoning that multinationals develop whenever markets are internalized across international borders. The authors indicate that high technology industries are good candidates for possessing significant levels of asset specificity. Asset specificity was also found to exist for industries characterized by heavy brand recognition.

As described in Langbein [40], other economists have also written on the role of transaction costs and multinationals. Langbein indicates that efforts were made to integrate "internalization" theory with theories of location-specific advantage in an "eclectic" theory of international production (e.g., Dunning and McQueen [25]). This theory was expanded to explain intermediate forms of integration, like long-term licensing and joint ventures (Rugman [52]). Empirical and applied work also explored the application of this theory to such diverse industries as banking

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14 Also of note is that other economists in the law and economics field have used transaction cost arguments relative to the assignment of property rights, see Demsetz [24] and Calabresi [15]. The issue of transaction costs is largely ignored in the transfer price regulations when an arm's length standard is employed.

(Tschoegl [59]), the growth and distribution of bananas (Casson [17]), and the international hotel industry (Dunning and McQueen [25]).

Berry, Bradford and Hines [9] also discuss the role of transaction cost savings, although they refer to these savings as economies of scope, relative to intercompany relations. The authors state that "commonly owned firms together are more profitable than the two would be were they independent yet performing the same functions ... Firms in different countries or firms doing different things are linked together by ownership because there is some internal economy generated by that ownership link-whether that be quality control, managerial efficiency and improvement of information flow, or whatever."

This is another important distinction, also explored by Langbein [40], that seems inconsistent with the spirit of the U.S. transfer pricing regulations (specifically the White Paper). Langbein explores the production cost approach, where income is apportioned to each factor of production with residual income attributable to the owner of intangible assets, associated with the arm's length standard relative to the transaction cost theory previously discussed. By characterizing the chief transaction cost saving that arises in transfer price situations as one where the risk of future lost revenue is mitigated (i.e., the incentives for opportunistic behavior is reduced), Langbein goes on to argue that integration within the "satellite, host, or out country" protects the hypothetical lost revenue, then that country should have the right to tax these "returns to organization form," or "the revenue imputable to what would be lost if the enterprise did not integrate its operations in that country." This is in contrast to the spirit of the White Paper, whereby the excess returns would be taxed by the owners of the intangibles (e.g., the licensor in a related party exchange of intangible property). Hence, this is an

important shortcoming of the current regulations where the allocation of transaction cost savings between related parties is not addressed.

EVALUATING WHETHER MULTINATIONALS USE TRANSFER PRICES TO SHIFT INCOME

There have been a number of papers analyzing whether multinationals use transfer profits to shift worldwide income to maximize worldwide, after-tax profits, although no general consensus exists as to the findings. Representative of this literature are the following articles.

Grubert and Mutti [30] use cross sectional regression analysis to conclude that their finding of a pattern of reported profits in low versus high tax jurisdiction is consistent with income shifting behavior. Specifically, the authors analyzed return on sales and return on equity data for U.S. manufacturing affiliates located abroad relative to tax rate differential between each foreign country and the U.S. Data on foreign country GDP growth was used to adjust for the impact of real differential profit opportunities across countries.

In contrast to the findings of Grubert and Mutti, Bernard and Weiner [7] compare inter-affiliate and arm's length prices in the petroleum industry over the years 1973-84. Their approach is to use regression analysis to evaluate prices paid by U.S. importers in three types of transactions: purchases from foreign affiliates, host governments and third parties. The authors, using a number of independent variables (e.g., transaction terms and shipping costs) to account for price variation, found little evidence of transfer price manipulation, particularly as correlated to differential tax rates. The commentator to this paper, Elden [26], felt that more

refinement was needed before such a conclusion could be reached. Additional variables that Elden suggests should be evaluated include organizational form, foreign tax credit limitation used, location of shipping affiliates and other variables.

The U.S. Commerce Department [60] has also published empirical studies comparing returns earned on U.S. direct investment abroad versus the rates earned on foreign direct investment into the U.S. The returns were based on historical cost, current cost and market value estimates. In all cases, the Commerce Department results show significantly higher returns earned on U.S. direct investment abroad. However, the Commerce Department acknowledges that these results may be influenced -- apart from transfer price considerations -- by lower cost of capital requirements of foreign investors, the willingness of foreign investors to trade short term profits for increased market shares over the long run, and the relatively unseasoned nature of foreign investment in the U.S. compared to U.S. direct investment abroad.

TRANSFER PRICING WITH UNCERTAINTY AND THE ROLE OF BARGAINING THEORY

Bargaining Theory Applications

Berry, Bradford and Hines [9] reference game theory and bargaining in their review of how economic analysis contributes to transfer pricing. In their discussion of the micro-economic theories espoused in the White Paper they state:

> "the appropriate inquiry, even under "arm's length," properly conceived, may not be what marginal return would induce all parties

> to enter a transaction, but rather the game theoretic question of how, viewing the multinational grouping as a cooperative games, and the residual profit as the aggregate value of the game, the separate components, as players, would divide the residual profit. That question turns upon the "value" of the game to each of the players".

In this context, the authors indicate that the in-house (i.e., "make or buy") option is particularly relevant to determining relative bargaining positions. In the 1993 regulations, there is an explicit example of the "make or buy" bargaining aspect of a U.S. multinational that uses a foreign subsidiary for contract manufacturing purposes.

Other than this paper, to my knowledge, there have been no papers that integrate the bargaining literature into a transfer pricing context, even though good survey articles relative to the general bargaining literature by Rochet, and also by Chalos and Haka, exist.

Rochet [50] provides a general survey of the bargaining literature. Rochet first discusses the generalized Nash solutions to the bargaining game. This involves the joint maximization of the agents' utility functions which include a parameter (specified by the researcher) depicting each agent's bargaining power. Rochet then introduces impatience (i.e., utility functions that involve a discount factor) and the risk of "break down" (based on a random variable governed by a Poisson process). Rochet points out that in the Nash model, an efficient outcome is reached -- namely that agreement is reached immediately if perfect information exists. In the real world situation, this is not the case because agents use early rounds of the

negotiation to transmit information. The extension of this is the use of Bayesian updating and the concept of sequential equilibrium.

Chalos and Haka [19] evaluate the effects that negotiation can have, due to external market opportunities, relative bargaining ability, and private information, on reducing the ability of negotiated transfer prices to promote firm wide profit maximization. The methodology used was a set of controlled experiments involving different payouts and different circumstances (e.g., presence of external market opportunities, existence of private information, presence of divisional versus firm reward schemes, ...). The results of this study were that divisional incentive schemes led to higher firm-wide profits than expected, especially under conditions of uncertainty. Further, over time bargaining strategies improved the total profits earned, thereby signifying the importance of learning behavior.

Uncertainty

Kanodia [39] relaxes Hirshleifer's condition of certainty to introduce differences in risk aversion among divisional managers when there is uncertainty over the final product price (and assuming that firms cannot make contingent contracts in external markets). Kanodia develops a theory that the more risk adverse the distribution division is, the lower will be the desired output at a given transfer price, the lower will be the equilibrium transfer price, and the lower will be the manufacturing division's profits. Kanodia goes on to show that under this result, it will be to the manufacturing division's benefit to induce the distribution division to undertake more risk. This can be accomplished through risk sharing (e.g., a vector of transfer prices may be used whereby the price chosen within the

vector will correspond to the actual price selected in the price vector for the good in the external market).

Ronen and Balachandran [51] also evaluate the role of transfer pricing in establishing proper incentives for both divisional and firm wide profit maximization. In their paper, the true cost of production is a random variable and communication between divisions is blocked. The authors analyze the relative benefits of the principal and agent under centralized and decentralized decision making. They conclude that the transfer price is higher under decentralization for larger levels of production cost.

Summary of the General Literature Review

The key points of this section are:

- The arm's length standard fails to recognize that under certain conditions (e.g., imperfect intermediate and demand independent markets) a manufacturing division has the firm-wide profit maximization incentive to price discriminate between the price extended to related and unrelated distributors. Application of a CUP approach fails to recognize this distinction and may therefore be flawed in certain instances.

- The arm's length standard fails to recognize that firms vertically integrate to generate transaction cost savings. If the transfer price is set in accordance with the unrelated party pricing benchmarks (e.g., under a CUP approach) these transactions costs savings are arbitrarily allocated. The tax code provides that if the taxpayer can show that the IRS's adjustment in a transfer pricing

dispute is arbitrary and capricious, then the adjustment will not stand. Accordingly, ignoring the role of transaction cost savings is a flow in the current regulations.

- There exists no consensus findings in the economic's literature as to whether a significant number of multinational corporations use transfer prices to shift income.

- In the past, the U.S. transfer pricing regulations failed to adequately allow for the relative bargaining strengths of related parties, and the impact of uncertainty, in the methodologies for determining "appropriate" transfer prices. In the regulations adopted in 1993, more references have been made to the applicability of bargaining theory although the topic is not rigorously explored.

If the arms length standard is to be interpreted to be consistent with the concept of profit maximization the concepts of market structure, transaction cost savings, bargaining theory and uncertainity need to be more explicitly developed in the U.S. transfer price regulations. If this harmonization cannot be implemented then perhaps the arm's length standard should be discarded in favor of a standard that more closely reflects the economic reality of vertically integrated businesses operating in different geographical markets.

With this general literature review (a more in-depth and targeted relative to the specific empirical tests undertaken, literature review will also be provided in each of the analytical sections to follow) as background, the subsequent empirical tests will focus on specific propositions that frequently arise when the IRS audits U.S.

distribution subsidiaries of foreign parents relying upon comparable company benchmarking methods.

III. SELECTED EMPIRICAL TESTS:

A. EVALUATING THE BIAS INHERENT IN USING AGGREGATE SIC CODE DATA TO DERIVE DISTRIBUTOR PERFORMANCE INDICIA FOR TRANSFER PRICING ANALYSIS

A central tenet of the transfer price regulations, particularly when comparable transaction based methods are not available, is that various "profit level indicators" should be sourced from comparable companies to be used as benchmark performance measures to evaluate the entities under review. The rationale being that if the transfer price for a tested party (i.e., the company being scrutinized) is set appropriately, then the tested party's profit and/or rate of return performance should approximate that of the independent, comparable companies.

1. Statement Of The Problem, Relevance, and Literature Review

In defining comparability, the U.S. transfer pricing regulations emphasize functional comparability. For example, in the discussion of sourcing comparable company performance data the currently proposed changes to the U.S. transfer pricing regulations [61] state "[I]f, however, it is not possible to obtain reliable data regarding uncontrolled taxpayers that perform functions with respect to product that closely correspond to the product related to the tested operations (i.e., the company under review for a transfer pricing violation), then the scope of the applicable business classification is broadened to include the functions performed by the tested party and as broad a category of product as is necessary to obtain reliable data." The example given by the regulations is that if the tested party is a distributor of compact disc players, but no comparable companies can be identified, then the regulations

indicate that the search parameters should be expanded to include distributors of all consumer electronic products. The key point is that the functional dimension is given the greatest weight, while the product dimension can be expanded as needed.

Examples of different business functions include not only broad distinctions -- manufacturing versus wholesale and retail distribution versus service providers -- but also more specific distinctions (e.g., marketing, warranty repair, maintenance, and research and development). The regulations suggest that companies performing more functions rather then less, or companies performing more complex functions, should be expected to earn higher profit margins.

The regulations also stress comparability with respect to business risks incurred and types of assets utilized. Drawing on the financial economics literature, the regulations suggest that higher levels of risk entail, over the long run, higher expected returns. Further, companies that possess valuable intangible assets should be expected to generate higher rates of return.

In applying a comparable company approach it has been often the case that the IRS and taxpayers have sought to apply "industry norm" data from various publications (e.g., such as those published by Robert Morris Associates and Dun and Bradstreet). Essentially, industry norm data are aggregated company results whereby classifications of different companies into industry types are made using four digit Standard Industrial Code (SIC) designations. SIC codes were structured to first distinguish between broad types of company functions (e.g., manufacturing, wholesale distribution, retail distribution and services) and then between detailed product groupings (e.g., textiles, food, electronics, ...). For example, the first digit in the SIC code pertains to broad functionality and subsequent digits pertain to product

level distinctions. The focus of this dissertation paper is on wholesale distributors. This classification uses a "5" in the first digit spot. For wholesale distribution, the second digit then indicates whether the product is durable (whereby the second digit is zero) or non-durable (the second digit is set to one) in nature. This distinction can be useful for assessing relative risk (i.e., durable goods distributors generally have lower inventory turnover rates, longer lead times, and greater risk of product obsolescence which imply relatively higher expected rates of return).

The formal definition [58] of establishments engaged in wholesale trade encompasses companies that sell goods to other businesses and perform functions that can include: maintaining inventory, extending credit, physical assembly, sorting and grading, and breaking down goods received in large lots, delivery, packaging and advertising. Typically, the types of establishments referenced under the banner of wholesale distributors include merchant wholesalers, sales offices maintained by manufacturing operations, agents, brokers and commission merchants.

The "norms" associated with these industry groupings are typically the median and quartile financial ratio (e.g., gross and operating profit margins, return on assets, and inventory turnover) results associated with the aggregate performance of all companies labelled under each four digit SIC code grouping.

A significant problem with this approach is that the use of industry data on a SIC code basis may well be too broad a benchmark to provide a meaningful measurement approach. This problem is believed, by many economists practicing

in the transfer pricing field[15], to exist because the firms associated with a particular four digit SIC code may not be homogenous relative to functions performed, risks undertaken, and/or assets utilized. Intuitively, if this is true, then the comparability and utility of these data, for benchmarking purposes, is diminished.

Recent papers by Jaditz [36] and Abbott and Andrews [1] analyze the effectiveness of the SIC code system as an effective means of delineating economic markets. This is a topic particularly relevant to market definition analysis in antitrust matters. Jaditz considered whether observed product price variations in four digit SIC codes are consistent with the use of these classifications as market delineators. He found, by statistically evaluating the price "distances", or degree of separations, and volatility between different industries to identify clustering patterns, that a significant portion of four digit SIC classes exhibited little correlation in their price movements. Consequently, he concluded that classification schemes based on similarities in price histories bear little resemblance to the SIC classification scheme. The Abbott and Andrews' paper reaches similar conclusions by also using clustering techniques. However, the Abbott and Andrews' paper focuses on differences in the underlying production technology, rather than price variation, as the chief explanatory factor. Neither of these papers focus on wholesale distribution industries.

With the foregoing in mind, the issue to be evaluated in this section of the dissertation is whether industry norm data based on SIC code classifications present

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15 The following quote, from an article recently published by two economists practicing in the transfer pricing field, is indicative of this sentiment: "the IRS is currently exploring the use of "short cuts" for the examination of small and medium owned companies. Among the options discussed are income adjustments based solely on industry statistics ... an industry statistic approach could result in significant distortions" See Bitler, R. and S. Sherwood [10].

an accurate benchmark for purposes of evaluating transfer prices by way of "comparable company" performance levels.

The test methodology will be first to evaluate the functional composition of public companies identified under four digit distributor SIC codes. Then, to the extent that functional heterogeneity is present, groupings of the public companies in the four digit distribution SIC codes by more specific functional types will be made so that statistical tests can be employed to evaluate whether there are meaningful profitability and/or rate of return differences between these groupings.

ANALYSIS:

2. Assessing The Functional Composition of Four Digit Standard Industrial Classification (SIC) Codes For Distributors

The starting point to this analysis was to access as the Lexis/Nexis database to source company profiles. This database contains both prose descriptions and primary and secondary (representing ancillary or related business activities) SIC code information about public companies classified under wholesale distributor SIC codes. From this source, I identified any company in the database that was associated with a four digit SIC code beginning with 50 (i.e., a durable goods distributor) or 51 (a non-durable goods distributor).

I then read the prose description of each company to distinguish between those distributors that performed distribution services only (which I labeled "pure" distributors), and those distributors that jointly undertook manufacturing and distribution functions (which I labeled for purposes of this dissertation "vertically

integrated") and those distributors that, while not performing a manufacturing function, nonetheless undertook research and design functions, possessed significant intangible assets and/or undertook significant marketing functions (I labeled these companies as "super"[16] distributors). The prose descriptions in Lexis/Nexis identified company functions in these terms.

On the basis of this review, I found that approximately 70 percent of the companies classified as wholesale distributors were vertically integrated in that manufacturing functions were undertaken. Of the remainder, I deemed 7 percent to be "super" distributors (if the companies performed either R&D, design or significant marketing functions involving a tradename), and the remainder were "pure" distributors (albeit some of these distributors also undertook significant marketing and/or technical service functions).

The vertically integrated category included as least some companies that appeared to perform only modest manufacturing activities in relation to their distribution efforts. To account for this, I further evaluated differences in the primary versus secondary SIC codes. I found that approximately 40 percent of the companies comprising the 70 percent share result had a primary SIC code that was a manufacturing based code (i.e., the first digit in the four digit code began with a 2 or 3, indicating the prominence of the manufacturing function). These companies were removed from my data set as they appear to be better classified as

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16 In the Bitler and Sherwood paper, a similar distinction is made between "service" distributors and "private label" distributors. They noted that "[G]enerally private label distributors contract out manufacturing of the products they distribute, and attach their own trade name and trademark to those products. Another difference is that private label distributors sometimes undertake research and developing activities ... private label distributors tend to earn higher net margins over the long run, in any particular industry, than service distributors." This later conclusion is stated by the authors without any empirical support. IBID, p. 472-473.

manufacturers that also distribute rather than distributors that do some manufacturing. This result is tempered because it is plausible that some of these companies have incorrectly chosen a manufacturing based code, on the basis of the product description alone, when in fact they function as distributors only. Nonetheless, the incidence and magnitude of this result is significant.

The import of these findings is that if the entity that is being scrutinized for transfer pricing abuses is truly a "pure" distributor, as many foreign companies are in inbound transfer pricing cases, then the use of aggregate or industry "norm" statistics, based on four digit SIC code groupings, may present a biased comparison because of the functional heterogeneity (particularly given the presence of a significant number of distributors that engage in manufacturing) of the companies classified as distributors on a four digit SIC code basis.

3. Statistical Testing For Margin And Rate Of Return Differentials

This section summarizes the results of statistical testing undertaken to determine whether there are significant differences, for various profit and rate of return measures, between the three (i.e., "pure" distributors, vertically integrated manufacturers and "super" distributors) different functional groupings defined above.

The statistical tests concern inferences (relative to the population from which the data samples were drawn) about two population means. It is expected that the Lexis database does not encompass all public distributors. Further, it may also be the case that this research can be used relative to private distributors as it is unclear whether there is persistent financial performance bias between public and private

distributors (e.g., while companies often go public becuase they are successful there are, at least partially, offsetting incremental costs to being public).

To construct these tests, averages (X) of selected parameters (e.g., gross margin, operating margin, sales turnover, ...) were taken from the various populations (e.g., "pure" distributors, "super" distributors, ...). It should be noted that the difference between these sample means is a point estimator that is unbiased and of minimum variance.[17] The data were screened to exclude very large outliers; these screens are detailed as Footnote (a) to the accompanying exhibits 2a - 2c. Because means are used in the test statistic, outliers were eliminated to reduce distortions recognizing that the incidence of an outlier typically indicates very unusual (e.g., partial year operations) operating characteristics. As this screening process was not constrained to be symmetrical this process should not be considered data "trimming". Sample variances were also computed assuming the sampling process involved two independent random variables; thus, the combined variance can be represented as the sum of the individual variances (Sp references the pooled standard deviation).

In each case, the null hypothesis (Hn) that the difference between the same parameter sampled from each population was equal to zero was evaluated, at the 95 percent confidence level, using a test statistic. This test statistic was based on the "t" distribution since the population variances are unknown. Annual data were used, where available, for each company over the period 1980-90.

If the population variances are unknown and if it can be assumed that these variances are equal then the confidence interval formula[18] becomes:

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17 See Pfaffenberger [45], p.329-357.

18 See Pfaffenberger [45], p.329-357.

$$(\overline{x}_1 - \overline{x}_2) \pm t_{\alpha/2;\, n_1 + n_2 - 2} \; Sp \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

where $Sp = \sqrt{\dfrac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{(n_1 - 1) + (n_2 - 1)}}$

degrees of freedom = $n_1 + n_2 - 2$ (alpha = .05)

However, when the population variances cannot be assumed to be equal, then a modification is necessary. I feel this is the case for the data I have collected because, intuitively, I would expect "pure" distributors to exhibit smaller variances due to their limited risk characteristics. The modification is to use the individual sample variances along with a more complex degree of freedom calculation. The confidence interval becomes:

$$(\overline{x}_1 - \overline{x}_2) \pm t_{\alpha/2;\, d.f.} \sqrt{(S_1^2/n_1) + (S_2^2/n_2)}$$

where d.f. [45]= $\dfrac{[(S_1^2/n_1) + (S_2^2/n_2)]^2}{\dfrac{(S_1^2/n_1)^2}{n - 1} + \dfrac{(S_2^2/n_2)^2}{n_2 - 1}}$

Exhibits 2a through 2c summarize the data relevant to these tests, and indicate whether the null hypothesis can be rejected. If so, then a statistically significant difference exists between the two populations under review. The results of these tests summarized as follows:

Exhibit 2a Summary Results for the Test Between "Pure" and Other Types of Distributors
(Data sourced over 1980-91 where available) Hn : (x1-x2) = 0

	ALL COMPANIES (ALL YEARS)										
	"Pure" Distributors (x1)			"Vertically Integrated" Distributors (x2)			Degrees of Freedom	t-value (@ 95% Conf. level) (#)	Point Estimate of Sample Mean Differences (x1-x2)	Confidence Interval (##)	Reject Hn @ 95% Conf.level (*)
	Mean	Std. Dev.	Sample Size	Mean	Std. Dev.	Sample Size					
Gross Margin	22.27%	13.11%	96	28.06%	16.21%	194	229	1.960	-5.79%	3.48%	*
Operating Margin	3.42%	2.13%	90	4.31%	8.10%	190	237	1.960	-0.89%	1.23%	
Sales/Assets	2.61	1.41	96	1.67	1.16	196	160	1.960	0.94	0.33	*
ROA	4.92%	2.64%	79	5.84%	8.43%	192	257	1.960	-0.92%	1.33%	
ROIC	5.08%	2.75%	75	9.31%	10.33%	191	244	1.960	-4.23%	1.59%	*

	ALL COMPANIES (NON-NEGATIVE YEARS)										
	"Pure" Distributors (x1)			"Vertically Integrated" Distributors (x2)			Degrees of Freedom	t-value (@ 95% Conf. level) (#)	Point Estimate of Sample Mean Differences (x1-x2)	Confidence Interval (##)	Reject Hn @ 95% Conf.level (*)
	Mean	Std. Dev.	Sample Size	Mean	Std. Dev.	Sample Size					
Gross Margin	22.39%	13.20%	96	28.49%	15.91%	193	224	1.960	-6.10%	3.47%	*
Operating Margin	3.83%	1.97%	88	7.59%	6.85%	181	233	1.960	-3.76%	1.08%	*
Sales/Assets	2.61	1.41	96	1.67	1.16	196	160	1.960	0.94	0.33	*
ROA	5.66%	1.97%	77	9.93%	5.83%	184	251	1.960	-4.27%	0.95%	*
ROIC	5.92%	2.15%	73	14.10%	8.09%	183	234	1.960	-8.18%	1.27%	*

(a) Sample is screened for outliers; Acceptable range is -25% to 100%.

