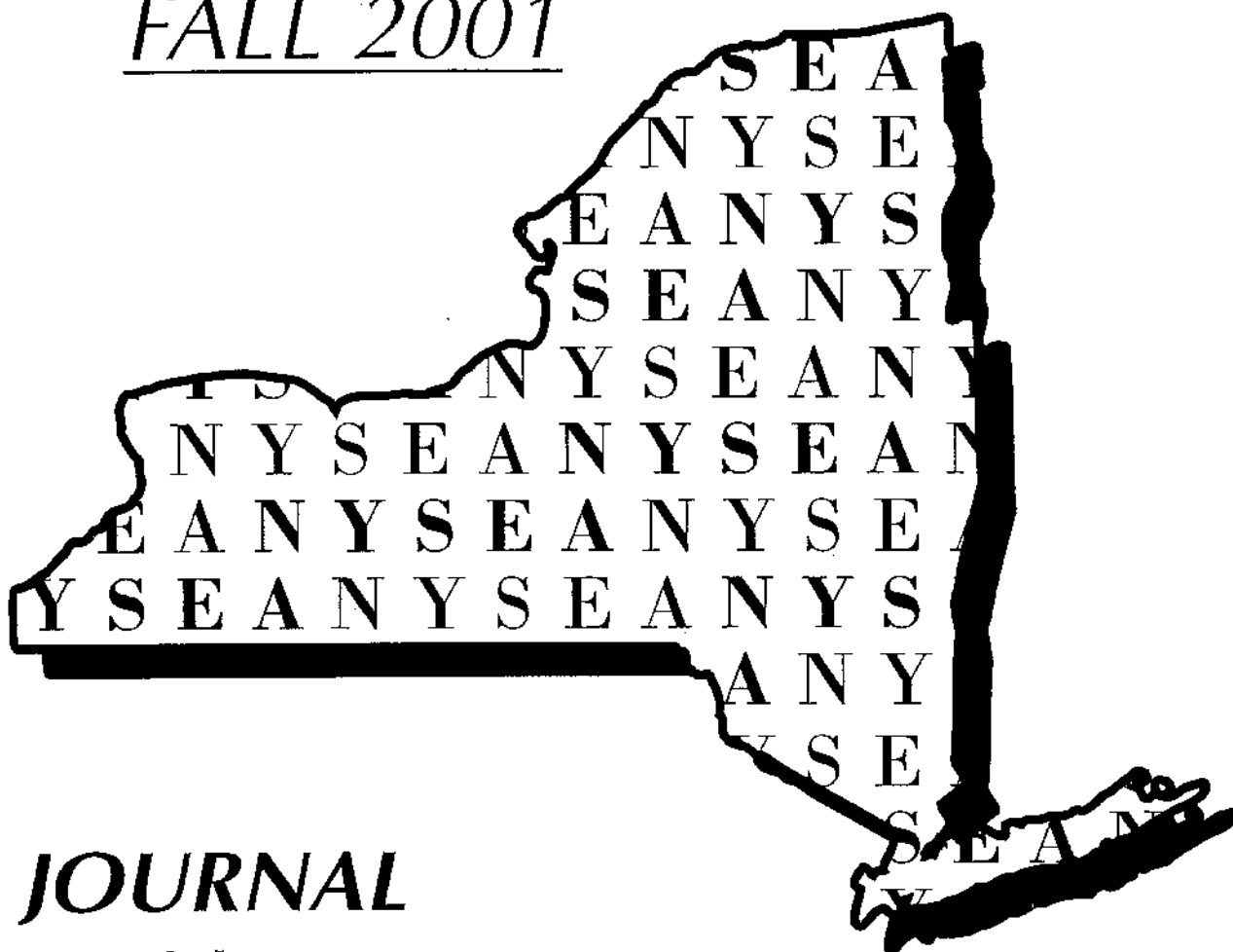


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New York Economic Review

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EDITORIAL

The *New York Economic Review* is an annual journal, published in the Fall. The *Review* publishes theoretical and empirical articles, and also interpretive reviews of the literature. We also encourage short articles. The *Review's* policy is to have less than a three month turnaround time for reviewing articles for publication.

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5. Citations in the text should include the author and year of publication, as found in the references, in brackets. For instance (Marshall, 1980).
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PRODUCT DIFFERENTIATION AND COST LEADERSHIP: THEIR EFFECT UPON PROFIT MARGIN AND ASSET TURNOVER

Richard Skolnik*

ABSTRACT

Previous research has linked product differentiation strategies with high profit margins and low asset turnover, while cost leadership strategies have been linked with low profit margins and high asset turnover. This paper demonstrates that the equilibrium effect of strategic policy on margin and turnover depends upon the characteristics of the industry. If product differentiators and cost leaders have essentially the same production process and asset requirements per unit of output, the profit margin in equilibrium will be larger for cost leaders. If the production process requires more capital per unit of output for product differentiators, then either cost leaders or product differentiators may have higher profit margins and lower asset turnover. If the production process requires less capital per unit of output for product differentiators, then they will have lower profit margins and higher asset turnover than the cost leader. In market equilibrium, the relative levels of profit margin and asset turnover for an industry or a segment of an industry depend upon capital requirements. Larger capital requirements result in higher profit margins and lower asset turnover. Smaller capital requirements result in lower profit margins and higher asset turnover.

INTRODUCTION

Cost leadership and product differentiation are strategic policies that can affect the performance of firms. Cost advantage or cost leadership strives to reduce costs in order to increase profitability through increased volume. Product differentiation involves creating real or perceived differences in one's product in order to obtain premium-pricing power (Porter 1985). The tradeoff between the strategies is usually viewed as a substitution between profit margin and asset turnover. Product differentiation strategies are associated with high profit margins and low asset turnover. Cost leadership strategies are associated with low profit margins and high asset turnover (Selling and Stickney 1989, Stickney and Brown 1999).

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* Assistant Professor of Finance, School of Business, State University of New York at Oswego

This paper demonstrates that the effects of strategic choice upon the profit margin and asset turnover profile of a firm depend upon the characteristics of the industry production process. Four different industry scenarios are examined. The first scenario deals with industries that have the same capital requirements per unit of output for product differentiators and cost leaders (Equal Capital Intensity, ECI). The second and third scenarios consist of industries in which product differentiators are more capital intensive per unit of output than cost leaders. In one case, product differentiators will have higher profit margins (capital intensive differentiators, CID-high margin). In the other case, product differentiators will have lower profit margins (CID-low margin). Finally, the fourth scenario examines industries with non-capital intensive differentiators (NCID). In these industries, product differentiators use less capital per unit of output than cost leaders, resulting in lower profit margins and higher asset turnover.

The paper is organized as follows. The first section surveys the literature on profit persistence and its components, profit margin and asset turnover. The second section develops a general equilibrium model linking profit margin and asset turnover to cost leadership and product differentiation strategies. The third section presents numeric examples for each of the four different industry scenarios. The final section uses heuristic examples to link industry type to production and demand characteristics.

RETURN ON ASSETS, PROFIT MARGIN AND ASSET TURNOVER

Operational performance for an unleveraged firm is measured by its return on assets (ROA). Qualls (1974) and Selling and Stickney (1990) note that a leveraged firm will have a lower ROA because ROA commingles operational performance with capital structure decisions. Interest payments on debt financing reduce taxable income, taxes, and net income. Geroski (1990), Mueller (1977, 1986), and Qualls (1974) have added interest payments back to net income and McGahan (1999) has used earnings before interest and taxes (EBIT) as the numerator of ROA to neutralize the effects of financing decisions upon operating performance. This study focuses on operational performance and therefore considers the unleveraged firm. Basic earning power (EBIT/Assets) would be the appropriate measure for the leveraged firm. Although leverage affects ROE, *a priori* it should not have an impact on cost leadership and product differentiation decisions.

In a competitive, general equilibrium analysis, industry profitability should trend to an economy-wide, long-run average (Scherer, 1980). Industries with higher returns will attract competition, eliminating excess returns. However, firms within industries that have significant barriers to entry and a non-competitive market structure may be able to earn excess returns. The persistence of operational profitability and the source of above average profitability has been extensively studied since Bain's (1951) seminal work. Using Compustat financial data, Mueller (1977) estimated a set of firm specific regressions with profit rates as the dependent variable and a deterministic, decaying time trend as the independent variable. The majority of firms with above average profit rates at the beginning of the sample period had negative coefficients, indicating decay in the profit rate. The majority of firms with below average profit rates at the beginning of the sample period had positive coefficients. These findings indicate that profit rates converge over time due to competitive pressures. However, for a significant number of firms, coefficients were either small or of the wrong sign, indicating that convergence may take place slowly or not at all.

Later work by Mueller (1986) used a stochastic time series model which estimated profit persistence using a first order autoregressive equation. This model has formed the basis of much subsequent research, including Geroski (1990) and Goddard and Wilson (1996). Their work has shown that for a typical firm, profits converge fairly quickly to a firm's long run equilibrium rate but that the long run rates differ significantly across firms. Both firm characteristics and industry characteristics are important in explaining the persistence of profits. McGahan (1999) studied U.S. profit performance from 1981-1994 using Compustat financial information and three measures of performance: Tobin's q , accounting profitability, and the return on the replacement value of assets. McGahan found that firm effects were more important in determining profitability than industry effects but that industry effects were more persistent.

Although profit persistence is widely studied, less attention has been focused on the components of operating profit. As specified in the well-known Dupont relationship, return on assets (ROA) is the product of profit margin and asset turnover. Assuming general equilibrium within a competitive market, ROA should be the same throughout the economy, implying that profit margin and asset turnover are inversely related. Empirical studies have demonstrated that profitability rates differ between industries and between firms within industries. However, since abnormal profits exhibit decay, profit margin and asset turnover should be inversely correlated. Although the general equilibrium assumption of equal profitability may be simplistic, many segments of the U.S. economy experience significant competitive pressures that eliminate long-run economic profits.

In their seminal study, Selling and Stickney (1989) documented inter-industry variation in profit margin and asset turnover. Using Compustat financial data from 1977 to 1986, they found a significant negative correlation between profit margin and asset turnover for 9 out of 10 years. As expected in competitive markets, firms with high profit margins usually have low asset turnover; those with low profit margins usually have high asset turnover. Firms with above average profit performance have higher profit margins and/or higher asset turnover than the typical firm.

