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**The impact of a value-added tax on the cash flow of
corporations**

Murphy, John Aloysius Daniel, Ph.D.

Florida Atlantic University, 1991

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**THE IMPACT OF A VALUE-ADDED TAX
ON THE
CASH FLOW OF CORPORATIONS**

by

John A. D. Murphy

**A Dissertation Submitted to the Faculty of
The College of Business
in Partial Fulfillment of the Requirements
for the Degree of
Doctor of Philosophy
in
Business Administration**

**Florida Atlantic University
Boca Raton, Florida
December 1991**

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THE IMPACT OF A VALUE-ADDED TAX
ON THE CASH FLOW OF CORPORATIONS



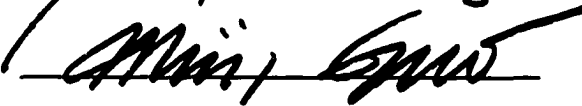
by

John A. D. Murphy

This dissertation was prepared under the direction of the candidate's dissertation director, Dr. Michael J. R. Hoffman, School of Accounting, and has been approved by the members of his supervisory committee. It was submitted to the faculty of the College of Business and was accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Business Administration.

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11/8/91
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ACKNOWLEDGEMENTS

My sincere appreciation is extended to my committee: Dr. Mike Hoffman (Chairman) for his time, patience, and suggestions; Dr. Bob Taylor for his understanding; Dr Ben King for his expertise and assistance; and, Dr. Miin Guo for his assistance and support.

My deepest appreciation is extended to my wife, Melica, without whom, I am not.

ABSTRACT

Author: John A. D. Murphy
Title: The Impact of a Value-Added Tax on the Cash Flow of Corporations
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Dissertation Adviser: Dr. Michael J. R. Hoffman
Degree: Doctor of Philosophy in Business Administration
Year: 1991

Advocates of a value-added tax claim VAT is superior to the existing corporate income tax (CIT) in the area of economic efficiency, i.e., tax neutrality. Since tax neutrality is a major criterion for tax policy analysis, VAT's superior allocative efficiency relative to a corporate income tax is an argument VAT proponents use to promote adoption of a value-added tax. VAT supporters maintain that CIT distorts allocation of production resources while VAT, a proportional tax, is insensitive to production methods or use of production resources.

This argument is questionable because assessments of corporate income tax neutrality automatically include the

impact of CIT on corporate cash flow since CIT, classified as an expense, is a cash drain. The incidence issue aside, VAT is not considered an expense but a pass-through liability with cash flow impact resulting from timing differences existing between receivables, payables and government remittances. The impact of VAT on corporate cash flow is not automatically included when assessing value-added tax neutrality nor is it evident that VAT proponents have consciously considered it in their evaluations. This study empirically examines the impact of VAT on cash flows of manufacturing corporations in order that value-added tax neutrality might be better assessed.

Impact of VAT on cash flow is simulated for an assumed year of effectivity and two follow-on years. Multiple regression techniques are used to evaluate statistically the relationships between company characteristics, industry group membership and cash flow due to VAT.

The results indicate that adoption of a VAT in the United States would cause a significant change in cash flows in the year of effectivity. Strong influence by sales, payables turnover, and to a lesser extent, receivables turnover is observed. The results also indicate existence of differential cash flow impact across manufacturing industry subgroups suggesting that VAT neutrality requires rethinking.

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CHAPTER 1
INTRODUCTION

Need for finding new sources of revenue has kept the value-added tax in the limelight. Although agreement as to the desirability of enacting a consumption tax does not currently exist, its pervasiveness in the industrialized countries of the world, its continued consideration by the legislators, and, the recent acknowledgement by House Ways and Means Committee Chairman Dan Rostenkowski that "I think that's [VAT] something that will come eventually ..."
(Louden, 1989), suggest enactment in the future.

The corporate income tax (CIT) is generally considered to distort the allocation of resources between the corporate and non corporate sectors (McLure, 1981), whereas advocates of VAT consider a consumption tax as more neutral, i.e., economically efficient (McLure, 1987; Tait, 1988). It is possible, however, that VAT advocates are not comparing CIT and VAT on an equitable basis. CIT analyses inherently have considered the impact of CIT on corporate cash flow, since a dollar-to-dollar relationship exists between CIT and cash. However this same dollar-to-dollar

relationship does not exist between VAT and cash, due to the nature of the tax and the timing differences that exist among receivables, payables and remittances to the government.

Evidence of the impact of VAT on the cash flow of corporations is needed to evaluate properly VAT's neutrality. Tax neutrality is the major criterion for tax policy analysis (Davies, 1986; Bittker, 1979) and such evidence is currently not available. The purpose of this research is to gather evidence on the cash flow impact of VAT on corporations.

Background

Charles E. McLure, Jr., former Deputy Assistant Secretary for Tax Policy at the Department of Treasury from 1980 to 1985, believes that, as the Gramm-Rudman-Hollings targets for deficit reduction become increasingly difficult to achieve without tax increases, interest in the value-added tax (VAT) will increase (1987). Ironically, the U. S. Treasury specifically rejected the VAT while McLure was serving as deputy assistant secretary (1984).

In its 1984 report to President Reagan on Tax Reform for Fairness, Simplicity and Economic Growth (Treasury I), the Treasury Department addressed the imposition of a VAT. As noted, Treasury had specifically "not recommended" a national sales tax be adopted at that time (1984). This was

not the first time that the Treasury Department or other Federal agency had conducted a study related to the imposition of a (VAT). In fact it has been addressed many times since its first serious consideration in 1941 as a method of taxation to support the World War II effort (Cohen, 1971). It should be noted that the U. S. chose the income tax, not the VAT, to finance the Second World War.

The most recent serious consideration prior to Treasury I was the "Tax Restructuring Act of 1980 " (H.R. 7015) which was introduced on April 2, 1980 by then Chairman of the House Ways and Means Committee, Al Ullman (D. Oregon). This proposed legislation was an amended version of Ullman's original proposal H.R. 5665, "Tax Restructuring Act of 1979." Both bills proposed restructuring the Federal tax system by reducing Social Security taxes as well as individual and corporate income taxes and by imposing a VAT to replace the revenues lost.

In the last five years a United States value-added tax has attracted considerable interest, both positive and negative, from various public and private organizations.¹ Although the Tax Reform Act of 1986 did not include provision for a VAT, prior to the 1986 TRA and subsequent to its enactment, several Congressmen have alluded to or

¹ See, for example, U. S. Congress, Senate, 1985; Birnbaum, 1985, 1987; Gordon, 1986; McLure, 1987; Gravelle, 1988; Bradford, 1988; Aaron, 1988; Kotlikoff, 1988.

explicitly referred to a VAT when expounding their solution for the deficit problem.

Representative Ullman's proposed 1980 Tax Restructuring Act (hereinafter referred to as 1980 TRA) never made it "through the House." Treasury I proposal (1984) never made it "to the House," insofar as it did not become the basis for President Reagan's tax reform proposals (1985).

The relentless budget deficit may very well be the catalyst for changing the political climate so that a VAT would be acceptable to the body politic. The unofficial consensus is that the political climate will change and that a value-added tax will be part of our tax structure in the near future, not as a replacement for the income tax but as an addition to the income tax.²

² A 1988 survey of CEOs' attitude about the challenges facing American business indicates that 55 percent support the introduction of a VAT (Quickel, 1989, p 37). Representative Dan Rostenkowski, Chairman of the House Ways and Means Committee, expresses doubt about a VAT being enacted in 1989-1990 but states "I think that's [VAT] something that will come eventually, but it will come in a less crises-atmosphere time." (Louden, 1989, p 1161). James Jones (1989), former Chairman of the House Budget Committee, maintains a major deficit reduction package will include a VAT and most likely occur in 1993. He states that "In the private conversations among both Democrats and Republicans, agreement occurs on the need for a major revenue increase. By process of elimination, the most likely candidate is a consumption-based tax ..." (p 217)

Economic, Social and Revenue Considerations

There is an extensive body of literature that addresses economic and social implications of a VAT.³ There is also literature that addresses VAT revenue potential.⁴ The study proposed herein examines VAT from a different perspective, namely the impact of a value-added tax on the cash flow of corporate business.

Business Considerations

Because VAT is a consumption tax, it is generally believed that, like a retail sales tax (RST), it is borne by the consumer (McLure, 1987, p.31). This implies that, other than administrative costs, no direct cost will be borne by a business entity.⁵ In contrast the impact of a corporate income tax (CIT) is that of a tax on, and therefore a direct cost to, the business entity. Admittedly, incidence of the CIT may not be on the business entity (Dresch, et al., 1977; Presidents Task Force, 1970; United States Treasury, 1984),

³ See, for example, Brannon, 1984; Kleine, 1984; Turnier, 1984; Schuyler, 1985; Stockfish, 1985; DeSanctis, 1986; Aaron, 1988; Gravelle, 1988; Kotlikoff, 1988; Kupfer, 1988; Tait, 1988, 1989.

⁴ For examples that are representative rather than exhaustive see Presidents Task Force, 1970; Dresch et al, 1977; and the United States Treasury, 1984.

⁵ Indirect costs, due to competitive strategies implemented because of the VAT enactment, are possible but extremely difficult to predict. For a general discussion of the effect of VAT on prices see McLure (1987) and Tait (1988).

but the actual CIT is recognized as a cost to, and a cash drain from the business itself.

For the most part, corporate business would incur administrative costs incident to VAT compliance. In addition to these administrative costs, it is theorized that the enactment of a VAT would impact a business entity's cash flow (Smith, Webber, and Cerf, 1973) in another way. Because a business entity is acting on behalf of the government, i.e., collecting from the ultimate or intermediary consumer and remitting to the government, net positive or negative cash flows could result because of timing differences between collection and remittance of the tax by the business entity. Timing differences between payment for purchases including VAT, and refund for that VAT paid could also result in net positive or negative cash flow.

Summary of Study

The purpose of this study is to investigate the cash flow effect VAT would have on the manufacturing industry if enacted in the United States. Specifically, the objectives of this research are as follows:

1. to simulate the impact of a value-added tax on the cash flow of manufacturing corporations;
2. to assess the differential cash flow effect of a value-added tax on manufacturing subgroups; and
3. to assess the influence company characteristics have on the cash flow impact of a value-added tax.

In addition, this study extends the qualitative work of Smith, Weber, and Cerf (1973) by providing empirical data.

The manufacturing industry is selected for two reasons. First, manufacturing represents almost 40% of total corporate business receipts reported to the Internal Revenue Service for the year 1985 (U.S. Treasury, 1988) and thus would be the biggest contributor of VAT revenue. Retail trade industry is a distant second, accounting for slightly less than 18%. Second, within the manufacturing industry, the nine major product groups have added-value content ranging from 14% to 66% of their group shipments (U.S. Commerce, 1986). This variety of value-added content adds to the robustness of the analysis.

All data except data regarding purchases were obtained from the COMPUSTAT database. Because corporations do not supply purchase information, industry purchasing data obtained from the United States Commerce Department's Annual Survey of Manufacturers were used. Data of one thousand eight hundred and thirty-eight corporations within the major manufacturing industry groups were reviewed to determine if the data needed for simulation were available. Nine hundred and thirty-nine firms reported the necessary data and are included in this study.

Research Questions and Hypotheses

The aforementioned objectives were converted into the following research questions:

1. Other than increased costs for compliance, does VAT permanently alter the cash flow of manufacturing corporations?
2. Is there a difference in VAT impact on cash flow among major industry groups within the manufacturing sector?
3. How do payment, collection, and remittance periods; sales growth; and value added content influence the cash flow impact of VAT?

In turn, these three research questions were translated into statistically testable hypotheses, so that results obtained from this inquiry would be rigorous. The hypothesis expressed in alternate form are as follows:

Hypothesis 1: The imposition of a VAT will impact cash flows of manufacturing corporations.

Hypothesis 2: VAT impact on cash flow will differ among major industry groups within the manufacturing sector.

Hypothesis 3a: There is a negative relationship between payables turnover and cash flow impact of VAT.

Hypothesis 3b: There is a positive relationship between receivables turnover and cash flow impact of VAT.

Hypothesis 3c: Sales growth will affect the cash flow impact of VAT.

Hypothesis 3d: Value-added content will affect the cash flow impact of VAT.

The impact of VAT on corporate cash flow was simulated for each company and accumulated by industry group. Relationships between this simulated impact and company and group characteristics were examined using multiple regression techniques. The data from these regressions were then used to test the aforementioned hypotheses for statistical significance.