(#) t-value taken from t-distribution for given degrees of freedom and 95% confidence level.

(##) t-statistic = (t-value) * $\sqrt{(((s1^2)/n1)+((s2^2)/n2))}$

Degrees of Freedom = $(((s1^2/n1) + (s2^2/n2))^2)/((((s1^2/n1)^2)/(n1-1)) + (((s2^2/n2)^2)/(n2-2)))$

Note 1: ROA = Operating Income/Total Assets
ROIC = Operating Income/Invested Capital
s=sample standard deviation
n=sample size
"^" denotes exponent
Hn=null hypothesis

Note 2: Means are unweighted.

Note 3: The general form of this test is to determine whether the range created by taking the point estimate of the sample mean differences (x1 - x2) plus/minus the confidence interval result includes a zero value. If it does not (which is indicated by an asterisk (*) in the last column of the above table), then the null hypothesis, that the mean levels are not statistically different can be rejected.

Exhibit 2b Summary Results for the Test Between "Pure" and Other Types of Distributors
(Data sourced over 1980-91 where available) Hn : (x1-x2) = 0

ALL COMPANIES (ALL YEARS)

	"Pure" Distributors (x1)			"Super" Distributors (x2)			Degrees of Freedom	t-value (@ 95% Conf. level) (#)	Point Estimate of Sample Mean Differences (x1-x2)	Confidence Interval (##)	Reject Hn @ 95% Conf.level (*)
	Mean	Std. Dev.	Sample Size	Mean	Std. Dev.	Sample Size					
Gross Margin	22.27%	13.11%	96	34.76%	21.03%	66	100	1.980	-12.49%	5.77%	*
Operating Margin	3.42%	2.13%	90	5.10%	9.18%	62	66	2.000	-1.68%	2.37%	
Sales/Assets	2.61	1.41	96	1.47	1.20	67	155	1.960	1.14	0.40	*
ROA	4.92%	2.64%	79	5.28%	11.83%	63	67	2.000	-0.36%	3.04%	
ROIC	5.08%	2.75%	75	9.10%	15.08%	62	64	2.000	-4.02%	3.88%	*

ALL COMPANIES (NON-NEGATIVE YEARS)

	"Pure" Distributors (x1)			"Super" Distributors (x2)			Degrees of Freedom	t-value (@ 95% Conf. level) (#)	Point Estimate of Sample Mean Differences (x1-x2)	Confidence Interval (##)	Reject Hn @ 95% Conf.level (*)
	Mean	Std. Dev.	Sample Size	Mean	Std. Dev.	Sample Size					
Gross Margin	22.39%	13.20%	96	36.54%	19.28%	65	104	1.980	-14.15%	5.43%	*
Operating Margin	3.83%	1.97%	88	11.43%	8.74%	56	59	2.000	-7.60%	2.37%	*
Sales/Assets	2.61	1.41	96	1.47	1.20	67	155	1.960	1.14	0.40	*
ROA	5.66%	1.97%	77	14.18%	8.20%	54	57	2.000	-8.52%	2.28%	*
ROIC	5.92%	2.15%	73	18.09%	11.38%	54	56	2.000	-12.17%	3.14%	*

(a) Sample is screened for outliers; Acceptable range is -25% to 100%.

(#) t-value taken from t-distribution for given degrees of freedom and 95% confidence level.

(##) Confidence Interval = (t-value) * √(((s1^2)/n1)+((s2^2)/n2))

Degrees of Freedom = (((s1^2/n1) + (s2^2/n2))^2)/((((s1^2/n1)^2)/(n1-1)) + (((s2^2/n2)^2)/(n2-2)))

Note 1: ROA = Operating Income/Total Assets
ROIC = Operating Income/Invested Capital
s=sample standard deviation
n=sample size
"^" denotes exponent
Hn=null hypothesis

Note 2: Means are unweighted.

Note 3: The general form of this test is to determine whether the range created by taking the point estimate of the sample mean differences (x1 - x2) plus/minus the confidence interval result includes a zero value. If it does not (which is indicated by an asterisk (*) in the last column of the above table), then the null hypothesis, that the mean levels are not statistically different can be rejected.

Exhibit 2c Summary Results for the Test Between "Pure" and Other Types of Distributors
(Data sourced over 1980-91 where available) Hn : (x1-x2) = 0

ALL COMPANIES (ALL YEARS)

	"Pure" Distributors Durable Goods (x1)			"Pure" Distributors Non-Durable Goods (x2)			Degrees of Freedom	t-value (@ 95% Conf. level) (#)	Point Estimate of Sample Mean Differences (x1-x2)	Confidence Interval (##)	Reject Hn @ 95% Conf.level (*)
	Mean	Std. Dev.	Sample Size	Mean	Std. Dev.	Sample Size					
Gross Margin	24.22%	12.25%	67	17.76%	14.11%	29	47	2.021	6.46%	6.10%	*
Operating Margin	3.87%	2.12%	62	2.44%	1.82%	28	60	2.000	1.43%	0.87%	*
Sales/Assets	2.30	1.01	67	3.33	1.90	29	35	2.021	-1.03	0.76	*
ROA	4.85%	2.47%	53	5.08%	3.00%	26	42	2.021	-0.23%	1.37%	
ROIC	4.75%	2.65%	51	5.80%	2.88%	24	42	2.021	-1.05%	1.40%	

ALL COMPANIES (NON-NEGATIVE YEARS)

	"Pure" Distributors Durable Goods (x1)			"Pure" Distributors Non-Durable Goods (x2)			Degrees of Freedom	t-value (@ 95% Conf. level) (#)	Point Estimate of Sample Mean Differences (x1-x2)	Confidence Interval (##)	Reject Hn @ 95% Conf.level (*)
	Mean	Std. Dev.	Sample Size	Mean	Std. Dev.	Sample Size					
Gross Margin	24.60%	12.20%	65	16.83%	13.43%	28	47	2.021	7.77%	5.97%	*
Operating Margin	4.32%	1.84%	60	2.79%	1.88%	28	52	2.000	1.53%	0.85%	*
Sales/Assets	2.30	1.01	67	3.33	1.90	29	35	2.021	-1.03	0.76	*
ROA	5.81%	1.91%	36	6.32%	2.31%	19	31	2.042	-0.51%	1.26%	
ROIC	5.74%	2.04%	34	6.50%	2.42%	20	35	2.021	-0.76%	1.30%	

(a) Sample is screened for outliers; Acceptable range is -25% to 100%.
(#) t-value taken from t-distribution for given degrees of freedom and 95% confidence level.
(##) t-statistic = (t-value) * √(((s1^2)/n1)+((s2^2)/n2))
Degrees of Freedom = (((s1^2/n1) + (s2^2/n2))^2)/((((s1^2/n1)^2)/(n1-1)) + (((s2^2/n2)^2)/(n2-2)))

Note 1: ROA = Operating Income/Total Assets
ROIC = Operating Income/Invested Capital
s=sample standard deviation
n=sample size
"^" denotes exponent
Hn=null hypothesis

Note 2: Means are unweighted.

Note 3: The general form of this test is to determine whether the range created by taking the point estimate of the sample mean differences (x1 - x2) plus/minus the confidence interval result includes a zero value. If it does not (which is indicated by an asterisk (*) in the last column of the above table), then the null hypothesis, that the mean levels are not statistically different can be rejected.

- Exhibit 2a (comparing "pure" distributors versus "vertically integrated" distributors) and Exhibit 2b (comparing "pure" versus "super" distributors) generate the same general result when all years of the data are used: "pure" distributors generate significantly lower gross margins and returns on invested capital, but higher sales turnover levels. There were no significant differences in operating margin nor in return on assets.

These gross margin results illustrate, at least in part, that "super" distributors and "vertically integrated" distributors have greater operating expenses relative to sales than do the "pure" distributors. Thus more gross margin is needed to compensate for these relatively higher operating expense levels. This difference appears to "wash out," in a statistical sense (albeit the point estimates still indicate a lower operating margin for "pure" distributors), at the operating margin level. The lower asset, and hence investment, levels of "pure" distributors are largely responsible for their higher asset turnover.

The lack of a statistical difference (again noting that "pure" distributors had a lower point estimate) for the return of assets (ROA) measure is likely due to the offsetting effects of the profit margin and sales turnover results (because ROA is equal to operating margin multiplied by sales turnover).

The bottom portion of each of Exhibits 2a through 2c presents a similar analysis but using data limited to those years when positive profits

only are reported. I include this presentation because (i) the IRS tends to use, for benchmarking purposes, only comparable companies that earn positive profits and (ii) there is some skewness in the distribution due to the presence of sizable loss results for specific observations. These results indicate, for Exhibits 2a and 2b, that all measures are significant. Thus, for those companies that were profitable in any given year, the results suggest that "pure" distributors earn significantly lower profit and rates of return, than do the "vertically integrated" and "super" distributors. This suggests that the "vertically integrated" manufacturers possess more risk: in profitable years even their operating margins and return on asset levels are higher then their "pure" distributor counterparts, but when loss years are included there is a mitigating effect relative to those measures.

- Exhibit 2c compares, within the "pure" distributor category only, performance results associated with those companies distributing durable versus non-durable products. Presumably, durable good distributors generate greater risk because their inventory turnover is slower and there is higher income elasticity associated with durable goods. This increase in risk suggests that higher returns should be expected over time. This is borne out by the gross and operating margin results. Also, as expected, non-durable good distributors possessed higher asset turnover levels since (i) inventory is a significant component of assets for distributors and (ii) this type of inventory sells faster vis-a-vis durable good inventories. However, the combined effect of these results (i.e., relatively high profit but low inventory turnover rates for durable goods distributors and the reverse

for non-durable goods distributors), is to produce no statistically significant difference in the rate of return measures. The same results hold when the data are limited to those years where positive profits are earned. [This result may indirectly suggest that there are no appreciable risk differences, in general, between these two types of distributors.]

At this juncture it is necessary to point out that the test procedures used here are those used when a random sample is made from a population. The procedures used to select the 24 "pure" distributors can be viewed as a sampling process if: (i) the population is considered all (i.e., public and private "pure" distributors); or (ii) time series analysis is to be used so that the population would be annual data (for these same distributors but over a greater period of time then that observed in the five year "sample" period). Condition (i) is of most interest because one would like to be able to extend the test results to private distributors as well. To do so, one would need to show that there is no meaningful bias (e.g., effects of size or that managers may not be the owners) as to profitability between public and private "pure" distributors. This is a legitimate concern; it is not further evaluated in the dissertation because the standard practice in the transfer price field is to use publicly traded companies to benchmark the performance of a subsidiary of an often publicly traded enterprise.

If the pure distributor data used in these tests cannot be considered a sample, then the mean results (without the need for confidence intervals because "sampling error" is not present) can largely relied upon although the distribution characteristics of the population are still of interest relative to the degree of overlap.

In summary, the foregoing analysis indicates that four-digit SIC codes contain a heterogeneous functional mix of companies even though such codes are identified under the wholesale distributor banner. If an analyst relies on industry "norm" profit margin and rate of return data sourced from the codes, without doing a more thorough analysis and screening of the companies comprising the codes, then bias is likely introduced. If the subject company is a "pure" distributor, the bias will effectively raise the benchmark level relative to what the subject company should otherwise be compared to.

While it may be possible, in applied transfer pricing work, to solve this aggregation problem by identifying the appropriate subsets in the four digit aggregation, this represents about the same level of effort as undertaking a more useful comparable company search under the Comparable Profit Method.

B. EVALUATING THE DETERMINENTS OF DISTRIBUTOR PROFITABILITY, THE INCIDENCE OF DISTRIBUTOR LOSSES, AND DIFFERENCES BETWEEN DISTRIBUTOR ACCOUNTING VERSUS ECONOMIC RATES OF RETURN

The purpose of this section is to use the "pure" distributor data set, that I constructed (subject to some refinements) in the preceding section, to first develop a regression model of how variations in a distributor's operating profit can be explained by variations in a set of independent variables that (i) have theoretical justification relative to causality and (ii), are variables that would not be influenced by transfer pricing considerations if the model were applied to a "pure" distributor in an inbound transfer pricing audit. Using limited dependent variable and multiple discriminant analyses these variables will also be used to assess, as a simulation, the probability that an observed operating margin deficit for a tested party is attributable to general business factors, rather than to transfer pricing abuses. Finally, this section will determine how well accounting rates of return for "pure" distributors proxy their economic rates of return. This is a topic that has generated much discussion in the industrial organization literature relative to manufacturing entities.

1. Statement Of The Problems, Relevance, And Literature Review

a. In General

In addition to the above primary objectives, the pure distributor data set can be used to provide descriptive statistics for various profit level indicators. This is relevant because, as is often the case in applied transfer pricing analysis involving comparable company approaches, one or more true (i.e., in terms of products,

functions, risks and the presence of intangible assets) comparable companies cannot be found. The currently proposed transfer pricing regulations stress that when this is the case the product comparability criteria should be relaxed (i.e., distributors handling more diverse types of products can be included as comparables as long as they are still similar in other respects, particularly in regard to functions performed). Thus, statistics on a general sample of "pure" distributor profit levels and returns can be useful.

The topic, for purposes of this dissertation, of analyzing pure distributor profit and rate of return levels is relevant because there have been very few studies on distributor, versus manufacturing, rates of return published in the economics literature. One of the more relevant studies is that of Holland and Myers [33].

Holland and Myers compare rates of return for manufacturing corporations ("MC's") versus all nonfinancial corporations ("NFC's"). The authors compute weighted average (reflecting both debt and equity sources of capital) rates of return, measured as the ratio of operating income to the current value of capital stock. Data are sourced from the National Income and Product Accounts. These data, for the period 1947-1978, provide current values for plant, equipment and inventories and operating income. Operating income is defined to include interest and depreciation net of the replacement cost of capital stock. The authors conclusions are that: (i) MC's earn greater rates of return than NFC's, but exhibit greater risk (as measured by the standard deviation in returns), (ii) performance for both MC's and NFC's generally peaked in the 1960's, and (iii) business risk and the real cost of capital have been relatively stable over time.

Fraumeni and Jorgenson [28] conducted a similar study, but across all major industries (where wholesale distribution represented one industry group). They found the aggregate after-tax, real economic rate of return on capital to be 8.5 percent but with significant interindustry differences that persisted over time (no discussion was presented as to the effects of risk in contributing to these differences). Interestingly, wholesale trade exhibited a 12.7 percent nominal return over this period. In general, those industries exhibiting returns below 12.7 percent were retail trade, services, transportation, agriculture and some extractive industries. Those industries more closely aligned with the manufacturing function generally exhibited returns higher than 12.7 percent.

In sum, there seems to be little past published analysis on the relative project levels of wholesale distribution as a distinct type of business entity.

b. Explaining Differences in Distributor Profitability: Causal Variables

Turning to a related "problem" in applying comparable company approaches, both the IRS and taxpayers often use comparable company data with little regard to how differences in operating characteristics (e.g., underlying demand and sales growth changes, differences in inventory turnover rates that affect carrying costs and required profit levels given investment in place, structural characteristics of the industry, ...) effect profit performance. The failure to account for these, and other meaningful, factors reduces the effectiveness of the comparable company approach for transfer pricing purposes. Hence, to address this problem there is a need among applied economists in this field to explore the quantitative impact of these variables on profit so as to better adjust and refine the applicability of comparable company data.

The basis for hypothesizing which variables should exert causal effect on distributor profitability should start with a review of the industrial organization literature. A point of departure is the role of industry structure in determining profitability.

Bain's seminal work found that higher rates of return exist in industries that he (subjectively) characterized as possessing relatively high barriers to entry versus those industries characterized as possessing low barriers. Albeit, there was some criticism of these results because the industries used by Bain appear to be in dis-equilibrium and because Bain really uses profit rates for leading firms and not the entire industry. Carlton and Perloff [16] also indicate that econometric studies have generally found that profitability is correlated to both advertising/sales and R&D/sales variables and that high rates of return are linked to industry growth.

Subsequent to Bain there have been a number of papers evaluating the relationship between concentration and profitability in cross-section data. Schmalense [53] noted that through the early 1970's, most of these studies found a weak, positive relationship in cross-section data. However, Demsetz [24] provided an alternative explanation of these findings: more efficient firms capture larger market shares and this, not collusive activity, is the reason why high concentration is observed. Thus, concentration and profitability can be highly correlated without any presence of collusive activity (which was presumed in earlier studies to explain the structure-performance link). Shepherd [55] provides a sharp rebuttal to Demsetz's hypothesis by analyzing, in a case study format, the performance of large U.S. firms. He found that economies of scale were not crucial because the

minimum efficient scale was well below the market share of each dominant firm studied. A chief explanatory factor of each firm's dominance was found by Shepherd to be the effects of advertising in creating brand loyalty.

Other papers in the industrial organization literature provide evidence of the role of other causal variables on firms profitability. A paper by Jones, Laudadic and Percy [38] provides a good example of this literature. The authors use regression analysis to test the effect of several variables on the standard accounting definition of (industry) return on assets. These variables include concentration (measured by four and eight firm concentration ratios), regional concentration (using a dummy variable), demand (measured by the change in industry shipments), product differentiation (measured by the ratio of advertising to sales), economies of scale (measured by the share of industry output of plants of minimum efficient scale), absolute costs (an entry barrier variable measured by the amount of capital needed to establish a Minimum Efficient Scale plant), presence of foreign competition (measured by the ratio of imports to industry output) and degree of industry specialization (measured by the ratio of value added of primary establishments in a given industry to value added of primary enterprises in that industry). Their results can be summarized as follows:

- In general, they found a positive and significant relationship for the concentration variable in producer, but not consumer, good industries.

- Product differentiation (advertising to sales) is strongly significant and correctly signed. Much poorer results are achieved with the other two entry barriers: economies of scale and absolute costs.

- The demand variable generally did not show up as significant. The authors attribute this to multicollinearity with the specialization variable. However, for some consumer good industries they found a positive (significant) relationship.

- Specialization was found to be significant for only the producer goods sample, but the sign was, unexpectedly positive. The authors speculate that specialization may be an entry barrier if specialization serves as a proxy for those factors which as entrant must overcome, especially in the producers' goods market. Presumably in the producer good markets, buyers have better information and are not swayed by artificial product differentiation.

- For the U.S. industries, foreign competition exhibited a significant and negative coefficient.

Gale [29], providing a related paper, hypothesized the market share should interact with concentration in determining profitability. Gale postulated that profit was responsive to increases in share where concentration is high. He found the market share-profit relationship significant in markets where concentration was high. He also confirmed the hypothesis that the behavioral share-profit relation would appear where growth is moderate, but not in situations of rapid growth where oligopolistic consensus could be expected to break-down. Caves, Gale, and Porter [18] also used the Profit Impact of Market Strategy ("PIMS") data on manufacturing firms over 1970-1973 to find further support for a behavorial relation for share and profitability in concentrated industries.

Exhibit 3

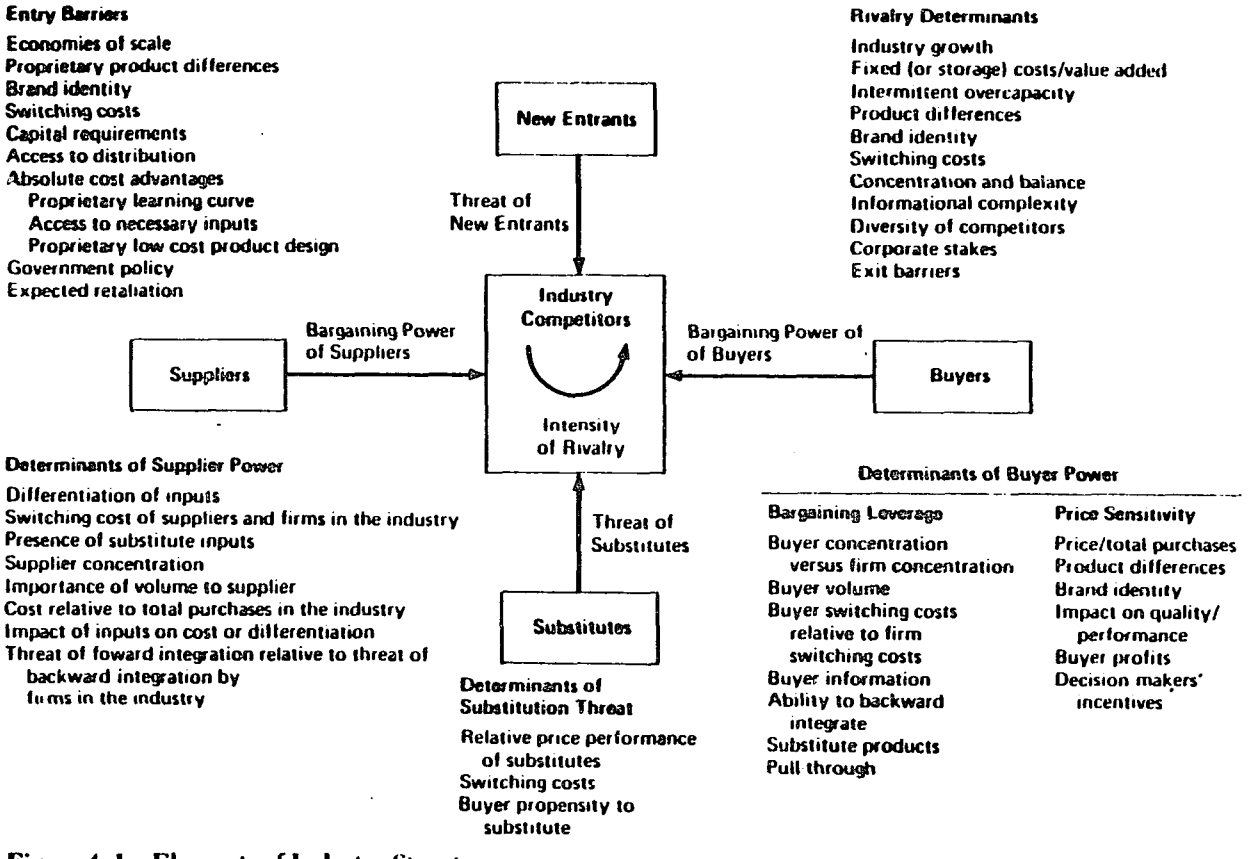

Figure 4-1 Elements of Industry Structure

SOURCE: Michael E. Porter, *Competitive Advantage* (New York: Free Press, 1985), p. 6.

From: A. Rappaport Creating Shareholder Value, the Free Press 1986

Thus, on the basis of these studies, it appears that concentration (and perhaps demand changes) does have an explanatory role in measuring profitability. Another aspect of this topic that the industrial organization literature has focused on is the interrelationship between firm size and profitability.