Selling and Stickney (1989) link profit margin and asset turnover to three different causes: 1) capacity and competitive constraints; 2) product differentiation versus cost leadership; and 3) the marginal rate of substitution of asset turnover for profit margin. The three sources of margin and turnover variability span industry characteristics and the strategic policies chosen by firms. First, they note that industries with high fixed capacity costs and large lead times to add new capacity operate under a capacity constraint, which limits their overall asset turnover. Firms within such industries attract capital with high profit margins that are maintained through barriers to entry. Second, they note that product differentiation strategies result in premium pricing ability that leads to higher profit margins. Conversely, cost leadership strategies are linked to low profit margins and high asset turnover. Selling and Stickney define the marginal rate of substitution of asset turnover for profit margin as the ratio of profit margin to asset turnover. They claim that firms within industries with high or low marginal rates of substitution are constrained in their strategic policies. Firms within capital intensive industries tend to follow product differentiation strategies and firms within non-capital intensive industries follow cost leadership strategies. They conclude that industries with high profit margins have differentiated or unique products and are

subject to barriers to entry, while industries with low profit margins have few opportunities for product differentiation.

Although the Selling and Stickney argument that barriers to entry explain the profit margin/turnover relationship has intuitive appeal, capital intensive industries should have high profit margins even without barriers to entry. In a general equilibrium framework, the amount of assets required in the production process determines the relative levels of profit margin and asset turnover for an industry. Assuming that competitive pressures erode abnormal profitability and that risk is independent of capital requirements, then even with no barriers to entry, industries with large capital requirements will have higher profit margins in order to attract capital investment. Profit margin for the unleveraged firm is the percentage of sales revenue that flows back to the providers of capital. Capital-intensive production processes use more capital relative to other inputs and therefore the providers of capital should claim a larger share of revenue. On the other hand, industries with low capital requirements will have lower profit margins, because a smaller portion of sales dollars needs to flow back to the suppliers of capital.

Total assets, not just fixed assets, need to be considered when predicting profit margins. Capital intensity is usually measured as the capital/labor ratio or by net fixed assets to total assets (Scherer 1980). However all assets need to be financed. Firms that require large asset bases to generate sales, that is, firms within industries with low asset turnover, will need to have relatively large profit margins. Since ROA is the product of profit margin and asset turnover, economic profits result from having an above average profit margin (asset turnover) for a given level of asset turnover (profit margin).

Within industries, the strategic choices made by firms influence their relative levels of profit margin and asset turnover, but the direction of the impact depends upon characteristics of the industry production process. Selling and Stickney (1989) and Stickney and Brown (1999) associate cost leadership with higher asset turnover and lower profit margins and product differentiation with relatively higher profit margins and lower asset turnover. However, this relationship holds only in certain types of industries. The model developed in the next section shows that product differentiation does not necessarily lead to higher profit margins and lower asset turnover. Instead product differentiation could lead to lower profit margins and higher asset turnover. Consumer preferences and the nature of the production process determine which outcome occurs.

MODEL

Consider a competitive industry with no barriers to entry and two different segments: a differentiated premium priced segment and a non-differentiated, cost leader segment. Consider two representative firms within these segments, a product differentiator who sells at a premium price (P_{pd}) and a cost leader who sells at low price (P_{cl}). The two firms are equity financed and operate in a tax-free environment. The firms have assets A_{pd} and A_{cl} , and encounter per unit costs V_{cl} and V_{pd} which are proportional to output, Q_{cl} and Q_{pd} . The cost leader has lower per unit costs than the product differentiator ($V_{cl} < V_{pd}$). Then,

$$\text{Sales}_{cl} = P_{cl} Q_{cl} \qquad \text{Sales}_{pd} = P_{pd} Q_{pd} \qquad (1)$$

$$\text{Profit}_{cl} = P_{cl} Q_{cl} - V_{cl} Q_{cl} \qquad \text{Profit}_{pd} = P_{pd} Q_{pd} - V_{pd} Q_{pd} \qquad (2)$$

$$\text{Margin}_{cl} = (P_{cl} Q_{cl} - V_{cl} Q_{cl}) / P_{cl} Q_{cl} \qquad \text{Margin}_{pd} = (P_{pd} Q_{pd} - V_{pd} Q_{pd}) / P_{pd} Q_{pd} \qquad (3)$$

$$\text{Turnover}_{cl} = \text{Sales}_{cl} / A_{cl} \qquad \text{Turnover}_{pd} = \text{Sales}_{pd} / A_{pd} \qquad (4)$$

Equilibrium conditions require ROA equality between the segments ($\text{ROA}_{cl} = \text{ROA}_{pd}$). Otherwise, firms will migrate from one segment to the other until profitability is the same. Therefore, from equations (3) and (4), it follows that:

$$\frac{P_{cl} Q_{cl} - V_{cl} Q_{cl}}{P_{cl} Q_{cl}} \times \frac{P_{cl} Q_{cl}}{A_{cl}} = \frac{P_{pd} Q_{pd} - V_{pd} Q_{pd}}{P_{pd} Q_{pd}} \times \frac{P_{pd} Q_{pd}}{A_{pd}} \qquad (5)$$

$$\left(1 - \frac{V_{cl}}{P_{cl}}\right) \times \frac{P_{cl} Q_{cl}}{A_{cl}} = \left(1 - \frac{V_{pd}}{P_{pd}}\right) \times \frac{P_{pd} Q_{pd}}{A_{pd}} \qquad (6)$$

Turnover for cost leaders will exceed turnover for product differentiators whenever $(1 - V_{cl}/P_{cl}) / (1 - V_{pd}/P_{pd}) < 1$, which implies that turnover for cost leaders exceeds turnover for product differentiators if $V_{cl}/P_{cl} > V_{pd}/P_{pd}$. Conceptually, this condition implies that cost leaders have higher turnover whenever costs as a percentage of product price are lower for the premium priced segment than for the mass market segment.

Each of the four industry scenarios will now be considered. In the first scenario the production process for the product differentiator and the cost leader are essentially the same. If the differentiator and the cost leader have the same asset requirements per unit of output, then Q_{cl}/A_{cl} will equal Q_{pd}/A_{pd} . Since the cost leader sells at a lower price than the product differentiator ($P_{cl} < P_{pd}$), turnover for the cost leader is lower than turnover for the product differentiator ($P_{cl} Q_{cl}/A_{cl} < P_{pd} Q_{pd}/A_{pd}$). Conceptually, we have two firms with relatively the same equipment requirements per unit of output. The firm that sells less output at a higher price is generating more sales per dollar of assets. Because of the equilibrium condition that ROA is the same, the profit margin for the differentiator should be less than the profit margin for the cost

leader; that is $\left(1 - \frac{V_{cl}}{P_{cl}}\right) > \left(1 - \frac{V_{pd}}{P_{pd}}\right)$. For this condition to hold, $\frac{V_{pd}}{P_{pd}} > \frac{V_{cl}}{P_{cl}}$. The ratio of cost to price for the differentiator is higher than that of the cost leader. Although the differentiator sells at a higher price, costs are proportionally higher leading to a lower profit margin, which offsets the higher asset turnover.

In the second and third industry scenarios, the product differentiator has a higher per unit asset requirement ($Q_{cl}/A_{cl} > Q_{pd}/A_{pd}$). Since the differentiator is selling at the higher price, two situations are possible. First, if $P_{cl}Q_{cl}/A_{cl} > P_{pd}Q_{pd}/A_{pd}$ the product differentiator has lower asset turnover, and therefore, higher profit margins, than the cost leader. Second if $P_{cl}Q_{cl}/A_{cl} < P_{pd}Q_{pd}/A_{pd}$, the product differentiator has higher asset turnover, and therefore, higher profit margins, than the cost leader.

In the fourth scenario, the NCID industry, the product differentiator has a lower asset requirement per unit of output ($Q_{cl}/A_{cl} < Q_{pd}/A_{pd}$) than the cost leader. Since $P_{cl} < P_{pd}$, total revenue for the product differentiator is higher ($P_{cl}Q_{cl} < P_{pd}Q_{pd}$) resulting in higher turnover and lower margins for the product differentiator. The results for the NCID industry are the same as those of the ECI industry, except more pronounced.

NUMERIC EXAMPLES

This section develops numeric examples for four different types of industries, one with the same capital requirements for product differentiators and cost leaders (ECI); one with high margin capital intensive differentiators (CID-high margin); one with low margin capital intensive differentiators (CID-low margin); and finally, one with non-capital intensive differentiators (NCID). The industries are assumed to be monopolistically competitive and have equality of ROA between segments. Product differentiation and pricing differences exist but competition eliminates economic profits.

Table 1 displays numeric examples for each type of industry by comparing two firms, a cost leader and a product differentiator, with the same asset base and the same ROA. The firms differ in per unit capital requirements, per unit costs, output quantity and output price. Although ROA is the same for each firm, profit margin and asset turnover differ. All of the firms have a benchmark asset base of \$100 and all of the cost leaders have annual sales of \$100. Price, quantity and per unit cost for the product differentiator are jointly determined to satisfy ROA equality and the characteristics of the industry. So, for instance, in the equal capital intensity (ECI) example, the product differentiator has the same \$1.00/unit asset to quantity ratio as the cost leader, which determines the quantity sold (100 units). Since the product differentiator sells the same quantity of output at a higher price, its asset turnover (sales revenue divided by assets) will exceed the cost leader's turnover. Price and per unit cost are simultaneously determined in order to produce the same 40 percent ROA as the cost leader. The ECI product differentiator example could also have used a per unit cost of \$1.80 and an output price of \$2.20. The relationship between prices in the cost leadership and product differentiator segments depends upon the demand characteristics. However, competitive pressures should ensure an equality of ROA between segments.

We begin with an example of an ECI industry. Consider two firms in an industry in which product differentiators and cost leaders have the same production process and equal capital requirements per unit of output. The product differentiator produces a premium priced product with a higher per unit cost, which can be due to advertising, packaging, or the quality of inputs. The cost leader produces a generic product, selling at a lower price and with a lower per unit cost of production. The cost savings may originate in the quality of raw materials or with marketing and promotional expenses. Both firms have the same capital requirements of \$1.00 per unit of output. A manufacturing industry with the two firms using

the same type of equipment to produce similar products corresponds to this example. Since the two firms have the same capital requirements per unit of output, the cost leader has a lower asset turnover, because its output is sold at a lower price. For ROA equivalence, the cost leader must have a higher profit margin. Compared to the cost leader, the product differentiator sells a higher priced product (\$2.00/unit versus \$1.00/unit) with higher costs (1.60/unit versus \$0.60/unit), but costs increase proportionally more than price (167 percent versus 100 percent) resulting in a lower margin for the product differentiator.

The second example is the CID-high margin industry. Again consider two firms focusing on different segments. The cost leader produces a generic product that sells for a lower price and has lower per unit costs of production. The product differentiator produces a premium priced product with higher costs of production and higher capital requirements per unit of output. In this type of industry, the product differentiator may have higher margins or lower margins, depending upon the ratio of cost to price.