The balance of this dissertation is organized as follows: the next chapter details and explains the nature of a value-added tax; Chapter 3 addresses the theoretical and conceptual issues of the research; Chapter 4 contains a review of the literature relevant to this study; Chapter 5 presents the statistical hypotheses and describes the method used to answer the research questions; Chapter 6 reports the results of the study; and, Chapter 7 presents a summary and limitations of the research and discusses implications that can be drawn from these findings.

CHAPTER 2
NATURE OF A VALUE-ADDED TAX

State and local retail sales taxes (RST) are consumption taxes imposed primarily on the final sale of goods. Excise taxes, which are transaction-type taxes such as those on gasoline, alcohol and cigarettes, are also consumption taxes. While VAT is a consumption tax, it is unlike the single stage sales tax, where single stage refers to the fact that the tax is levied and collected only at one stage-- the final retail point of sale of goods. The VAT, however, is a multi-stage comprehensive sales tax insofar as the tax is levied and collected at each level of production and distribution on both goods and services.

VAT is a broad-based tax because, as noted above, it is imposed on the value-added at each stage of the production and distribution of goods and services. As each stage of the production or distribution process is completed, a VAT rate is applied to the value added during that stage to determine the tax liability thereon. The VAT is included in the price that is paid by the buyer to the producer or distributor. Insofar as each producer or

distributor pays VAT when purchasing goods or services for use in production or distribution, a credit is allowed for the VAT on goods and services purchased when those goods or services are sold as part of a good or service. The only taxpayer who does not qualify for a credit is the final consumer. The final consumer generally bears the ultimate burden of all or most of the VAT which has been added to the cost of a good or service (DeSanctis, 1986).

A VAT is in reality a sales tax on goods and services collected in a different manner. Each entity that makes or sells a product or service pays a tax on the material it buys from the suppliers and collects a tax on whatever it sells to its customers. The entity then transfers to the government the VAT it has collected after taking a credit for the VAT it has paid suppliers of goods and services. Thus, it is remitting a tax only on the value that it has added to a product or service.

For the following example a 20% value-added tax rate is assumed. If a raw material supplier sells iron ore to a steel mill for \$100, the supplier would pay \$20 in value-added tax. This \$20 tax would be included in the total price of \$120 paid by the steel mill purchaser. Assuming the supplier had made no purchases, the supplier is not entitled to a credit to offset the \$20 tax due. When the mill owner, in turn, sells steel to an appliance manufacturer for \$300, the mill charges the appliance

manufacturer \$360 because a nominal VAT obligation of \$60 (20% x 300) has been incurred. However, because the mill has already paid \$20 VAT on its purchases, it only need remit \$40 to the government (20% x (\$300-\$100)). In effect, the mill is paying taxes on the value (\$200) it added in converting the raw material (\$100) into finished steel (\$300). When the appliance maker uses the steel and sells the appliance made therefrom to a retailer for \$600, the appliance maker would charge \$720 (\$600 plus value-added-tax of \$120). However the appliance maker need only remit \$60, insofar as it would be allowed a \$60 credit for VAT paid on the purchase of steel. In effect the tax is paid only on the \$300 value added by the appliance maker (\$600-\$300).

Finally, when the retailer sells the appliance to a customer for \$960 (\$800 plus value-added-tax of \$160), the retailer would owe \$40 on its \$200 added value. The total tax would be \$160 spread among all the stages of production and distribution. The customer pays the full \$160 in the higher price charged. At each stage the price was increased by the amount of tax actually paid while each taxpayer, except the final consumer, received credit for the taxes paid to the previous level.

In practice the VAT system is more complex because of variations from the simple method described above. These major variations include:

1. The manner in which businesses are allowed to recover VAT paid on capital assets;

2. The method used to determine tax liability; and
3. The method of allowing preferential treatment (DeSanctis, 1986).

VAT Recovery on Capital Goods

The three common methods for recovering VAT paid on capital goods are the "consumption", "income", and "gross product" methods. The first two methods differ in the timing of the VAT credit, whereas the third (gross product) precludes any VAT credit.

Consumption Method

The consumption method, the one most frequently used by VAT countries, allows full recovery when the VAT is paid for the capital goods. Inasmuch as it is immediate, the credit would be an investment incentive. When firms calculate the difference between sales and purchases (to identify the value-added component), the amount of capital goods purchased is deducted in the period the purchase is made.

Income Method

The income method allows a company to recover the VAT paid on capital goods over a period of years in much the same way as depreciation. In fact there should be no difference between CIT depreciation and VAT amortization,

insofar as both match capital recovery to revenue generated therefrom. Under this income method, the VAT paid on the purchase of a capital asset is amortized over the life of that asset and the amortization for the taxable period is deducted from the VAT base in determining the tax due on sales made in that period. The income method clearly is less of an investment incentive than the consumption method because the income method does not provide an immediate reduction in VAT for capital expenditures upon which VAT was paid. However, it is not the disincentive that the gross product method is. It should be noted that record keeping for the consumption approach is minimal, whereas there may be substantial record-keeping requirements for the income approach, especially if VAT amortization is not the same as CIT depreciation.

Gross Product Method

The gross product method, as noted, is a disincentive to capital formation because it allows no recovery of VAT paid on capital good expenditures. There is no recovery of the tax paid either immediately or over the life of the asset. This result is inconsistent with the concept of a tax on consumption. In fact, it could be inflationary because one recourse a purchaser of the asset has to recover the tax is to include it in the price of goods and services produced therefrom (Treasury I, 1984; DeSanctis, 1986).

Tax Determination of the Tax Base and Liability

The three common methods for determining tax liability are: the invoice method; the addition method; and the subtraction method. While the procedures differ, there would be little difference in the VAT determined as long as the tax base and tax rates are identical.

Invoice Method

The invoice method, which is also called credit method because a firm receives credit for taxes previously paid on goods and services, is the approach used in the European Economic Community (EEC). Under this method, the selling company multiplies the sales for the period by the VAT rate applicable and separately identifies this VAT tax on its sales invoice. This approach provides to the business purchaser the exact amount of tax applicable to each purchase during that period. That is, this information is only included in all business-to-business (but not retail) sales situations. The business entity then (using the sales invoices as source documents) totals the VAT it has charged its customers and subtracts the total VAT it has been charged by its suppliers (using the purchase invoice as source documents). From this net amount, the VAT on capital goods is deducted in full (if using the consumption method), deducted partially (if using the income method) or ignored

(if using the gross product method) to determine the VAT liability for that period. Under the consumption method, the VAT credit may even create a refund. Included in these source documents (sales invoices and purchase invoices) are adjustments for bad debts, purchase discounts and similar adjustments that are included in the calculations to reflect properly the value-added.

Addition Method

The addition method considers the components of added value to determine the VAT base. The VAT base for this method is calculated by subtracting the total of value-added components received from the total of value-added components paid out. Components received generally include dividends, interest, rents and royalties whereas components paid out include any paid out dividends, interest, rents and royalties plus wages and profits. This base multiplied by the VAT rate would determine the gross tax liability. Under the consumption method for capital goods, depreciation expense would be added back and any capital expenditures for the period would be deducted; and therefore, the tax payments would be reduced or a refund may be created. Under the income method, no adjustments are necessary insofar as depreciation expense is the method used to recover capital expenditures for computing profits. Under the gross product

method, depreciation expense would be added back and no deduction for capital expenditures would be allowed.

Subtraction Method

In the subtraction method, the VAT base is the difference between total taxable sales and the total of all purchased goods and services on which VAT was paid. The base times the applicable VAT rate is the gross tax liability. Under the consumption method for capital goods, total capital expenditures for that period would be deducted in arriving at the tax base, reducing the payment or creating a refund. Under the income method, the depreciation expense would be deducted from the base; and under the gross product method, no adjustments are made for capital goods (Treasury I, 1984).

Preferential Treatment

Under a VAT, preferential treatment for commodities, transactions, or entities can be accommodated by zero-rating or by exemption. Under zero-rating, all VAT is removed from the zero-rated good, transaction or entity. In contrast, exemption only removes the VAT at the exempt stage and it will actually increase rather than reduce the total taxes paid by the exempt entity's business or non-retail customer. The following examples extracted from Treasury I (1984) are

most helpful in understanding the difference between zero-rating and exemption.

If a commodity, for example, is exempt only at the retail level, then only the retail level is freed of VAT. Although the retailer would not charge VAT on its sale, the retailer would not be entitled to a credit for VAT paid on the purchase of an exempt item. Thus, exemption of a commodity through all of its production and distribution channels would be necessary to free it of its entire VAT burden. But, with zero-rating, unlike exemption, only the final sale of the commodity needs to be zero-rated, because any tax previously paid would be credited on the last sale.

If a particular type of transaction, for example, exports, is zero-rated, the seller (the exporter) would not be subject to tax and would receive a credit for tax paid on the purchase of the goods and other purchased inputs. This procedure frees the zero-rated transaction of all VAT. If the transaction is exempted, rather than zero-rated, the sale itself would not be subject to VAT, but the exporter would not receive a credit for VAT paid on the purchase of the exported goods or other inputs used in their production.

If urban transit service is zero-rated, no tax would be charged on the transit service fares, and the transit system would receive credit (or refund) for the VAT paid on its purchases of equipment, motor fuel, supplies, electricity, and any other business-use items. But if

transit service is exempt, the system providing the service would not apply VAT on the fares received and would not receive a credit or refund for VAT paid on its various purchases.

Entities that are zero-rated, that are engaged in zero-rated transactions, or that sell zero-rated goods, are "in the system"; they must be registered to obtain credits or refunds for the VAT paid on their purchases. Exempt entities and those selling solely exempt goods or engaging in only exempt transactions are not registered and are not required to file a VAT return. They are "outside the system." Entities making both exempt and taxable (or zero-rated sales), or engaged in both exempt and taxable (or zero-rated) transactions, must be registered, but they receive credit only for the VAT paid on materials and other inputs used in the production of taxable or zero-rated goods (Treasury I, 1984).

Preferred VAT Form

Because there is no VAT proposal presently being considered by Congress, the form and extent of the VAT legislation must be assumed. Treasury I concluded that if the policy debate in the United States ever focused on choosing a form of VAT it should have the characteristics of a broad base, with minimal and well-justified exclusions. Moreover it should be a consumption-type VAT with a

credit/invoice (not subtraction) method of determining tax liability and it should be imposed at a single uniform rate (Treasury I, p.6). The VAT form used in this study conforms to this Treasury I description with the single VAT rate set at 8%⁶, and exclusions and exemptions set at zero.

⁶ Eight percent is chosen because it approximates the average of several VAT rates proposed as CIT replacement rates.

CHAPTER 3
THEORY AND CONCEPTUAL FRAMEWORK

Theory

The original and most important function of taxation is raising revenue. Taxes, by transferring resources from the private to the public sector, enable the government to perform a variety of functions. In order that the economy is not unduly disrupted by this forced transfer, sound tax criteria are required.

Canons of Taxation

Adam Smith (1937) and Break and Pechman (1975) established several principles of taxation to guide tax policy so that disruption of the economy would be minimized. These four principles or canons of taxation are equity, certainty, simplicity and fiscal economy. Attendant with the mid-1970 challenging of Keynesian aggregate theory, economists added a fifth canon, economic efficiency (Davies, 1986, p.17)

Until recently, equity was the economic standard most frequently used by tax theorists when analyzing provisions

of the federal income tax. They asked: "Does the tax law treat equals equally (horizontal equity) and unequals differentially (vertical equity)?" Because of the poor economic performance during the 1970s and the failure of Keynesian-based remedies, scholars, politicians, and others have turned to economic efficiency as the predominant criterion for tax policy analysis (Davies, 1986; Bittker, 1979). The remaining three principles, simplicity, certainty, and fiscal economy, generally have been used as secondary or supplemental criteria.

Tax Neutrality

Ideally, an economically efficient tax should have no impact on the allocation of resources. It should be neutral with respect to its effect on economic behavior and taxpayers' business decisions. For example, a newly proposed tax should not lead corporations to alter their choices. Taxation alone should not cause a company to capitalize more or less or to modify its product investment strategies.

In the real world, ideal neutrality is not attainable and in fact is in conflict with the government's use of tax law to accomplish specific social goals. However, an objective of minimizing the misallocation of resources and the altering of economic decisions is a very important element of sound tax policy (Davies, 1986, p. 17).