Schmalensee [54], motivated by the critique that accounting data provide (at best) only rough measures of economic profitability (a topic discussed in the subsequent section of this dissertation), uses twelve different measures of profitability to try to mitigate the effect of these distortions and to evaluate profit differences by size. Gathering data on manufacturing industries from the IRS's Statistics of Income, over 1953-1983, Schmalensee found that there was a profit advantage in favor of larger firms, but that it declined over 1953-1983. Additionally, he found that all measures of the profit advantage varied counter cyclically around their trends during the sample period. Schmalensee found this surprising because larger firms generally have higher capital/output ratios, accordingly one would also expect higher operating leverage (i.e., a relatively higher proportion of fixed cost in their cost structure) and greater profit variability for a given sale level change. This would seem to suggest pro-cyclical movements. Schmalensee observes that the counter cyclical movement is "strongly consistent" with the Mills and Schumann [42] result that larger firms experience smaller relative variation in output (i.e., they contract less in recession and expand less in prosperity vis-a-vis their smaller rivals).

Mills and Schumann find that market share had a negative effect on sales variability -- larger firms within industries have less output fluctuation vis-a-vis small rivals so that flexibility and firm size are inversely related. Moreover, Mills and Schumann conclude that if technologically heterogeneous firms coexist in a competitive, fluctuation prone industry then these firms must exhibit a trade off

between flexibility and static efficiency. The more flexible firms have greater minimum average costs (hence, "trading-off" scale economies for flexibility). "Trading-off" greater capital intensity requires more labor input. Conversely, greater reliance on capital increases fixed costs, so on a per unit basis, fixed costs should be greater for inflexible technologies. In short, small firms act as "shock absorbers" so that sales volatility is negatively related to capital intensity.

Sheshinski and Jacques [56] set out to test this proposition by gathering data on 856 U.S. manufacturers over 1970-1980. They found that capital-output ratios are bigger for larger firms. They also tested for variability of firm rates of return around their trends. Smaller firms were found to exhibit more variability.

Stigler also discusses the role of flexibility in the face of demand changes; he identifies flexibility as a condition where a particular technology set can accommodate a wider range of outputs (i.e., a larger range whereby the bottom to a firm average curve remains relatively flat). In essence, it is believed that smaller firms achieve greater flexibility because they rely on more variable factors of production in their cost mix (albeit at the expense of scale economies). This line of thinking helps explain why many industries are persistently comprised of both large and small firms (although other reasons could include the availability of niche markets) and hence, size may be a relevant variable for analysis.

Research on the PIMS data collected[19] by the Strategic Planning Institute also provides insight into which variables affect profit margin (ROS) and return on investment (ROI) across a diverse set of functional and product industries. Buzzell

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19 This study, initiated in 1972, uses data from more than 450 companies (or 3,000 strategic business units) over a period of 2 to 12 years.

and Gale [14] use these data to identify five factors that have positive effects on ROS and ROI: market share, product/service quality, newness of plant and equipment, labor productivity and vertical integration. They also found five negative factors: fixed capital intensity, inventory investment (although this was not found to be significant in the service industries), the rate of new product introduction and current levels of spending on marketing and R&D. *The authors also found that ROI and ROS are typically higher in rapidly growing markets;* in industries that export more than is imported; when products are standardized as opposed to custom-ordered; and when customers buy in relatively small quantities. Also, ROI (but not ROS) was found to be higher for businesses that concentrated their purchases with a few suppliers.

Kwoka and Ravenscraft [16] find industry growth to be a significant (and positive) explanatory variable relative to price-cost margins. Carlton and Perloff also note that other researchers have found that unions and increased buyer concentration lower price-cost margins while high advertising-sales ratios raise these margins.

Finally, another perspective is that offered by Rappaport [49]. Rappaport, summarizing Michael Porter's well known writings on competitive strategy, identifies several important strategic variables that determine the long run rate of return that firms in an industry can expect to earn. These are depicted in Exhibit 3. Some of these (i.e., supplies and buyer power, availability of substitutes, industry growth) are particularly relevant to distributors. Others (e.g., brand differentiation of those products distributed) would appear less relevant for "pure" distributors.

These studies collectively indicate that independent variables measuring concentration or market share, firms size, sales growth and possibly inventory investment are plausible (if one assumes these manufacturing based results are also applicable to distributors) explanatory variables for analyzing "pure" distributor performance. The regressions performed in the analysis section to follow will rely upon these variables (where they are applicable to "pure" distributors) to assess differences in performance for the data set I have constructed.

c. Incidence of Distributor Losses

Another "problem" to be explored (by computing both descriptive statistics and also using more sophisticated limited dependent variable regression and discriminant analysis techniques) relative to the data set that I have constructed is to explore the validity of the IRS assertation that if transfer prices are set appropriately then inbound distributors should not earn losses.

Limited dependent variable regressions, sometimes referred to as binary choice models, can involve both linear and non-linear specifications. A linear specification is used in a linear probability model whereby the probability that an event will occur, given some independent variable(s), is the estimated coefficient of the independent variables(s) plus the constant. The dependent variable is either one, if the event in question has taken place, or zero.

Pindyck and Rubenfield [47] indicate that regressions of this type possess error terms that are heteroscedastic (i.e., not of constant variance). "Observations for which the associated probability is close to 0 or close to 1 will have relatively low variances and observations with the associated probability closer to 1/2 will have

higher variances. The presence of heteroscedasticity results in a loss of efficiency but does not in itself result in either biased or inconsistent parameter estimates."

Weighted least squares regression is of limited use because for small samples it is not efficient. Pindyck and Rubenfield suggest that OLS is a preferable technique although they note, as is the case with weighted least squares, the predicted probability results may lie outside the [0,1] range resulting in specification bias.

To mitigate the problem of predicted probabilities lying outside the [0,1] range Pindyck and Rubinfeld indicate that Probit and Logit models are more useful. These models transform the linear model by constraining the observations to lie with the [0,1] range. One can think of this as compressing the linear regression line into a "S" shape whereby the upper and lower bounds of the [0,1] range are approached by the fitted regression "line."

This transformation uses the assumption of a cumulative uniform probability function.[20] The Probit model uses the cumulative normal probability function and the Logit model uses the cumulative logistic probability function. The difference between the two is that while the Logit model has fatter tails, it is easier to use. Pindyck and Rubinfeld also note that because the cumulative normal transformation is non-linear, OLS cannot be used. Rather maximum likelihood techniques are required.

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20 A cumulative probability function is defined as having as its value the probability that an observed value of a variable X (for every X) will be less than or equal to a particular X over the range [0,1].

Another empirical technique can help address the problem of assessing the likelihood of distributor losses due to factors apart from transfer pricing. This technique is called Multiple Discriminant Analysis ("MDA") and is discussed in detail by Altman [4 and 5].

MDA assigns independent observations to one of two or more groups which are delineated by a given qualitative characteristic (e.g., incurring a loss or not). To assign each observation, MDA derives a linear combination of certain features (e.g., variables such as sales growth) which can best discriminate between the qualitative groups. Additionally, the percentage of firms correctly classified on the basis of the resultant discriminant function serves as a measure of the explanatory power. This is analogous to an R square statistic in a regression equation, and, in fact, measures the degree of intra-group cohesiveness relative to the inter-group dispersion.

The calculation procedure employed by MDA is to first calculate the difference between the group average results for each predictive variable. If four variables are used, then an one by four vector (labeled D) will result. This vector will be comprised of the difference, for each of the four variables, between the average value of the failed versus viable distributor. Next, the sums, sum of squares and cross products for each variable (X_1, through X_4), across both groups, are computed to form a matrix:

$$A = \begin{matrix} \Sigma X_1^{\,2} & \Sigma X_2 X_1 \cdots \\ \Sigma X_1 X_2 & \Sigma X_2^{\,2} \\ \vdots & \end{matrix}$$

Then, an equation is established such that:

[A]	x	[C]	=	[D]
(4x4)		(4x1)		(1x4)

The vector C, whose values are simultaneously solved for, provides the coefficient values to the discriminant function. The underlying assumption to MDA involves equality of intra-group covariation and dispersion to enable the use of a linear function. A normality assumption is necessary to perform tests for statistical significance.

From this section I conclude that various empirical techiniques are available to measure, in a probabalistic fashion, the incidence of a distributor loss driven by non-transfer price, business variables.

d. Accounting Versus Economic Rates of Return

Still, another topical is that the data can be used to address is the issue of how well accounting rates of return proxy the underlying economic rate of return. This has been the subject of a number of papers in the economics and accounting literature.

The apparent inability of accounting data to adequately measure economic rates of return[21] is an area of focus by Fisher, McGowan and Greenwood [27]. Fisher, who testified as an expert witness on behalf of IBM in its landmark antitrust case,

21 Defined as the interest rate at which the present value of the benefit stream from an investment just equals the cost of the investment.

was most interested in this topic as it related to the measurement of monopoly profits.

Fisher (et al) first identified a set of measurement problems associated with accounting rates of return. These include:

- the problem that current period profits are in current dollars, but the denominator in accounting rates of return measures are typically book values. This will bias the return measurement upwards. The best measure is the replacement value of assets.

- accounting measures do not incorporate relative risk characteristics;

- accounting for depreciation can vary markedly across firms for reasons that have little to do with the true underlying rate of depreciation. This affects both numerator and denominator of accounting rate of return measures. Fisher notes that adding depreciation back still does nothing to adjust for differences in the numerator;

- R&D and advertising expenditures are treated as expenses, not investment, by the accounting rules; and

- book value can include the capitalized value of monopoly profits if the company being evaluated was recently acquired

On some of these topics there is a relatively wide body of literature. For example, Ibbotson and Sinquefeld [34] provided detailed time series analysis for

different classes of financial securities to document the risk-return trade off. Others in the financial economics field have written extensively on this topic. In analyzing intangible asset returns Jaffe [37] found, using cross section regressions, that the gross return on R&D expenditures was about double the return on physical assets. Similarly, Bernstein [8] also used inter-industry regression analysis to find that the private returns on R&D capital were generally two and a half to about four times greater than the private rates of return on physical capital. Hirschey's paper [31], which uses a market valuation model, found that "advertising and R&D expenditures" have positive and significant market value (intangible capital) effects.

Due to the focus of this dissertation on "pure" distributors -- who have little in the way of depreciation, R&D and advertising expenses, and/or non current assets -- these measurement concerns should be mitigated for purposes of my dissertation. However, Fisher goes on to state that a more important conceptual problem is that current period profits are driven by investments made in the past and not directly to capital stock that is currently in place. Fisher states that this cannot be overcome with averaging.[22]

Fisher [27] also identifies a potentially more serious difficulty: differences in the time path effects of depreciation and cash flow. While the economic rate of return of (EROR) is the internal rate of return (i.e., the discount rate equating the present value of investment and expected cash flow) the accounting rate of return (AROR) if influenced by different factors. For example, these factors include the amounts of book depreciation and the amount of earnings retained. With this

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22 Further, this problem is compounded if the end -- not beginning -- of period investment is used as the denominator.

understanding, Fisher provides a numerical example for a hypothetical investment to show that the EROR and AROR can be significantly different.

Even if one modifies some of the assumptions used in his example (e.g., a flatter earnings stream rather than a "humped" or "Q"-profile stream used by Fisher) similar results can be had. Consider the following hypothetical investment.

Assume an initial investment of $100 to finance a one asset firm. Let that asset be net working capital to finance inventory and credit sales. Assume sales are initially $200 and operating profit as a percent of sales is 3 percent, or $6 in year one, and there is no depreciation. Finally, assume sales grow at a steady rate of 5 percent annually. Exhibit 4 simulates the associated AROR and EROR rates.

Exhibit 4 illustrates that a determinant of AROR is the earnings retention rate (that portion of current earnings funneled back into the business to provide working capital financing to support sales growth). If the retention rate is 75 percent or above, the AROR and EROR results coincide fairly closely. Retention rates of this magnitude are suggested by the "pure" distributor sample results used in the dissertation. Lower retention rates cause relatively higher EROR's (as do higher sales growth rates, although the partial effect of an increasing profit margin is to cause the AROR results to be relatively higher). This suggests that there may be significant differences between AROR and EROR results for distributors should, for example, profit retention rates be less than 75 percent.

Other economists have utilized various methods to overcome these measurement problems. Mueller and Reardon [43] attempt to avoid the critiques associated with using accounting rates of return, and also the critiques of lag

Exhibit 4.

Simulated* AROR and EROR Result for a Hypothetical Company

Period	Sales	Cash In-flow	Beginning Assets	Ending Assets	Average Assets	AROR (a)	EROR (b)
1	200	6.00	100.00	104.50	102.25	5.87%	6.50%
2	210	6.30	104.50	109.23	106.86	5.90%	6.51%
3	221	6.62	109.23	114.19	111.71	5.92%	6.51%
4	232	6.95	114.19	119.40	116.79	5.95%	6.52%
5	243	7.29	119.40	124.87	122.13	5.97%	6.53%
6	255	7.66	124.87	130.61	127.74	5.99%	6.53%
7	268	8.04	130.61	136.64	133.62	6.02%	6.54%
8	281	8.44	136.64	142.97	139.81	6.04%	6.54%
9	295	8.86	142.97	149.62	146.30	6.06%	6.55%
10	310	9.31	149.62	156.60	153.11	6.08%	6.56%
11	326	9.77	156.60	163.93	160.27	6.10%	6.56%
12	342	10.26	163.93	171.63	167.78	6.12%	6.56%
13	359	10.78	171.63	179.71	175.67	6.13%	6.57%
14	377	11.31	179.71	188.19	183.95	6.15%	6.57%
15	396	11.88	188.19	197.10	192.65	6.17%	6.58%

*

Assumptions	
Sales growth	5%
Operating Margin as a percentage of sale	3%
Percent of profit retained	75%

a. Calculated as cash in-flow/average assets

b. Calculated as ((cash in-flow - (percent of profit retained x cash in-flow))/beginning assets) + sales growth

specification problems of earlier work (see Baumal, Heim, Malkiel and Quandt [6]) whereby economic rates of return were estimated by regressing changes in profits over one time period onto the amounts invested in an earlier period. Mueller and Reardon focused on the concept that if the change in the market value[23] of the firm in a period is greater (less) than the amount invested,[24] then the return on this investment was expected to be greater (less) than the cost of capital. In conducting their analysis, they assume that an investment in any period earns a constant return on perpetuity to avoid the criticisms voiced by Fisher and McGowan. This effectively requires the use of cumulative averaging to smooth the annual results. The authors found that only 19 of the 698 firms in their sample had a cumulative return on investment, over an eighteen year period, that exceeded its cost of capital.

Mueller and Reardon conclude that while returns are below shareholder opportunity costs the problem may not be that returns are too low but that capital costs are too high due to large government deficits and low personal savings rates. This result has relevance to this dissertation in that requiring economic returns to achieve "hurdle" rates relative to their cost of capital as evidence that a tested party's transfer price is appropriate may still be too high of a benchmark, given that Mueller and Reardon found most companies fail to achieve this benchmark (i.e., only 19 of 698 firms achieved this hurdle over the eighteen year period studied by Mueller and Reardon).

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23 Computed as the market value of common stock, preferred stock and current (taken at book value) and long term debt.

24 Investment is defined as profit plus depreciation expense minus dividends plus changes in equity, plus changes in debt, plus advertising and R&D outlays.

Jacobson [35] seeks to examine the "validity" of accounting return on investment ("ROI") as a measure of economic return by measuring how well ROI is correlated to stock returns. Jacobson collects accounting ROI and stock price data over 1963-1982 for industrial companies listed on the AMEX and NYSE exchanges. He then fits three regressions using stock return (and, alternatively, the unsystematic portion of this return) as the dependent variable and accounting return (and the unsystematic portion of the accounting return) as the independent variable. In every case, he found very high "t" values but low R^2 results. These findings were generated for a pooled set of the data and also for cross sectional analysis relative to each year in the sample.

Jacobson concludes that ROI is a valid measure of economic performance. He also notes, referring to Fisher, that there is some belief that if the general shape of the benefit profile associated with an investment stays constant, then the ROI and economic return will vary together. This implies that a weak time series association between the two measures will exist, but not so across firms. While Jacobson's results partially confirm this, contradictory evidence is present because significant effects were found on the aforementioned cross sectional tests.

Jacobson finds that both growth in operating income and profit margin are significantly correlated with stock return. However, the associated R^2 results are very low (e.g., .009). In a separate study by Lev [41], regressions were run for stock returns on various financial statement ratios. Overall, Lev found R^2 results in the .04 to .06 range.

In sum, there seems to be conflicting results as to how well accounting reform measures underluying economic rates of return.

2. Analysis: Data Collection and Descriptive Statistics of Sample Returns

For purposes of this section of the dissertation I refined the data set used to test for SIC code bias in the following ways:

- I chose only to work with those "pure" distributors possessing publicly available financial data for at least the five year period 1986-1990.

- A more comprehensive screening approach for identifying "pure," stand-alone distributors was also undertaken. This involved a detailed reading of each company's 10-K Securities and Exchange filing to more definitely eliminate distributors that engaged in manufacturing, research and design, highly significant marketing functions, or possessed (i.e., valuable) intangible assets.

- More data were collected for each company relative to variables such as the presence of direct foreign exchange risk,[25] sales size, operating leverage, sales and operating expense growth, and industry concentration.

These refinements were made to keep the years under review consistent among distributors in the data set as this section of the dissertation will involve

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25 Direct foreign exchange risk refers to transactional risk where a U.S. distributor's foreign purchases are denominated in the foreign currency and not dollars. Indirect foreign exchange risk refers to situations whereby the distributor in question may have no direct foreign exchange risk but where at least a portion of its competitors do have such risk. There was not enough variation in the data sample to undertake testing on this variable.

tests on the determinents of distributor profitability. In the SIC code tests, companies were included in the data regardless of what years, over 1980-91, data were available. Because macroeconomic conditions varied a great deal over 1980-91 (the time frame used in the previous section where hypothesis testing was undertaken), and because macroeconomic conditions effect sales and thereby profitability, consistency in the years under review is important for the forthcoming tests. Further, because this section of the dissertation will focus on "pure" distributors only, I wanted to do more extensive screening, by reviewing published information on each company, to derive a more functionally consistent data set. I was not as concerned with this in the previous section because there I was comparing companies in broad functional classes, using procedures that the IRS would rely on. Here, I will be focusing on companies within a functional group without regard to how the IRS might undertake this type of data search.

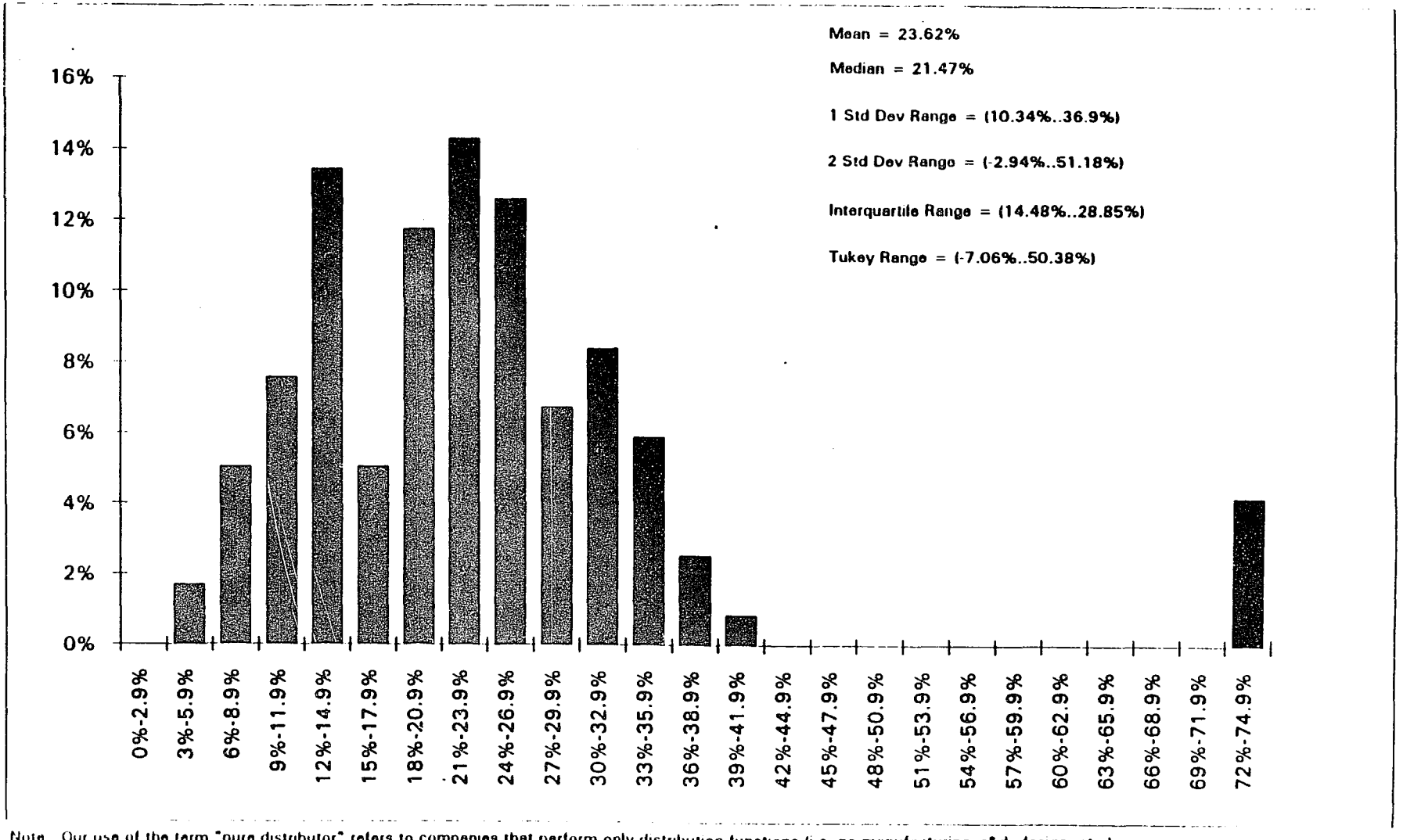
With the resultant data set, I first set out to derive some very basic summary statistics to help fill the void that exists in the economics literature regarding "pure," wholesale distributor returns. Exhibits 5a - 5e portray the frequency distributions of the four profit level indicators (as well as a separate distribution for inventory turnover) most commonly applied in transfer pricing audits of inbound distributors. The following observations can be drawn from these exhibits:

- Gross margins averaged 24 percent with a one standard deviation range of 10.3% to 36.9%).