Table 1: Numeric Examples by Industry Type

	ECI		CID-High Margin		CID-Low Margin		NCID	
	CL	PD	CL	PD	CL	PD	CL	PD
Assets	\$ 100.00	\$ 100.00	\$ 100.00	\$ 100.00	\$ 100.00	\$ 100.00	\$ 100.00	\$ 100.00
Price	\$ 1.00	\$ 2.00	\$ 1.00	\$ 2.00	\$ 1.00	\$ 2.00	\$ 1.00	\$ 2.00
Cost/Unit	\$ 0.60	\$ 1.60	\$ 0.60	\$ 1.00	\$ 0.60	\$ 1.33	\$ 0.60	\$ 1.80
Cost/Price	0.600	0.800	0.600	0.500	.600	0.667	0.600	0.900
Quantity	100	100	100	40	100	60	100	200
Assets/Quantity	\$ 1.00	\$ 1.00	\$ 1.00	\$ 2.50	\$ 1.00	\$ 1.67	\$ 1.00	\$ 0.50
Sales	\$ 100.00	\$ 200.00	\$ 100.00	\$ 80.00	\$ 100.00	\$ 120.00	\$ 100.00	\$ 400.00
Total Cost	\$ 60.00	\$ 160.00	\$ 60.00	\$ 40.00	\$ 60.00	\$ 80.00	\$ 60.00	\$ 360.00
Net Income	\$ 40.00	\$ 40.00	\$ 40.00	\$ 40.00	\$ 40.00	\$ 40.00	\$ 40.00	\$ 40.00
Asset Turnover	1.000	2.000	1.000	0.800	1.000	1.200	1.000	4.000
Profit Margin	0.400	0.200	0.400	0.500	0.400	0.333	0.400	0.100
ROA	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400

CL: Cost Leader, PD: Product Differentiator

Equal Capital: Equal capital intensity for CL and PD firms.

CID-high margin: Product differentiators have higher capital intensity per unit, higher margins.

CID-low margin: Product differentiators have higher capital intensity per unit, lower margins.

NCID: Product differentiators have lower capital intensity.

If the ratio of cost to price is higher for the cost leader, then in equilibrium the product differentiator will have higher margins, as indicated by the second example in Table 1. The ratio of costs to price is larger for the cost leader (\$0.60) than for the product differentiator (\$0.50). Compared to the cost leader, the product differentiator is producing a higher priced product (\$2.00/unit versus \$1.00/unit),

with higher costs (\$1.00/unit versus \$0.60/unit), but the costs increase proportionally less (66 percent) than the price increase (100 percent). Possible examples of high margin CID industries include department stores, restaurants and hotels.

A capital-intensive product differentiator may have a lower profit margin than the cost leader if it has a higher ratio of cost to price. The third example in Table 1 models this scenario. Although the low-margin differentiator has a higher asset requirement per unit of production than its corresponding cost leader, the asset requirement per dollar of output is lower since it is selling a premium priced product. The product differentiator's higher turnover drives a lower profit margin.

The last example considered is the NCID industry. The product differentiator produces a premium priced product with less capital per unit of output. A higher product price and a smaller per unit asset requirement both contribute to increased asset turnover for the product differentiator. As in the ECI and CID-low margin examples, higher turnover necessitates lower margin for ROA equivalence. More of the product price flows to inputs other than capital.

All of the scenarios used the same total asset base (\$100) and return on assets (0.40). Each scenario also used the same demand and cost characteristics for the cost leader. The differences in the scenarios lie with the demand and cost structures of the product differentiator. Although the per unit costs of the premium priced product are higher in all of the scenarios, the ratio of costs to price is larger for the cost leader than for the product differentiator in the CID-high margin industry. The product differentiator adds relatively more capital to produce the premium priced product.

In the three other scenarios, the ratio of costs to price is larger for the product differentiator than for the cost leader. Although it seems counterintuitive to have higher margins for products that cost less and sell for less, the finding is similar to one outlined by Cho (1999) that price cuts can result in higher profit margins. Cho showed that, depending upon the demand characteristics facing the firm, stockholder wealth maximization might occur with lower profit margins.

CHARACTERIZING INDUSTRIES

Given exogenous consumer demand, the previous section used numeric examples to illustrate the effect that strategic policy can have upon profit margin and asset turnover. This section links consumer demand and production characteristics to industry type. The degree of capital requirements in the premium price segment relative to the generic segment determines whether an industry is ECI, CID or NCID. Both demand and production characteristics of the industry play a part, and indeed, the two are intertwined.

Consumer preferences define the characteristics of the premium priced product. For example, if consumers value handcrafted items over mass-produced merchandise, the premium price segment will require more labor and less capital than the generic segment, resulting in a NCID industry. Firms producing the premium priced product will have higher asset turnover and lower profit margins than their mass-merchandising counterparts. Basket making provides a hypothetical example. Consider two firms, one that produces low priced baskets for the mass market using a capital-intensive production process; the other producing premium priced handmade baskets with little capital equipment. In equilibrium the two producers will experience the same ROA. The mass-market producer will have a higher profit margin and

a lower asset turnover than the product differentiator because a larger EBIT is needed to cover the cost of higher capital requirements. Profit margin is less for the specialty producer, even though it sells a premium priced product, because asset requirements are lower. A greater percentage of the product price flows to labor, less to capital because non-capital cost as a percentage of price are higher for the product differentiator. Brewing provides another example with premium priced microbreweries employing less capital and mass-market breweries employing more. Comparing the financials of Anheuser-Busch, the largest brewing company in the world, with Boston Beer Company, the brewer of premium-priced Samuel Adams, provides supporting evidence. These two companies had relatively similar operating return on assets from 1995 through 1999, but Anheuser Busch had an average asset turnover of 1.0 and an operating margin of 18.6 percent compared to the average asset turnover of 2.0 and operating margin of 7.5 percent for the Boston Beer Company.

Consumer preferences could have the opposite effect, resulting in a CID industry. If the product differentiated, luxury market is defined by opulent surroundings, then product differentiators will have relatively higher asset requirements, resulting in higher profit margins and lower asset turnover, which are the characteristics of a CID industry. Consider the retail industry as an example. Although upscale retailers have a higher cost of goods sold, the increase in capital costs due to more lavish physical facilities and retail location probably exceeds the increase in non-capital costs. A larger EBIT is needed to cover the cost of the higher capital requirements. A greater percentage of the product price flows to the providers of capital. Financial data from Compustat confirms that discount retailers have lower operating margins but greater asset turnover. In 1999, the average operating margin for 26 discount retailers with a positive operating profit was 5.6 percent; the average for the 15 listed department stores was 6.5 percent. Correspondingly, discount retailers had a higher asset turnover (2.5) than department stores (1.6).

Production characteristics also play a role in determining industry type. In an ECI industry, the capital requirements for the differentiated product are the same as the generic product. Many consumer products would fit within this category. Branded products and generic products are often produced in the same facilities. Differences between the products include the quality of raw material used, packaging, and advertising and promotion. In general equilibrium, with an equal ROA for the segments, the branded product would have a higher asset turnover (Sales/Assets) and thus a lower profit margin than the generic segment.

In an NCID industry, the generic producer uses a more capital-intensive production process due to the relatively higher marginal product of capital in the generic segment. In a CID industry, the product differentiator has a relatively higher marginal product of capital resulting in greater capital intensity than in the generic segment. The relative marginal product of capital (MP_k) between the segments determines industry type.

STRATEGY IMPLICATIONS

The results are valid only in equilibrium with no barriers to entry. If a firm is able to create and maintain a competitive advantage, then it will enjoy a correspondingly higher ROA, the whole point of a competitive advantage. An ROA-enhancing advantage for cost leaders could originate in the

development of efficient, low cost operations; for product differentiators it could be through premium pricing ability supported through branding power. In assessing the potential success of a cost leadership or product differentiation strategy, a firm should determine which segment has the largest ROA. Returning to the retail example, the 1999 average operating return for department stores was 6.9 percent, while discount retailers had an average operating return of 11.3 percent. Even though department stores had a higher operating margin, discount retailers had a proportionally higher asset turnover. A cost leadership strategy in retailing, which corresponds to the discount retail segment, appears more attractive than a product differentiated strategy.

The effect that a strategy will have upon a firm's financial statements can be predicted based upon the firm's industry. So for instance, in a CID industry like retailing, a move to the cost leadership segment will lower operating margins while lifting turnover. On the other hand, in a NCID industry a movement to the cost leadership segment would increase operating margins while lowering turnover. The net effect on ROA ultimately depends upon the profitability of the segment and the ability of a firm to successfully implement its strategy.

CONCLUSION

In an equilibrium setting, the degree of capital intensity in a segment determines the relative levels of profit margins and asset turnover for firms choosing a cost leadership or product differentiation strategy. Even if barriers to entry do not exist, the capital-intensive firm will tend to have higher profit margins to support a higher level of capital. Although counterintuitive, firms pursuing a cost leadership strategy may have higher profit margins and lower asset turnover than product differentiators. Indeed, unless the capital requirements per dollar of sales revenue are higher the product differentiator, the cost leader will have lower turnover. This paper contributes to the literature by demonstrating that strategic policy cannot be inferred by simply comparing profit margin to asset turnover.

The analysis assumes that risk is the same for each producer. In reality, business risk will vary, most probably with capital intensity. Firms with greater capital intensity have a larger amount of business risk. Introducing risk would not change the essence of the analysis since risk adjusted returns could be substituted for returns.

This paper developed a model of asset turnover and profit margin for cost leaders and product differentiators, assuming ROA equality. The validity of the assumption could be tested empirically, although it may be difficult to classify firms as cost leaders or product differentiators. An additional difficulty is that divisions within a firm may have different strategic focuses. Aggregate firm level data would combine results from both strategies. Other related research involves determining whether ROA persistence is evenly distributed among product differentiators and cost leaders in both CID and NCID industries.