Neutrality of the Corporate Income Tax (CIT)

Changes in the allocation of resources due to introducing or changing the CIT depends to a great degree on CIT's incidence. Although extensive literature examining this question exists,⁷ the polemic over forward shifting (increased prices for the consumer), backward shifting (decreased payments to labor and other resource suppliers), and no shifting (incidence on corporations and their stockholders) is not resolved. Despite the different theories and assumptions many economists are gravitating towards the position that shifting in the short run is not likely (Davies, 1986 p.131). Adopting a long range point of view, McLure (1981, p.3) believes that most public finance specialists would probably agree there is a shifting to owners of capital outside the corporate sector through the Harberger mechanism, with effects on both capital formation and wage rates. The CIT, it seems, distorts the allocation of resources between the corporate and non corporate sectors.

Neutrality of the Value-added Tax (VAT)

Advocates of VAT look upon a consumption tax as more neutral than an income tax.⁸ They maintain it would realize

⁷ See for example, Goode, 1951; Harberger, 1962; Krzyzaniak and Musgrave, 1963; Baumol, 1965; Pechman and Okner, 1974; McLure, 1981; Musgrave and Musgrave, 1980;

⁸ See, for example, Dresch, Lin, and Stout 1977; Ballard, Scholz, and Shoven, 1987; McLure, 1987; Tait, 1988;

superior allocative efficiency because a tax on added value can be viewed as a proportional tax on the firm's use of the factors of production. Economic theory holds that because a firm combines all its factors in the most efficient fashion, resources are moved into their most productive use.

Proponents reason, therefore, that a uniform VAT on all firms imposes the same proportional tax cost and is neutral toward the choice of production methods or the use of productive resources.

The conclusion of this theoretical postulating becomes suspect in a real world application where certain socially sensitive goods and services such as food, clothing, and medicine are exempt or carry differentiated rates. Even then it is maintained that a VAT would result in less distortion than an income tax (McLure, 1981 p. 149). Further, a general equilibrium study by Ballard, Scholz, and Shoven (1987) concluded that at the margin even a differentiated VAT is more efficient than the income tax.

Limitation of VAT Neutrality Analysis

As observed in the preceding sections the CIT is generally believed to distort the allocation of resources between corporate and noncorporate sectors, while the VAT is generally believed to be neutral since it is proportional and insensitive to production methods and resources. The detraction from ideal neutrality for VAT comes about because

of the apparent need to exempt or differentially rate certain goods and services because they are considered too difficult to tax or because the tax would unduly burden the lower income population. It should be noted that both CIT and VAT are not neutral with regard to individual's consumption choices; however McLure (1980 pp. 311-12) maintains the weight of evidence and argument are on the side of the VAT.

The incidence issue aside, it is not readily apparent that the full impact of a VAT on corporate cash flow has been considered in studies analyzing VAT neutrality. The impact of CIT on corporate cash flow is straightforward. CIT is a known expense and like any other expense is reflected in period cash remittance to the government and/or change in a payable. The magnitude of the CIT has a direct dollar-to-dollar relationship with cash flow and therefore CIT has a bearing on, and a link to, the financial and production decisions of the firm. By definition the amount of CIT is considered in studies assessing CIT neutrality. As a result, the impact of CIT on corporate cash flow is implicitly, if not explicitly, considered in studies analyzing CIT neutrality.

Conversely, the impact of VAT on corporate cash flow is not straightforward. Vat is not an expense; but, like CIT, it is reflected in cash disbursements and payables. Unlike CIT, value-added tax is also reflected in cash

receipts and receivables. The relationship between quantity of VAT and corporate cash flow is not immediately obvious because timing differences among payables, receivables, and government remittances are seldom identical or constant. However it can be reasoned that the magnitude of the VAT does not have a dollar to dollar relationship with cash flow nor is the relationship necessarily direct or consistent. Thus the cash flow link between the quantity of VAT and financial and business decisions of a firm is not readily apparent. Because of the cryptic relationship between VAT and cash flow, implicit consideration of VAT's impact on corporate cash flow in VAT neutrality studies cannot be assumed. Since the impact of VAT on corporate cash flow was not explicitly addressed it must be concluded that VAT neutrality analyses are incomplete.

Contribution of the Study

Intuitively, it was expected that VAT would impact cash flow but the extent and differences among firms was unknown. This study's empirical evidence of significant impact and differences among firms brings into question the VAT proponents' contention that VAT inherently would realize allocative efficiency superior to CIT because it can be viewed as a proportional tax on the firm's use of the factors of production. Because of this evidence, more

equitable comparisons between VAT and CIT economic efficiency can be achieved.

Conceptual Framework

Intuitively, one would expect imposition of a VAT to affect systematically business cash flow. This impact on cash flow would vary depending on a taxpayer's accounting method, company characteristics, and provisions of the VAT law. Assuming the accounting rules for VAT are uniform and consistent with existing income tax accounting rules, a taxpayer's reliance on cash accounting or accrual accounting would have a differential effect on cash flow. If cash accounting were used, the impact would be mostly determined by the accounting period and the required filing date; whereas, if accrual accounting were used, payable and receivable periods would become additional determinants. Company characteristics directly impacting VAT cash flow would include the aforementioned payable and receivable periods, sales growth, capital expenditures, and value-added percentage (Smith, Weber and Cerf, 1973). General provisions or form of the VAT law such as the type of value-added tax (consumption, income, or gross product), and the method of collection (cash, or invoice) would also be expected to affect business cash flow (Crum, 1985).

This study examines the impact that VAT has on cash flow and the influence that company characteristics have on

this impact. Because it is generally believed that a VAT should be a consumption type with an invoice collection method (Treasury 1; McLure, 1987; Tait, 1988), alternative VAT forms are believed to have minimal interest and are not included in this study. The alternative cash accounting method is not considered in this study for two reasons: (1) the cash method of accounting is generally unavailable to regular corporations (IRC Section 448); and (2) the VAT form utilized in this study has an invoice collection method, i.e., a non-cash method. Timing differences and other company characteristics are analyzed in the balance of this chapter. The provisions of a value-added tax law were explained in the previous chapter.

Timing Differences

Four interacting timing differences influence the impact of VAT on cash flow: VAT accounting period; VAT remittance period; receivables period; and, payables period. These timing differences are addressed in the following sections.

VAT Accounting and Remittance Period

The 1980 Tax Reform Act would have required that the VAT return be filed and the VAT paid during the first month following the close of each taxable period, which would usually be every quarter. Some suggest that for most

companies (other than exporters) cash flow improves as the accounting period and the related tax filing period lengthens, and vice-versa (Smith et al., 1973, p.147).

Receivables Period

The "tax point," which is used to describe when a taxable transaction takes place, is the earlier of: (a) the time when any income from the sale should be treated as received or accrued for purposes of income taxation; or (b) the time when the seller receives payment (1980 TRA Sec. 301(9c)). In general, entities selling for cash or with short credit terms would benefit from the fact that they would collect the VAT from their customers before they must remit it to the government; therefore, they would have the use of funds at no interest cost for the intervening period.

On the other hand, companies who help finance their customers by allowing credit terms longer than its taxable period would pay the VAT to the government before their customers pay for the merchandise. Therefore they receive the VAT after it must be paid to the government.

Payables Period

The opposite holds true for the payables. Entities paying for goods or services in cash or on short credit terms will be paying VAT to their suppliers before receiving

the VAT from their customers. Conversely, entities that receive extended terms on payables will be receiving the VAT from customers before paying VAT to their suppliers (Schiff, 1974).

The point at which a VAT becomes due or available as a credit is significant for all non-cash or accrual transactions. It is presumed that every entity would rather have the VAT due on its sales not remitted until cash is received, but have the VAT credit for purchases effected on the date of the invoice. Obviously, mixing cash sales with accrual purchasing is inconsistent accounting and not allowed under the income tax law.

Other Company Characteristics

If sales were static, period VAT cash flows would be zero after an appropriate start-up period(s). Stated differently: cumulative VAT cash flow would stabilize at a positive, negative, or zero value after an appropriate start-up period. The sign of the cumulative VAT cash flow and the duration of the start-up period will depend on the previously discussed timing variables interacting with characteristic variables of a specific company. The quantity of VAT cash flow is mostly dependent on other company characteristics. An analysis of the characteristics of sales growth, capital expenditures and proportion of value-added content follows.

Sales Growth

Increasing sales means increased VAT collections each period. A company with mostly cash customers has the advantage of immediate collection with delayed remittance and therefore would expect an increase in cash inflow. Conversely, a company with mostly credit customers might remit to the Federal government before collection from its customers. Increasing accounts receivable could mean an increase in cash outflow.

Capital Expenditures

Under the consumption-type VAT as explained in the previous chapter, capital expenditures result in a full refund for that period's purchases instead of depreciation-like refunds in future periods. Therefore, the VAT cash flow impact incident to capital expenditures would be a one-time reversible change that would last no longer than the remittance period. Because of its short term nature it is not considered in this study.

Value-added

The greater the proportion of value-added (i.e., the lower the proportion of purchase content), the more favorable the impact VAT should have on cash flow. This follows because VAT cash outflow for purchases would be

reduced and is zero in the extreme case. For example, when a corporation is completely integrated vertically, the VAT paid on purchases is zero. Any favorable impact on cash flow resulting from a large proportion of value-added content is offset to some degree for companies that purchase on credit. This offset occurs because they lose the advantage of receiving a refund credit before actually paying the tax. Cash buyers have no such advantage.

Summary

Accounting and filing periods, sales and sales growth, capital expenditures, and value-added content are not independent factors. Their interrelation, complex and variable, is an important determinant of the resultant impact VAT has on cash flow. It is because of the number and the interdependency of these factors that it is most difficult to reduce them to a formula for determining the effect of VAT on cash flow. However the impact of VAT on cash flow due to these factors and the interdependence among factors can be investigated by means of multiple regression analysis.

This study examines the impact of VAT on cash flow by comparing corporate financial data with and without a value-added tax. Financial data for the period 1984 to 1986 are used for the pretest or "without VAT" observations. A VAT is applied and the change in cash flow calculated using the

same database and therefore the same factor interdependencies. The only change is the change in cash flow due to VAT. Inasmuch as ex-post data are used, only first-order or first-round effects are analyzed. Second-order effects of changes in business and consumer decisions which may occur in reaction to the tax is beyond the scope of this study.

CHAPTER 4
LITERATURE REVIEW

The impact of a United States value-added-tax has been extensively addressed from the social, economic and revenue viewpoints by a number of authors.⁹ However, there are relatively few studies¹⁰ that consider the effect of VAT on corporate business.

The absence of empirical research in this area is not surprising because a value-added-tax is not a reality in the United States and thus corporate financial data reflecting the impact of VAT do not exist. Such data may exist for foreign countries; however, no empirical research in this area has been identified. There are however, two

⁹Recent literature addressing the social and economic impact of VAT include: Brannon (1984); Kleine (1984); Turnier (1984); Schuyler (1985); Stockfish (1985); DeSanctis (1986); Aaron (1988); Gravelle (1988); Kotlikoff (1988); Kupfer (1988); and Tait (1988,1989). In respect to revenue, Presidents Task Force (1970), Dresch, et al. (1977), and the United States Treasury (1984) analyzed value-added tax revenue potential and the value-added-tax rate necessary to assure revenue neutrality, if the VAT was substituted for all or part of the corporate income tax CIT.

¹⁰ The word studies is used here in the broad sense and includes analytical and descriptive research studies.

earlier publications and one recent publication which specifically address cash flow impact of a VAT on United States corporate businesses. The two earlier studies are the basis for this proposal and are analyzed in the balance of this chapter. Results of the third study (Crum, 1991), published this summer, lend some support to the findings of the study reported herein.

The earliest study, commissioned by Cambridge Research Institute in 1973, qualitatively evaluates the impact of a VAT on cash flow (Smith, Weber and Cerf, 1973). The second of the two earlier studies (Crum, 1985) simulates VAT remittance cash flow for each of twenty four possible VAT collection alternatives. The study reported herein extends the cash flow analysis of Smith, Weber, and Cerf (1973) and provides empirical evidence of VAT impact on corporate cash flow.