- Operating margins averaged 2.7 percent with an apparent normal distribution (the one standard deviation range was -3.8% and 9.3%). An explanation as to why one would expect (and indeed finds) the

Exhibit 5a

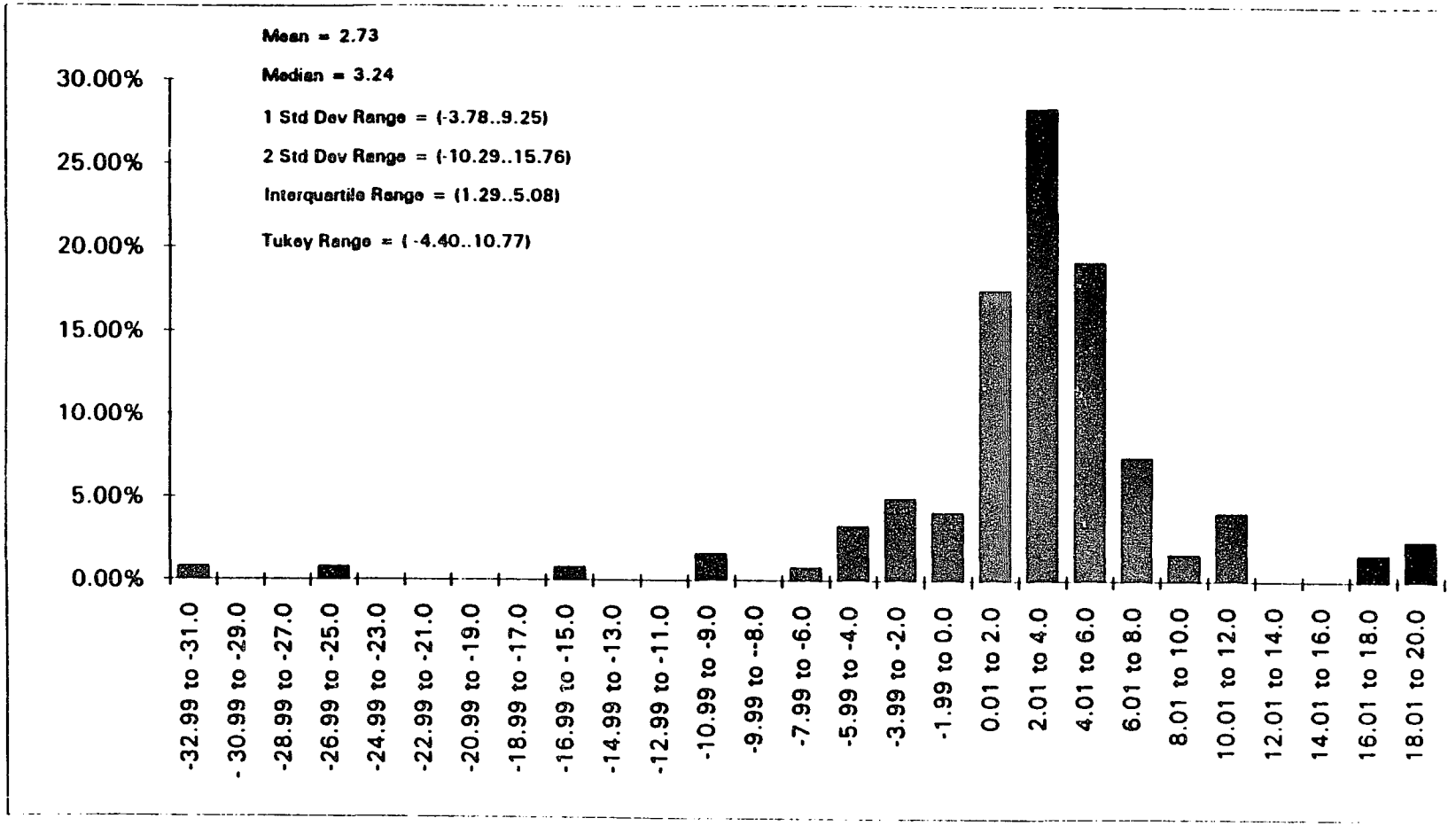
FREQUENCY DISTRIBUTION - GROSS MARGINS FOR "PURE DISTRIBUTORS"
24 Companies
119 Observations



Note: Our use of the term "pure distributor" refers to companies that perform only distribution functions (i.e. no manufacturing, r&d, design, etc.)
(a) Data for each company were sourced for the years 1986-1990

Source: Companies were identified through the Nexis/Lexis database and 10k reports. Financial data were sourced from Compustat.

Exhibit 5b FREQUENCY DISTRIBUTION - OPERATING MARGIN FOR "PURE DISTRIBUTORS"
24 Companies
120 Observations (a)

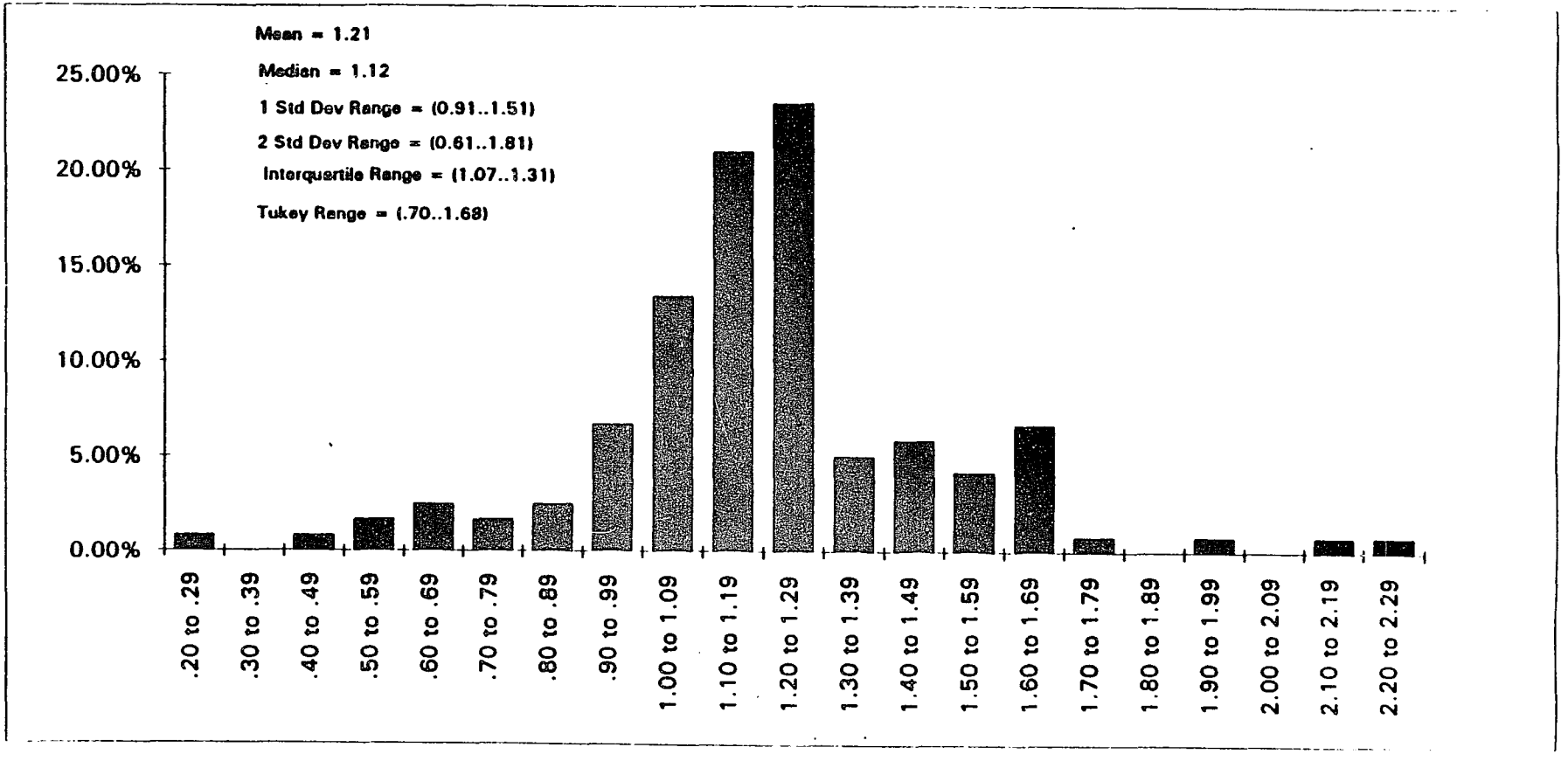


Note: Our use of the term "pure distributor" refers to companies that perform only distribution functions (i.e. no manufacturing, r&d, design, etc.).
(a) Data for each company were sourced for the years 1986-1990.

Source: Companies were identified through the Nexis/Lexis database and 10k reports. Financial data were sourced from Compustat.

Exhibit 5c

FREQUENCY DISTRIBUTION - BERRY RATIOS FOR "PURE DISTRIBUTORS'
24 Companies
119 Observations



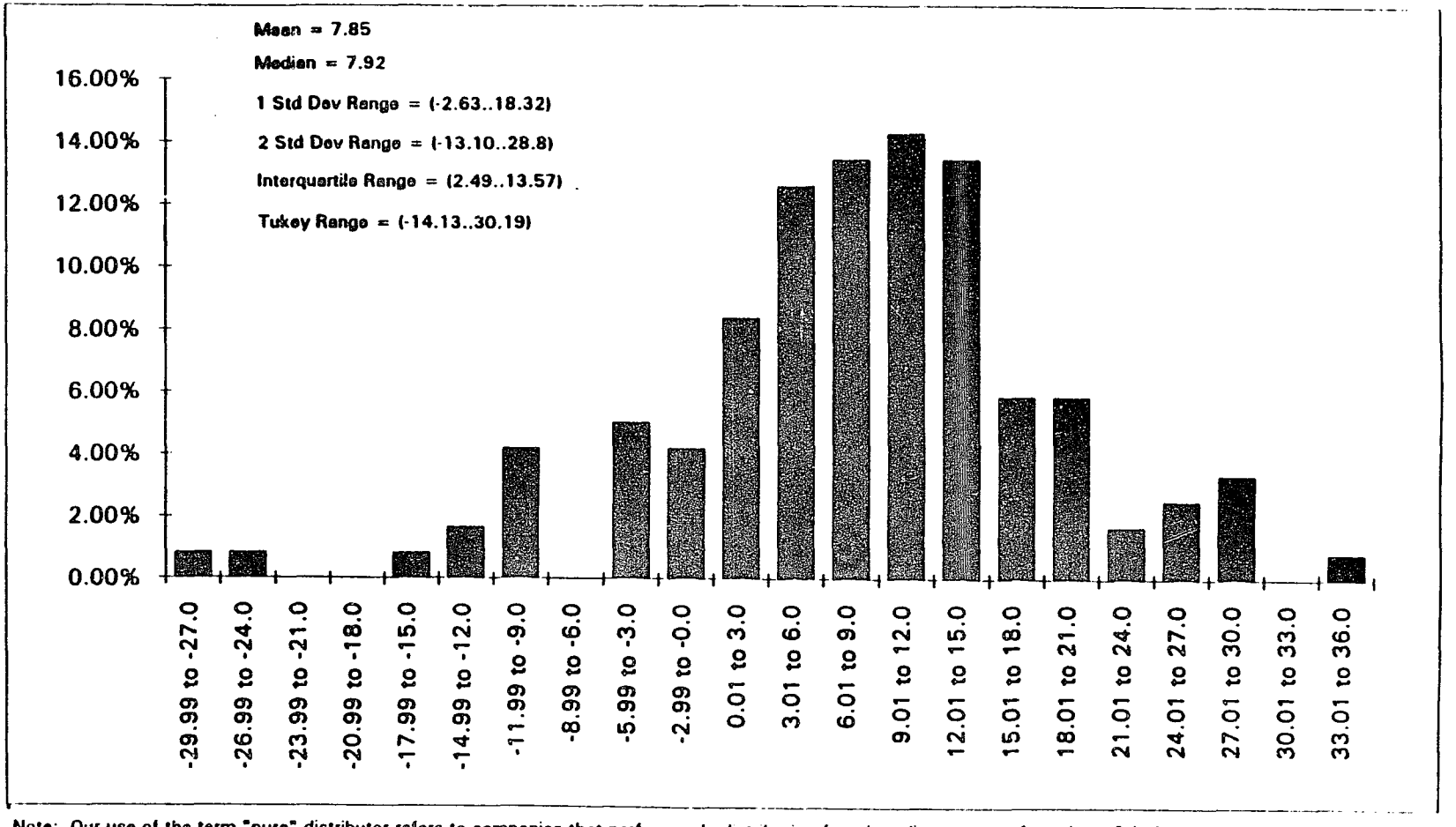
Note: Our use of the term "pure distributor" refers to companies that perform only distribution functions (i.e. no manufacturing, r&d, design, etc.)

(a) Data for each company were sourced for the years 1986 1990

Source: Companies were identified through the Nexis/Lexis database and 10k reports. Financial data were sourced from Compustat.

Exhibit 5d

FREQUENCY DISTRIBUTION - ROA FOR "PURE" DISTRIBUTORS
24 Companies
119 Observations (a)



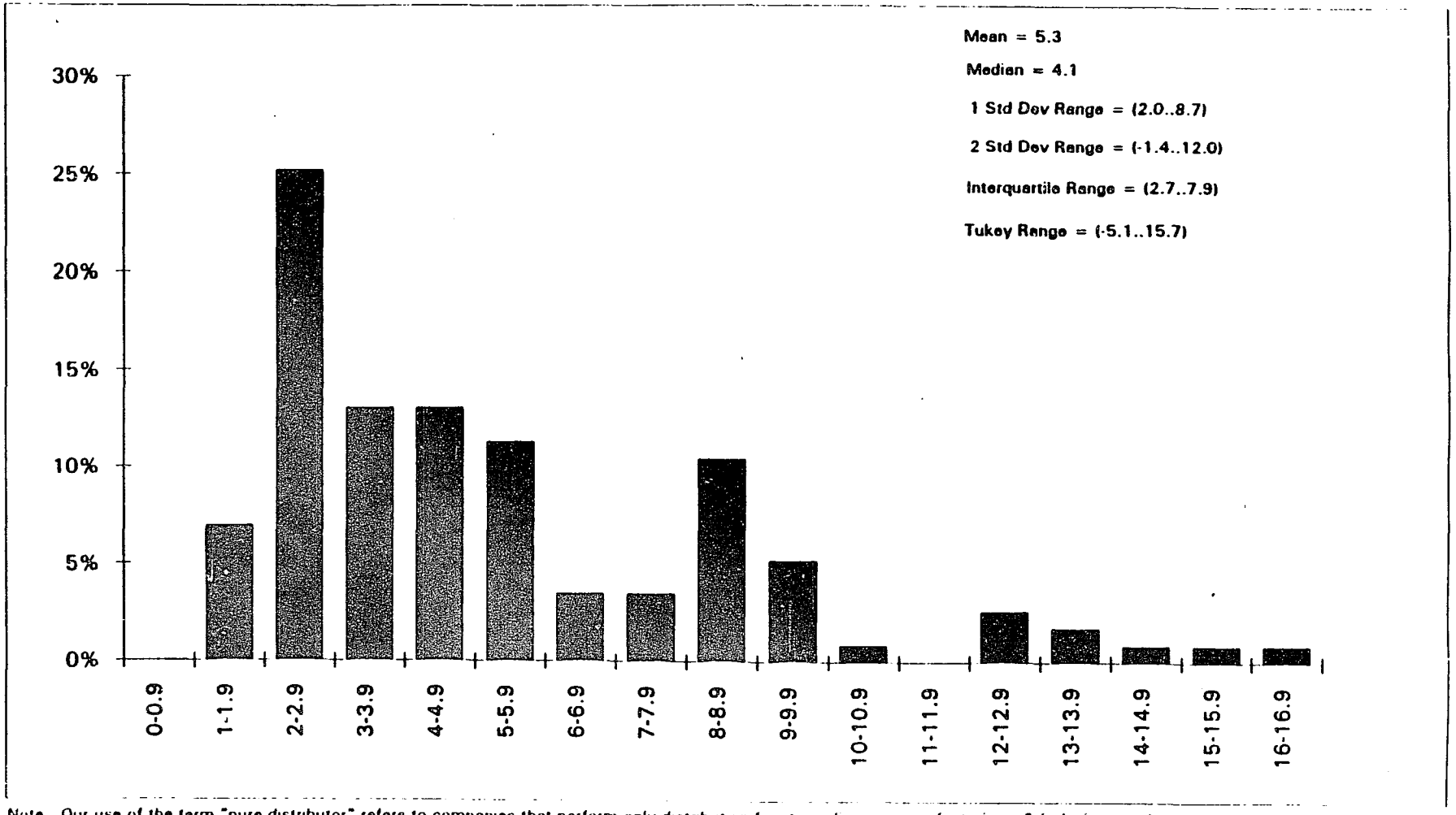
Note: Our use of the term "pure" distributor refers to companies that perform only distribution functions (i.e. no manufacturing, r&d, design, etc.)
(a) Data for each company were sourced for the years 1986-1990. 1990 Data for Graybar Electronics Company were unavailable.

Source: "Pure distributors" were screened through the Nexis/Lexis database and 10k reports. Financial data were sourced from Compustat.

Exhibit 5e

FREQUENCY DISTRIBUTION - INVENTORY TURNOVER RATIOS FOR "PURE DISTRIBUTORS"

24 Companies
115 Observations



Note Our use of the term "pure distributor" refers to companies that perform only distribution functions (i.e. no manufacturing, r&d, design, etc.)
(a) Data for each company were sourced for the years 1986 1990

Source Companies were identified through the Nexis/Lexis database and 10k reports. Financial data were sourced from Compustat.

operating margin distribution to be narrower, from a visual inspection of these exhibits, then that found for the gross margin results is that there is still some variation in the "below the line"[26] functions performed across distributors. This variation would be reflected more in gross profit, than in operating profit, because operating profit measures the profit derived from these functions net of the associated costs (i.e., gross profit does not include the netting effect relative to cost). This explains why the extreme positive outlier in the gross profit chart "disappears" in the operating profit presentation.

- The Berry ratio (gross profit/operating expenses) averaged 1.2% with an one standard deviation range of .91% to 1.51%.

- The return on asset results averaged 7.8 percent with a fairly wide (approximately normal) distribution. The one standard deviation range was -2.6% to 18.3%.

- Inventory turnover results are not normally distributed (rather this distribution is skewed to the right).

I next sought to examine the presence of certain relationships. First on my list was the relationship between inventory turnover and profit margin. Recognizing (i) the fundamental accounting relationship that return on assets (operating profit/total assets) is equal to the product of profit margin (operating profit/sales) and asset turnover (sales/assets) and (ii), that for pure distributors the

26 Reflected as an operating expense.

largest component of total assets is usually inventory, one could then hypothesize that for two (except for relative inventory turnover rates) functionally equivalent distributors, that the distributor with the lower turnover rate would possess higher inventory carrying costs and therefore need to earn a relatively higher profit margin to generate the same return on investment as the other (i.e., high turnover) distributor. The data do indicate a negative (roughly linear) relationship between inventory turnover and profit: higher levels of turnover are associated with lower gross margins and vice versa for low levels of turnover. A comparison was also made with average operating margin to average sales growth. As expected, there seems to be a positive linear relationship.

As a final step to trying to use these data in a purely descriptive manner I sought to determine the incidence, and characteristics, of those distributors incurring losses. This is important because in practice the IRS is quick to assert for inbound transfer price audits that the presence of a distributor loss is indicative of transfer price abuse. The one exception given by the IRS is when the distributor is in a start-up mode (such a mode is informally deemed by the IRS to last no more than three years). In support of this belief, the Service argues that because the manufacturer performs most of the functions, undertakes most of the risk and investment, and perhaps possesses significant intangible assets, then distributor subsidiaries should not incur a loss (rather the manufacturer should incur a bigger loss in these situations).

The data constructed for this dissertation are ideal to evaluate this proposition because these data involve independent distributors for which the incidence of loss is directly observable.

Specifically, the data show that many independent distributors do, in fact, earn losses. Of the twenty-four distributors in the sample for 1986-1990, eight companies (i.e., approximately one-third) in the sample incurred at least one year of an operating loss. Of these eight distributors, the average loss as a percent of sales was 5.7 percent (the median loss was 3.3 percent). The loss (as a percent of sales) range, for any year, was .03 to 32.04 percent. By way of reference, the average operating profit for the entire sample was 2.7 percent. Among the distributors earning losses, the number of years in which each experienced one or more years of losses was roughly evenly spread over the categories: one year, two years, three years, and four or more years (although this last category exhibited the lowest number of responses). The average duration of consecutive year losses was 2.25 years. Similarly, the timing of the losses seem to be spread relatively uniformly over each of the years in the period, 1986-1990. This was interesting because one may have expected a higher concentration of losses in the recession year of 1990.

Reasons for these losses are summarized in the table presented in Appendix A. Notable examples include: increased competitive pressures, increased costs in the face of stable resale prices, currency fluctuations, price erosion due to excess industry capacity, aggressive pricing associated with market expansion (i.e., "buying" market share), sales force disruptions, difficulties with data processing systems and structural changes to the companies operations. These are all variables that are completely unrelated to the transfer price or other elements of cost of goods sold. As such, it is quite apparent that distributors can suffer losses due to a variety of legitimate business factors.

In reviewing these data, it is also apparent that smaller (using sales as the measurement variable) size firms incurred a higher incidence of loss. Specifically,

for those distributors earning losses their average sales size was $347 million (or $60 million on a median basis) versus an average sales level of $869 million (or $252 million on a median basis) for those distributors not incurring losses. Those distributors sustaining losses possessed lower inventory turnover (4.6% average and 3.6% median results) versus those distributors who did not (5.8% average and 4.9% median).

Similarly, as one might expect, those distributors sustaining losses achieved notably lower sales growth (.25% average and a median of 3.80%) versus those distributors who remained profitable (possessing an average annual sales growth of 18.44% and a median rate of 12.65%). Further, those distributors sustaining losses exhibited slightly higher levels of operating leverage.

3. Cross Section Regressions

Based on the results of the literature review discussion I hypothesized that variables measuring firm size, sales growth (as a proxy for demand changes, competitor and technology changes and other non-transfer price factors), and industry concentration were important predictive variables in explaining differences in distributor operating profit levels. Accordingly, to test this hypothesis using the pure distributor data set I structured the following OLS regression and generated the following results (the "t" statistics are shown below the coefficient estimates):

$$OPM_t = a + b_1 (QUART\ 1)_t + b_2 (S\ CHANGE)_t + b_3 (INDCON)_t + e_t$$

$$OPM_t = .026 - .036 (QUART\ 1)_t + .064 (S\ CHANGE)_t + .022 (INDCON)_t$$

(1.88) (1.59) (1.33) (.76)

$\bar{R}^2 = .15$ F = 2.38 Std. error = .045 N = 24

Where OPM = average operating margin (i.e., operating profit divided by sales), expressed in decimal form, for each firm over 1986-1990.

QUART 1 = a dummy variable equal to one if the average sales level of the firm places it in the lower quartile of all firm results (refer to the earlier discussion for a theoretical justification of this variable). A plot of the size results indicates a "break" between the first two quartiles.

S CHANGE = average annual sales percentage growth of each firm over 1986-1990.