REFERENCES

- Bain, Joe S. 1951. "Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936-1940," *Quarterly Journal of Economics* 65, August, 293-324.
- Cho, Dongsae. 1999. "The Impact of a Price Cut on Net Income and Profit Margin," *Journal of Financial and Strategic Decisions* 12,2, Fall, 83-94.
- Geroski, P.A., 1990. "Modeling Persistent Profitability," in D.C. Mueller (ed), *The Dynamics of Company Profits: an International Comparison*, Cambridge: Cambridge University Press.
- Goddard, J.A. and J.O.S. Wilson. "Persistence of Profits for UK Manufacturing and Service Sector Firms," *The Service Industries Journal* 16,2, April, 105-117.
- McGahan, Anita M., 1999. "The Performance of US Corporations: 1981-1994," *The Journal of Industrial Economics* XLVII, 4, December, 373-398.
- Mueller, Dennis C., 1977. "The Persistence of Profits Above the Norm," *Economica* 43 November, 369-80.
- Mueller, Dennis C., 1986. *Profits in the Long Run*, Cambridge: Cambridge University Press.
- Porter, Michael. A. 1985. *Competitive Advantage: Creating and Sustaining Superior Performance*. The Free Press.
- Qualls, David. 1974. "Stability and Persistence of Economic Profit Margins," *Southern Economic Journal* 40, April, 604-12.
- Scherer, F.M. 1980. *Industrial Market Structure and Economic Performance*, 2nd Edition. Rand McNally College Publishing.
- Selling, Thomas I., and Clyde P. Stickney. 1989. "The Effects of Business Environment and Strategy on a Firm's Rate of Return on Assets," *Financial Analysts Journal* (January/February): 43-52.
- Selling, Thomas I., and Clyde P. Stickney. 1990. "Disaggregating the Rate of Return on Common Shareholders' Equity: A New Approach," *Accounting Horizons* (December): 9-18.
- Stickney, Clyde P., and Paul R. Brown. 1999. *Financial Reporting and Statement Analysis*. Fort Worth, TX: Dryden Press.

THE EFFECT OF THRIFT COMPETITION ON BANKING: A SURVEY

Robert J. Tokle^{*}

Over the past 30 years, thrifts, generally defined to include savings and loan associations (S&Ls), mutual savings banks and credit unions, have become more similar to banks. At one time, banks specialized in commercial loans while S&Ls and mutual savings banks specialized in home mortgages and credit unions specialized in consumer loans, while only banks could offer checking deposits. Today, all depository institutions can have some commercial, real estate and consumer loans on their asset side and also offer interest-bearing checking deposits as well as CDs and money market deposit accounts on their liability side.

The development of these products by S&Ls and credit unions was an important reason for their strong growth in the 1970s. While S&L growth stalled in the 1980s and 1990s because of the S&L crisis, credit union growth remained strong. For example, from 1970 to 1999, total bank assets grew by 139 percent in real terms, while credit union total assets grew by 433 percent (Mishkin 2001, p.39 and author's calculation). Another measure of credit union growth is quite revealing. In 1935, just one percent of Americans age 18 or greater belonged to a credit union. By 1989, this figure had jumped to 33 percent. (American Bankers Association, 1989, p29). Table 1 shows the increase in credit union membership as a percent of the U.S. population from 1950 to 1999. Note that credit union membership, as a percentage of the U.S. population, has steadily increased from three percent in 1950 to 28 percent in 1999. These large increases would not have happened if credit unions had not become more full service institutions, offering products such as checking deposits and credit cards.

There are two implications of thrifts becoming more like banks. First, both the courts and the Justice Department now take thrift competition into account in their decisions regarding bank mergers. Second, although banking groups have historically sought to limit credit union competition, their efforts greatly intensified in the 1990s. The credit union industry is still quite small relative to the banking industry. In 1999, credit unions as a group had total assets that equaled only seven percent of total banking assets (Mishkin 2001, p.39 and author's calculation). However, the higher growth rate of credit unions relative to banks has resulted in some increased competition for banks, especially for smaller, independent banks. The 1990s have seen an increased effort by bankers and banking groups to restrict credit union competition in the courts and in legislative bodies. These issues included who can be in a credit union's field-of-membership¹, credit unions' exemption from corporate income taxation (historically, many cooperatives have not paid corporation income taxes in the U.S.), which other family members can join a credit union to which a family member already belongs, and most credit unions' "once-a-member, always-a-member" policy for members who leave a field-of-membership.

^{*} Department of Economics, Idaho State University

TABLE 1

Year	Credit Union Members (in millions)	U.S. Population (in millions)	Membership Population <input type="checkbox"/>
1950	4.6	152.3	3.0%
1960	12.0	180.7	6.6%
1970	22.8	205.1	11.1%
1980	43.3	227.7	19.0%
1990	61.6	250.0	24.6%
1999	77.5	276.8	28.0%

Source: Credit Union Administration and Affiliates, Credit Union Report, 1999 Year-End and U.S. Census.

An important court case was filed by the American Bankers Association and several banks against the AT&T Family Federal Credit Union, which had expanded from serving employees of the Western Electric Company to serving more than 150 separate employer groups (Srinivasau and King 1998, p.39). Multiple common-bond group credit unions were allowed by the National Credit Union Administration (NCUA) beginning in 1982 as a way for federal credit unions to diversify their memberships and become more stable, especially during a time of recession and stability problems in the S&L and banking industries. Also, some states had already adopted multiple common-bond membership for state chartered credit unions.

The AT&T case ended up at the U.S. Supreme Court. In February 1998, the Court ruled, by a 5 to 4 vote, that the NCUA's policy to allow for multiple common-bond membership was illegal. In response, the credit union industry was able to get the Credit Union Membership Access Act passed in Congress and signed by President Clinton in August 1998. This Act was a partial victory for credit unions. It does allow for multiple common-bond membership for occupational and associational federal credit unions, but only for groups of 3,000 or less with a definable single common-bond (Rothman, 1998). And there are other restrictions placed on federal credit unions, such as limits on business loans to 12.25 percent of total assets.

As banking groups continue to try to restrict credit union competition, the credit union industry and consumer groups often point out that consumers benefit when they can join credit unions, since credit unions often pay higher interest rates on deposits and often charge lower interest rates on loans. Table 2 shows a comparison of average interest rates on selected products for banks, S&Ls and credit unions for July 1997 (Evans and Shull, 1998). Except for home equity line-of-credit and mortgage loans, where

rates don't vary much, credit unions typically have better rates than banks and S&Ls, while S&Ls typically have somewhat better rates than banks. The major reason credit unions typically have better rates is because of their non-profit structure. However, credit unions also benefit by being exempt from corporate income taxes. On the other hand, credit unions face more legal restrictions than do banks and S&Ls and because most are so much smaller than banks and S&Ls they typically do not realize their potential economies of scale, which would lower their average costs.

Table 2

Comparison of Rates on Loans, Deposits, and Savings Products on July 9, 1997 (Annual Percentage Rate)			
	Commercial Banks	Thrfts	CUs
New Car	9.44	9.41	7.92
Credit Card	18.10	16.03	13.31
Personal Loan	15.57	15.10	13.76
Interest-Bearing Checking Yield	1.26	1.44	2.10
Money Market Yield	2.48	2.80	3.72
1-Year CD Yield	5.10	5.32	5.70
5-year CD yield	5.57	5.94	6.26
Fixed 30-Year Mortgage	7.52	7.41	7.63
Home Equity Line of Credit	8.57	8.32	8.72
Note: Data are from Bank Rate Monitor TM . Reproduced from Evans and Shull, 1998.			
Bank Rate Monitor compiles comparative statistics based on the data for the top 5 banks (based on asset size) in the top 10 U.S. markets (based on deposits), the top 5 thrfts (based on asset size) in the top 10 U.S. markets (based on deposits), and the top 50 credit unions based on asset size			

Credit union advocates and consumer groups have also argued that the credit union industry also benefits nonmembers because competition from credit unions compels banks to offer more competitive products. For example, Luntz (1998, p.4) wrote in *Credit Union News Watch* that "Congress should not do anything that would stifle competition in any way. Without competition, interest rates paid to depositors would be lower, and loans and ATM fees would be more expensive." And, Evans and Shull (1998, p.26) in a report for National Economic Research Associates wrote that "coupled with the large number of individuals who have access to credit unions and the widespread presence of credit unions, these favorable rates reinforce credit unions' competitive presence in commercial banks and other banking service providers." Also, Consumer Federation of America Executive Director Steve Brobeck said during the credit unions' Campaign for Consumer Choice, that "where not-for-profit credit unions compete directly with for-profit institutions, the competition benefits all consumers. This is why bank customers should care about this issue" (*Credit Union News Watch*, 1997). While it is easy to show that

credit union interest rates are lower on most types of loans and higher on most types of deposits, it is much more difficult to show that credit union and/or S&L competition benefits bank customers.

There have been numerous studies published on bank structure. For example, Gilbert (1984) wrote a survey of 44 bank structure studies published during the time period 1964 to 1983, and numerous other bank structure studies have been published since 1983. A much smaller number have examined what effect thrift competition might have on bank customers. This paper presents a survey of these studies.

This survey examines 11 studies published since 1979 that tested, among other effects, the effect that thrift competition may have on bank performance. These models typically used the structure-performance paradigm, which hypothesizes that firms in more concentrated markets find it easier to collude, to earn higher profit rates, charge higher interest rates on loans, and to pay lower interest rates on deposits. The measure of concentration used in banking studies is typically the three-firm concentration ratio or the Herfindahl index. These studies surveyed are grouped into four categories. First, two studies tested separately for the effects on bank performance of S&Ls, credit unions and mutual savings banks. Second, two studies tested for the effects of S&Ls, credit unions and mutual savings banks together. Third, four studies emphasized S&L competition alone, while the last category has three studies that emphasized credit union competition. By coincidence, the chronological order of these studies fits into these categories.

TESTING SEPARATELY FOR THE EFFECTS OF S&LS, CREDIT UNIONS AND MUTUAL SAVINGS BANKS

Rhoades (1979) used a structure-performance model to test for the effect that non-bank thrift institutions may have on bank performance and bank portfolio selection. His regression analysis used 1970, 1972 and 1974 data from 184 Standard Metropolitan Statistical Areas (SMSAs), which are often used as a proxy measure of local banking markets for urban areas. His bank performance (dependent) variables were measures of income, interest paid on deposits and received on loans, service charges, and real estate and consumer loans as a percent of total loans. The three thrift competition independent variables were S&L deposits-to-bank deposits, mutual savings bank deposits-to-bank deposits and federal credit union deposits-to-bank deposits. He ran seven regressions for each of the three different measures of thrift competition, for a total of 21 regressions. (He also ran 7 other regressions using another model, related to his first model). Of the 12 equations for income, interest charged and paid, and service charges, only the mutual savings deposits-to-bank deposits variable was negative and significant at the five percent level or better for services charges. However, the thrift competition variables did influence the portfolio selection (e.g., the mix of real estate and consumer loans) in most equations.