Qualitative Analysis of VAT Impact on Cash Flow

In their study, Smith, Weber and Cerf (1973) analyze the VAT path taken by various countries and review the possible effects if a VAT were introduced in the United States. The analysis was prepared by the Cambridge Research Institute for business executives concerned with understanding future pragmatic consequences of tax policy. Smith, et al., examine the impact of VAT from several viewpoints. However, only the authors' opinions concerning

the impact of VAT on a company's cash flow are included here. The essence of the authors' analysis is that:

1. VAT will affect the cash flow of all companies;
2. With the invoice method, companies with all-cash sales will experience cash inflow due to VAT, but companies with credit sales will usually incur cash outflow due to VAT;
3. VAT affects cash flow only during the first period introduced and this impact is permanent but changes as revenue changes; and,
4. Company characteristics which affect cash flows are:
 - a) Suppliers and accounts receivable terms
 - b) Sales
 - c) Capital expenditures, and
 - d) Value added percentage

Simulation Analysis of VAT Impact on Cash Flow

Crum (1985) examines several VAT collection alternatives, which the author labels VAT forms, for the purpose of comparing revenue and cash flow effects across VAT collection alternatives. Crum's 1985 research extends previous studies (primarily Smith, Weber and Cerf) in two ways: first, by identifying and consolidating the major factors into a framework for classifying VAT law configurations (forms); and second, by providing notational VAT remittance models for the VAT forms based on these factors. The five factors identified by Crum were:

1. Exports -- included or excluded;
2. Collection method -- cash or invoice;
3. Type -- consumption, income, or gross product;
4. Cost recognition -- period (when purchased) or product (when sold); and,
5. Remittance periods.

The results of Crum's 1985 simulation indicate that both the VAT type (treatment of capital goods) and the inclusion or exclusion of exports have significant effects on the revenue generated while collection methods and cost recognition have little effect on revenue. The fifth factor, remittance period, was addressed but not included in Crum's simulation model. As a result, the study did not address the impact of VAT on cash flow. Crum's 1991 study is an extension of his 1985 research. Whereas his 1985 study investigated the differential impact twenty-four potential VAT forms have on IRS revenue, his 1991 study addresses the differential impact potential VAT forms have on VAT neutrality.

In the 1991 study, Crum evaluated thirty-two potential VAT forms and compared the impact each would have on VAT neutrality. The concept of VAT neutrality was operationalized as the cost of financing cash flows emanating from the various VAT forms. Statistical analysis of the differences in cost of financing led Crum to infer that in general, there are differential cash flow effects across VAT forms, across industry groups, and across companies within industry groups. It should be noted that for the VAT form used in the study reported herein, Crum's results were mixed. When remittance periods are monthly, four of the five years studied exhibited significant

differential impact between groups. When remittance periods are quarterly none of the years showed significant results. Overall however, the evidence Crum presented tends to support the premise that there is a difference in VAT impact on cash flow among industry groups.

Crum's sample was limited to ninety-two large companies which reported the necessary data. This sample of ninety-two included twenty-one corporations from industry groups other than manufacturing namely: wholesale, retail, financing and service firms. The study reported herein examines 939 small, medium and large manufacturing corporations. With these differences, direct comparison of results is difficult. Detail comparison of results is an area for future study.

CHAPTER 5

RESEARCH PROBLEM AND METHOD

Although substantial literature addressing the value-added tax exists, there is little empirical examination of the impact a value-added tax would have on corporate business in the United States. This chapter: (1) presents the research questions and hypotheses for this study of VAT impact on cash flow of manufacturing corporations; and, (2) describes the method used to answer these questions.

Research Questions

The following research questions are addressed by this study:

1. Other than increased costs for compliance, does VAT permanently alter the cash flow of manufacturing corporations?
2. Is there a difference in VAT impact on cash flow among major industry groups within the manufacturing sector?
3. How do payment, collection, and remittance periods; sales growth; and, value-added content influence the cash flow impact of VAT?

Statement of Hypotheses

The research questions presented above translate into the following statistically testable hypotheses. The hypotheses, are expressed in their alternative forms, which represent the expected relationships.

Hypothesis 1: The imposition of a VAT will impact cash flows of manufacturing corporations.

Hypothesis 2: VAT impact on cash flow will differ among major industry groups within the manufacturing sector.

Hypothesis 3a: There is a negative relationship between payables turnover and cash flow impact of VAT.

Hypothesis 3b: There is a positive relationship between receivables turnover and cash flow impact of VAT.

Hypothesis 3c: Sales growth will affect the cash flow impact of VAT.

Hypothesis 3d: Value-added content will affect the cash flow impact of VAT.

Research Design and Method

This quasi-experiment employs a one-group pretest-posttest design which offers comparison of the same manufacturing corporations before VAT (pretest) and after VAT (posttest). In this design, subjects' (manufacturing corporations) cash flow impact due to VAT is measured before (O_1) being exposed to the experimental VAT treatment (X) and then the subjects' cash flow impact is measured after (O_2) they are exposed to the treatment. The design is

characterized as $O_1 \times O_2$. Threats to internal validity inherent to this design are discussed in the internal validity section of this chapter.

Multiple regression techniques were used to evaluate the above stated hypotheses and F-Ratio tests and t-tests were conducted to ascertain respectively the statistical significance of the overall regression equation and the incremental R-squares of each additional predictor.

Multiple Regression Model

A regression model requires assumptions about the nature of the statistical relation, i.e., a theory as to the systematic manner in which the dependent variable is expected to vary with the independent variables. Although a relation is thought to exist, the functional description of this relation may not be readily apparent or may be so complex that linear regression models may be used only as satisfactory first approximations (Neder, Wasserman and Kutner, 1985, p 31). Since there was no previous empirical study upon which to base the expected functional relation between company characteristics, group membership, and VAT cash flow, this study employed a general linear multiple regression model of the following form:

$$Y_i = B_0 + B_1X_{i1} + B_2X_{i2} + \dots + B_{p-1}X_{i,p-1} + e_i$$

where:

y_i is cash flow due to VAT

B_0, B_1, \dots, B_{p-1} are parameters

$X_{i1}, \dots, X_{i,p-1}$ are variables and interaction terms representing company and group characteristics influencing cash flow impact

e_i are independent $N(0, \sigma^2)$, and

i equals the index of companies in the study

Multiple Regression Variables

Selection of the set of independent variables to be employed in the model is one of the most difficult problems in regression analysis. When a serviceable theoretical model is not directly available it becomes necessary to identify as many conceivably related variables as possible and then by screening, select a reduced number of independent variables for use in the final model. Screening is necessary because too many variables make the model expensive to maintain and unduly difficult to analyze and understand. Further, too many variables substantially increase the sampling variation of the regression coefficients and detract from the explanatory power of the model (Neter, Wasserman, and Kutner, 1985, pp.417-8).

In their 1973 analysis, Smith, Weber, and Cerf identified several company characteristics affecting cash flows, namely: suppliers' terms; accounts receivable terms; sales; sales growth; capital expenditures; remittance

requirements; and, value added contribution (pp. 149-150). The study contained herein empirically extends the analysis of Smith et al., and employs the characteristics identified by them as predictor variables in a multiple regression model. Capital expenditures are not included in this study since they represent temporary excursions that add little to an inquiry into permanent alteration of cash flow resulting from VAT. Other factors such as labor, capital, and purchase content are not included in this study because they are subsets of the variable value-added and as such would confound this initial analysis. Contribution of the components of the value-added factor is left to a future study.

In this multiple regression model, the dependent variable is "Cash flow due to VAT". The independent variables, which are defined in Appendix A, are as follows:

- X_1 = Payables turnover
- X_2 = Receivables turnover
- X_3 = VAT accounting and remittance period
- X_4 = Sales
- X_5 = % Sales growth
- X_6 = Value-added as % of sales
- X_7 = Industry group dummy variable
- X_8 = Interaction terms

Statistical Procedures

The Statistical Package for the Social Sciences (SPSS) was used to analyze the data for this study. For significance testing, the level of significance was p values $\leq .05$. As part of the study log, exponential, and inverse transformations were examined but none proved beneficial.

A multiple regression model assumes normality, linearity and constant error variance. Appropriate testing and plotting of residuals were therefore performed to determine if serious violations of these assumptions exist. Scatterplots of residuals versus predicted values revealed no pattern that would cause one to conclude that the assumptions of linearity and equality of variance were seriously violated. This finding was further supported by residual histograms and normal probability plots. No evidence of serious violation of assumptions was uncovered.

As indicated in preceding sections of this chapter, regression analysis was employed to test statistically the hypotheses of the study. The parameters of the regression equation were estimated using ordinary least squares, and stepwise regression procedures were used to select independent variables for inclusion in the equation. Criteria levels for selecting independent variables were: .05 inclusion; .10 exclusion; and, .01 tolerance. Three models were developed: one for the year of effectivity

(1984); and one each for the follow-on years of 1985 and 1986. Evaluation of relative importance of retained independent variables was attempted when possible.

Assumptions

The assumptions for this study are as follows:

1. VAT form adopted would employ the characteristics delineated in Treasury I, *i.e.*, a consumption type VAT with an invoice collection method and no exemptions or exclusions.
2. VAT rate is 8%. This rate is arbitrary and was selected because it approximates the average of rates identified by Crum (9.23%), Dresch et al (7.22%) and President's Task Force (6.9%) as the CIT replacement rate.
3. Period is 1984 - 1986. 1984 was selected for the first year because COMPUSTAT began reporting domestic sales separately in that year.
4. VAT accounting and remittance period is two months which reflects European Economic Community practice.
5. Interest expense or interest income related to VATCF and VAT administrative/compliance cost are not addressed in this study.
6. Since ex-post data are being used, only first-order or first-round effects are analyzed.

Source of Data

COMPUSTAT computerized database was the source file for this study. This database contains financial data extracted from annual reports and the SEC required 10-K and 10-Q reports for the majority of publicly traded corporations. Manufacturing corporations for which the

appropriate data were included in the database were included in the study. To reduce the complexity of the analysis only nine of the twenty major manufacturing industry groups were investigated. These nine were selected because they account for 80% of the total manufacturing business receipts reported to the Internal Revenue service for the year 1985 (U.S. Treasury, 1988). The nine industry groups analyzed and their SIC codes are:

<u>Industry Group</u>	<u>SIC Code</u>
Food & kindred products	2000-2099
Printing & publishing	2700-2799
Chemical & allied products	2800-2899
Petroleum & coal	2900-2999
Primary metals	3300-3399
Fabricated metal products	3400-3499
Machinery, except electrical	3500-3599
Electric & electronic equipment	3600-3699
Transportation equipment	3700-3799

Internal Validity

When respondents are randomly assigned, many threats to internal validity are nullified.¹¹ With quasi-experimental groups the situation is quite different.

¹¹ The reader is referred to Cook and Campbell (1979) for a detailed discussion of threats to internal validity.

Instead of relying on randomization to rule out most internal validity threats, each threat must be explicitly addressed (Cook and Campbell, 1979, p. 56). In this study, as with most quasi-experimental research, the threat to internal validity is selection bias. The remaining threats (history, maturation, testing, instrumentation, statistical regression and mortality) are not of concern here. History and maturation are not a threat because the only event taking place between the pretest and posttest is the VAT treatment and any impact of maturation is already embodied in the pretest data. The number of times responses are measured (testing) and a change in measuring instrument (instrumentation) are not threatening because existing financial data are used and the measuring instrument, change of cash flow, is consistently applied. Subject drop-outs between pre-testing and post-testing (mortality) are controlled and a regressing effect that could cause misinterpretation is not possible in this simulation.

Selection is a threat to internal validity when an effect may be due to the difference between the make-up of subjects (corporations) in one group as opposed to another group. In an attempt to control for this problem, this study groups manufacturing corporations into industry product groups in accordance with the standard industry code (SIC). Grouping manufacturing corporations by industry product groups is appropriate because it was anticipated

that, due to competition, firms within an industry group would have similar payment and receivable characteristics, which characteristics were believed to be major determinants of VAT cash flow impact. As a result of this grouping, firms within an industry group tend to be homogeneous whereas industry groups tend to be heterogeneous. Since this study addresses differential impact between industry groups, heterogeneity between groups is desirable.

External Validity

External validity pertains to the generalization of the findings beyond measures, subjects, and other conditions associated with the study (Stone, 1978, p. 109). Generalization of the findings is important when the researcher intends to obtain data from a sample and make subsequent generalizations about the population based on the sample data. Cook and Campbell maintain that in the last analysis, external validity is a matter of replication and this replication can be within a study or across studies (1979, p. 78). Cook and Campbell also suggest that deliberate sampling for heterogeneity will enhance the external validity of a study. In deliberate sampling, target classes or subgroups are defined and a wide range of subjects from within each subgroup is selected. This is really an attempt at multiple replications by statistical

testing of treatment effects within each group (Cook and Campbell, 1979, p.75).

This study addresses the threat to external validity by deliberate sampling and by validation within the study. As discussed above, manufacturing corporations are grouped into heterogeneous subgroups, and all corporations that reported data necessary to simulate cash flow impact of VAT were included. This provided the maximum range of subject variations within the manufacturing corporate population. Statistical testing of each group, and of the total industry was conducted.