INDCON = a dummy variable set to one if the firm is in a highly concentrated industry (defined as an industry in the top quartile of the ranked CR_8 values) and the firm is one of the top 8 firms. The variable CR_8 shares a high positive correlation with market share and a high negative correlation with the total number of companies in the industry. The 24 companies comprise more than a dozen industries.

While the dependent variable, and two of the independent variables, involve sales, the way that sales is reflected in each of these three variables is different which should prevent any spurrious correleation among these variables. Appendix Exhibit B also provides a graph of the residual values relative to the SCHANGE variable, indicating that the size of the residual does not appear to be linearly related to the size of SCHANGE.

Upon inspection of the data it became clear that one firm in the sample had profit margin results that could characterize it as an outlier. This firm, Lawson, exhibits a very high and persistent profit margin (consistently above 15 percent) in each year. None of the other distributors come close to these results in any one year, let alone consistently over the five year period. Because the OLS criteria (i.e., to minimize the square sum of the residuals) is used, the goodness of fit result will suffer due to the presence of the Lawson as a particularly large outlier. Aside from the Lawson results, a plot of the residuals generated by this regression indicated a

relatively normal distribution. A correlation matrix indicate that significant multicollinearity among the independent variables did not appear to be present.

It is worth noting that running a correlation matrix on these independent variables indicates that the only significant correlation exists not between these variables but between inventory turnover and QUART 1 (-.45), inventory turnover and S CHANGE (.26) and inventory turnover and INDCON (.38).

As an alternative, I re-ran the above regression but dropping Lawson from the sample. The results (the "t" values are again denoted in partentheses below the coefficient estimates) are as follows:

OPM = .013 - .024 (QUART 1) + .077 (S CHANGE) + .032 (INDCON)
(1.39) (1.55) (2.40) (1.69)

R^2 = .36 F = 5.2 Std. error = .03 N = 23

Additionally, I tried another approach. Noting that upon inspection of the raw data it became apparent that Lawson possessed an unusually high operating margin, I kept Lawson in the sample and constructed a dummy variable which was set to one if the firm ranked in the upper quartile of the overall results in both operating leverage and sales growth. The rationale, or theory, behind this variable is that high operating leverage (defined as operating expense divided by a denominator of cost of goods sold plus operating expenses) is a favorable condition if sales are rapidly expanding. The results of this regression are:

OPM = .018 - .037 (QUART 1) +.053 (S CHANGE) + .031 (INDCON) + .217 (OPERDUM)
(1.90) (2.49) (1.65) (1.64) (5.10)

R^2 = .62 F = 10.5 Std. error = .03 N = 24

In each of these three regressions, each of the coefficients is correctly signed (e.g., higher sales growth -- particularly when combined with high operating leverage -- and the ability of the firm to be a leader in a highly concentrated industry exerts positive effects on operating margin while small size exerts negative effects). The associated "t" statistics are significant for, at least, an 85% confidence level.

4. Pooled Regressions

Pooled (i.e., where each annual result for each company represents one observation) regressions were also run using these variables. In the first instance regressions were run (including Lawson) without the use of dummy variables to delineate between companies and years. The basis for this implicit assumption is that this "pure" set of distributors is thought to be relatively homogeneous and that there were no significant structural changes in the years under review. The results of this regression are:

OPM = .015 - .025 (QUART 1) + .053 (S CHANGE) + .034 (INDCON) + .209 (OPERDUM)

(2.04) (2.13) (2.72) (2.26) (6.17)

$\bar{R}^2$ = .34 F = 16.2 Std. error = .053 N = 120

While the signs are all correct and the "t" values are significant at the higher 95 percent level, the standard error is larger in this regression vis-a-vis the previous cross section regression.

A pooled regression was also run using these same variables but excluding OPERDUM. Dummy variables for four of the five years under review and dummy variables for most[27] of the individual companies were also included. The results of this regression were less satisfactory in that significant "t" values were not achieved (albeit sales change possessed a positive "t" value of 1.65). The R^2 was .48, the F statistic was 5.7 and the standard error was .047. Five of the company variables generated significant "t" values. Additionally, I ran a regression including a time trend variable for the five years under review (but without company specific dummy variables). The results were very similar to the above regression.

I also ran another variation of this pooled regression by using only the change in real GNP, for each year over 1986-1990, and company specific dummy variables as the independent variables. The R^2, F and standard error results were just a little lower than the previous pooled regression, with the GNP variable possessing, as expected, a positive "t" value of 1.4.

27 To avoid problems of a singular matrix, more than one company needed to go without a dummy variable.

5. Limited Dependent Variable Model

Because of the previously discussed interest in testing for the incidence and causal influences associated with distributor losses, I also applied regression analysis to my data set using binary dependent variable[28] (i.e., the dependent variable equals one when a loss in operating profit is incurred, and zero otherwise) approaches involving linear probability and Logit specifications.

Applying (as a "first cut" approach) the linear probability method, in conjunction with the cross section data set (with variable QUART 1, S CHANGE, and INDCON), yielded the following OLS results:

$$\text{Loss} = 1.49 + .045\ (\text{QUART 1}) - 1.029\ (\text{S CHANGE}) - .350\ (\text{INDCON}) + e_t$$

(11.0) (.2) (2.2) (1.3)

$R^2 = .16$ F = 2.43 Std. error = .44 N = 24

These rather poor results (referencing the standard error result) were not enhanced by dropping Lawson from the data set. As discussed on the next page these poor results may be attributable to some of the statistical deficiencies associated with linear probability models.

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28 An extension, not pursued here, could also be the use of a TOBIT model, where if a positive operating profit is earned the dependent variable would be scaled to the level of this profit. A loss would be reflected as a zero result.

In following a linear probability approach, I also sought to use the pooled data (without the year and company dummy variables) set with the variables QUART 1, S CHANGE, INDCON, and OPERDUM. This generated the following results:

Loss = .23 + .109 (QUART 1) - .396 (S CHANGE) - .176 (INDCON) - .316 (OPERDUM) + e
(4.7) (1.4) (3.0) (1.7) (1.4)

R2 = .13 F = 5.3 Std. error = .36 N = 120

Using these same variables but including company specific and year dummy variables, significantly higher explanatory power was achieved (R^2 = .38) albeit with a notable loss in significance for the "t" values associated with the independent variables.

Logit

Pietta and Sauer [46] discuss the relative tradeoffs in using linear probability versus logit verus discriminant analysis models in estimating binary choice models. The authors identify four shortcomings of linear probability models:

- linear regression estimates are not constraint to lie in a [0,1] interval;
- the error terms are heteroscedastic, resulting in inefficient parameter estimates;
- even if the estimates are constrained to lie within a [0,1] interval, out-of-sample estimates may not satisfy this constrain; and
- classical statistical measures cannot be used because the error term distribution is not necessarily normal.

The authors state that logistic regression models avoid the distributional problems in linear models and hence, these difficulties are avoided. Further, it is stated that linear discriminant models (discussed in the next section) perform poorly with discrete independent variables and fail to produce consistent parameter estimates. In contrast, logit estimates "retain their statistical significance under a variety of non-normality conditions".

With this background, and referencing Pindyck and Rubinfeld [47], I specified a Logit model using a cumulative logistic probability function as:

$$P_i = F(Z_i) = F(a + b\ X_i) = \frac{1}{1 + e^{-(a+b\ X_i)}} = \frac{1}{1 + e^{-Z_i}}$$

To estimate the model, both sides of the above equation are multiplied $(1+e^{-Z})$ to derive:

$$(1 + e^{-Z_i})\ P_i = 1$$

Dividing by P_i and then subtracting by 1 yields:

$$e_i^{-Z_i} = \frac{1}{P_i} - 1 = \frac{1-P_i}{P_i} \quad \text{or} \quad \frac{1}{e^{Z_i}} = \frac{P_i}{1-P_i}$$

Then by taking the natural logarithm of both sides:

$$Z_i = \log \frac{P_i}{1-P_i} = a + b\ X_i$$

Using the SYSTAT Logit procedure, and the pure distributor pooled data, the following result was achieved:

$$\text{Log} \quad \frac{P_i}{1-P_i} = -.2973 - 9.6990 \text{ (S CHANGE)}$$

Given a value of X for the variable "S CHANGE," P_i can be solved for as follows:

Let Y = antilog [.2973 - 9.6990 (X)]

Then $P_i = Y (1-P_i)$

$$\frac{P_i}{P_i} = 1 = \frac{Y}{P_i} - \frac{Y P_i}{P_i}$$

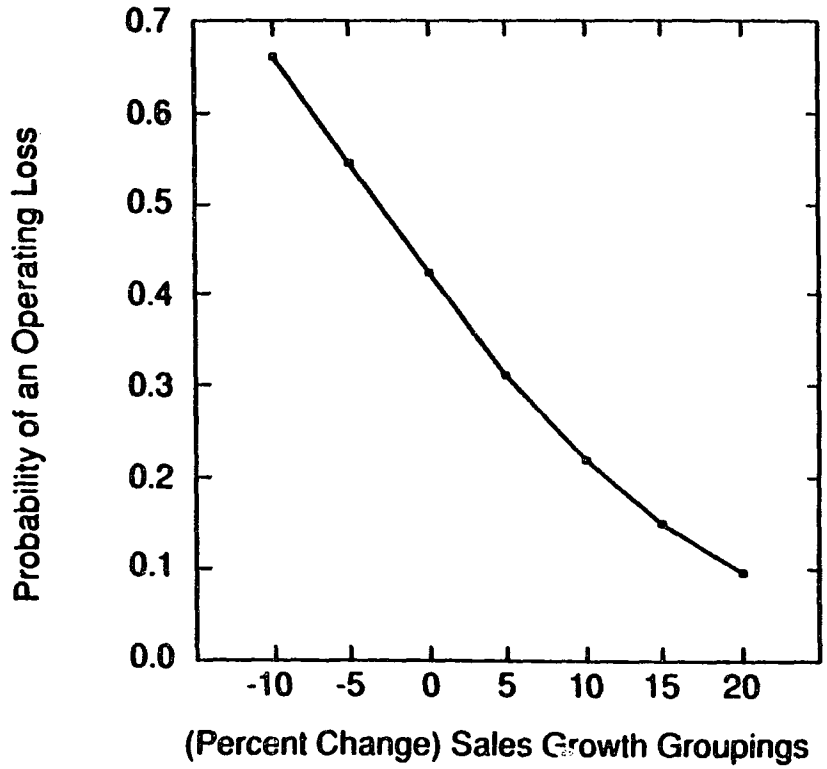
$$1 = \frac{Y}{P_i} - Y$$

$$1 + Y = \frac{Y}{P_i} \quad \text{or} \quad P_i = \frac{Y}{1+Y}$$

Using this result and "backcasting" through the data set, a "charactistic" line depicting the relationship between the probability of an operating loss and sales growth can be derived. This relationship is depicted as a downward sloping, near linear function in Exhibit 6. This result has intuitive appeal.

Exhibit 6a

Characteristic Line Generated by LOGIT to Describe the Relationship between Sales Growth and the Incidence of Operating Losses by "Pure Distributors"



NOTE: The horizontal axis measures the percentage change in sales volume.

Further, Exhibits 6b and 6c depict the estimated probability (P_i) results for each observation relative to whether that observation was actually a LOSS or NO LOSS result. Again, the results have intuitive appeal and seem to reflect reasonable accuracy in the model.

Because the Systat software was limited to a univariate logit procedure, I also used the "Economic Toolkit (ET)" software to attempt a multivariate approach. The model (N=120) I estimated was:

Loss =f (SCHANGE, QUART1, INDCON)

or Loss = 1.33 - 4.67(SCHANGE) + .48(QUART1) - 10.49(INDCON)

(3.8) (2.5) (0.8) (0.1)

While all variables are signed correctly, the "t" values (shown in parentheses below the estimated coefficients) are very low. However, while the "t" value of INDCON is low, the "partial effect" (i.e., holding other variables constant) was quite high at .43. The only other significant partial effect was for SCHANGE (.19). I also estimated this model by eliminating the results associated with the Lawson company, for reasons previously discussed. However, there was not appreciable improvement in the performance statistics of the model.

Exhibit 6b

Visual Presentation of Estimated Probabilities versus Actual Results

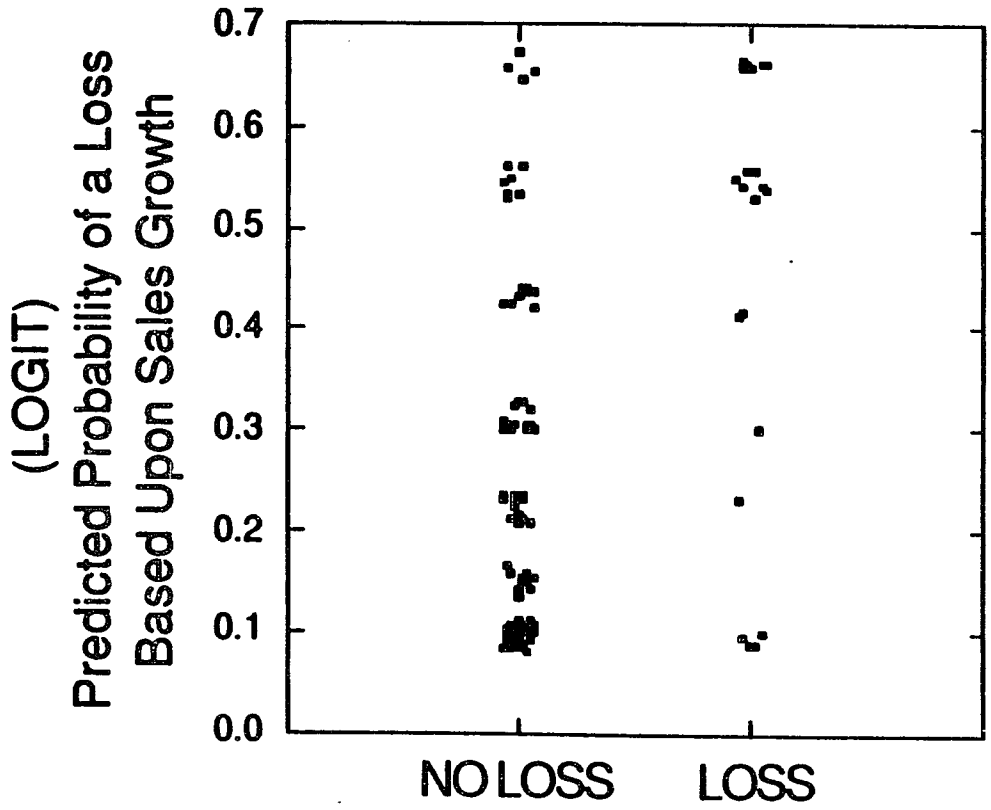


Exhibit 6c Numerical Presentation of the Estimated Loss Probabilities versus Actual Results

Pct. Change in Sales Growth Groupings	NO LOSS	LOSS
-10%	4	6
-5%	7	7
0%	10	2
5%	13	1
10%	14	1
15%	12	0
20%	39	4
TOTAL	99	21

This multivariate logit model generated the following prediction table, where a loss is predicted if the probability from the model was found to be .50 or higher.

		Predicted		
		0	1	Total
	0	98	1	99
Actual	1	17	4	21
Total		115	5	120

This table indicates that the model did a better job predicting "no loss" results but failed to correctly predict many actual losses. I believe this signifies that there are a number of firm-specific events (e.g., loss from restructuring) that play a large role in determining loss results. While it would be desirable to increase the accuracy of predicting actual losses, this model is still useful in that if the model predicts a loss (on the basis of the independent variables which are completely unrelated to any transfer price influences) for an unclassified distribution subsidiary of a related manufacturer, then there is a strong likelihood of an actual loss causes by non-transfer price reasons.

6. Multiple Discriminant Analysis

To apply a multivariate approach to analyzing the incidence of loss, multiple discriminant analysis was also used. The result of this approach is different from that of my application of Logit. Logit assess the probability of a loss given a unvariate (e.g., sales change) measure. Discriminate Analysis is a multivariate approach to predicting group membership (i.e., membership in the group of distributors incurring losses in particular years versus the group comprised of

distributors not incurring a loss). I applied Discriminant Analysis to my distributor data set using the SYSTAT software.

In my application, I chose QUART 1, S CHANGE, INDCON and OPERDUM as the classification variables using, as the observations to be classified, all five years of data for each of the 24 pure distributors previously identified. This generated the following "Group Classification Function Coefficients."

	Loss	No Loss
Constants	-1.39	-1.35
QUART 1	1.90	2.78
INDCON	2.13	.71
S CHANGE	3.36	.16
OPERDUM	2.22	.67

These constants and coefficients are identified in SYSTAT as the Fisher discriminant functions for classifying raw data. The constant and coefficient sets can now be applied to an unclassified observation to predict group membership. This is done by assigning the untested observation to the Function Group (i.e., Loss or No Loss) where the largest value is produced from using each the two sets of constants and coefficients.

Goodness of fit and Type I and Type II Error probabilities can be assessed by re-applying the Group Classification Function Coefficients to the data set. This produces the following actual versus predicted results:

	Predicted		
	No Loss	Loss	Total
No Loss	72	27	99
Loss	6	15	21
Total	78	42	120

The above table indicates that out of 99 "No Loss" observations, the Discriminant Function classified 72 (or 73 percent) correctly. Similarly, 15 of the 21 (or 71 percent) of the "Loss" observations were classified correctly. Overall, 87 out of 120 observations (or 73 percent) of the observations were correctly classified.

7. Analyzing the Economic Rate of Return

Finally, in this section, I sought to use the distributor data set to impute economic rates of return which could then be compared against the associated (accounting) return on invested capital results.[29]

29 Defined as operating income divided by the sum of stockholders' equity plus interest bearing debt.

Since the distributors in the databases are all publicly traded, the economic rate of return was calculated using a variation of the dividend valuation model.[30] Formally,

$$P_0 = \sum_{t=1} \frac{D_t}{(1 + Ke)^t}$$

where P_0 = observed share price

D_t = dividend per share received each year (t)

Ke = equity cost of capital or required rate or return to equity shareholders

If one makes the assumption that dividends grow steadily at a constant rate "g", then a "steady state" variation of this model can be found as:

$$Po = \frac{D1}{Ke-g}$$ where D1 equals dividends per share for the current period.

Alternatively, solving for "Ke" (the required economic rate of return) yields the relationship:

$$Ke = \frac{D1}{Po} + g$$

Exhibit 7a provides this calculation of "Ke" for each of the distributors in the database. To estimate the applied growth rate, the convention used by Brealey and

30 See Solomon and Pringle [57].

Exhibit 7a

Company Name	(1) Avg. Price Cal.Yr. Close (86-90)	(2) Avg. Div/Sh. Ex-Date (86-90)	(3)=(2)/(1) Avg. Div. Yield (86-90)	(4) Avg. Retained Earnings % (86-90)	(5) Avg. Return on Equity (86-90)	(6)=(4)*(5) Avg. Derived Growth Rate (86-90)	(7)=(3)+(6) Rate of Return (Div) Plowback
All American Semiconductor	1.70	0.00	0.00%				
Amalgamated Automotive Inds	NA	0.00					
American Metals Service Inc	1.10	0.00	0.00%				
Arrow Electronics Inc	5.55	0.00	0.00%				
Bergen Brunswig Corp -Cl A	15.22	0.29	1.89%	63.30%	13.54%	8.96%	10.86%
Dynamic Classics Ltd	1.09	0.00	0.00%				
Graybar Electric Co Inc	NA	0.00					
Handleman Co	13.97	0.40	2.86%	64.69%	18.74%	12.60%	15.46%
Lawson Products	22.13	0.37	1.67%	71.00%	22.96%	16.46%	18.13%
Marshall Industries	16.30	0.00	0.00%				
Milgray Electronics Inc	11.85	0.00	0.00%				
Moore Handley Inc	5.13	0.00	0.00%				
Moore Medical Corp	13.18	0.00	0.00%				
Pioneer Standard Electronics	8.10	0.15	1.85%	69.37%	14.22%	11.46%	13.32%
Republic Automotive Parts	6.13	0.00	0.00%				
Seaport Corp	0.69	0.00	0.00%				
Showcase Cosmetics -Cl A	1.79	0.00	0.00%				
Sirco International Corp	4.25	0.00	0.00%				
Southern Electronics Corp	2.67	0.00	0.00%				
Tech Data Corp	4.62	0.00	0.00%				
United Stationers Inc	16.45	0.40	2.43%	72.27%	13.10%	9.78%	12.21%
Vwr Corp	8.51	0.40	4.70%	-90.23%	14.38%	-8.06%	-3.36%
				41.73%	16.16%	8.53%	11.10%

Myers was used. Specifically, the growth rate was estimated as the "plowback" ratio (i.e., ratio of income kept as a percent of retained earnings) multiplied by the return on book equity. For those distributors paying dividends over 1986-1990, the average cost of equity capital was about 11 percent.

Exhibit 7b incorporates these equity cost of capital results into a Weighted Average Cost of Capital ("WACC") calculation. This is calculated as:

$$WACC = Kd\ (1 - t)\ (D) + Ke\ (E)$$

Where Kd and Ke are the debt and equity cost of capital estimates, t is the tax rate and D and E the optimal proportion of debt and equity, respectively, in each firm's capital structure. I assume, following the typical convention, that the observed weights reflect the "optimal" weights. The cost of debt is taken as the annual average (over 1986-1990) interest rate observed on BBB corporate bonds. Firms with this rating are deemed to possess adequate capacity to meet their financial obligations. The results suggest WACC results of still 11 percent.

Finally, Exhibit 7c provides a comparison of each company's estimated average WACC versus the average (accounting) Return on Invested Capital ("ROIC") generated over the same period.