Hannan (1984) used 1971 and 1972 data from 412 banks operating in Pennsylvania. He made a substantial effort to define these local banking markets on economic criteria rather than by political boundaries (p.10). The two bank performance (dependent) variables were the savings interest rate and the number of hours open per week. For both of these variables, the inclusion of S&Ls in computing the Herfindahl index "adds considerably to the explanatory power of market structure while the further inclusion of mutual savings banks and credit unions adds relatively little" (p.12). Hannan also

decomposed the Herfindahl index into its component parts and found that S&L competition "in local banking markets significantly influences the pass book savings rates and banking hours that banks offer their customers, while the presence of mutual savings banks and credit unions adds little in explaining the behavior of these two measures of bank performance" (p.13). Hannan concludes that "this study found strong competitive interactions" between banks and S&Ls (p.14). He also notes that the inconclusive evidence for mutual savings banks and credit unions could be due to their insignificant presence in Pennsylvania's local banking markets at the time.

TESTING FOR THE EFFECTS OF S&LS, CREDIT UNIONS AND MUTUAL SAVINGS BONDS TOGETHER

Rhoades and Heggstad (1985) used a sample of 167 major banking markets (SMSAs) for the period of 1968 to 1974. The performance (dependent) variables for banks were profit rates, three different price estimates and total operating expenses-to-total assets. In their model, they constructed a thrift competition variable by summing S&L and mutual saving bank savings deposits plus federal credit union assets, divided by total commercial bank deposits. In one of the five equations, where service charges on bank deposit accounts was the dependent variable, the thrift competition variable showed a negative and significant effect.

Rhoades (1987) examined the effect that thrift competition may have on bank profits for the period 1978 - 1982. Based on a sample of 335 local banking markets (104 counties and 231 SMSAs), Herfindahl indexes were computed with and without the inclusion of thrifts (S&Ls, mutual savings banks and federally insured credit unions). Rhoades noted that measures of concentrations, such as the Herfindahl index, have been commonly used to test for the relationship of structure and performance in banking and industrial sectors. Thus, "if nonbank thrifts are significant competitors with commercial banks, a structural measure accounting for these firms will be a better measure than one based solely on commercial banks. Accordingly, this composite measure should exhibit greater explanatory power than one based on commercial banks alone" (Rhoades, 1987, p.18). The regression results for periods of 1978-1982, 1978-1979 and 1981-1982 found that all the different Herfindahl index measures were insignificant. Rhoades concludes, that for this time period, including thrifts into the market structure measurement does not give a better explanation of bank behavior.

S&L COMPETITION EMPHASIZED

Rose and Wolken (1988) used a modified statistical cost accounting model to test if thrift competition, measured as the total number of S&Ls divided by the total number of S&Ls plus banks in a local market, affected bank performance. The sample consisted of 912 Texas banks in 1983, and the bank performance variables were total bank operating income and total bank interest expense. In their model, a bank's total income is a linear function of its asset components and interest expense is a linear function of its liability components. Thrift competition was tested as an interaction of three variables: the number of S&Ls divided by the number of S&Ls plus banks times a Hirschman-Herfindahl index measured for each asset or liability category times business, consumer or real estate loans, and

checking, savings or time deposits. Only with business loans, did thrift competition have a negative and significant effect on interest expense.

Berger and Hannan (1989) used a structure-performance model to test for the effect of market concentration and other factors on money-market interest rates for 470 banks in 195 local markets for the time period 1983-1985. While the focus of their study was on concentration and money-market interest rates, they also include an independent variable to measure thrift competition: the number of bank branches divided by the number of bank plus S&L branches in each local market. This variable "is an inverse index of the extent to which S&Ls compete with banks and is predicted to have a negative coefficient" (p.293). While concentration was shown to have a negative and significant effect on money market interest rates, the thrift competition variable was insignificant in all 10 regression equations reported.

Cooperman et al (1990) used vector autoregressive techniques and Granger-causality tests to analyze six-month CD interest rates for the largest five banks and largest five thrifts¹ in six major cities for the time period 1983-1985. Also, an impulse response function methodology was used to see what the interdependence in setting of CD rates might be between banks and thrifts. They found that the "evidence points to a causal relationship in which commercial bank institutions exert an unidirectional influence on thrift rates, whereas the converse is not true" (p.43). In other words, "thrifts do not appear to have a competitive effect on bank deposit rates" (p.49).

Hannan and Liang (1995) investigated the effect that thrift competition may have on the pricing of bank small business loans (less than \$100,000), covering a period between 1989 and 1991. The sample consisted of over 300 banks included in the Federal Reserve's survey of the Terms of Bank Lending to Business; local markets were SMSAs. They tested varying weight assignments of thrifts (thrifts and S&Ls are the same in their article) used in computing the various Herfindahl indexes used in the regression equations. As of 1994, for antitrust analysis, the Federal Reserve Board typically assigns thrifts a weight of 50 percent (100 percent if they devote five percent or more of their collective assets to business loans), while the Department of Justice uses a weight of 20 percent. Hannan and Liang compiled Herfindahl indexes using these and other weights. In 36 regressions equations computed, the Herfindahl index coefficient was positive in all, and significant in most. However, by comparing the adjusted R^2 coefficients in the different equations, they, "conclude that the inclusion of thrift institutions with positive weights in measures of market concentration does not explain bank lending behavior any better than does the complete exclusion of their institutions" (p.121).

CREDIT UNION COMPETITION EMPHASIZED

Emmons and Schmid (2000) use a model related to the structure-performance model (p. 30) to examine the interaction of competition between banks and credit unions. They hypothesize that higher bank concentration leads to higher credit union participation (measured as credit union members-to-potential members) and that in response, higher credit union participation leads to higher bank concentration (which results in higher prices). Using data from 1989 through 1996, their empirical model is a system of two "seemingly unrelated equations" (p. 35). They conclude that "both theoretical predictions are supported by the empirical results presented in this article suggesting that credit unions,

indeed, play a role in local deposit-market competition" (p. 39). One criticism of their results, however, is their use of the credit union participation rates. These are obtained from the National Credit Union Administration call reports. While the numerator, memberships, are exactly known by credit unions, the denominator, potential memberships, are not accurately known by credit unions. Since the families of members can also generally join credit unions (parents, grandparents, children, grandchildren, and siblings), credit unions do not know their exact potential membership and typically have different ways to estimate or guess what it is.

Tokle and Tokle (2000) examined the effect that credit union and S&L competition may have on bank deposit rates in Idaho and Montana. They used data for 1996-1998, and their sample included all banks in Idaho and Montana in cities with a population of 8,000 or more at year-end 1996. The bank performance (dependent) variables were interest rates on savings deposits and one- and two-year CDs, while separate measures³ of credit union and S&L competition were used. The credit union competition variable was credit union deposits-to-credit union plus S&L plus bank deposits for each local banking market (city). The S&L competition variable was computed similarly.

They did find that the credit union competition coefficient was positive and significant at the five percent level for the one- and two-year CD rates, while the S&L competition coefficient was positive and significant for one-year CD rates. They conclude that "this suggests that there is some evidence that a larger thrift presence in a local market will lead to more competition and result in statistically significant higher interest rates paid on some bank deposits. And, the presence of credit union competition seems to have a stronger effect than S&L competition" (Tokle and Tokle, p. 435-36).

Feinberg (2001) examined what effects credit union competition might have on bank consumer interest rates. His bank performance (dependent) variables were interest rates for 24 month unsecured (non-credit card) loans and 48 month new vehicle loans, while his credit union competition variables were credit union deposits-to-total market deposits (CU) and a dummy variable (HISTATE) equal to one for states that have a credit union membership-to-population of 25 percent or greater. He used data from the 1992-1997 period for 40 markets. Of these markets, 33 were small to mid-size metropolitan statistical areas and seven were rural counties.

For the unsecured loan rate, CU was not significant while HISTATE was negative and significant. And, for the new vehicle loan rate, both CU and HISTATE were negative and significant. He states that the HISTATE result indicates "a spillover effect on local markets of a large CU presence in the state." In conclusion, he wrote that "implications exist for antitrust treatment of bank and S&L mergers and for easing the entry and expansion of small lenders (both credit unions and other firms)."

These last three studies surveyed added to the previous studies in a couple of ways. First, they focused on the effect that credit union competition alone may have on bank behavior. In the previous studies, only Rhoades (1979) and Hannan (1984), both using data from the early 1970's, employed a separate variable for credit union competition. And both found credit union competition did not affect bank behavior. Second, these three studies provided a general update. Of the studies surveyed here, only Hannan and Liang (1995) used 1989-91 data, while the others used data from 1985 or before. However, as previously discussed, there has been rapid growth of credit unions over the last 20 years, which now offer more products similar to banks. In addition, there has been an increased effort by banks

in the 1990s to restrict credit union growth over issues such as field-of-membership. Therefore, an update of these studies, using more recent data, should be of interest.

CONCLUSION

The competitive effect that thrift competition may have on banking is of interest for two reasons. First, both the courts and Justice Department take it into account in their decisions regarding bank mergers. Second, as the credit union industry has grown rapidly and developed products more similar to those of banks, the last ten years have seen an increase in efforts by banking groups seeking to restrict credit union competition in both the courts and in legislative bodies. Many studies have been published on bank structure during the past 20 to 30 years, but only a relative few have also examined the effect of thrift competition on banking. This survey presents an analysis of 11 such studies published since 1979.

Although somewhat mixed, overall the results of these studies found relatively little evidence that thrift competition affects bank behavior. However, the last two studies in this survey, Feinberg (2001) and Tokle and Tokle (2000), found that credit union competition, measured as credit union deposits divided by total market deposits, did result in banks charging lower rates on new vehicle loans and paying higher rates on CDs. There are two reasons why these studies are significant. First, both studies used data from the 1990s, a big update of the previous studies. Since the Depository Institutions Deregulation and Monetary Control Act of 1980 and the Garn - St. German Act of 1982 gave thrifts much of their new powers to be more like banks, we would expect to see more competitive effects over time. Second, they tested separately for credit union competition in a structure-performance model, last done by Rhoades (1979) and Hannan (1984), using early 1970s data. The 1980s and 1990s was a period of rapid growth for credit unions that drew the bankers' attention. As a result, credit union competition should have a bigger effect today.

Future research should continue to investigate the effects of thrift competition on banking performance for two reasons. First, it can help answer the policy question of how to account for thrift competition in evaluating bank mergers. Second, if future studies show that credit union competition in particular benefits nonmembers as well as members, then this should be taken into account in deciding which restrictions to place on credit unions.

ENDNOTES

1. Credit unions can be chartered at the state or federal level with a common-bond field-of-membership of occupation, association (such as fraternal organization or church) or community. In 1999, credit union distribution of primary field-of-membership were: occupational 79 percent, associational 10 percent, community 9 percent and low income 2 percent (Credit Union Administration and Affiliates, 2000).
2. Of the 34 thrifts in the sample, 27 were S&Ls and 6 were mutual savings banks.
3. The credit union and S&L competition variables (i.e., market shares) were of similar size, with means (and standard deviations) of 13.8 percent (7.31) and 12.1 percent (8.99) respectively.