Validation is accomplished by comparing, in a different time period, simulated cash flow impact of VAT to that predicted by the study's regression equation. The same subjects used to construct the regression equation are used in the validation since they comprise the population. Validation across industries is not attempted because this study is limited to manufacturing corporations. Impact of VAT on cash flow of industries other than manufacturing is an area for future research.

Limitations

The conclusions of this study are limited in their generalizability to publicly-held manufacturing corporations. This limitation stems from two decisions made in the beginning of the study. The first was to limit this

initial study to manufacturing corporations since they would be the largest contributor of VAT revenue. The second was to use COMPUSTAT which only reports data for publicly-held corporations. Using COMPUSTAT was a pragmatic decision because data are not readily available for privately-owned businesses or non-corporate entities.

Insofar as the study relies on ex-post data, only first order effects are measured. The effect of changes in business decisions which may occur in reaction to the tax are not captured and are beyond the scope of this study. The first-order results observed should find application at the Federal level in the formation of VAT legislation, and at the business level in the development of strategies vis-a-vis payable and receivable time periods.

CHAPTER 6

ANALYSIS OF DATA AND DISCUSSION OF RESULTS

Theory and methodology for this research study was presented in previous chapters. In this chapter the results of the analysis of the data collected in the course of the study are presented and the implications which these results have concerning the impact of VAT on the cash flow of manufacturing corporations are discussed.

As anticipated, the data indicate that a United States VAT would alter corporate manufacturing cash flow in the initial year of effectivity. Regression analysis shows that this initial year impact is mainly due to the interaction of sales and receivables turnover, the interaction of sales and payables turnover, sales itself, and the three-way interaction of sales, receivables turnover and payables turnover. Differential impact is evidenced across five of the nine industry groups studied. In the interest of simplicity, however, only one group (electronic) is retained in the final regression model. Lastly, when 1985 data are substituted for the 1984 data used to generate the

regression equation, comparable results are observed. This validation test lends support to the model developed.

Contrary to expectations, after the initial year of effectivity, sales growth is not a major factor in explaining the change in cash flow due to VAT. In the follow-on years the major factors explaining the impact of VAT on cash flow are sales crossed with receivables turnover and sales crossed with payables turnover. The fourth company characteristic studied, value-added content, does not appear to be a significant factor in either the initial or the follow-on years.

The next section of this chapter contains a review of the research methodology used in the study, followed by presentation of the regression model. Results and analysis of each research question are then discussed. Next is a section discussing results of validation testing, and the final section summarizes the results and conclusions presented in this chapter.

Review of Research Methodology

As discussed in Chapter 5, this study employed a linear regression model. During the study, tests were conducted to check the assumptions attendant to this linear model. These tests provided no evidence to indicate that use of a linear model was inappropriate.

Cash flow due to the value-added tax (VC) is the dependent or criterion variable. The independent or predictor variables used were based on company characteristics that Smith, Weber, and Cerf (1973) reasoned would affect VAT cash flow. They are: (1) Receivables turnover (AR); (2) Payables turnover (AP); (3) Sales (S) or sales growth (SGWT); and, (4) Value added content (VA%). To facilitate the study of differential cash flow effect of VAT on manufacturing industry groups, dummy variables for the nine groups (G1 to G8) were included. The research questions that were investigated by use of this linear regression model are restated in the following segment of this section.

Research Questions

This study was initiated to answer the following research questions:

1. Other than increased costs for compliance, does VAT permanently alter the cash flow of manufacturing corporations?
2. Is there a difference in VAT impact on cash flow among major industry groups within the manufacturing sector?
3. How do payment, collection, and remittance periods; sales; and value added content influence the cash flow impact of VAT?

Answers to each of the above questions are discussed in detail in the results and analysis section of this chapter. The source of data and a review of the methodology

used in pursuing answers to these questions are presented in the next segment.

Source of Data and Methodology

The COMPUSTAT computerized database was used to generate the data for this study. When "purchases" data for a particular company were not listed in COMPUSTAT they were calculated based on industry group statistics published in the United States Commerce Department's Annual Survey of Manufacturers. All COMPUSTAT listed firms that reported data required for VAT simulation were included in the study. This resulted in a population of 939 manufacturing corporations segmented by industry groups as follows:

1. 78 Food and kindred products (Food)
2. 59 Printing and publishing (Printing)
3. 121 Chemical and allied products (Chemical)
4. 29 Petroleum and coal (Petroleum)
5. 53 Primary metals (Metal)
6. 89 Fabricated metal products (Fabricated)
7. 222 Machinery except electrical (Machinery)
8. 205 Electric and electronic equipment (Electronic)
9. 93 Transportation equipment (Transportation)

Note: Names in () are frequently used when referring to group membership.

The criterion variable in the linear regression model is VAT cash flow and the independent variables include industry group membership and company characteristics theorized to influence the impact VAT has on cash flow. In addition, all 2-way and four 3-way interaction terms were

considered during the development of the regression model. In total, 73 independent variables and interaction terms were considered during the study. The 73 independent and interaction terms are as follows:

1. Receivables turnover (AR)
2. Payables turnover (AP)
3. Receivables crossed with Payables turnover (ARP)
4. Sales (S)
5. Sales growth (SGWT)
6. Value-added content (VA%)
7. Group membership (G1 to G8)
8. Groups crossed with Receivables turnover (GR1 to GR8)
9. Groups crossed with Payables turnover (GP1 to GP8)
10. Groups crossed with Receivables turnover crossed with Payables turnover (GARP1 to GARP8)
11. Groups crossed with Sales (GS1 to GS8)
12. Groups crossed with Sales growth (GSGWT1 to GSGWT8)
13. Groups crossed with Value-added content (GVA1 to GVA8)
14. Sales crossed with Receivables turnover (SAR)
15. Sales crossed with Payables turnover (SAP)
16. Sales crossed with Value-added content (SVA)
17. Sales crossed with Receivables turnover crossed with Payables turnover (SARP)
18. Sales growth crossed with Receivables turnover (SGAR)
19. Sales growth crossed with Payables turnover (SGAP)
20. Sales growth crossed with Value-added content (SGVA)
21. Value-added content crossed with Receivables (VAAR)
22. Value-added content crossed with Payables (VAAP)
23. Group 8 crossed with Sales crossed with Receivables turnover (GSAR8)
24. Group 8 crossed with Sales crossed with Payables turnover (GSAP8)

Because 1984 was the year COMPUSTAT began setting apart domestic sales data, 1984 was chosen as the year of

effectivity. The Statistical Package for the Social Sciences (SPSS) was used in building the regression model and checking the aptness of the model for this study. The general model and sub models resulting therefrom are discussed in the section which follows.

Development of Regression Model

Multiple regression was used to analyze relationships between VAT cash flow and the four quantitative company characteristics together with industry group membership. The parameters of the regression equation were estimated using ordinary least squares, and stepwise regression procedures were used to select independent variables for inclusion in the equation. Criteria levels for selecting independent variables were: .05 inclusion; .10 exclusion; and, .01 tolerance. Three models were developed: one for the year of effectivity (1984); and one each for the follow-on years of 1985 and 1986.

General Model

Of the 73 previously itemized independent and interaction terms, 13 were found to have statistically significant associations with VAT cash flow in the year of effectivity (1984). Of these thirteen, six (of which four are group related) did not meaningfully contribute to explaining the associations being examined and are not

included in the final model. The regression equation defining the model for the year of effectivity is as follows:

$$\text{VC} = - 1.68 + 9.33\text{S} - .15\text{SAR} - 1.18\text{SAP} + .04\text{SARP} \quad (6.1) \\ + 1.79\text{G8} - 12.64\text{GS8} + .90\text{GSAR8}$$

where:

- VC = VAT cash flow (\$M)
- S = Sales (\$B)
- SAR = Sales crossed with Receivables turnover (\$B)
- SAP = Sales crossed with Payables turnover (\$B)
- SARP = Sales crossed with receivables turnover crossed with payables turnover (\$B)
- G8 = Electronic group
- GS8 = Electronic group crossed with Sales (\$B)
- GSAR8 = Electronic group crossed with Sales crossed with Receivables turnover (\$B)

To help explain the impact of the parameters in the regression model, two modules derived from the general model displayed above are examined in the next two segments of this section.

Model for Typical Groups

The typical or normal industry group, i.e., groups other than electronic (G8), exhibit an association with VAT cash flow that is depicted by an equation with the three electronic group terms removed from the general model as follows:

Normal or typical group

$$\text{VC} = - 1.68 + 9.33\text{S} - .15\text{SAR} - 1.18\text{SAP} + .04\text{SARP} \quad (6.2)$$

Expression (6.2) indicates that for a typical group the average impact of VAT on cash flow is a positive function of a group's sales (S) and a positive function of a group's sales crossed with both receivables and payables turnover (SARP). Further, the average impact of VAT on cash flow is negatively associated with a group's sales crossed with payables turnover (SAP) and negatively affected by a group's sales crossed with receivables turnover (SAR). By way of example, assume the following characteristics for two typical groups with identical sales volume but different receivable and payable timing relationships:

<u>Variable</u>	<u>Group B</u>	<u>Group A</u>
Sales	\$1.0B	\$1.0B
AR	9X	11X
AP	10X	10X

Under these conditions the impact of VAT on cash flow would be influenced in the following manner:

<u>Variable</u>	<u>Group B</u> (\$M)	<u>Group A</u> (\$M)
Constant	-1.68	-1.68
S	+9.33	+9.33
SAR	-1.35	-1.65
SAP	-11.80	-11.80
SARP	+3.60	+4.40
VAT cash flow	-1.90	-1.40

As previously noted, S and SARP tend to make cash flow positive or favorable to corporations. The coefficient of the sales variable in expression (6.2) indicates that Sales (S) has a large impact on VAT cash flow, since for

every billion sales, VAT cash flow becomes more favorable by \$9.33 million.

Offsetting the direct positive effect of S are the two other sales-related variables: sales crossed with receivables turnover (SAR); and, sales crossed with payables turnover (SAP). SAR and SAP have a negative marginal influence on cash flow for corporations with higher values of AR and AP. The coefficients of expression (6.2) above, indicate that for every billion sales, SAP decreases VAT cash flow by \$1.18 million while SAR decreases VAT cash flow by only \$0.15 million. The resultant unfavorable impact of each interaction variable is about one order of magnitude higher. In the Group A example above, SAP accounts for \$ -11.80 million and SAR accounts for \$ -1.65 million of the total \$ -1.40 million VAT cash flow resulting from VAT.

However, the effect of the three-way interaction of receivables turnover and payables turnover with sales in the SARP variable results in a favorable impact on VAT cash flow about two orders of magnitude higher, i.e., about 4.0 million. In the Group A example above, independent variable SARP accounts for \$ +4.40 million of the total \$ -1.40 million cash flow resulting from VAT.

The result is that Group A with the higher AR has slightly lower VAT cash flow when all of the interactions are taken into account.

Conventional wisdom has held that low receivables turnover (AR) and high payables turnover (AP) are conditions most unfavorable to corporate cash flow. The negatively signed coefficients of SAR and SAP in the general equation above suggest something different. They suggest that conditions most unfavorable to VAT-related cash flow exist not only when payables turnover is high but, contrary to conventional wisdom, when receivables turnover is also high but with lesser impact than that of AP. For fixed values of S and AP, the marginal effect of increasing AR by one unit is $-.15 + .04 = -.11$. On the other hand, if S and AR are fixed a one unit increase in AP has an effect on VAT cash flow of $-1.18 + .04 = -1.14$.

The presence of sales (S) as a multiplier of both receivables turnover (SAR) and payables turnover (SAP) indicates the unfavorableness of this tandem condition is exacerbated by high sales levels. Since S is present in both terms, however, it has a constant effect on each term and can be ignored when examining the interaction between receivables and payables turnovers.

The apparent contradiction with respect to receivables turnover may not be a substantive one. It can be demonstrated mathematically that, for this general model, the crossover point (where the negative impact on cash flow of high SAR is offset by the positive impact on cash flow of SARP) occurs when payables turnover is 3.75 times per year.

As long as payables turnover is greater than 3.75 times, higher receivables turnover, consistent with conventional wisdom, impacts VAT cash flow favorably. Only when payables turnover is less than 3.75 times does higher receivables turnover impact VAT cash flow unfavorably. Payables turnovers as low as 3.75 are not normally found in industry, and in this study, the lowest average group figure observed was 7.6. This low crossover point of 3.75, compared to the 7.6 minimum average observed in this study, suggests that conventional wisdom still holds for VAT cash flow, i.e., the higher the receivables turnover the more favorable is the impact on cash flow.