Exhibit 7d uses the same hypothesis test as that employed in Exhibits 2a to 2c (i.e., those tests used to evaluate profit and rate of return differences between "pure" and "vertically integrated" distributors in Section III) to determine whether there is a statistical difference between the WACC-DIV, ROIC and ROA results. Exhibit 7 indicates that the ROIC and ROA results are not statistically different (at a 95 percent

Exhibit 7b

Company Name	Average Annual Highs of BBB rated Bonds (86-90)(a)	Weighted Avg. Cost of Debt (b)	Average Effect. Tax Rate (86-90)	Weighted Avg. Cost of Equity (DIVIDENDS) (c)	Weighted Avg. Cost of Capital (DIVIDENDS) (e)
All American Semiconductor	11.42%	6.74%	44.37%		
Amalgamated Automotive Inds	11.42%	4.68%	21.85%		
American Metals Service Inc	11.42%	1.41%	0.00%		
Arrow Electronics Inc	11.42%	6.94%	0.00%		
Bergen Brunswig Corp -Cl A	11.42%	4.44%	41.30%	6.63%	9.24%
Dynamic Classics Ltd	11.42%	0.18%	44.04%		
Graybar Electric Co Inc	11.42%	2.95%	43.36%		
Handleman Co	11.42%	0.73%	40.74%	14.47%	14.90%
Lawson Products	11.42%	0.00%	38.68%	18.13%	18.13%
Marshall Industries	11.42%	3.26%	43.03%		
Milgray Electronics Inc	11.42%	4.71%	25.13%		
Moore Handley Inc	11.42%	3.92%	41.99%		
Moore Medical Corp	11.42%	0.89%	39.80%		
Pioneer Standard Electronics	11.42%	6.46%	18.88%	5.79%	11.03%
Republic Automotive Parts	11.42%	3.81%	18.30%		
Seaport Corp	11.42%	4.56%	21.27%		
Showcase Cosmetics -Cl A	11.42%	0.95%	47.64%		
Sirco International Corp	11.42%	3.19%	19.64%		
Southern Electronics Corp	11.42%	11.42%	42.11%		
Tech Data Corp	11.42%	2.06%	42.30%		
United Stationers Inc	11.42%	3.48%	39.10%	8.49%	10.61%
Vwr Corp	11.42%	5.09%	0.00%	-1.87%	3.22%
					11.19%

(a) Debt rated 'BBB' is regarded as having an adequate capacity to pay interest and repay principal. Whereas it normally exhibits adequate protection parameters, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity to pay interest and repay principal for debt in this category than in higher rated categories.
(b) Calculated as the ratio of long-term debt to long-term debt plus equity multiplied by the average annual highs of B rated bonds.
(c) Calculated as the ratio of equity to long-term debt plus equity times rate of return derived through the Gordon dividend model.
(d) Calucated as the ratio of equity to long-term debt plus equity times average earnings per share.
(e) Calculated as the weighted average cost of equity (dividends) times (weighted average cost of debt times (one minus the effective tax rate))
(f) Calculated as the weighted average cost of equity (EPS) times (weighted average cost of debt times (one minus the effective tax rate))

Exhibit 7c

AVERAGE RATES OF RETURN (1986-1990) FOR 22 "PURE DISTRIBUTORS"

COMPANY	WACC - DIVIDEND MODEL	RETURN ON INVESTED CAPITAL	RETURN ON ASSETS
All American Semiconductor	-- --	12.46%	8.36%
Amalgamated Automotive Industries	-- --	6.50%	5.12%
American Metals Service	-- --	-5.16%	-3.64%
Arrow Electronics	-- --	3.18%	2.32%
Bergen Brunswig	9.24%	15.18%	7.60%
Dynamic Classics	-- --	12.74%	10.18%
Graybar Electric Co.	-- --	10.53%	6.18%
Handleman Co.	14.90%	30.94%	19.14%
Lawson Products	18.13%	30.96%	25.64%
Marshall Industries	-- --	16.36%	13.10%
Milgray Electronics	-- --	9.42%	6.82%
Moore Handley Inc	-- --	3.62%	2.54%
Moore Medical Corp	-- --	23.45%	11.06%
Pioneer Standard Electronics	11.03%	10.08%	8.08%
Republic Automotive Parts	-- --	4.13%	0.92%
Seaport Corp	-- --	-2.16%	-5.52%
Showcase Cosmetics	-- --	-2.24%	-4.80%
Sirco International Corp	-- --	0.10%	-0.08%
Southern Electronics Corp	-- --	34.86%	20.08%
Tech Data Corp	-- --	21.86%	15.68%
United Stationers Inc	10.61%	16.30%	10.74%
Vwr Corp	3.22%	16.56%	11.08%
AVERAGE (a)	**11.19%**	**20.00%**	**13.71%**
STANDARD DEVIATION (b)	**5.09%**	**8.80%**	**7.16%**

PEARSON RANK CORRELATION STATISTIC: **0.96**
(Return on Invested Capital vs. Return on Assets)

NOTE: WACC computed using average annual high rate of return for BBB bonds

(a) Average encompasses only observations for which a corresponding WACC - Dividend Model observation is noted.
(b) Standard Deviation encompasses only observations for which a corresponding WACC - Dividend Model observation is noted.

Exhibit 7d

SUMMARY RESULTS FOR THE TEST BETWEEN RATES OF RETURN PREDICTED BY EPS MODEL AND ROIC

	WACC - DIVIDEND MODEL			RETURN ON INVESTED CAPITAL			Degrees of Freedom	t-value @ 95% confidence level	Point Estimate (x1-x2)	Confidence Interval	Reject HN @ 95% confidence level
	Mean	St.Dev.	Sample Size	Mean	St. Dev.	Sample Size					
Rates of Return	11.19%	5.09%	6	20.00%	8.80%	6	7	2.365	8.81%	9.82%	No

	WACC - DIVIDEND MODEL			RETURN ON ASSETS			Degrees of Freedom	t-value @ 95% confidence level	Point Estimate (x1-x2)	Confidence Interval	Reject HN @ 95% confidence level
	Mean	St.Dev.	Sample Size	Mean	St. Dev.	Sample Size					
Rates of Return	11.19%	5.09%	6	13.71%	7.16%	6	8	2.306	2.52%	8.27%	No

confidence level) from the WACC-DIV results. Indeed, the ROA results are quite similar. This suggests that even for "pure" distributors, accounting rate of return measures may not necessarily (referencing the earlier discussion on Fisher and the importance of the profit retention rate as shown in the hypothetical simulation presented as Exhibit 4) be a biased measure of economic return. In closing, I note that the 5 percent earnings growth assumption in the WACC-EPS model would need to be increased to 8 percent for the ROIC and WACC-EPS results to be statistically the same.

As an additional test under this topical heading, I set out to analyze the hypothesis that the ratio of share price to book value for the pure distributors was equal to one. This hypotheses is motivated by the observation that because distributor assets, as reported on financial statements, are largely current in value, then the typical "wedge" between economic versus book value of assets should not be significantly large. The relevant data (calendar year-end book and market share value were used) are presented in Appendix Exhibit C.

I chose to use two test scenarios. First, using all five years of data for all but two (where share price data were unavailable) of the twenty-four distributors, I found the average ratio (share price / book value) to equal 1.47 with a standard deviation of 2.32 (see Exhibit 7e). Using a "Z" test statistic (because n > 30), the following test statistic was computed:

$$Z = (1.47\text{-}1) / (2.31 / \sqrt{97}) = 2.0039$$

Because 2.01 is greater than the critical Z value of 1.96, using a 5 percent confidence level, the null hypothesis (that the ratio equals one) can marginally be rejected. However, such a conclusion could not be reached if a confidence level below 4 percent was used.

Exhibit 7e **EVALUATING THE HYPOTHESIS THAT THE RATIO OF SHARE PRICE TO BOOK VALUE IS EQUAL TO ONE FOR 24 "PURE" DISTRIBUTORS**

OVERALL DATA--ALL POINTS POOLED INTO ONE SAMPLE (a)

N	97
MEAN	1.47
STANDARD DEVIATION	2.32
CRITICAL VALUE	1.96
TEST STAT.	2.01

The p-value associated with this test statistic (a "z") is .04; we conclude that the ratio of share price to book value is not equal to one at alpha=.05

USING THE COMPANY MEANS (b)

N	20
MEAN	1.45
STANDARD DEVIATION	1.04
CRITICAL VALUE	2.093
TEST STAT.	1.94

The p-value associated with this test statistic (a "t") is .0675; we cannot conclude that the ratio of share price to book value is not equal to one at alpha=.05

(a) Each share price to book value ratio in each year (1986-1991) was considered to be a data point.
(b) The simple average over the five year period 1986-1991 (where data were available) for each company was used as a data point.

Note 1: All data from Lotus OneSource CD/Corporate: U.S. Equities (Compustat Industrial)
Note 2: Amalgamated Automotive Ind. and Graybar Electric Co. did not have share price data listed in our source.
Note 3: Market share price and book value per share were as of the calendar year close.
Note 4: Not every company had five years of data; thus the sample size is not equal to 120 in the first test.

In the second scenario, I used the average ratio for each company across the five year time span. This generated an average ratio of 1.45 across firms and a standard deviation of 1.04. Using a "t" distribution (because n > 30), the following test statistic was derived:

$$(1.45\text{-}1) / (1.04 / \sqrt{20}) = 1.931$$

Because 1.931 is (marginally) below the critical "t" value (assuming a 5 percent confidence level), I cannot reject the null hypothesis that the share value / book value ratio is equal to one.

While these results are not highly conclusive, there is marginal support that the same underlying economic value of "pure" distributor assets is not significantly different from the book value. This provides support for the preceding result, suggesting distributor AROR and EROR may be similar. As was noted earlier, further testing is needed before these results, based on publicly traded distributors, can theoretically be applied to privately-held distributors (although, in practice, public company data are used quite often to benchmark the performance of private companies).

IV. CONCLUSIONS

The specific conclusions of this dissertation, relative to the various literature reviews conducted throughout, can be briefly summarized as follows:

- The results of the distributor SIC codes tests further support, albeit by a different test methodology, the results put forth by Jaditz and Abbott and Andrews. Namely, four digit SIC groupings are poor delineators of markets. As shown with the empirical results from this section, distributors that perform different functions exhibit different levels of profit performance and inventory turnover, although the offsetting differences in these two measures tend to mitigate broad differences in rate of return. These results also support those of Fraumeni and Jorgenson in that "pure" distributors were found to earn lower returns on invested capital, and less variance in their results, vis-a-vis distributors that also engaged in manufacturing and/or product design functions.

- Most of the empirical literature on measuring profit and rate of return performance has focused on manufacturing industries. In contrast, I have constructed a data set for "pure" distributors, which is the most common type of entity present for inbound transfer pricing cases. My descriptive statistics on this data set suggest a relatively narrow, normal distribution of "pure" distributor operating margins (centered on a 2 to 4 percent range) but "wider" and more skewed distributions are found for inventory turnover and return on assets.

- Relative to the determinants of "pure" distributor profitability, I found, consistent with the findings of Jones, Laudadic and Percy. Buzzell and Gale and Carlton and Perloff, that sales growth (i.e., demand change) had a particularly significant effect on "pure" distributor profitability. Of somewhat less significance, I found that dummy variables for small size and industry concentration generated correctly signed coefficients (in both pooled and cross-section regression) as did a dummy variable (in the pooled regression) for high sales growth firms also possessing high operating leverage. The pooled regression result using these variables generated a reasonable goodness of fit result (i.e., $R^2 = .34$). The results associated with the sales size variable are generally consistent (particularly when the binary choice loss models are applied) with the results of Mills and Schumann, Sheshinski and Jacques, and Schmalensee. Similarly, the industrial concentration results are consistent with the findings of Gale, Porter and others. Again, these economists have largely focused on manufacturing entities, my efforts extend these results to "pure" distributors as well.

- Using the aforementioned variables, I also tested the "pure" distributor data using various (i.e., Linear Probability, Logit, and Discriminant Analysis) binary choice models. The Logit specification gave the best performance (relative to predicting the probability of actual loss), although sales change was found to be the only significant variable. Models of this type should be particularly useful, for transfer pricing purposes, given the frequency to which the IRS argues that a transfer price abuse is present if a distributor operating loss is observed. My

results show, at a minimum, that changes in sales growth must also be evaluated.

- In contrast to the criticism of Fisher, Gordon and others — but consistent with the findings of Jacobson — I found that accounting and economic rates could, at least marginally, be consistent for "pure" distributors. For this to result, a fairly stable time path of earnings and a relatively high "plow back" ratio are necessary. These results are motivated, in part, by the observation that the "pure" distributor ratio of share price to book value is (marginally) equal to one. Intuitively, this seems to occur because the assets of "pure" distributors are largely current in nature.

- Event Study tests were developed (in a preliminary fashion) to attempt to observe ex-ante, profit splits germane to the licensing of intangible assets. Significant results could not be found, due in part to the small sample size. None-the-less, the concept is appealing enough such that new tests should be performed as more data become available.

My general conclusion is that the curent transfer pricing regulations, and applciation thereof by IRS economists are deficient in several important respects. The regulations should recognize more explicitly the role of uncertainity, transaction costs, and bargaining dynamics. While a benchmark range of comparable companies should be a useful measure to assess the accuracy of transfer prices (after accounting for transaction costs and profit maximizing bwehavior for a vertically integrated firm) "short cuts" SIC code measures are flawed. Further, the regulations need to suggest adjustments in comparable company size, growth rates,

operating leverage and market share characteristics. This dissertation enabled me to develop a better understanding of the role of these variables in applying comparable company based approaches.

APPENDIX EXHIBITS

APPENDIX A
PURE DISTRIBUTOR STUDY
SUMMARY RESULTS

Company Name	Products	D/ ND(a)	Ave Sales(b)	Years W/ Losses	Max Loss Duration	Reasons for Loss(c)	Ave Neg Mgn(d)	Oper Mgn(e)	Inv Turn(g)	Sales Growth(h)
All American Semiconductor	High-Tech Electronics	D	29.02					4.11	2.74	34.14%
Amalgamated Automotive Ind	Auto Parts & Supplies	D	10.05					2.89	2.44	2.27%
American Metals Service Inc	Specialized Metals	D	17.34	7, 88, 89, 90	4	Decline in foreign sales, expansion of distribution network, intense competition, restructuring	-3.87	-2.88	2.28	-16.58%
Arrow Electronics Inc	Electronic Components & Computer Products	D	798.91	86, 87	2	Price erosion, industry overcapacity, acquisition integration costs	-2.31	1.05	3.82	16.23%
Bergen Brunswig Corp	Pharmaceutical Products & Videocassettes	ND	3658.69					1.95	8.98	13.01%
Dynamic Classics Ltd	Gifts, Auto Accessories, Fitness Equipment & Luggage	D	20.36					4.63	4.46	10.76%
Graybar Electric Co Inc	Electronic & Telecomm Equipment	D	1766.63					1.83	9.15	3.56%
Handleman Co	Prerecorded Music, Books, Software & Audio/Video	D	555.55					10.06	4.30	12.43%
Lawson Products	Supplies for Repair & Operation of Equipment	D	162.43					17.77	2.72	7.81%
Marshall Industries	Electronic Components & Work Stations	D	405.79					6.06	2.72	16.97%
Milgray Electronics Inc	Electronic Components	D	86.92					2.66	3.64	12.48%
Moore Handley Inc	Plumbing & Electrical Supplies, Tools, Hardware	D	97.79	89	1	Aggressive pricing, market expansion, acquisitions, problems with sales force	-0.24	0.94	8.40	10.79%
Moore Medical Corp	Pharmaceuticals, Medical & Surgical Supplies	ND	246.17					3.02	5.50	16.13%
Pioneer Standard Electronics	Electronic Products	D	258.21					3.87	3.38	7.23%

APPENDIX A
PURE DISTRIBUTOR STUDY
SUMMARY RESULTS

Company Name	Products	D/ ND(a)	Ave Sales(b)	Years W/ Losses	Max Loss Duration	Reasons for Loss(c)	Ave Neg Mgn(d)	Oper Mgn(e)	Inv Turn(g)	Sales Growth(h)
Republic Automotive Parts	Automotive Products	D	85.25	86, 87	2	Increased competitive pressures, depreciation, acquisitions/divestitures	-1.53	0.42	1.94	-8.35%
Seaport Corp	Automotive Parts & Supplies	D	12.41	86, 88, 90	1	Discontinued operations, difficulties w/ electronic data processing system, order fill problems	-13.25	-6.46	3.84	-30.84%
Showcase Cosmetics	Cosmetics	ND	2.27	88, 89, 90	3	Increased cost of product w/ stable sales price, returns, consulting fees, inventory write-down, bad debt expense	-16.91	-6.90	1.48	23.15%
Sirco International Corp	Handbags, Luggage & Related Products	ND	35.59	86, 87, 90	2	Increase in sales credits & allowances termination of division, settlement of employment contract, increased SG&A	-2.74	-0.20	3.44	-1.48%
Southern Electronics Corp	PCs, Peripheral Products & Consumer Electronics	D	64.58					4.42	8.53	42.44%
Subaru of America (i)	Motor Vehicles & Replacement Parts	D	1723.59	87, 88, 89	3	Currency fluctuations, increased product costs, marketing push & increased competition	-5.11	-0.03	11.44	9.09%
Sysco Corp	Food & Food Related Products	ND	5130.96					3.36	13.72	24.59%
Tech Data Corp	Computer Hardware	D	170.62					5.32	6.83	76.25%
United Stationers Inc	Office Products	ND	835.95					4.30	5.36	12.83%
Vwr Corp	Lab Equipment, Photo & Art Supply, Textiles & Electronics	D	498.78					3.42	7.68	2.14%
Averages			694.74		2.25		-5.74	2.73	5.37	12.38%

a. D/ND represents Durable or Nondurable Products
b. Average Sales represents 1986-1990 sales figures, reported in $million
c. Reasons for Loss were derived from 10k and Annual Reports
d. Ave Neg. Margin defined as average of negative operating margin figures, where applicable
e. Oper Margin defined as average operating income after deducting COGS, SG&A & depreciation divided by sales
f. Oper Lev = Average operating levarage 1986-1990 calculated as SG&A/SG&A + COGS
g. Inventory Turnover equals average inventory turnover 1986-1990 defined as COGS/Inventory.
h. Sales Growth equals average sales growth 1986-1990
i. Data for Subaru of America is for the five year period 1985-1989. The company went private in 1990.

Source: COMPUSTAT PC PLUS

DEP VAR: OPMARG N: 24 MULTIPLE R: 0.513 SQUARED MULTIPLE R: 0.263
ADJUSTED SQUARED MULTIPLE R: 0.152 STANDARD ERROR OF ESTIMATE: 0.045

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	0.026	0.014	0.000	.	1.883	0.074
QUART1	-0.036	0.022	-0.323	0.891	-1.589	0.128
SCHANGE	0.064	0.048	0.264	0.934	1.327	0.199
INDCON	0.022	0.028	0.149	0.952	0.758	0.457

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	0.014	3	0.005	2.379	0.100
RESIDUAL	0.040	20	0.002		

DEP VAR: OPMARG N: 23 MULTIPLE R: 0.672 SQUARED MULTIPLE R: 0.451
ADJUSTED SQUARED MULTIPLE R: 0.364 STANDARD ERROR OF ESTIMATE: 0.030057

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	0.013236	0.009508	0.000000	.	1.39218	0.17995
QUART1	-0.023520	0.015203	-0.280129	0.881382	-1.54712	0.13833
SCHANGE	0.077365	0.032285	0.422402	0.929995	2.39635	0.02701
INDCON	0.032346	0.019135	0.295464	0.945832	1.69043	0.10729

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	0.014100	3	0.004700	5.202474	0.008598
RESIDUAL	0.017165	19	0.000903		

DEP VAR: OPMARG N: 24 MULTIPLE R: 0.830 SQUARED MULTIPLE R: 0.689
ADJUSTED SQUARED MULTIPLE R: 0.624 STANDARD ERROR OF ESTIMATE: 0.029961

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	0.017630	0.009289	0.000000	.	1.89802	0.07299
QUART1	-0.037203	0.014968	-0.336904	0.890380	-2.48548	0.02242
SCHANGE	0.053112	0.032143	0.219112	0.930386	1.65239	0.11488
INDCON	0.031256	0.019051	0.216182	0.942230	1.64064	0.11732
OPERDUM	0.217239	0.042561	0.657864	0.984810	5.10422	0.00006

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	0.037816	4	0.009454	10.531748	0.000114
RESIDUAL	0.017056	19	0.000898		

DEP VAR: OPMARG N: 120 MULTIPLE R: 0.600 SQUARED MULTIPLE R: 0.360
ADJUSTED SQUARED MULTIPLE R: 0.338 STANDARD ERROR OF ESTIMATE: 0.053003

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	0.014686	0.007166	0.000000	.	2.04939	0.04270
SCHANGE	0.053030	0.019498	0.210963	0.924756	2.71977	0.00755
OPERDUM	0.208566	0.033815	0.465570	0.976495	6.16782	0.00000
QUART1	-0.025677	0.011964	-0.170071	0.872258	-2.12944	0.03535
INDCON	0.034211	0.015123	0.174420	0.935920	2.26219	0.02556

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	0.181854	4	0.045463	16.182901	0.000000
RESIDUAL	0.323076	115	0.002809		

DEP VAR: LOSS N: 24 MULTIPLE R: 0.517 SQUARED MULTIPLE R: 0.267
ADJUSTED SQUARED MULTIPLE R: 0.157 STANDARD ERROR OF ESTIMATE: 0.442

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	1.490	0.135	0.000	.	11.038	0.000
QUART1	0.045	0.221	0.041	0.891	0.202	0.842
SCHANGE	-1.029	0.473	-0.431	0.934	-2.174	0.042
INDCON	-0.350	0.280	-0.245	0.952	-1.251	0.226

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	1.424	3	0.475	2.428	0.095
RESIDUAL	3.909	20	0.195		

Appendix Exhibit C

Company Name	Price-- Calendar Year Clo 90	Price-- Calendar Year Clo 89	Price-- Calendar Year Clo 88	Price-- Calendar Year Clo 87	Price-- Calendar Year Clo 86	Book Value/ Shr (A) 90	Book Value/ Shr (A) 89	Book Value/ Shr (A) 88	Book Value/ Shr (A) 87	Book Value/ Shr (A) 86
All American Semiconductor	0.75	2.00	2.60	1.45	NA	1.22	1.22	1.27	0.99	0.34
Amalgamated Automotive Inds	NA	NA	NA	NA	NA	1.46	1.34	1.49	1.52	1.54
American Metals Service Inc	0.63	1.38	1.13	0 85	1.50	2.61	3.00	3.12	3.43	3.47
Arrow Electronics Inc	4 38	3.88	6.63	6 75	6.13	12.64	12.48	12.88	14.23	15.57
Bergen Brunswig Corp -Cl A	22.90	19.50	14.64	9.40	9.64	10.43	9.16	7.67	6.63	6.23
Dynamic Classics Ltd.	0 75	1	1	1.63	NA	2 45	2.26	2.41	2.12	1.84
Graybar Electric Co Inc	NA	NA	NA	NA	NA	40.51	37.62	37.34	36.11	32.54
Handleman Co	12.88	21.00	14.08	9.22	12.87	7.08	6.73	6.01	5.07	4.30
Lawson Products	29.00	22 50	25.00	20.00	14.17	8.04	6.74	5.85	5.74	4 82
Marshall Industries	20.00	18 88	16.13	16.50	10.00	18.69	16.85	14.59	12.29	8.36
Milgray Electronics Inc	8.50	15 00	14.00	10.50	11.25	20.23	19.67	17.82	14.89	13.80
Moore Handley Inc	5.00	4 50	4.13	4 00	8.00	5.91	5 66	5.99	6.09	6.03
Moore Medical Corp	4.13	9.38	10.63	16 00	25.75	3.66	6.80	7.62	9.95	8.45
Pioneer Standard Electronics	6.17	5 33	6.33	4 67	4.50	6.46	5.53	4.91	4.17	3.61
Republic Automotive Parts	4.75	6.00	5.50	5 63	8.75	8 95	8.39	8.27	8.34	9.21
Seaport Corp	0 25	0 50	0.94	0 88	0.88	0.25	0.26	0.16	0.41	0.08
Showcase Cosmetics -Cl A	1.87	3 12	0.94	1 25	NA	3.91	3.48	5.73	6.75	7.05
Sirco International Corp	3.50	4.25	4.25	4 25	5.00	6.01	6 84	6 88	6.14	7.62
Southern Electronics Corp	3.00	2.76	0.89	0 89	1.33	0.18	(0.33)	(0.77)	(0 96)	0.81
Tech Data Corp.	4.13	3.88	6.50	5 25	3.33	4.14	3.61	3.36	1 56	1.13
United Stationers Inc	8.88	16.00	22.75	17 75	16.88	11 47	11.03	9.79	8 60	7.84
Vwr Corp	7.19	8.38	10.25	8.75	8.00	3.02	5.74	6.79	6.21	5.90

Appendix Exhibit C

Company Name	Price/ Book 90	Price/ Book 89	Price/ Book 88	Price/ Book 87	Price/ Book 86
All American Semiconductor	0.61	1.65	2.04	1.46	
Amalgamated Automotive Inds					
American Metals Service Inc	0.24	0.46	0.36	0.25	0.43
Arrow Electronics Inc	0.35	0.31	0.51	0.47	0.39
Bergen Brunswig Corp -Cl A	2.20	2.13	1.91	1.42	1.55
Dynamic Classics Ltd.	0.31	0.44	0.41	0.77	
Graybar Electric Co Inc					
Handleman Co	1.82	3.12	2.34	1.82	2.94
Lawson Products	3.61	3.34	4.28	3.49	2 94
Marshall Industries	1.07	1.13	1.11	1.34	1.20
Milgray Electronics Inc	0.42	0.76	0.79	0.71	0 82
Moore Handley Inc	0.85	0.80	0.69	0.66	1.33
Moore Medical Corp	1.13	1.38	1.39	1.61	3 05
Pioneer Standard Electronics	0.96	0.96	1.29	1.12	1.25
Republic Automotive Parts	0.53	0.72	0.66	0.67	0.95
Seaport Corp	0.99	1.93	5.97	2.13	10 48
Showcase Cosmetics -Cl A	0.48	0.90	0.16	0.14	
Sirco International Corp	0 58	0.62	0.62	0.69	0.66
Southern Electronics Corp	16.53	-8.42	-1.16	-0.92	1 65
Tech Data Corp	1.00	1.07	1.93	3.32	2.94
United Stationers Inc	0.77	1.45	2.32	2 07	2 15
Vwr Corp	2.38	1.46	1.51	1 41	1 36
Mean	1 84	0.81	1.46	1 23	2 12

APPENDIX EXHIBITS

APPENDIX EXHIBIT D.