REFERENCES

- American Banker's Association. *The Credit Union Industry: Trends, Structure, and Competitiveness* (Washington, D.C., 1989).
- Berger, Allen N. and Timothy H. Hannan. "The Price-Concentration Relationship in Banking." *The Review of Economics and Statistics* 71 (May 1989): 291-299.
- Credit Union News Watch. "Credit Unions Urged to Remember Nonmembers." (June 9, 1997):7.
- Credit Union Administration and Affiliates. *Credit Union Report, 1999 Year-End*. Madison, Wisconsin: July 2000.
- Cooperman, Elizabeth, Winson B. Lee and James P. Lesage. "Commercial Bank and Thrift Interdependence and Local Market Competition for Retail Certificates of Deposit." *Journal of Financial Services Research* 4 (Number 1, 1990): 35-52.
- Emmons, William R. and Frank A. Schmid. "Bank Competition and Concentration: Do Credit Unions Matter?" *Federal Reserve Bank of St. Louis* (May/June 2000): 29-40.
- Evans, David S. and Bernard Shull. "Economic Role of Credit Unions in Consumer Banking Markets." A Report for National Research Associates, Cambridge, Massachusetts (January 15, 1998): 1-50.
- Feinberg, Robert M. "The Competitive Role of Credit Unions in Small Local Financial Services Markets." *Review of Economics and Statistics*, forthcoming August 2001.
- Gilbert, Alton R. "Bank Market Structure and Competition." *Journal of Money, Credit and Banking* 16 (1984): 617-645.
- Hannan, Timothy H. "Competition Between Commercial Banks and Thrift Institutions: An Empirical Examination." *Journal of Bank Research* 15 (Spring 1984): 8-14.
- Hannan, Timothy H. and J. Nellie Liang. "The Influence of Thrift Competition on Bank Business Loan Rates." *Journal of Financial Services Research* 9 (June 1995): 107-122.
- Luntz, Frank. "Special Message to the U.S. Congress." *Credit Union News Watch* (April 27, 1998): 3-4.
- Mishkin, Fredric S. *The Economics of Money, Banking and Financial Markets*. New York: Addison - Wesley Longman, Inc., 2001.
- Rhoades, Stephen A. "Nonbank Thrift Institutions as Determinants of Performance in Banking Markets." *Journal of Economics and Business* 32 (Number 1, 1979): 66-72.
- _____. "The Effect of Nonbank Thrift Institutions on Commercial Bank Profit Performance in Local Markets." *Quarterly Review of Economics and Business* 27 (Spring, 1987): 16-28.
- Rhoades, Stephen A. and Arnold A. Heggestad. "Multimarket Interdependence and Performance in Banking: Two Tests." *The Antitrust Bulletin* 30 (Winter, 1985): 975-996.
- Rothman, Sheri. "H.R. 1151 Becomes Law." *Credit Union Magazine* 64 (September 1998): 38-44.
- Rose, John T. and John D. Wolken. "Thrift Competition and the 'Commercial Banking' Line of Commerce." *Atlantic Economic Journal* 16 (December 1988): 24-36.
- Srinivasan, Aruna and B. Frank King. "Credit Union Issues." *Federal Reserve Bank of Atlanta Economic Review* (Third Quarter 1998): 32-41.
- Tokle, Robert J. and Joanne G. Tokle. "The Influence of Credit Union and Savings and Loan Competition On Bank Deposit Rates in Idaho and Montana." *Review of Industrial Organization* 17 (December 2000): 427-439.

AN EMPIRICAL ANALYSIS OF THE SOCIOECONOMIC DETERMINANTS OF FERTILITY IN COSTA RICA

Nader Asgary* and José A. Pagán**

ABSTRACT

This study uses cross-sectional data from the 1989 *Encuesta de hogares de propósitos múltiples* to examine the socioeconomic determinants of fertility in Costa Rica. Possible causes of fertility changes in Costa Rica are the severe economic recession that the country experienced during the earlier part of the eighties coupled with stabilization programs implemented in the latter part of the decade. The stabilization programs adopted by the government were helpful in improving labor market outcomes but they may have led to a reduction in the budgetary allocations to basic social programs such as education and health care. Our empirical model shows that education is negatively related to fertility and, as such, stabilization-induced reductions in basic and health educational expenditures have important implications in terms of their impact on fertility rates. Our empirical analysis also reveals that there are no differences in fertility levels between women employed in the formal and the informal sectors.

JEL: J13, Fertility; O54, Economywide Country Studies: Latin America

I. INTRODUCTION

Recently, social scientists have been interested in analyzing the socioeconomic determinants of fertility in developed countries but relatively little work on this topic has been conducted for developing countries (e.g., Stykos, 1982; Zhang, 1994; Asgary and Pagán, 1998). Nevertheless, there are a few studies that have analyzed the determinants of fertility in Latin America (Cutright, Hout and Johnson, 1976; Hermalin, 1983; Gendell, 1985; Hermalin, 1986; Hermalin *et al.* 1997; Birdsall and Griffin, 1988; Palloni, 1990; Rios, 1991; and Palloni and Tienda, 1992). According to our literature survey, there is no study that has investigated the socioeconomic determinants of fertility in Costa Rica for the late 1980s and, as such, the goal of this paper is to fill this gap in the literature.

Knowledge of the determinants of fertility can be useful to policy makers and demographers when setting optimal population-related policies. For example, policies that attempt to raise the educational levels of Costa Rican women can be potentially important if education is connected to low fertility levels and high economic growth. Low levels of education and other socioeconomic factors have been identified as important determinants of poverty in many Central American countries (Cardoso and Helwege, 1992).

* Assistant Professor of Economics & International Business, Jones School of Business, State University of New York-Geneseo.

** Associate Professor of Economics, College of Business Administration, University of Texas-Pan American.

During the early 1980s, Costa Rica experienced its worst economic recession since the 1930s (Gindling and Berry, 1992). Between 1979 and 1982 real wages fell by 35 percent. Comprehensive structural adjustment programs implemented in mid-1982 led to improvements in labor market conditions. Although other Latin American countries experienced economic recessions during this period, the Costa Rican economic recovery was more rapid and pronounced than that experienced by others. Also, Costa Rica has spent a higher share of its national income on education than other Latin American countries. The abrupt changes in the labor market (and their connection to fertility decisions at the family level) may have affected fertility levels and make Costa Rica's experience an interesting case to study the possible (and somewhat indirect) impact of stabilization programs.

Birthrate, which is also called crude birthrate, is defined as births per thousand of population. The technical term for the birthrate is fertility and for the death rate is mortality. The rate of natural population increase is the difference between fertility and mortality (Todaro, 1997; Perkins *et al.*, 2001).

To analyze the socioeconomic determinants of fertility in Costa Rica, we utilize micro data from Costa Rica's *Encuesta de hogares de propósitos múltiples* (EHPM) conducted in July 1989.¹ Our sample from the EHPM includes married females who resided in the metropolitan area of San José. The EHPM allows us to consider basic socioeconomic determinants of fertility (e.g., level of educational attainment, labor force participation, etc.) as well as other important factors that apply to developing economies such as, for example, the sector of employment (formal vs. informal). The distinction between formal and informal employment may be important since childrearing and childcare costs have been found to differ across sectors (e.g., Tiefenthaler, 1994).

Some economic factors may affect fertility differently in Costa Rica when compared to the developed countries. First, the relative share of the wife's income to total family income in Costa Rica is lower than in western economies (Dávila and Pagán, 1999). Second, nonlabor income is substantially lower in Costa Rica than in western countries because financial markets are poorly developed. Third, the education level in Costa Rica, on the average, is lower than in western countries, especially at the graduate level (Ball and McCulloch, 1996). Resource constraints and government education policies are the sources of lower educational attainment in Costa Rica. Finally, government expenditures on family planning and health care are relatively low (e.g., Mauldin and Berelson, 1978; Cutright and Kelly, 1981).²

The paper is organized as follows. Section II presents the literature survey. The Poisson model and discussion of the data, and the empirical results, are described in sections III and IV. The conclusions and the public policy applications of the study are discussed in Section V.

II. LITERATURE SURVEY

Two fertility theories have been paramount in the field of family studies since the 19th century: Malthusian and neoclassical. Malthusians contend that fertility and income are positively correlated. Malthusian theory has been rejected in this century, because of the significant improvements in education and technology, which have raised living standards and lowered mortality rates. The neoclassical model argues that the opportunity cost of women's time is the most important factor that affects fertility. This model concludes that higher levels of education imply lower fertility rates.

Becker and Barro (1988) describe a model which they argue is complementary to both Malthusian and neoclassical theories. Becker and Barro assert that their "... analysis contains both the Malthusian and neoclassical models since fertility is endogenous and rates of return on investments in physical capital decline as its stock increases. The endogeneity of fertility also leads to multiple steady states: A 'Malthusian' undeveloped steady state with high birth rates and low levels of human capital, and a developed steady state with much lower fertility and abundant stocks of human and physical capital" (1988, p. S14). Therefore, the recent improvements in education and human capital, especially for women, in the western countries have led to lower fertility levels in these countries.³

The neoclassical fertility theory has been evaluated and tested by using data from developed, developing and centrally planned economies (e.g., Rios, 1978; Gregory, 1982; Mouskopf and Wallace, 1984; Palloni, 1990; Rios, 1991; Asgary and Mokhtari, 1996; Asgary and Pagán, 1998).

Some scholars (e.g., Duesenberry 1960; De Tray, 1972; and Becker and Lewis, 1973) employed a household utility maximization approach and evaluated the relationship between the quality and quantity of children and the quantity of all other consumption goods in a family. They concluded that substitution takes place between the number of children and the quality of children, holding everything else constant. Quality is defined as investment in the human capital of the children.

Kelly and Poston (1983) in their evaluation of the determinants of fertility in developed countries have concluded that there are direct effects from female contraception, population/family planning policy, and female labor force participation on fertility. The strongest impact is from contraception and the weakest impact from labor force participation.

Palloni (1990) argued that there were three factors that caused a shift in the fertility rate in Latin American during this century. First, life expectancy increased from 35 to 60 years between 1945 and 1980. Second, during the period of 1950 to 1960, fertility has increased while internal migration, mortality and economic growth have declined. Birdsall and Griffin (1988) show that fertility has declined for low-income groups in developing countries when education programs, family planning and health care services are accessible to the poor. They also state that most policy makers in developing countries have acknowledged the importance of reducing fertility for nurturing economic growth and development. Moreover, Birdsall and Griffin (1988) discuss the effects of high fertility levels on the government share of resources for poor families. They state that, "...many characteristics of poverty contribute to high fertility-high infant mortality, lack of education for women, too little family income to invest in children, inequitable shares in national income, and inaccessibility of family planning" (Birdsall and Griffin, 1988: p. 30). Their findings provide evidence in support of the long-term benefits of allocating resources for education, health care, and family planning services.