Before discussing the model for the electronic group, differences between Group A and Group B results are considered. In the above example, the contribution of Sales crossed with Receivables turnover (SAR) for Group A is .20 less than that of group B. This is expected since the .15 coefficient of SAR in model 1.1 indicates that for each unit change in S and/or AR, VAT cash flow will change by \$.15M. Since AR changes from 9X for group A to 11X for group B, while S remains constant, the contribution to VAT cash flow due to SAR increases by 2 times \$.15M or \$.30M. Intergroup differences in the contributions of other variables are interpreted similarly.

Model for Electronic Group

There are three differences between the model for electronic group and the typical or normal group model identified in expression (6.2) First, the intercept point or constant value is slightly more than double that of the typical group, but in a favorable direction. As such, the constant is now close to zero but positively signed. Second, sales impact on VAT cash flow is now negative and 140% less favorable than that of typical non-electronic groups. Third, sales crossed with receivables turnover (SAR) is 6 times more favorable than that of all other groups studied. Because of this 6 times change, SAR has switched from negatively signed to positively signed for electronic group. To place these last two differences in perspective, it should be emphasized that variation in VAT cash flow due to sales is less favorable for electronic firms than for other groups; however, variation in VAT cash flow due to sales coupled with receivables turnover is much more favorable for electronic firms than for other groups. Some possible explanations for these marked differences are addressed later in this chapter. The model indicating associations between VAT cash flow and company characteristics for the electronic group is as follows:

Electronic group (G8)

$$VC = + 0.11 - 3.39S + .65SAR - 1.18SAP + .04SARP \quad (6.3)$$

In summary, since electronic group (G8) variables are present in the general model, the effect of industry group membership is examined by comparing the electronic group regression model to the typical group model. In the preceding paragraphs two regression functions were derived from the general model constructed during this study; one typical and one for the electronic group. The two regression functions for the first year of effectivity are:

Typical group
$$VC = - 1.68 + 9.33S - .15SAR - 1.18SAP + .04SARP \quad (6.2)$$

Electronic group (G8)
$$VC = + 0.11 - 3.39S + .65SAR - 1.18SAP + .04SARP \quad (6.3)$$

These two models are used in the next section wherein results of the study are interpreted in an attempt to answer each research question. Using a similar approach, models were developed for the follow-on years of 1985 and 1986.

Results and Analyses

Descriptive statistics were used in seeking answers to the first question about the impact of VAT on cash flow. As discussed above, regression analysis was used to provide answers about the relationship, if any, between VAT cash flow and industry groups and between VAT cash flow and company characteristics (Research Questions 2 and 3). In this section, the descriptive data and the results of regression analysis are examined in an attempt to answer each research question.

Research Question 1: Impact of VAT on Cash Flow

The first Research Question is concerned with determining the impact that enactment of VAT would have on cash flows of manufacturing corporate entities. Impact on cash flow was expected but neither the magnitude nor the direction was known. The results obtained by simulating VAT indicate cash flow impact in the year of effectivity averaged negative \$391 thousand for manufacturing corporations. The largest negative impact for any one firm was \$173 million and the largest positive impact for any one firm was \$177 million. Negative amounts signify a cash outflow or burden while positive amounts signify a cash inflow or benefit. Of the 939 firms examined, 743 or close to 80% exhibited an impact greater than plus or minus \$100,000. Cash flow impact for the remaining 20% is unknown since \$100,000 was the cut-off amount used in the study.

Table 6.1 presents amounts and direction of group VAT cash flows resulting from enactment of a VAT. Cash flow comparisons among the industry groups and over the three-year period are further examined in Fig 6.1. The data provide insight into the impact in the first year after the imposition of a VAT, the follow-on impact in later years, and the cumulative effect over the period 1984 to 1986.

Table 6.1 and Fig 6.1 indicate that: (1) enactment of a VAT impacts cash flow of manufacturing entities

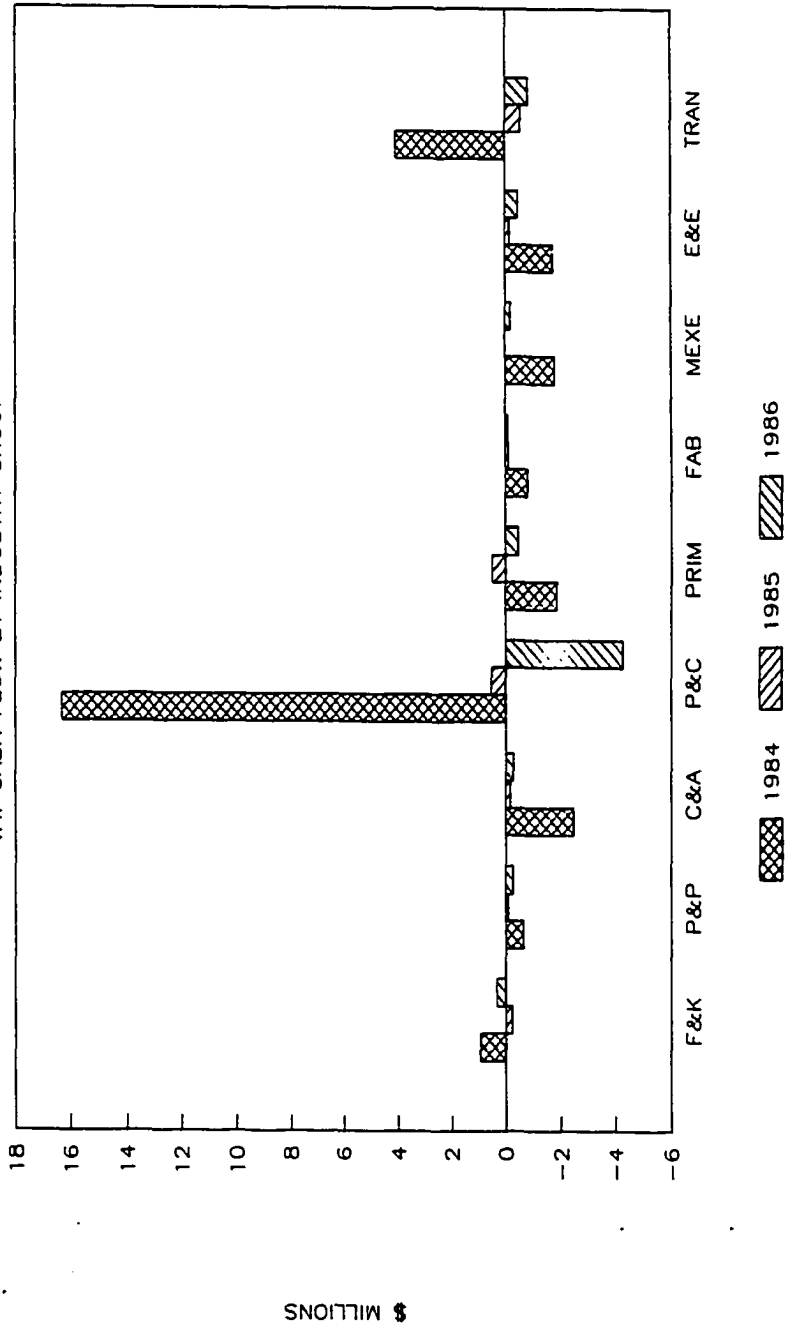
TABLE 6.1

VAT CASH FLOW BY INDUSTRY GROUP
(\$ Millions)
1984-1986

	1984	1985	1986	Cumulative
Food & kindred products (78)	0.962	-0.221	0.342	1.083
Printing & publishing (59)	-0.627	-0.081	-0.259	-0.967
Chemical & allied products (121)	-2.471	-0.159	-0.269	-2.899
Petroleum & coal (29)	16.293	0.524	-4.276	12.541
Primary metals (53)	-1.849	0.519	-0.440	-1.77
Fabricated metal products (89)	-0.796	-0.091	-0.069	-0.956
Machinery except electrical (222)	-1.766	0.039	-0.179	-1.906
Electric & electronic equip (205)	-1.717	-0.152	-0.448	-2.317
Transportation Equipment (83)	4.023	-0.555	-0.811	2.657
MANUFACTURING SECTOR AVERAGE (939)	-0.391	-0.080	-0.398	-0.869

(n)= Number of firms

FIGURE 6.1
VAT CASH FLOW BY INDUSTRY GROUP



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(cumulative average outflow of \$.869 million); (2) three industry groups realize positive cash flows (petroleum, transportation, and food); (3) six industry groups experience cash drains (chemical, electronic, machinery, metal, fabricated and printing); however, (4) because of the large number of firms in industry groups exhibiting cash outflows, on average, the manufacturing sector experiences a cash drain. Further examination of this cash flow data reveals that the impact of VAT is greatest in the first year and drops off considerably in later years, for the most part trending in a direction back toward zero. In an attempt to enhance the comparison of VAT impact on different size firms, VAT cash flow data were normalized by expressing the results as percentage of sales. The same phenomena of first-year effect and drop off was observed and although the relative positions of some groups changed the trend back towards zero did not.

It is clear from the data presented that the alternative hypothesis formulated to address Research Question 1 is supported. VAT does impact cash flow of corporations. Additionally the data indicate that this impact varies over the years and among industry groups. Differential impact among industry groups is discussed in the next section, wherein Research Question 2 is examined. Finally, Research Question 3, concerning the influence

company characteristics have on the impact VAT has on cash flow, is discussed.

Research Question 2: VAT's Differential Effect

The second Research Question is concerned with the effect VAT has on cash flow of industry groups within the manufacturing sector. Is the impact the same or does it differ depending on industry group affiliation?

VAT's differential effect on several manufacturing industry groups is supported by the results reported in Table 6.2.

In the early stages of regression analysis, significant group effects and interactions were found for five of the nine groups studied. The only appreciable contributor to R-Square, however, came from the electronic group (G8), and only the electronic group was retained in the final regression function. Four groups were removed from the model because they did not materially contribute to the explanatory or predictive power of the model.

Four of the seven variables in the model (SAR, SAP, S, SARP) are company characteristics and account for 86.8% of the full model's adjusted R-Square statistic. Electronic group related variables account for the remaining 13.2%. This suggests that the predominant factors in explaining the impact of VAT on cash flow are company characteristics not group memberships. It does not negate, however, the

TABLE 6.2

STEPWISE REGRESSION RESULTS
1984

Step	Variable Added (a)	Variable Coefficient (b)	Coefficient Std Error (b)	Total Adj. Rsq	Rsq Increment (c)
1	-SAR	-0.15	0.015	0.3170	0.3170
2	-SAP	-1.18	0.029	0.5311	0.2141
3	-GS8	-12.64	0.845	0.6330	0.1019
4	+S	9.33	0.266	0.7357	0.1027
5	+SARP	0.04	0.002	0.8350	0.0993
6	-GSAR8	0.90	0.144	0.8422	0.0072
7	G8	1.79	0.454	0.8446	0.0024

(a) Plus or minus indicates sign of estimated regression coefficient.

(b) Values in the final full model (step 7)

(c) F-test shows p-value of .001 or less.

evidence that suggests there is differential effect among the groups.

Group differential impact becomes clearer when individual regression sub models are examined. These two regression functions were introduced in the model development section of this chapter and are restated here for convenience.

Typical group

$$VC = - 1.68 + 9.33S - .15SAR - 1.18SAP + .04SARP \quad (6.2)$$

Electronic group (G8)

$$VC = + 0.11 - 3.39S + .65SAR - 1.18SAP + .04SARP \quad (6.3)$$

The two sub models listed above exhibit different intercept points and as indicated by the different coefficients for S and SAR, each sub model has a different slope. This difference in intercept point and in slope indicates support for hypothesis two, i.e., there is a difference in VAT impact on cash flow among major industry groups within the manufacturing sector. In an attempt to identify reasons why electronic exhibits differential impact, sales and turnover characteristics of the nine groups were ranked and analyzed.

As discussed in the preceding sections, sales, payables turnover, and receivables turnover are key company characteristics in the estimation of the impact of VAT on cash flow. From a company point of view, high sales, high receivables turnover, and low payables turnover relative to

receivables turnover are favorable conditions for cash flow. When a value-added tax exists, an additional relationship must be considered. Receivables and payables turnover conditions must be also judged in light of their relation to remittances turnover to the IRS.