USING THE EVENT STUDY TECHNIQUE TO EVALUATE EX-ANTE PROFIT SPLITS ON LICENSING TRANSACTIONS INVOLVING INTANGIBLE ASSETS

[Appendix Note: While I believe this is a creative research idea, I have been stymied by a very small sample size of observations. Accordingly, I herein present only a short discussion of my approach, data and the limited results achieved.]

Quantifying royalty rates, for purposes of the licensing intangible assets, is a particularly important area of transfer pricing analysis. "Profit splits" based on rules-of-thumb and functional analysis of the licensee and licensor, have often been relied upon to set royalty rates. Profit splits involve dividing the overall profit earned by the licensee between a portion to be kept by the licensee and that portion earned by the licensor as a royalty. Though this approach is often used in practice, there has been little rigorous analysis applied to the topic of what an appropriate (i.e., arm's length) outcome should be.

Ideally, one would like to be able to have an ex-ante measure of profit splits that accounts for the time pattern of the anticipated returns to each party. The ex-ante approach is appealing because it incorporates expectations about such factors (discussed in Purnell [48]) as anticipated life cycle, learning curve, and currency fluctuation effects. With these requirements, an event study approach could be particularly useful.

An event study is a technique that has recently been used in a number of papers in the industrial organization literature. The essence of the technique is that the value, i.e., the incemental present value associated with the vevent's projected return stream lost or created due to a particular event (e.g., new regulations) can be measured by the net (i.e., after screening out general and industry effects) change in the firm's share price during a short interval surrounding the discrete public announcement of the event. This assumes that active stock markets exist for those firms under study and no leakage of information to the public occurs before the announcement date.

A reasonable use of this technique, I believe, is to identify licensing transactions where the following conditions are met:

- both licensee and licensor are publicly traded in active (i.e., liquid) markets;

- there is no "leakage" of the licensing agreement to the market prior to the selected announcement public date; and

- there exists a relatively small amount of "noise" (i.e., other announcements about either the licensee or licensor).

To identify relevant transactions satisfying these criteria a list of licensing transactions involving intangible assets (e.g., trade names and patents) was compiled from the Wall Street Journal Index and the Business Periodical Index over the period 1987-1991. This resulted in 17 announcements. This sample was reduced by removing any observation where either the licensee and/or licensor exhibited (as

referenced in the Wall Street Journal Index) another (unrelated) public announcement on the same day as the licensing announcement. This resulted in the removal of 5 observations. Next, an observation was removed if the licensing announcement of interest was previously discussed in the Journal. No observations were lost due to this "leakage" condition. Finally, recognizing the window concept (i.e., because stock markets are deemed to be efficient, all new information is expected to be reflected in the share price over a period of not more than a few days) surrounding stock price movements, observations were removed if there were other general announcements made 3 days before the announcement of interest. This left 7 observations. Finally, one company set (Macrochem/UpJohn) was eliminated because no Macrochem shares were traded during the period over which the regressions were run. A summary of this screening process, with particular emphasis on the existence of contemporary announcements, is provided in Appendix Exhibit E

With this limited data set, regressions were performed, for both licensee and licensor, to estimate a relationship between each entity's share price movement and the Standard & Poor 500 Index (as the independent variable). The resulting equations were then used to predict the pro-forma share price (i.e., absent the effect of licensing announcement but including general market effects as represented by the S&P 500) during the event window. The value created for the licensee, and separately for the licensor, was then found as the difference between each company's actual and predicted share price multiplied by the number of shares outstanding for each entity. This information thus provides a forward looking (i.e., net present value estimate whereby future returns are discounted for risk), or ex-ante, estimate of the relative profit to be earned by the licensor and licensee.

The general form of the regressions were:

$$(\text{Entity share price})_t = a + b\ (\text{S\&P 500 Index})_t + e_t$$

The regressions, which were also run in first difference form, were estimated over a 30 day period preceding the announcement date of interest. The results of the regressions are contained in Appendix Exhibit F.

The coefficient estimates, "t" values, and R^2 results of these regressions are not particularly strong. In only one of the six transactions (Silicon/Microsoft) did both the licensee and licensor exhibit a significant result with respect to a positive "t" value statistically different from zero.

Nonetheless, using the regression results, and data on the independent variable over the event window, pro-forma share prices for the licensees and licensors were estimated. Appendix Exhibit G provides the actual and predicted results on the announcement date and over the subsequent five trading days, for each of the licensees and licensors in the data set. A summary of these results is also provided.

While the results are mixed, some preliminary observations seem warranted. In only three transaction sets (Cytogen/Lilly, Wang/Micron and Mattel/Price) did the licensee and licensor both exhibit positive price movements relative to the licensing announcement. This result was present under a the first difference approach as well, although an additional transaction set (Disney/Mattel) exhibited this result as well. For the Cytogen/Lilly set, the total (unexplained or residual) increase in share value on the announcement date was $98 million, which was split

84% to the licensee and 16% to the licensor. (The first difference results were roughly the same.) This has some a priori or intuitive appeal. The relative splits (licensor/licensee) were 6%/94% and 98%/2% for the non-first difference results observed on Wang/Micron and Mattel/Prince transaction sets, respectively, and 2%/98% and 98%/2% on a first difference basis.

Ex-Ante Regression and Profit Split Results

	Regression Results		Profit Splits	
Entity	R^2	S&P Variable Significance	Percentage of Total value Earned[31]	Percent of Total value Earned[32]
Comm. Stat.	.04	*	109	124
Eagle	.10		-9	-24
Wang	.02	*	6	6
Micron	.59	*	94	94
Disney	.82	*	-229	392
Mattel	.00		329	-292
Cytogen	.22		84	89
Lilly	.81		16	11
Mattel	.10		98	97
Price	.02	*	2	3
Silicon	.34	*	-10	-12
Microsoft	.22		110	112
Image	.00		-9	-6
Disney	.76		109	106

Note: The licensor is the first entity represented in each of the entity sets.

31 Announcement date basis.

32 Average over announcement day plus five subsequent trading days.

Ex-Ante Regression and Profit Split Results

(First Difference Basis)

	Regression Results		Profit Splits	
Entity	R2	S&P Significance	Percentage of Total value Earned[33]	Percent of Total value Earned[34]
Comm. Stat.	.10		101	103
Eagle	.01		-1	-3
Wang	.00		2	-7
Micron	.18	*	98	107
Disney	.57	*	33	-22
Mattel	.00		67	122
Cytogen	.00		84	89
Lilly	.13	*	16	11
Mattel	.06		98	97
Price	.02	*	2	3
Silicon	.15	*	-47	22
Microsoft	.46	*	147	78
Image	.00		-13	-9
Disney	.25	*	113	109

33 Announcement date basis.

34 Average over announcement day plus five subsequent trading days.

SUMMARY REGRESSION RESULTS

Transaction Set Entity	R^2	Intercept	S&P 500	Std. Error of Regression
Comm Sat.	.24	114.8 (4.5)*	-.18 (2.9)*	1.08
Eagle	.10	3.8 (1.1)	.01 (1.7)	.16
Wang	.02	7.3 (3.6)*	.01 (.9)	.21
Micron	.59	-62.9 (5.7)*	.20 (7.1)*	1.12
Disney	.82	-11.8 (4.3)*	.10 (11.1)*	.23
Mattel	.00	8.7 (1.9)	.00 (.2)	.37
Cytogen	.22	-1.9 (.9)	.02 (3.0)	.27
Lilly	.81	-2.8 (.6)	.18 (11.5)*	.63
Mattel	.10	-10.6 (1.7)	.0 (1.7)	1.91
Price	.02	-.01 (.7)	.0 (.7)	1.08
Silicon	.34	-22.7 (2.0)*	.12 (3.8)*	.71
Microsoft	.22	-38.2 (1.3)	.22 (2.9)*	1.8
Image	.00	6.9 (.7)	.00 (.2)	.82
Disney	.76	-6.7 (1.8)	.1 (9.2)*	.32

Note: The licensor is the first entity represented in each of the six sets.

Note: Values in ( )'s denote "t" values. An asterisk (*) indicates a coefficient estimate that is statistically different from zero at a 95 percent confidence level.

SUMMARY REGRESSION RESULTS (FIRST DIFFERENCE FORM)

Entity	R^2	Intercept	S&P 500	Std. Error
Comm Sat.	.10	.03 (.1)	.08 (.1)	.57
Eagle	.01	.01 (.03)	-.01 (.0)	.19
Wang	.00	-.01 (.4)	.00 (.0)	.21
Micron	.18	-.04 (.4)	.08 (2.7)*	.61
Disney	.57	-.01 (.3)	.08 (5.9)*	.25
Mattel	.00	.01 (.3)	.00 (.2)	.25
Cytogen	.00	.01 (.4)	.00 (.0)	.17
Lilly	.13	.05 (.5)	.10 (2.1)*	.54
Mattel	.06	1.36 (.7)	-.00 (1.3)	.59
Price	.02	.06 (1.4)	.00 (.64)*	.26
Silicon	.15	-.00 (.0)	.07 (2.2)*	.58
Microsoft	.46	.05 (.3)	.27 (4.8)*	1.03
Image	.00	.07 (.8)	-.00 (.2)	.49
Disney	.25	-.07 (1.2)	.04 (2.9)*	.30

Appendix Exhibit B. **Event Study Effect of License Agreement Announcements on Stock Prices**

LICENSOR	LICENSEE	Other Announcements occurring in the preceding 3 days		Other Announcements on the same day		Other Announcements in the succeeding 3 days		LICENSED INTANGIBLE	DATE
		Licensor	Licensee	Licensor	Licensee	Licensor	Licensee		
Communications Satellite Corp.	Eagle-Picher Industries Inc.	0	0	0	0	0	0	Nickel-hydrogen battery technology	Mar. 30, 1992
Varian Associates Inc.	Applied Materials Inc.	1	0	0	0	0	0	Heat-transfer technology	Feb. 25, 1992
Image Entertainment Inc.	Walt Disney Co.	0	0	0	0	0	1	Laser disk	Dec. 23, 1991
Wang Laboratories Inc.	Micron Technology Inc.	0	0	0	0	0	0	Single-in-line memory modules	Dec. 2, 1991
Ecogen Inc.	Monsanto Co.	0	1	0	0	0	2	Development and marketing rights of seeds with insecticidal genes	Oct. 25, 1991
MacroChem Corp.	Upjohn Co.	0	0	0	0	0	1	Marketing rights to SEPA	Sept. 6, 1991
Silicon Graphics Inc.	Microsoft Corp.	0	0	0	0	1	0	Computer graphics technology	Apr. 3, 1991
Liposome Co.	Pfizer Inc.	0	1	0	1	0	0	Marketing of an anticancer drug	Nov. 21, 1990
Mattel Inc.	Price-Stern Sloan Inc.	0	0	0	0	1	0	"Barbie" books	Aug. 13, 1990
Warner Bros.	Tonka Corp.	1	1	0	0	0	0	"Batman" trademark	Nov. 9, 1989
IBM Corp.	Micron Technology Inc.	2	0	1	0	1	0	Chip technology	Nov. 9, 1989
IBM Corp.	Compaq Computer Corp.	0	0	1	0	4	1	Computer products	July 17, 1989
Cytogen Corp.	Eli Lilly & Co.	0	0	0	0	0	1	Drug Delivery Technique	May 3, 1989
Texas Instruments Inc.	Micron Technology Inc.	1	0	0	0	0	0	Semiconductor technology	May 2, 1989
Walt Disney Co.	Sears Roebuck & Co.	0	0	1	0	0	0	Clothing/toys	Nov. 19, 1987
Walt Disney Co.	Mattel Inc.	0	0	0	0	0	0	Infant toys	Oct. 13, 1987
Adobe Systems Inc.	IBM Corp.	0	2	0	1	0	2	Postscript computer software	Mar. 4, 1987

Note Shaded entries were excluded from further analysis

Appendix Exhibit F.

SUMMARY REGRESSION RESULTS

Transaction Set Entity	R^2	Intercept	S&P 500	Std. Error of Regression
Comm Sat.	.24	114.8 (4.5)*	-.18 (2.9)*	1.08
Eagle	.10	3.8 (1.1)	.01 (1.7)	.16
Wang	.02	7.3 (3.6)*	.01 (.9)	.21
Micron	.59	-62.9 (5.7)*	.20 (7.1)*	1.12
Disney	.82	-11.8 (4.3)*	.10 (11.1)*	.23
Mattel	.00	8.7 (1.9)	.00 (.2)	.37
Cytogen	.22	-1.9 (.9)	.02 (3.0)	.27
Lilly	.81	-2.8 (.6)	.18 (11.5)*	.63
Mattel	.10	-10.6 (1.7)	.0 (1.7)	1.91
Price	.02	-.01 (.7)	.0 (.7)	1.08
Silicon	.34	-22.7 (2.0)*	.12 (3.8)*	.71
Microsoft	.22	-38.2 (1.3)	.22 (2.9)*	1.8
Image	.00	6.9 (.7)	.00 (.2)	.82
Disney	.76	-6.7 (1.8)	.1 (9.2)*	.32

Note: The licensor is the first entity represented in each of the six sets.

Note: Values in ( )'s denote "t" values. An asterisk (*) indicates a coefficient estimate that is statistically different from zero at a 95 percent confidence level.

SUMMARY REGRESSION RESULTS (FIRST DIFFERENCE FORM)

Entity	R^2	Intercept	S&P 500	Std. Error
Comm Sat.	.10	.03 (.1)	.08 (.1)	.57
Eagle	.01	.01 (.03)	-.01 (.0)	.19
Wang	.00	-.01 (.4)	.00 (.0)	.21
Micron	.18	-.04 (.4)	.08 (2.7)*	.61
Disney	.57	-.01 (.3)	.08 (5.9)*	.25
Mattel	.00	.01 (.3)	.00 (.2)	.25
Cytogen	.00	.01 (.4)	.00 (.0)	.17
Lilly	.13	.05 (.5)	.10 (2.1)*	.54
Mattel	.06	1.36 (.7)	-.00 (1.3)	.59
Price	.02	.06 (1.4)	.00 (.64)*	.26
Silicon	.15	-.00 (.0)	.07 (2.2)*	.58
Microsoft	.46	.05 (.3)	.27 (4.8)*	1.03
Image	.00	.07 (.8)	-.00 (.2)	.49
Disney	.25	-.07 (1.2)	.04 (2.9)*	.30

APPENDIX G

Licensor

Date	S&P 500	CommSat (Actual)	CommSat (Predicted)	Residual (Actual-Predicted)	Value of Residual	
3/30/92	**403**	**41.25**	42.1933237	-0.943323699	-17838251.15	(a)
3/31/92	403.69	41.625	42.06895081	-0.443950813	-8395109.881	
4/1/92	404.23	41.625	41.97161551	-0.346615511	-6554499.321	
4/2/92	400.5	41.75	42.6439501	-0.893950097	-16904596.34	
4/3/92	401.55	41.75	42.45468701	-0.70468701	-13325631.36	
4/6/92	405.59	41.875	41.72647475	0.148525249	2808612.46	
Number of shares outstanding on 3/30/92:			18910000			

Licensee

Date	S&P 500	Eagle-P (Actual)	Eagle-P (Predicted)	Residual (Actual-Predicted)	Value of Residual
3/30/92	**403**	**2.375**	2.239109939	0.135890061	1491801.084
3/31/92	403.69	2.25	2.250278657	-0.000278657	-3059.097223
4/1/92	404.23	2.5	2.259019393	0.240980607	2645485.108
4/2/92	400.5	2.5	2.198643571	0.301356429	3308290.873
4/3/92	401.55	2.5	2.215639446	0.284360554	3121710.162
4/6/92	405.59	2.375	2.281033097	0.093966903	1031568.663
Number of shares outstanding on 3/30/92:			10978000		

CommSat	
114.834299	intercept
-0.1802506	slope

Eagle-P	
-4.2840686	intercept
0.01618655	slope

Date	Licensor: CommSat		Licensee: Eagle-P	
3/30/92	109%	(b)	-9%	(c)
3/31/92	100%		0%	
4/1/92	168%		-68%	
4/2/92	124%		-24%	
4/3/92	131%		-31%	
4/6/92	73%		27%	
AVERAGE	124%		-24%	

(a) Computed as the residual times the number of shares outstanding.

(b) Computed as the Disney value of residual on 10/13 over the sum of the Disney value of residual and the Mattel value of residual.

(c) Computed as the Mattel value of residual on 10/13 over the sum of the Disney value of residual and the Mattel value of residual.

FIRST DIFFERENCES

Licensor

Date	S&P 500	CommSat (Actual)	CommSat (Predicted)	Residual (Actual-Predicted)	Value of Residual
3/30/92	**-0.5**	**0.875**	-0.005683595	0.880683595	16653726.78
3/31/92	0.69	0.375	0.086522668	0.288477332	5455106.351
4/1/92	0.54	0	0.07490003	-0.07490003	-1416359.562
4/2/92	-3.73	0.125	-0.255957736	0.380957736	7203910.792
4/3/92	1.05	0	0.114416999	-0.114416999	-2163625.459
4/6/92	4.04	0.125	0.34609492	-0.22109492	-4180904.934
Number of shares outstanding on 3/30/92:			18910000		

Licensee

Date	S&P 500	Eagle-P (Actual)	Eagle-P (Predicted)	Residual (Actual-Predicted)	Value of Residual
3/30/92	**-0.5**	**0**	0.016363798	-0.016363798	-179641.7759
3/31/92	0.69	-0.125	0.006582004	-0.131582004	-1444507.243
4/1/92	0.54	0.25	0.007815004	0.242184996	2658706.892
4/2/92	-3.73	0	0.042914381	-0.042914381	-471114.0795
4/3/92	1.05	0	0.003622806	-0.003622806	-39771.16581
4/6/92	4.04	-0.125	-0.020954978	-0.104045022	-1142206.247
Number of shares outstanding on 3/30/92:			10978000		

CommSat	
0.03305853	intercept
0.07748425	slope

Eagle-P	
0.0122538	intercept
-0.00822	slope

Date	Licensor: CommSat	Licensee: Eagle-P
3/30/92	101%	-1%
3/31/92	136%	-36%
4/1/92	-114%	214%
4/2/92	107%	-7%
4/3/92	98%	2%
4/6/92	79%	21%
AVERAGE	103%	-3%

Licensor

Date	S&P 500	Cytogen (Actual)	Cytogen (Predicted)	Residual (Actual-Predicted)	Value of Residual
5/3/89	**308.16**	**5.125**	4.492255935	0.632744065	83124853.28
5/4/89	307.77	5.375	4.48417972	0.89082028	117028841.8
5/5/89	307.61	5.6875	4.480866401	1.206633599	158517869.2
5/8/89	306	5.375	4.447526129	0.927473871	121844097.4
5/9/89	305.19	5.75	4.430752451	1.319247549	173312189
5/10/89	305.8	5.75	4.44338448	1.30661552	171652694.1
Number of shares outstanding on 10/13/87:			131372000		

Licensee

Date	S&P 500	Lilly (Actual)	Lilly (Predicted)	Residual (Actual-Predicted)	Value of Residual
5/3/89	**308.16**	**54**	53.66859357	0.331406433	15793504.97
5/4/89	307.77	54.125	53.59707067	0.527929329	25159000.12
5/5/89	307.61	54.125	53.56772794	0.557272056	26557357.11
5/8/89	306	53.75	53.27246676	0.477533244	22757324.26
5/9/89	305.19	52.625	53.1239192	-0.498919202	-23776493.51
5/10/89	305.8	54	53.23578835	0.764211652	36419270.49
Number of shares outstanding on 10/13/87:			47656000		

Cytogen	
-1.8891965	intercept
0.02070824	slope

Lilly	
-2.8454981	intercept
0.18339204	slope

Date	Licensor: CYTOGEN	Licensee: LILLY
5/3/89	84%	16%
5/4/89	82%	18%
5/5/89	86%	14%
5/8/89	84%	16%
5/9/89	116%	-16%
5/10/89	82%	18%
AVERAGE	89%	11%

FIRST DIFFERENCES

Licensor

Date	S&P 500	Cytogen (Actual)	Cytogen (Predicted)	Residual (Actual-Predicted)	Value of Residual
5/3/89	**5.13**	**0.4375**	0.032438273	0.405061727	53213769.21
5/4/89	-9.29	-0.84375	-0.019678279	-0.824071721	-108259950.1
5/5/89	-7.15	-0.375	-0.011943922	-0.363056078	-47695403.01
5/8/89	-15.38	-1.15625	-0.041688667	-1.114561333	-146422151.4
5/9/89	-57.86	-4.71875	-0.195219259	-4.523530741	-594265280.5
5/10/89	11.99	0.9375	0.057231584	0.880268416	115642622.3
Number of shares outstanding on 10/13/87:			131372000		