In Latin American and the Caribbean total fertility had declined between 1970 to 1992 from 5.3 to 3.1 and it is projected to decline to 2.5 by the year 2000 (Gillis *et. al*, 1996). Rios (1991) compares the demographic changes in Latin America with those in Western Europe and infers that these demographic shifts have led to higher family size while the experience of Western European countries has been the opposite.

Some researchers (e.g., Palloni and Tienda, 1992) have analyzed the impact of the Great Depression of the 1930s and the severe recession of the 1980s on population growth. Palloni and Tienda

(1992) claim that while the impact of Great Depression on population changes was severe, the effect of the recession of the 1980s was much less severe; perhaps because government demographic and social policies may have reduced the effect of recessions on population growth during this period.

In the case of Costa Rica, Stycos (1982) examines the literacy-fertility relationship by means of sub-national statistics. He notes that since 1886 Costa Rica has invested a significant share of national income in education. By the late 1960s, Costa Rica was spending more than 25 percent of its national budget on education (Stycos, 1982). In fact, according to Stycos (1982), "By the late 1950, with 79 percent literate, Costa Rican was perhaps a half-century ahead of its four central American neighbors, where only about one in three could read and write" (p. 6). Some scholars (e.g., Heer and Turner, 1965; Stycos, 1968; Hicks 1974) discussed other aspects of fertility change in South and Central America during 1950-1970. Between 1960 and 1968, total fertility fell from 7.7 to 5.5 and even declined more rapidly to 3.7 in 1976 (Stycos, 1982).

Pebley and Bixby (1997) examined the influences of region on family size preferences among rural Costa Rican women. They used data from surveys of different regions and concluded that there were substantial provincial differences in desired family size.

Possible sources of structural fertility changes in Costa Rica during the 1980s are the severe economic recession that the country experienced in the early part of the decade, coupled with stabilization programs implemented in the latter part of the decade (Gindling and Berry, 1992). The stabilization programs adopted by the government were helpful in improving the labor market but, due to their nature, may have led to a reduction in the budgetary allocations to basic social programs such as education and health care. These types of reductions have important implications in terms of their impact on fertility rates. In particular, Caldwell (1980) suggests that education plays an important role in changing the incentive structure in which households make optimal family size decisions.

Our literature survey above has shown that women's income, labor force participation and mortality rates, socioeconomic and demographic factors—such as place of residency—affect fertility. As women's opportunity cost of staying at home increases, female labor force participation will increase and fertility will decrease. Improvements in family planning and health care for poor people would reduce both the mortality rate and the fertility rate. Educational attainment may have both direct and indirect effects on fertility (Berliner, 1983). The direct effect is that as education attainment increases, women's earning power increases and this, in turn, could lead to fertility decreases. The indirect effect is through its impact on increasing female labor supply (hours of work). Lastly, holding everything else constant an urban population has fewer children than a rural population.

III. POISSON REGRESSION

Researchers have used different econometric techniques to examine the determinants of fertility. The single equation estimation technique, ordinary least squares, has been the most widely used estimation method employed to examine the determinants of fertility (Schultz, 1978; Olsen, 1980; Lee and Schultz, 1981). Also, some researchers have employed the Tobit maximum likelihood estimation technique and/or sequential logit (Zhang, 1990; 1994) for their empirical estimation. The reasons for

using different econometric methods have been either data restrictions/characteristics and the objectives of the researchers.

For our empirical estimation we employed the Poisson regression estimation technique, because it is more suitable for our data and it accounts for the observed skewness of the distribution of the dependent variable—the number of children. Table 1 reveals the frequency distribution for the EHPM San José sample. Our dependent variable, the number of children, ranges from 0 to 13 but about 83 percent of the sample has five children or less. The examination of the data shows that our sample is not symmetrically distributed. The high proportion of zeroes and small values in this distribution, coupled with the discrete nature of fertility levels, suggests that a Poisson specification is appropriate (e.g., Maddala, 1983; Michener and Tighe 1992; Greene, 1993).

TABLE 1
FREQUENCY DISTRIBUTION OF TOTAL FERTILITY, COSTA RICAN WOMEN

Number of Children	Frequency	Relative Frequency	Cumulative Frequency	Cum. Relative Frequency
0	29	0.012	29	0.012
1	174	0.074	203	0.087
2	368	0.157	571	0.244
3	559	0.239	1130	0.482
4	511	0.218	1641	0.700
5	311	0.133	1952	0.833
6	163	0.070	2115	0.903
7	98	0.042	2213	0.945
8	76	0.032	2289	0.977
9	28	0.012	2317	0.989
10	12	0.005	2329	0.994
11	11	0.005	2340	0.999
12	0	0.000	2340	0.000
13	3	0.001	2343	1.000

Let the fertility level for the i th female (i.e., the total number of children) be represented by a discrete random variable N_i . For this individual, the probability that the observed fertility level is equal to n_i is given by:

$$(1) \quad P(N_i = n_i) = \exp(-\lambda_i) \cdot \lambda_i^{n_i} / n_i!$$

for $n_i = 0, 1, 2, \dots$. The expected number of children for the i th female can be expressed as $E(n_i) = \lambda_i$. If we allow λ_i to be determined by a set of regressors X_i , with a vector of parameters β , we can specify the expected number of children as:

$$(2) \quad \lambda_i = \exp(X_i' \beta),$$

which guarantees the nonnegativity of λ_i . X_i' includes the socioeconomic determinants of fertility that were discussed in Section II.

IV. DATA, ECONOMETRIC ISSUES AND EMPIRICAL RESULTS

To implement our model, we employ data from Costa Rica's *Encuesta de hogares de propósitos múltiples* (EHPM) conducted in July 1989. Although there is more recent household survey data available, we employ 1989 data because it captures the period after the economic recession and during the implementation of economic stabilization programs in the later part of the eighties (Dávila and Pagán, 1999). During the nineties, the Costa Rican economy has been growing steadily and the substantial economic changes occurred right before this period.

Our EHPM sample consists of 2,343 married females that resided in the metropolitan area of San José. Table 2 reports the definition of variables and descriptive statistics for this sample. The dependent variable (CHILDREN) equals the total number of children. This variable is a good proxy for fertility since we do not have data for the birthrate per thousand of population. There is high correlation between number of children and the fertility in a society. Tolnay (1996) constructed "fertility-related indexes (Coale and Treadway, 1986)" by defining I_f as the number of births to all women in the population. Also, Tolnay has used other indexes as the dependent variable to measure fertility. Stycos (1982) refers to issues related to the measurement of fertility including to Roger Avery's techniques to measure fertility, which include "own-children methods".⁴

EHPM women have almost five children (4.84). Personal and socioeconomic variables used to estimate equation (2) include AGE, AGE SQUARED, EARNINGS, and OTHER INCOME (i.e., household income, excluding individual earnings). We also included dummy variables for SECONDARY and UNIVERSITY education, INFORMAL sector of employment, and whether the individual was EMPLOYED.⁵ Table 2 also presents the mean and standard deviations of these variables. Note that the level of education in Costa Rica is relatively low when compared to developed economies but high by Latin American standards. Informal sector employment is also lower than that of other Latin American countries (see, for example, Psacharopoulos and Tzannatos, 1992).

All of the independent variables are assumed to be exogenous except female labor- force participation (FLFP). FLFP is assumed to be endogenous because factors that affect women's labor force participation might also affect the expected number of children (Gregory, 1982). As such, predicted FLFP is used as an instrument for FLFP.⁶

Table 3 reports the estimated parameters of the Poisson regression model. As we expected the estimated parameters for respondents who continue education through secondary and higher education are negative and statistically significant at the one percent level.⁷ These results are consistent with the findings of other researchers in developed and developing countries as they relate to the impact of education on fertility (Asgary and Mokhtari, 1996; Asgary and Pagán, 1998). Higher levels of education may lead to lower fertility rates because education increases the opportunity cost of leisure (see Section II). Also, as education increases families prefer higher quality (and more costly) children and, hence, the quantity demanded of children decreases. This is in agreement with the results of Becker and Lewis

(1973), who show that, *ceteris paribus*, families substitute between the number of children and the quality of children.

Our empirical model also reveals that fertility is a quadratic function of age. That is, the coefficients of AGE and AGE SQUARED alternate in sign, but only the coefficient of the second order term is statistically significant. This result is consistent with the "biological capacity and the behavioral tendency to have births within a concentrated period of the life cycle," (Zhang, 1994: 70). It also shows that the impact of age on fertility reflects not only the life cycle stage but could also be related to age cohort differences. The age variable may also capture the changes in government social policies on the childbearing life of respondents. Social policies may in turn have been influenced by the recession in the earlier part of the eighties as well as the stabilization programs on the later part of that decade.

TABLE 2
DEFINITION OF VARIABLES AND DESCRIPTIVE STATISTICS

Variable	Description	Mean	Standard Deviation
CHILDREN =	number of children of respondent	4.837	1.958
SECONDARY =	1 if the highest level of education is = <i>secundaria académica</i> or <i>secundaria técnica</i> ; 0 otherwise	0.437	0.496
UNIVERSITY =	1 if the highest level of education is = <i>universidad</i> ; 0 otherwise	0.141	0.348
AGE =	age of respondent in 1989	34.358	14.113
AGE SQUARED =	square of AGE	1,379.600	1,074.800
INFORMAL =	1 if respondent is employed in the informal sector; 0 if employed in the formal sector	0.188	0.136
EARNINGS =	respondent's average weekly earnings in 1989 measured (in colones)	8,117.100	17,762.00
OTHER INCOME =	yearly household income, excluding individual earnings, in 1989 (in colones)	2,316,800	4,170, 000
FLFP =	1 if individual is employed; 0 otherwise	0.326	0.469

TABLE 3
PARAMETER ESTIMATES OF THE POISSON FERTILITY MODEL
FOR COSTA RICAN WOMEN

Variable	Estimate	Standard Error	t-ratio
INTERCEPT	1.634 ^a	0.065	25.146
SECONDARY	-0.083 ^a	0.021	-3.847
UNIVERSITY	-0.167 ^a	0.033	-5.014
AGE	0.005	0.004	1.249
AGE SQUARED	-0.001 ^b	0.505*10 ⁻⁴	-2.778
INFORMAL	-0.100	0.072	-1.390
EARNINGS	-0.867*10 ⁻⁶	0.823*10 ⁻⁶	-1.053
OTHER INCOME	0.154*10 ^{-7a}	0.218*10 ⁻⁸	7.080
PREDICTED FLFP	0.110*10 ⁻⁴	0.028	0.000
<hr/>			
Number of Observations		2,343	
Log Likelihood Function		-4,777.277	
LR Statistic		141.8 ^a	

Notes:

(i) The reference educational level is less than secondary.0

(ii) a and b indicate the significance levels at the 1 and 5 percent levels using two-tailed t-tests.