When ranking the aforementioned characteristics, the best or most favorable condition was ranked number 1 while the worst or most unfavorable was ranked number 9. In applying this criterion, characteristic levels were designated as follows:

- Sales: Highest sales level is best or favorable
- AP: Lowest payables turnover level is best or favorable
- AR: Highest receivables turnover level is best or favorable
- AR-REM: Highest positive difference between receivables turnover and remittance to the IRS is best or favorable
- REM-AP: Lowest negative difference between payables turnover and remittance to the IRS is best or favorable
- AR-REM less REM-AP: Highest positive difference between the benefit-derived (from receivables turnover greater than remittance turnover) and the benefit-foregone (because payables turnover is greater than remittance turnover) is best or favorable

TABLE 6.3

GROUP RANKING BY SALES AND TURNOVER

Group Name Group #	E&E 8	MEXE 7	P&P 2	C&A 3	FAB 6	PRIM 5	TRANS 9	P&C 4	F&K 1
INDIVIDUAL CHARACTERISTIC VALUES:									
Sales (\$M)	339	594	413	1005	168	907	2863	8551	1550
AP	7.6	8.1	7.6	8.6	10.4	10.1	10.0	10.3	14.5
AR	6.2	5.9	6.9	7.4	7.4	7.8	9.6	10.4	13.8
REM	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
AR-REM(R)	0.2	-0.1	0.9	1.4	1.4	1.8	3.6	4.4	7.8
REM-AP(P)	-1.6	-2.1	-1.6	-2.6	-4.4	-4.1	-4	-4.3	-8.5
(R)-(P)	1.8	2	2.5	4	5.8	5.9	7.6	8.7	16.3
INDIVIDUAL CHARACTERISTIC RANKING:									
Sales	8	6	7	4	9	5	2	1	3
AP	1.5	3	1.5	5	4	7	6	8	9
AR	8	9	7	5.5	5.5	4	3	2	1
REM									
AR-REM(R)	8	9	7	5.5	5.5	4	3	2	1
REM-AP(P)	1.5	3	1.5	4	8	6	5	7	9
(R)-(P)	9	8	7	6	5	4	3	2	1
TOTAL GROUP RANKING:									
S+AP+AR									
+((R)-(P))	26.5	26	22.5	20.5	23.5	20	14	13	14

Table 6.3 shows the cross tabulation and aggregate results of ranking. Other than payables turnover (AP) and the attendant statistic showing AP in relation to remittance turnover, electronic group occupies last or next to last position, i.e., worst or least favorable. Payables turnover for electronic group is one of the lowest value observed in the study, and thus, is ranked in a tie for best rating. However, this singular favorable AP rating and the AR rating are not indicative of the turnover timing interactions that are critical to the examination of the impact of VAT on cash flow.

A benefit-derived less benefit-forgone statistic (AR-REM less REM-AP) does reflect the impact of timing differences among the three turnovers under study. This benefit-derived less benefit-forgone statistic classifies electronic group as the worst group in the study. Further it is interesting to note that, for this benefit statistic, the four groups not included, for parsimony, in the regression model are ranked 8th (machinery), 7th (printing), 6th (chemical), and 4.5 (primary metals). This ranking of electronic group as the worst of the groups studied and the proximity ranking of the other groups that exhibited differential impact suggests that the magnitude of a benefit-derived less benefit-forgone statistic may be the prime discriminating factor. This comes as no surprise since this three way benefit version follows, to some

extent, the aforementioned conventional beliefs about receivables and payables turnover relationships

An aggregate statistic was calculated in an attempt to evaluate the overall ranking of the characteristics identified in the regression equation as well as this benefit statistic. This aggregate ranking is the sum of the ranking assigned average sales level, receivables turnover, payables turnover, and benefit-derived less benefit-foregone statistic. Similar results were obtained when median sales level was substituted for average sales level ranking. The combined ranking statistic of 26.5 for electronic group shows further support for the explanation that this group experiences differential impact of VAT on cash flow because it exhibits the least favorable company characteristics of the nine groups studied.

From the foregoing, it appears that this relationship between receivables, payables, and remittances is a major element in differentiating the impact of a VAT on company's cash flow. However further study, wherein remittances turnover is varied, is required to test this relationship in a more definitive manner.

In summary, based on the data and analysis results reported, it appears that a differential effect on cash flow impact is supported. Electronic, machinery, printing, chemical, and metal groups exhibit significant differences

in impact of VAT on cash flow, while the remaining four groups do not.

This concludes the inquiry into differential impact of VAT among industry groups. The influence of company characteristics on the cash flow impact of VAT is analyzed next. Since the regression addressed both industry and company effects, some of the tables and figures introduced in this differential impact section will be referenced in the next section.

Research Question 3: Company Characteristics

The third and last Research Question is concerned with the influence certain company characteristics have on the impact VAT has on cash flow of manufacturing corporations. In pursuing answers to this multifaceted question several hypotheses were formulated and presented in chapter 5. They are:

- Hypothesis 3a: There is a negative association between payables turnover and cash flow impact of VAT.
- Hypothesis 3b: There is a positive association between receivables turnover and cash flow impact of VAT.
- Hypothesis 3c: Sales growth will affect the cash flow impact of VAT.
- Hypothesis 3d: Value-added content will affect the cash flow impact of VAT.

Looking again at previously introduced Table 6.2, it is apparent that the relationships among sales, receivables turnover and payables turnover have major impact on VAT cash flow. Of the total variation explained by the model ($R^2 = .8446$), receivables turnover crossed with sales (SAR), payables turnover crossed with sales (SAP), and combined receivables and payables turnover crossed with sales (SARP) contribute a major portion. Each is significant at the .001 level and their combined R^2 (.6304) accounts for almost 75% of the total R^2 . Including sales (S), raises the combined R^2 to .7331 or 86.8% of the total R^2 .

What is not apparent from the data presented in Table 6.2 is the relative importance of sales and turnover variables included in the regression equation. One way to make regression coefficients somewhat more comparable is to use Beta weights which are the coefficients of the independent variables when all variables are expressed in standardized (Z-score) form. Care should be taken in interpreting the relative importance by use of Beta weights, since Beta weights are affected by multicollinearity of the independent variables (Neter et al., 1985, p 262). Although multicollinearity is present (since all four terms are crossed with sales) comparison of SAP, S, SARP, and SAR Beta weights provides some insight into their relative impact on cash flow. The observed Beta coefficients are listed in Table 6.4

TABLE 6.4

REGRESSION BETA COEFFICIENTS
1984

Step	SAR	SAP	S84	SARP
1	0.5636			
2	1.1218	-0.7252		
3	1.0840	-0.6528		
4	0.7831	-1.5800	1.2292	
5	-0.6313	-3.2050	2.5320	1.7012

The data in Table 6.4 indicate that upon the introduction of sales (S), sales crossed with receivables turnover (SAR) dropped to 3rd place and sales crossed with payables (SAP) rose to 1st place. When the three way interaction of sales, receivables turnover, and payables turnover (SARP) was introduced in step 5 SAR dropped to 4th place and changed sign. At the same time sales crossed with payables turnover (SAP) and sales (S) remained in 1st and 2nd place respectively. Further changes after step five were minor.

Although collinearity exists, these data suggest that sales coupled with payables turnover (SAP) and sales coupled with receivables and payables turnover (SARP) have more of an influence on VAT cash flow than the interaction of sales and receivables turnover (SAR). Similar indications were also observed earlier in the regression model development section of this chapter. In that section, examples were presented to show application of the typical group regression model for two groups with identical sales volume. The influence of the terms of the model on VAT cash flow was as follows:

<u>Variable</u>	<u>Group B</u> (<u>\$M</u>)	<u>Group A</u> (<u>\$M</u>)
Constant	-1.68	-1.68
S	+9.33	+9.33
SAR	-1.35	-1.65
SAP	-11.80	-11.80
SARP	+3.60	+4.40
VAT cash flow	-1.90	-1.40

This comparison example lends support to the supposition that the interaction of sales and payables turnover (SAP) is most influential; sales interacting with both payables and receivables turnover is next; and, sales interacting with only receivables turnover is least. In the remainder of this discussion of Research Question 3 the association or influence of each company characteristic studied is individually discussed.

Influence of Payables Turnover. It is not immediately apparent from the data that VAT cash flow varies inversely with payables turnover. There is strong support, however, for the premise that VAT cash flow varies inversely with payables turnover interacting with sales (SAP). Since VAT is determined by multiplying sales by a value-added tax rate, it is mathematically known that VAT varies directly with sales. From this, it follows that payables turnover varies inversely with VAT cash flow. Thus, the evidence of an inverse association between VAT cash flow and the interactive sales and payables turnover term supports Hypothesis 3a which is:

There is a negative association between payables turnover and cash flow impact of VAT.

Influence of Receivables Turnover. Similar logic is used to determine the direction of the association between receivables turnover and VAT cash flow. Since receivables

turnover, interacting with sales, (SAR) exhibits a negative or inverse association with VAT cash flow, it appears that receivables turnover varies inversely with VAT cash flow. This finding appears to provide no support for the alternative Hypothesis 3b which held:

There is a positive association between receivables turnover and cash flow impact of VAT.

As discussed in the model development section of this chapter, however, this model's apparent lack of total support for Hypothesis 3b may be misleading. It can be mathematically demonstrated that, for this model, if payables turnover is greater than 3.75 times, VAT cash flow varies directly with receivables turnover. When payables turnover is less than 3.75 times, VAT cash flow varies inversely with receivables turnover. Payable turnovers as low as 3.75 means that suppliers are being paid about every three months. Although this long pay period is possible in certain circumstances, it is most unusual and would not be tolerated for an extended period. This low crossover point of 3.75, compared to the 7.6 lowest average observed in this study, suggests that, substantively, Hypothesis 3b is supported by the results of this study.

Influence of Sales Growth. Testing the association between sales growth and VAT cash flow (Hypothesis 3c) is not appropriate in the year of effectivity because VAT sales

were zero prior to VAT imposition. Thus sales growth is infinite in the first year of effectivity. The influence of sales growth on VAT cash flow is addressed in the next segment of this section in which data for the follow-on years of 1985-86 are considered.

Influence of Value-Added Content. A review of the data generated during this study indicates VAT content is not a major contributor to the explanation of the impact of VAT on cash flow. Therefore, it must be concluded that when other variables are taken into account, we must reject Hypothesis 3d which stated:

Value-added content will affect the cash flow impact of VAT.

This lack of support is somewhat surprising in light of the observed influence of payables turnover on the impact of VAT cash flow. Intuitively one would expect payables turnover to have relatively little effect on firms with high value-added content (little or no external purchases) but relatively high effect on firms with low value-added content (large amounts of outside purchases). It is possible that this finding was influenced by the method used to determine value-added content. As previously described, when "purchases" data were not listed in COMPUSTAT they were calculated based on industry group statistics published in the United States Commerce Department's Annual Survey of Manufacturers. An alternative approach of surveying

manufacturing firms to obtain sample data was not considered practical or necessary for this initial study. It may be that lack of variation in this value-added content variable has masked the effect if one were present. This is an area for future study.

Results for Follow-on Years

In a static environment, VAT cash flows would come to equilibrium during the enactment year and thereafter the impact of VAT on cash flow would be zero. Stated in cumulative terms, the cumulative amount of a business entity's cash flow due to VAT would stabilize at the level attained in the year of enactment. However, corporations usually do not operate in a static environment. Therefore the impact of sales growth (Hypothesis 3c) was tested with data from the follow-on years of 1985-86. Stepwise regression, as previously described, was used to examine the influence of sales growth on the impact of VAT on cash flow.

Although the variables in the regression models developed for 1985 and 1986 equations have statistically significant coefficients, the explanatory power of the models (adjusted R^2 slightly over .5) are not as large as that found for the year of effectivity. Basically, the same variables found in the 1984 model are again present in the models for 1985 and 1986. This includes effects for the electronic group. With 1985 data it is possible to define

sales growth from 1984 to 1985. Similarly, sales growth for 1985 to 1986 can be calculated. This new variable, however, did not enter into the regression for 1985 or 1986.

In summary, the data simulated for impact of VAT on 1985 and 1986 cash flow, although not as strong as that obtained for the year of enactment, do not detract from conclusions drawn for 1984. For the most part variables observed to be significant in explaining impact of VAT on cash flow in 1984 were found to be significant in 1985 and 1986 models. The results, however, failed to support the hypothesis that sales growth will impact VAT cash flow (Hypothesis 3c.). Further, the results for 1985 and 1986, similar to 1984, provided no indication that value-added content affects VAT impact on cash flow.

Model Validation

One reason for developing this regression model is its potential for predicting how manufacturing firms will perform on the criterion variable when a VAT is actually enacted. Although the data for year of effectivity indicate a .9196 coefficient of multiple correlation, the predictive capability of the model may be lacking.