Licensee

Date	S&P 500	Lilly (Actual)	Lilly (Predicted)	Residual (Actual-Predicted)	Value of Residual
5/3/89	**5.13**	**0.265625**	0.566049175	-0.300424175	-14317014.5
5/4/89	-9.29	-0.0625	-0.877834888	0.815334888	38855599.43
5/5/89	-7.15	-0.46875	-0.663555284	0.194805284	9283640.6
5/8/89	-15.38	-0.671875	-1.487630585	0.815755585	38875648.15
5/9/89	-57.86	-1.328125	-5.741180863	4.413055863	210308590.2
5/10/89	11.99	-0.140625	1.252945477	-1.393570477	-66411994.67
Number of shares outstanding on 10/13/87:			47656000		

Cytogen	
0.0138975	intercept
0.00361419	slope

Lilly	
0.05237891	intercept
0.10013066	slope

Date	Licensor: CYTOGEN	Licensee: LILLY
5/3/89	137%	-37%
5/4/89	156%	-56%
5/5/89	124%	-24%
5/8/89	136%	-36%
5/9/89	155%	-55%
5/10/89	235%	-135%
AVERAGE	142%	-42%

Date	S&P 500	Walt Disney (Actual)	Disney (Predicted)	Residual (Actual-Predicted)	Value of Residual
10/13/87	**314.52**	**18.59375**	18.55180144	0.041948561	5510866.4
10/14/87	305.23	17.75	17.65601091	0.093989092	12347535.05
10/15/87	298.08	17.375	16.9665704	0.408429598	53656213.15
10/16/87	282.7	16.21875	15.48355013	0.735199874	96584677.9
10/19/87	224.84	11.5	9.904385419	1.595614581	209619078.8
10/20/87	236.83	12.4375	11.06052411	1.376975887	180896076.3
Number of shares outstanding on 10/13/87:			131372000		

Date	S&P 500	Mattel (Actual)	Mattel (Predicted)	Residual (Actual-Predicted)	Value of Residual
10/13/87	**314.52**	**7.46875**	7.634906488	-0.166156488	-7918353.606
10/14/87	305.23	7.40625	7.665215557	-0.258965557	-12341262.59
10/15/87	298.08	6.9375	7.688542774	-0.751042774	-35791694.41
10/16/87	282.7	6.265625	7.738720758	-1.473095758	-70201851.45
10/19/87	224.84	4.9375	7.927491772	-2.989991772	-142491047.9
10/20/87	236.83	4.796875	7.888373824	-3.091498824	-147328468
Number of shares outstanding on 10/13/87:			47656000		

Disney	
-11.77587	intercept
0.0964252	slope

Mattel	
8.661043	intercept
-0.003263	slope

Date	DISNEY	MATTEL
10/13/87	-229%	329%
10/14/87	196853%	-196753%
10/15/87	300%	-200%
10/16/87	366%	-266%
10/19/87	312%	-212%
10/20/87	539%	-439%
AVERAGE	392%	-292%

FIRST DIFFERENCES

Date	S&P 500	Walt Disney (Actual)	Disney (Predicted)	Residual (Actual-Predicted)	Value of Residual
10/13/87	**5.13**	**0.4375**	0.395363059	0.042136941	5535614.154
10/14/87	-9.29	-0.84375	-0.754410419	-0.089339581	-11736719.43
10/15/87	-7.15	-0.375	-0.583778294	0.208778294	27427622.03
10/16/87	-15.38	-1.15625	-1.239994364	0.083744364	11001664.57
10/19/87	-57.86	-4.71875	-4.627121782	-0.091628218	-12037382.29
10/20/87	11.99	0.9375	0.942342675	-0.004842675	-636191.9565
Number of shares outstanding on 10/13/87:			131372000		

Date	S&P 500	Mattel (Actual)	Mattel (Predicted)	Residual (Actual-Predicted)	Value of Residual
10/13/87	**5.13**	**0.265625**	0.026495767	0.239129233	11395942.72
10/14/87	-9.29	-0.0625	-0.009920699	-0.052579301	-2505719.156
10/15/87	-7.15	-0.46875	-0.004516314	-0.464233686	-22123520.55
10/16/87	-15.38	-0.671875	-0.025300469	-0.646574531	-30813155.85
10/19/87	-57.86	-1.328125	-0.132580045	-1.195544955	-56974890.36
10/20/87	11.99	-0.140625	0.043820105	-0.184445105	-8789915.945
Number of shares outstanding on 10/13/87:			47656000		

Disney	
-0.013676	intercept
0.0797346	slope

Mattel	
0.0135404	intercept
0.0025254	slope

Date	DISNEY	MATTEL
10/13/87	33%	67%
10/14/87	82%	18%
10/15/87	517%	-417%
10/16/87	-56%	156%
10/19/87	17%	83%
10/20/87	7%	93%
AVERAGE	-22%	122%

Licensor

Date	S&P 500	Image (Actual)	Image (Predicted)	Residual (Actual-Predicted)	Value of Residual
12/23/91	**396.82**	**10**	9.317943399	0.682056601	7414637.307
12/24/91	399.33	9.875	9.332804391	0.542195609	5894208.47
12/26/91	404.84	10.125	9.365427523	0.759572477	8257312.398
12/27/91	406.46	9.75	9.375019079	0.374980921	4076417.59
12/30/91	415.14	10.25	9.426410874	0.823589126	8953237.389
12/31/91	417.09	9.875	9.437956266	0.437043734	4751102.436

Number of shares outstanding on 12/23/91: 10871000

Licensee

Date	S&P 500	Disney (Actual)	Disney (Predicted)	Residual (Actual-Predicted)	Value of Residual
12/23/91	**396.82**	**27.4375**	28.13281272	-0.695312724	-90453927.63
12/24/91	399.33	27.78125	28.35337358	-0.572123584	-74428129.21
12/26/91	404.84	27.625	28.837553	-1.212553002	-157742232.6
12/27/91	406.46	28.3125	28.97990702	-0.667407023	-86823647.05
12/30/91	415.14	28.71875	29.74264338	-1.023893384	-133199314.2
12/31/91	417.09	28.625	29.91399545	-1.288995446	-167686706.6

Number of shares outstanding on 12/23/91: 130091000

Image	
6.96848579	intercept
0.00592071	slope

Disney	
-6.7368926	intercept
0.08787285	slope

Date	Licensor: Image	Licensee: Disney
12/23/91	-9%	109%
12/24/91	-9%	109%
12/26/91	-6%	106%
12/27/91	-5%	105%
12/30/91	-7%	107%
12/31/91	-3%	103%
AVERAGE	-6%	106%

FIRST DIFFERENCES

Licensor

Date	S&P 500	Image (Actual)	Image (Predicted)	Residual (Actual-Predicted)	Value of Residual
12/23/91	**9.78**	**-0.75**	0.034803935	-0.784803935	-8531603.58
12/24/91	2.51	-0.125	0.064684119	-0.189684119	-2062056.054
12/26/91	5.51	0.25	0.052353919	0.197646081	2148610.545
12/27/91	1.62	-0.375	0.068342078	-0.443342078	-4819571.728
12/30/91	8.68	0.5	0.039325008	0.460674992	5007997.834
12/31/91	1.95	-0.375	0.066985756	-0.441985756	-4804827.152

Number of shares outstanding on 12/23/91: 10871000

Licensee

Date	S&P 500	Disney (Actual)	Disney (Predicted)	Residual (Actual-Predicted)	Value of Residual
12/23/91	**9.78**	**0.9375**	0.375574465	0.561925535	73101454.73
12/24/91	2.51	0.34375	0.046452303	0.297297697	38675754.69
12/26/91	5.51	-0.15625	0.182266125	-0.338516125	-44037901.24
12/27/91	1.62	0.6875	0.006160869	0.681339131	88636088.87
12/30/91	8.68	0.40625	0.325776064	0.080473936	10468934.82
12/31/91	1.95	-0.09375	0.02110039	-0.11485039	-14941002.03

Number of shares outstanding on 12/23/91: 130091000

Image	
0.07500039	intercept
-0.0041101	slope

Disney	
-0.0671786	intercept
0.04527127	slope

Date	Licensor: Image	Licensee: Disney
12/23/91	-13%	113%
12/24/91	-6%	106%
12/26/91	-5%	105%
12/27/91	-6%	106%
12/30/91	32%	68%
12/31/91	24%	76%
AVERAGE	-9%	109%

Licensor

Date	S&P 500	Macrochem (Actual)	Macrochem (Predicted)	Residual (Actual-Predicted)	Value of Residual
9/6/91	**389.1**	**4.625**	2.994810001	1.630189999	9601819.094
9/9/91	388.57	4.4375	2.987377027	1.450122973	8541224.312
9/10/91	384.56	4.25	2.931138864	1.318861136	7768092.092
9/11/91	385.09	4.375	2.938571838	1.436428162	8460561.874
9/12/91	387.34	4.25	2.970126917	1.279873083	7538452.459
9/13/91	383.59	4.1875	2.917535119	1.269964881	7480093.151

Number of shares outstanding on 9/6/91: 5890000

Licensee

Date	S&P 500	Upjohn (Actual)	Upjohn (Predicted)	Residual (Actual-Predicted)	Value of Residual
9/6/91	**389.1**	**43**	44.60075163	-1.600751625	-282769573.1
9/9/91	388.57	43.625	44.58912231	-0.964122312	-170310278.2
9/10/91	384.56	43.125	44.50113449	-1.376134491	-243091405.5
9/11/91	385.09	43	44.5127638	-1.512763804	-267226700.4
9/12/91	387.34	43.375	44.56213353	-1.187133529	-209704763.7
9/13/91	383.59	43	44.47985065	-1.479850654	-261412658.3

Number of shares outstanding on 9/6/91: 176648000

Macrochem	
-2.462115	intercept
0.01402448	slope

Upjohn	
36.0630805	intercept
0.0219421	slope

Date	Licensor: Macrochem	Licensee: Upjohn
9/6/91	-4%	104%
9/9/91	-5%	105%
9/10/91	-3%	103%
9/11/91	-3%	103%
9/12/91	-4%	104%
9/13/91	-3%	103%
AVERAGE	-4%	104%

FIRST DIFFERENCES

Licensor

Date	S&P 500	Macrochem (Actual)	Macrochem (Predicted)	Residual (Actual-Predicted)	Value of Residual
9/6/91	**-0.04**	**0.25**	0.05864708	0.19135292	1127068.7
9/9/91	-0.53	-0.1875	0.059546108	-0.247046108	-1455101.578
9/10/91	-4.01	-0.1875	0.065931045	-0.253431045	-1492708.856
9/11/91	0.53	0.125	0.057601271	0.067398729	396978.5125
9/12/91	2.25	-0.125	0.054445498	-0.179445498	-1056933.982
9/13/91	-3.75	-0.0625	0.06545401	-0.12795401	-753649.117

Number of shares outstanding on 9/6/91: 5890000

Licensee

Date	S&P 500	Upjohn (Actual)	Upjohn (Predicted)	Residual (Actual-Predicted)	Value of Residual
9/6/91	**-0.04**	**- 1**	0.004109112	-1.004109112	-177373866.3
9/9/91	-0.53	0.625	-0.022672559	0.647672559	114410062.3
9/10/91	-4.01	-0.5	-0.212877079	-0.287122921	-50719689.76
9/11/91	0.53	-0.125	0.0352633	-0.1602633	-28310191.44
9/12/91	2.25	0.375	0.129272431	0.245727569	43407283.69
9/13/91	-3.75	-0.375	-0.198666396	-0.176333604	-31148978.4

Number of shares outstanding on 9/6/91: 176648000

Macrochem	
0.05857369	intercept
-0.0018348	slope

Upjohn	
0.00629537	intercept
0.05465647	slope

Date	Licensor: Macrochem	Licensee: Upjohn
9/6/91	-1%	101%
9/9/91	-1%	101%
9/10/91	3%	97%
9/11/91	-1%	101%
9/12/91	-2%	102%
9/13/91	2%	98%
AVERAGE	2%	98%

Licensor

Date	S&P 500	Mattel (Actual)	Mattel (Predicted)	Residual (Actual-Predicted)	Value of Residual
8/13/90	**338.84**	**17.325**	20.49897351	-3.173973512	-155807185.7
8/14/90	339.39	18	20.51503134	-2.515031343	-123460373.6
8/15/90	340.06	18.125	20.5345927	-2.409592702	-118284496.1
8/16/90	332.39	17.375	20.31065894	-2.935658945	-144108561.9
8/17/90	327.83	17.125	20.17752492	-3.052524925	-149845396
8/20/90	328.51	17.375	20.19737824	-2.822378244	-138547725.6

Number of shares outstanding on 3/30/92: 49089000

Licensee

Date	S&P 500	Price (Actual)	Price (Predicted)	Residual (Actual-Predicted)	Value of Residual
8/13/90	**338.84**	**2.75**	3.663601443	-0.913601443	-3514624.753
8/14/90	339.39	2.75	3.66733379	-0.91733379	-3528983.09
8/15/90	340.06	2.5	3.671880467	-1.171880467	-4508224.155
8/16/90	332.39	2.5	3.619831198	-1.119831198	-4307990.619
8/17/90	327.83	2.5	3.588886653	-1.088886653	-4188946.952
8/20/90	328.51	2.375	3.59350119	-1.21850119	-4687574.078

Number of shares outstanding on 3/30/92: 3847000

Mattel	
10.6061816	intercept
0.02919606	slope

Price	
1.36420455	intercept
0.00678608	slope

Date	Licensor: Mattel	Licensee: Price
8/13/90	98%	2%
8/14/90	97%	3%
8/15/90	96%	4%
8/16/90	97%	3%
8/17/90	97%	3%
8/20/90	97%	3%
AVERAGE	97%	3%

FIRST DIFFERENCES

Licensor

Date	S&P 500	Mattel (Actual)	Mattel (Predicted)	Residual (Actual-Predicted)	Value of Residual
8/13/90	**3.32**	**-0.425**	-0.134317892	-0.290682108	-14269294.01
8/14/90	0.55	0.675	-0.148859303	0.823859303	40442429.34
8/15/90	0.67	0.125	-0.14822935	0.27322935	13412555.58
8/16/90	-7.67	-0.75	-0.192011073	-0.557988927	-27391118.44
8/17/90	-4.56	-0.25	-0.175684795	-0.074315205	-3648059.093
8/20/90	0.68	0.25	-0.148176854	0.398176854	19546103.6

Number of shares outstanding on 3/30/92: 49089000

Licensee

Date	S&P 500	Price (Actual)	Price (Predicted)	Residual (Actual-Predicted)	Value of Residual
8/13/90	**3.32**	**0**	-0.062277445	0.062277445	239581.3313
8/14/90	0.55	0	-0.065384911	0.065384911	251535.7525
8/15/90	0.67	-0.25	-0.065250292	-0.184749708	-710732.1285
8/16/90	-7.67	0	-0.074606344	0.074606344	287010.6053
8/17/90	-4.56	0	-0.071117456	0.071117456	273588.8544
8/20/90	0.68	0	-0.065239073	0.065239073	250974.7147

Number of shares outstanding on 3/30/92: 3847000

Mattel	
-0.1517466	intercept
0.00524961	slope

Price	
-0.0660019	intercept
0.00112183	slope

Date	Licensor: Mattel	Licensee: Price
8/13/90	102%	-2%
8/14/90	99%	1%
8/15/90	106%	-6%
8/16/90	101%	-1%
8/17/90	108%	-8%
8/20/90	99%	1%
AVERAGE	98%	2%

Licensor

Date	S&P 500	Silicon (Actual)	Silicon (Predicted)	Residual (Actual-Predicted)	Value of Residual
4/3/91	**378.94**	**19**	21.51821667	-2.518216666	-48805557.2
4/4/91	379.77	18.4375	21.61513639	-3.17763639	-61585770.87
4/5/91	375.36	18.375	21.10017738	-2.725177376	-52816662.72
4/8/91	378.66	18.5625	21.48552086	-2.923020856	-56651067.2
4/9/91	373.56	18.625	20.88999002	-2.264990023	-43897771.64
4/10/91	373.15	19	20.84211402	-1.842114015	-35702011.73

Number of shares outstanding on 4/3/91: 19381000

Licensee

Date	S&P 500	Microsoft (Actual)	Microsoft (Predicted)	Residual (Actual-Predicted)	Value of Residual
4/3/91	**378.94**	**50.5625**	47.32363592	3.23886408	562457897.3
4/4/91	379.77	50.5625	47.51095473	3.051545268	529928299.7
4/5/91	375.36	48.890625	46.51568249	2.374942512	412430141.7
4/8/91	378.66	49.5	47.26044403	2.239555969	388919050
4/9/91	373.56	49	46.10944892	2.890551081	501970210.2
4/10/91	373.15	47.78125	46.01691794	1.764332061	306392141.4

Number of shares outstanding on 4/3/91: 173659000

Silicon	
-22.730892	intercept
0.11677075	slope

Microsoft	
-38.197558	intercept
0.22568532	slope

Date	Licensor: Silicon	Licensee: Microsoft
4/3/91	-10%	110%
4/4/91	-13%	113%
4/5/91	-15%	115%
4/8/91	-17%	117%
4/9/91	-10%	110%
4/10/91	-13%	113%
AVERAGE	-12%	112%

Licensor

Date	S&P 500	Wang (Actual)	Wang (Predicted)	Residual (Actual-Predicted)	Value of Residual
12/2/91	**381.4**	**5**	5.541458667	-0.541458667	-3074943.771
12/3/91	380.96	4.875	5.543443463	-0.668443463	-3796090.425
12/4/91	380.07	5.125	5.547458163	-0.422458163	-2399139.906
12/5/91	377.39	5.25	5.559547372	-0.309547372	-1757919.523
12/6/91	379.1	5.5	5.551833735	-0.051833735	-294363.7785
12/9/91	378.26	5.375	5.55562289	-0.18062289	-1025757.39
Number of shares outstanding on 12/2/91:			5679000		

Licensee

Date	S&P 500	Micron (Actual)	Micron (Predicted)	Residual (Actual-Predicted)	Value of Residual
12/2/91	**381.4**	**13**	14.4054156	-1.405415597	-52500705.04
12/3/91	380.96	13.25	14.31625026	-1.066250263	-39830844.82
12/4/91	380.07	13.5	14.13589311	-0.63589311	-23754423
12/5/91	377.39	13.25	13.59279517	-0.342795165	-12805456.19
12/6/91	379.1	13	13.93932408	-0.939324077	-35089390.24
12/9/91	378.26	12.5	13.76909935	-1.269099349	-47408475.26
Number of shares outstanding on 12/2/91:			37356000		

Wang	
7.26191549	intercept
-0.0045109	slope

Micron	
-62.884717	intercept
0.20264849	slope

Date	Licensor: Wang	Licensee: Micron
12/2/91	6%	94%
12/3/91	9%	91%
12/4/91	9%	91%
12/5/91	12%	88%
12/6/91	1%	99%
12/9/91	2%	98%
AVERAGE	6%	94%

FIRST DIFFERENCES

Licensor

Date	S&P 500	Silicon (Actual)	Silicon (Predicted)	Residual (Actual-Predicted)	Value of Residual
4/3/91	**-0.56**	**-2.25**	-0.041810595	-2.208189405	-42796918.86
4/4/91	0.83	-0.5625	0.055120528	-0.617620528	-11970103.45
4/5/91	-4.41	-0.0625	-0.310288885	0.247788885	4802396.382
4/8/91	3.3	0.1875	0.227365041	-0.039865041	-772624.3618
4/9/91	-5.1	0.0625	-0.358405773	0.420905773	8157574.794
4/10/91	-0.41	0.375	-0.031350402	0.406350402	7875477.141
Number of shares outstanding on 4/3/91:			19381000		

Licensee

Date	S&P 500	Microsoft (Actual)	Microsoft (Predicted)	Residual (Actual-Predicted)	Value of Residual
4/3/91	**-0.56**	**0.671875**	-0.098902628	0.770777628	133852472.1
4/4/91	0.83	0	0.280712502	-0.280712502	-48748252.45
4/5/91	-4.41	-1.671875	-1.150354608	-0.521520392	-90566709.73
4/8/91	3.3	0.609375	0.955280396	-0.345905396	-60069585.18
4/9/91	-5.1	-0.5	-1.338796651	0.838796651	145664587.7
4/10/91	-0.41	-1.21875	-0.057936967	-1.160813033	-201585630.6
Number of shares outstanding on 4/3/91:			173659000		

Silicon	
-0.0027592	intercept
0.06973462	slope

Microsoft	
0.05403584	intercept
0.27310441	slope

Date	Licensor: Silicon	Licensee: Microsoft
4/3/91	-47%	147%
4/4/91	20%	80%
4/5/91	-6%	106%
4/8/91	1%	99%
4/9/91	5%	95%
4/10/91	-4%	104%
AVERAGE	22%	78%

FIRST DIFFERENCES

Licensor

Date	S&P 500	Wang (Actual)	Wang (Predicted)	Residual (Actual-Predicted)	Value of Residual
12/2/91	**6.18**	**-0.125**	-0.011603474	-0.113396526	-643978.8725
12/3/91	-0.44	-0.125	-0.012540735	-0.112459265	-638656.168
12/4/91	-0.89	0.25	-0.012604446	0.262604446	1491330.647
12/5/91	-2.68	0.125	-0.012857874	0.137857874	782894.868
12/6/91	1.71	0.25	-0.012236337	0.262236337	1489240.159
12/9/91	-0.84	-0.125	-0.012597367	-0.112402633	-638334.5544
Number of shares outstanding on 12/2/91:			5679000		

Licensee

Date	S&P 500	Micron (Actual)	Micron (Predicted)	Residual (Actual-Predicted)	Value of Residual
12/2/91	**6.18**	**-0.25**	0.458925283	-0.708925283	-26482612.86
12/3/91	-0.44	0.25	-0.076857274	0.326857274	12210080.32
12/4/91	-0.89	0.25	-0.113277538	0.363277538	13570595.72
12/5/91	-2.68	-0.25	-0.258149257	0.008149257	304423.6331
12/6/91	1.71	-0.25	0.097150656	-0.347150656	-12968159.91
12/9/91	-0.84	-0.5	-0.109230842	-0.390769158	-14597572.66
Number of shares outstanding on 12/2/91:			37356000		

Wang	
-0.0124784	intercept
0.00014158	slope

Micron	
-0.0412463	intercept
0.08093392	slope

Date	Licensor: Wang	Licensee: Micron
12/2/91	2%	98%
12/3/91	-6%	106%
12/4/91	10%	90%
12/5/91	72%	28%
12/6/91	-13%	113%
12/9/91	4%	96%
AVERAGE	-7%	107%

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