To investigate whether the regression equation has potential for prediction it was tested using 1985 financial data for the 939 manufacturing firms. The equation with 1984 effectivity data was used to predict 1985 VAT cash flow

for each firm. This 1985 predicted cash flow was then compared to observed VAT cash flow simulated with 1985 as the year of effectivity. A relatively high correlation suggests that the model may be applicable for manufacturing corporations in other time periods. As the scope of this study was limited to manufacturing entities, validation was not intended to test, and is silent on, prediction capability for firms other than manufacturing corporations.

The correlation results indicate a positive .907 coefficient (significant at the .001 level) between predicted and observed VAT cash flow for 1985. This correlation coefficient suggests there is no difference between observed VAT cash flow and that predicted using the regression model. Therefore, it appears that the derived model may be useful for evaluating impact of VAT on cash flow of manufacturing corporations. Implications of the use of this model are discussed in the next chapter.

Summary and Conclusions

Strong support for affirmative response to Research Question 1 and Research Question 2 was found by analyzing corporate financial data adjusted to reflect the simulated impact of a value-added tax. Specifically, data analysis showed that imposition of a value-added tax does alter the cash flow of manufacturing corporations and a differential cash flow effect of VAT on manufacturing industry subgroups

does exist. Further, support for using the multiple regression equation developed in this study as a predictive instrument was found by validation testing. The data also supplied strong support for two of the four hypotheses associated with Research Question 3. The two hypotheses supported addressed the direction of association between turnover characteristics and VAT cash flow. However, support for Hypothesis 3c (sales growth influence) and 3d (value-added content influence) was not in evidence.

The amount and direction of VAT-induced cash flow is evidenced in the year of enactment and is strongly influenced by sales, payables turnover and moderately influenced by receivables turnover. In the years following the year of effectivity changes to the amount and direction of VAT cash flow are associated with the same variables identified for 1984 and are not influenced by sales growth. Value-added content demonstrated no influence in the year of effectivity or in the follow-on years of 1985 and 1986.

CHAPTER /
SUMMARY OF STUDY

In this chapter, the research study presented in the previous chapters is summarized and its limitations and the implications that can be drawn from its results are discussed. The chapter concludes with a discussion of areas for future research.

Summary of Study

The research conducted was a simulation study which examined the impact a value-added tax would have on cash flow of manufacturing corporations. The objective of the study was to answer three research questions:

1. Other than increased costs for compliance, does VAT permanently alter the cash flow of manufacturing corporations?
2. Is there a difference in VAT impact on cash flow among major industry groups within the manufacturing sector?
3. How do payment, collection, and remittance periods; sales growth; and value added content influence the cash flow impact of VAT?

The first two questions address the fundamental tax policy criterion of economic efficiency commonly referred to

as tax neutrality. The third question seeks insight into company specific characteristics that could alter the impact of VAT on cash flow.

Nine manufacturing industry groups were selected to simulate the impact of VAT on corporations. Manufacturing was chosen because manufacturing would be the biggest contributor of VAT revenue (manufacturing accounts for 40% of total corporate business receipts reported to the Internal Revenue Service for the year 1985). Nine industry groups were selected because they account for 80% of the total manufacturing output.

COMPUSTAT data for corporations in the nine industry groups were examined to identify firms that: (1) were incorporated in the United States; (2) reported domestic sales as a separate line item; and, (3) provided sufficient financial data for simulating the impact of VAT on cash flow. This screening resulted in a set of 939 manufacturing corporations distributed among the nine industry groups in essentially the same manner as before the screening.

The impact of VAT on cash flow was simulated for the first year of VAT effectivity and the following two years. Because 1984 was the year COMPUSTAT started segregating domestic sales data, 1984 was designated the first year of value-added tax.

The cash flow impact of an 8% VAT from receivables, payables and remittance to the government was simulated and

aggregated for each corporation using data items and equations detailed in Appendix A. A sample of initial results for each contributing segment and the total impact were cross checked manually to ensure that the computer generated data were reliable. These cash flow impact data were then regressed on company and group characteristics to statistically test hypotheses formulated for each of the three research questions. The hypotheses (expressed in alternate form) are as follows:

Hypothesis 1: The imposition of a VAT will impact cash flows of manufacturing corporations.

Hypothesis 2: VAT impact on cash flow will differ among major industry groups within the manufacturing sector.

Hypothesis 3a: There is a negative relationship between payables turnover and cash flow impact of VAT.

Hypothesis 3b: There is a positive relationship between receivables turnover and cash flow impact of VAT.

Hypothesis 3c: Sales growth will affect the cash flow impact of VAT.

Hypothesis 3d: Value-added content will affect the cash flow impact of VAT.

Four company characteristics, nine industry groups and the sixty interaction terms spelled out in the previous chapter were examined in numerous regression analyses. This resulted in the following validated, parsimonious and significant equation for the first year of impact:

$$VC = - 1.68 + 9.33S - .15SAR - 1.18SAP + .04SARP \quad (7.1) \\ + 1.79G8 - 2.64GS8 + .90GSAR8$$

where:

- VC = VAT cash flow (\$M)
- S = Sales (\$B)
- SAR = Sales crossed with Receivables turnover (\$B)
- SAP = Sales crossed with Payables turnover (\$B)
- SARP = Sales crossed with receivables turnover crossed with payables turnover (\$B)
- G8 = Electronic group
- GS8 = Electronic group crossed with Sales (\$B)
- GSAR8 = Electronic group crossed with Sales crossed with Receivables turnover (\$B)

Expression 7.1 was then partitioned into two models; one describing the impact of VAT on cash flow for the typical or normal industry group; and, one describing impact of VAT on cash flow for the electronic group. The derived regression functions for these two models are:

Typical group

$$VC = - 1.68 + 9.33S - .15SAR - 1.18SAP + .04SARP \quad (7.2)$$

Electronic group (G8)

$$VC = + 0.11 - 3.39S + .65SAR - 1.18SAP + .04SARP \quad (7.3)$$

Analysis of data for the two years following the first year of impact identified essentially the same associations as found in expression (7.1) above. However, the explanatory capacity of the 1985 and 1986 models (each with adjusted R^2 slightly over .5) were not as great as that exhibited in the 1984 model (adjusted R^2 almost .85).

Implication of Results

Previous research in the area of VAT impact on corporate business is limited to a qualitative evaluation of the impact of a VAT on cash flow (Smith, Weber, and Cerf, 1973) and simulations of differential impact of potential VAT forms on IRS revenue (Crum, 1985) and on corporate finance costs (Crum, 1991).

This study of the cash flow of manufacturing corporations takes on importance because it extends the theoretical findings of Smith et al., by providing empirical evidence of VAT impact on corporate cash flow. The results of this study have implications in the domains of tax policy and corporate business policy.

Perhaps the first observation that should be made is that VAT is not tax neutral as generally assumed by VAT proponents. Table 6.1 and Figure 6.1 clearly show an impact on the cash flow of manufacturing corporations and this impact differs among the nine industry groups. Analyses discussed in Chapter 6 confirm that there is a statistically significant differential impact across five of the nine industry groups tested¹². These findings bring into question VAT advocates' contention that VAT would realize superior allocative efficiency over CIT (Corporate Income

¹² Only one group, electronic, is included in the final regression model in the interest of parsimony.

Tax) because a uniform VAT is proportional and therefore neutral toward the use of productive resources.

The economic argument that CIT distorts allocation of resources while VAT is proportional and insensitive to use of production resources is often used as justification for the enactment of a value-added tax in place of a corporate income tax. It appears that the impact of VAT on corporate cash flow is ignored when using this argument. This oversight is most likely due to the generally held belief that, the incidence issue aside, VAT, like a retail sales tax, is paid by the consumer and is not a direct cost to the business entity, whereas the corporate income tax is paid by, and is a direct cost to, the business unit. The findings of this study suggest that enactment of VAT could result in a direct cost to the business entity. As such, the use of economic efficiency as justification for complete or partial replacement of the corporate income tax by a value-added tax appears suspect.

The findings of this research clearly provide evidence of differential impact within the manufacturing industry. Study of the impact of VAT on other industries and comparison of impacts between VAT and CIT is necessary before stronger conclusions can be drawn. Meanwhile the results reported herein suggest that to date, tax neutrality comparisons between VAT and CIT have been incomplete because cash flow impact has been ignored.

Results of this study for business are not as informative as they are for tax policy since the influence of payables and receivables on cash flow is a well known phenomenon in the business world. The importance of this study lies in the empirical support that VAT, which would be classified as a fiduciary pass-through liability (not as an expense as it is for CIT), could permanently alter a firm's cash flow. A business entity's cash flow from operations could be enhanced or diminished due to VAT. This is a phenomenon similar to that occurring with payables and receivables. The difference here is that a third variable, remittance, exists, and this variable is controlled by the Internal Revenue Department, not the firm.

In this study the remittance period was fixed for all firms at two months and the results clearly demonstrated that six of the nine industry groups experienced cash drains. A remittance period of two months was chosen because it is the period most often used in European countries that have value-added taxation. If the Internal Revenue Service follows a remittance procedure similar to existing federal excise tax deposit requirements (within "days" of collection depending on the amount), the negative impact of VAT on cash flow could be exacerbated.

The results of this study presented in the previous chapters indicate that business firms are not immune to the impact of VAT. Provisions of VAT legislation should be

carefully examined by corporations for negative impact in light of its payable and receivable procedures relative to legislative remittance requirements. Further, business entities should attempt to influence any VAT legislation contemplated so that legal requirements reflect industry characteristics, neither enhancing nor diminishing an industry's cash flow.

Limitations of Study

The conclusions of this study are limited to publicly-held manufacturing corporations since only publicly-held firms are included in the COMPUSTAT data base. This is a practical limitation because data are not readily available for privately-owned businesses or non-corporate entities.

Insofar as this study relies on ex-post data, only first-order effects are measured. The effect of changes in business decisions which may occur in reaction to the tax are not captured and are beyond the scope of this study.

Future Research

Since this study is one of the first to examine empirically VAT impact on cash flow, several future empirical analyses come to mind. Some are extensions to this study, while others are offshoots to seek answers to questions raised during this study.

As extensions, future research might explore the impact of VAT on cash flow of industry sectors other than manufacturing such as wholesale trade, retail trade, mining. Probing differences and similarities of VAT influencing characteristics among different industry sectors will reveal a more general picture of its impact on corporations and give further insight into the neutrality of VAT. Retail and wholesale trades with somewhat constant and relatively low proportions of value-added content might present completely different results.

Other areas for future research include: (1) impact of shorter remittance periods; (2) comparison of cash flow impact on corporations between a combination of CIT and sales tax as presently exists and VAT; (3) sensitivity of cash flow impact due to changing VAT content including perfect vertical integration; (4) study of actual results of VAT's impact on cash flow in England where VAT has been in existence for decades or in Canada where VAT was initiated this year.

APPENDIX A

DATA ITEMS AND EQUATIONS

Variables used in this study are listed below. First, COMPUSTAT data items are presented. Following that, the calculated variables together with their method of calculation are listed. The calculated variables are not listed alphabetically; rather they are grouped by account classification, i.e., sales; purchases; VAT; and miscellaneous.

Data Items

AP	Accounts payable
RECT	Accounts Receivable - Total
RECX	Receivables Turnover
SALE	Sales - Net
SALEG	Sales Geo. Seg.- Net

Calculated Variables

Variable	Title	Equation
<u>Sales:</u>		
S	SALES	COMPUSTAT item
AR	RECEIVABLES TURNOVER	COMPUSTAT item
ARB	RECEIVABLES ACCOUNT BALANCE	S/AR
CFIR	RECEIVABLES CASH IN	$ARB[t-1] + (1-1/AR) * S$

Purchases:

AP	PAYABLES TURNOVER	PURCH/AVG AP
PURCH	PURCHASES	COMPUSTAT item or ASM Statistic PURCH/AP
APB	PAYABLES ACCOUNT BALANCE	
CFOP	PAYABLES CASH OUT	$APB[t-1] + (1-1/AP) * PURCH$

VAT:

VATR	VAT RATE	8%
VATB	VAT BASE	$1/12(S-PURCH)[t-1]$ $+ 11/12(S-PURCH)$
VCFIR	VAT CASH FROM CUSTOMERS	$VATR * CFIR$
VCFOP	VAT CASH TO SUPPLIERS	$VATR * CFOP$
VCFOM	VAT CASH TO GOVERNMENT	$VATR * VATB$
VCF	VAT CASH FLOW	$VCFIR - VCFOP - VCFOM$

Miscellaneous

VA%	VALUE-ADDED CONTENT	$(S-PURCH)/S$
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