The estimated parameter for other household income (OTHER INCOME) has the expected sign and is also statistically significant at the one percent level; It seems that the income effect dominates the substitution effect because, *ceteris paribus*, as the income of other family members increases, women are able to reduce their labor supply and dedicate more time to child rearing. As was expected, the estimated

parameter for individual earnings (EARNINGS) is negative, albeit not statistically significant at conventional levels.

The coefficient for the informal sector variable is unexpectedly negative although insignificant. As opposed to the work of Tiefenthaler (1994), we find that women that work in the informal sector do not have higher fertility rates than those employed in the formal sector. This implies that women employed in the informal and formal sectors in the San José metropolitan area have similar opportunity costs of child rearing.

The estimated parameter for female labor force participation has the expected sign, although it is statistically insignificant (recall that we employ predicted rather than actual labor force participation to address the possibility of endogeneity). However, the sign of the coefficient is in agreement with most of the findings in the industrialized world and the neoclassical theory of fertility (Gregory, 1982; Kelly and Poston, 1983).

V. CONCLUSIONS

This study employs data from the 1989 *Encuesta de hogares de propósitos múltiples* to examine the socioeconomic determinants of fertility in Costa Rica. During the earlier part of the eighties Costa Rica experienced a severe economic recession that was followed by stabilization programs at the end of the decade. As a result, relative and absolute government spending on education, health care, and family planning programs substantially fell during the period. An economic recession forced the government to reduce expenditures on education and other social programs (e.g., health care and family planning) more than its expenditures on goods and services that were necessities (e.g., subsidies).

Our Poisson regression model of fertility in Costa Rica showed that higher levels of secondary and university education lead to lower fertility. Fertility is a quadratic function of female age. The estimated parameter for female labor force participation has the expected sign, although it is statistically insignificant. Also, we do not find statistically significant differences in fertility across the formal and the informal sectors.

The results of this study can be improved with the use of panel data or a more comprehensive set of variables that fully capture other important socioeconomic and demographic characteristics of the decision-making unit, i.e. the household. However, finding comprehensive data especially micro data in developing countries is difficult. This resource constraint has limited our ability to quantify the effects of other independent variables on fertility. Nevertheless, to our knowledge, this paper is the first one to study the determinants of fertility in Costa Rica utilizing individual level micro data in a critical period of the country's development. Future work should address the interaction (and simultaneity) between fertility and labor supply given the rapid increases in female employment that have been observed in Latin American countries over the last two decades (Psacharopoulos and Tzannatos, 1992).

Perhaps the most important finding of this study is the role that education plays in lowering fertility levels. Because the government is the primary provider of education in most Latin American countries, government policies that attempt to raise the educational levels of Costa Rican women are extremely important if the government wants to obtain the benefits of low fertility levels and high economic growth. Examples of these types of policies are: the diversion of resources into secondary and higher education,

lower student/teacher ratios to increase the quality of education; and increasing the percentage of children enrolled in school. Other policies that could be implemented include large-scale health and family planning campaigns. Although stabilization programs have diverted resources away from health and education, our expectation is that these programs eventually lead to faster economic growth, which can result in increases in the resources devoted to health and education in the long run. Over the last decade, Costa Rica has experienced steady economic growth and significant reductions in fertility rates. Nonetheless, it remains to be seen whether these reductions in fertility are due to well-thought social and economic policies or simply due to other unrelated events.

ENDNOTES

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1. This data set has been used in other studies by Gregory (1993) and Dávila and Pagán (1999).
2. Findings by Kelly and Poston (1983) demonstrate the importance of "socioeconomic development and family planning programs" for fertility declines.
3. Becker and Lewis (1973) in their dynamic choice theoretic approach to fertility discuss that their "... approach relies on the assumption that higher fertility of the present generation increases the discounts on per capita future consumption in the intertemporal utility functions that guide consumption and other decisions. Therefore, higher fertility discourages investments in both human and physical capital. Conversely, higher stocks of capital reduce the demand for children because that raises the cost of the time spent on child care." (p. S14).
4. R.C. Avery, appendices A and B-'The measurement of fertility', and A 'comparison of birth rates estimated from the vital statistics system of Costa Rica with birth rates estimated from own-children methods' (Stycos, 1978).
5. Other independent variables such as the woman's age at the time of marriage, the usage of contraceptives, etc. are expected to affect fertility. However, due to data constraints we did not include them. More complete cross-sectional or longitudinal data would give us a better understanding of most of the factors that theory predict would influence fertility. However, finding comprehensive data especially micro data in developing countries is difficult. This resource constraint has limited our ability to quantify the effects of other independent variables on fertility. On the average, women that get married very young (about twenty years of age and younger) tend to have more children compared to older women (thirty years of age and older). Younger married women tend to have less schooling and, thus, the opportunity cost of having children is less than the wages that they can earn by working. Therefore, age at the time of marriage would positively influence fertility. The availability and usage of contraceptives would also affect fertility negatively.
6. Variables included in the FLFP equation were educational attainment, age, age squared, school enrollment and nonlabor income.

7. The base category includes those respondents who stated that they had either primary education or no education.

REFERENCES

- Asgary, Nader and M. Mokhtari (1996). "Fertility and Quantity Constraints: Evidence from the SIP Survey", Working Paper, The State University of New York, Geneseo, and Princeton University.
- Asgary, Nader and José A. Pagán (1998). "The Socioeconomic Determinants of Fertility in El Salvador during the Civil War in the 1980s." *Ensayos*, 33 (2), 11-26.
- Ball, Don and Wendell McCulloch (1996). *International Business*. New York: Irwin McGraw-Hill.
- Becker, Gary S. and Robert Barro (1988). "A Reformulation of the Economic Theory of Fertility," *Quarterly Journal of Economics*, 103, 1-25.
- Becker, Gary S. and H. Gregg Lewis (1973). "On the Interaction between Quantity and Quality of Children," *Journal of Political Economy*, 81, Supplement, S279-S288.
- Berliner, S. Joseph (1983). "Education, Labor-Force Participation, and Fertility in the USSR." *Journal of Comparative Economics*, 7, 131-157.
- Birdsall, Nancy M. and Charles C. Griffin (1988). "Fertility and Poverty in Developing Countries." *Journal of Policy Modeling*, 10 (1), 29-55.
- Caldwell, J (1980). "Mass Education as a Determinant of the timing of fertility decline." *Population and Development Review*, 6, 225-55.
- Cardoso, Eliana and Ann Helwege (1992). *Latin America's Economy: Diversity, Trends, and Conflicts*. Cambridge, MA: MIT Press.
- Cutright, P., and M. Hout, and D. Johnson (1976). "Structural Determinants of Fertility in Latin America:1800-1970," *American Sociological Review*, 41, 511-527.
- Cutright, P., and W. R. Kelly (1981). "The Role of Family Planning Programs on 1958 to 1977 Fertility Decline in Less Developed Countries," *International Family Planning Perspectives*, 7, 145-151.
- Dávila, Alberto and José A. Pagán (1999). "Gender Pay and Occupational-Attainment Gaps in Costa Rica and El Salvador: A Relative Comparison of the Late 1980s," *Review of Development Economics*, 3(2), 215-230.
- De Tray, Dennis N (1972). "The Interaction Between Parent Investment in Children and Family Size: An Economics Analysis." R-1003-RF, Santa Monica, CA: RAND Corp., May.
- Duesenberry, James (1960). Comment on "An Economic Analysis of Fertility." by Gary S. Becker., *In Demographic and Economic Change in Developed Countries.*, Universities-National Bureau Conference Series 11. Princeton, NJ: Princeton University Press.
- Gendell M., (1985) "Stalls in the Fertility Decline in Costa Rica, Korea, and Sri Lanka." World Bank Staff Working Papers, No. 693, Washington, DC: The World Bank.
- Gillis, M., Perkins, H.D., Roemer, M., and Snodgrass, R. D., (1996). *Economic of Development*, 4th ed. W.W. Norton & Company.
- Gindling, T.H., and Albert Berry (1992). "The Performance of the Labor Market During Recession and Structural Adjustment: Costa Rica in the 1980s," *World Development*, 20 (11), 1599-1616.
- Greene, William H. (1993). *Econometric Analysis*. New York, NY: MacMillan.

- Gregory, Paul R. (1982). "Fertility and Labor Force Participation in the Soviet Union and Eastern Europe," *Review of Economics and Statistics*, 64 (1), pp. 18-31.
- Gregory, Peter. (1993). "The Labor Market in El Salvador." U.S. Agency for International Development Final Report.
- Heer, D. M. and Turner, Elsa S. (1965). "Real differences in Latin American Fertility," *Population Studies*, 18 (3).
- Hermalin, A.I. (1983). "Fertility Regulation and Its Costs: A Critical Essay." In R. A. Buñatao et al. (eds.), *Determinants of Fertility in Developing Countries: A Summary of Knowledge*. National Research Council, Panel on Fertility Determinants New York: Academic Press.
- _____. (1986). "The Multilevel Approach To Family Planning Program Evaluation." Chapter III in *Addendum to Manual IX: The Methodology of Measuring the Impact of Family Planning Programmers on Fertility*. *Population Studies*, No. 66:15-24. New York: United Nations.
- Hermalin, Albert I., Ripley, Ann P., Rosero-Bixby, Luis (1997). "Regional Differences in Family Size Preferences in Costa Rica and Their Implication for Transition Theory," *Demographic Diversity and Change in the Central American Isthmus*, 403-454.
- Hicks, W. W. (1974). "Economic Development and Fertility Change in Mexico, 1950-1970," *Demography* 11 (3), 407-442.
- Kelly, William R., and Dudley L. Poston, Jr. (1983). "Determinants of Fertility Levels and Change Among Developed Countries: 1958-1978," *Social Science Research*, 12, 87-108.
- Lee and Schultz (1981). "Specification Bias in Estimation the Influence of Child Mortality on Fertility." Unpublished manuscript. Yale University.
- Maddala, G. S. (1983). *Limited-Dependent and Qualitative Variables in Econometrics*. New York: Cambridge University Press.
- Mauldin, W. P., and B. Berelson. (1978). "Condition of Fertility Decline in Developing Countries", 1965-75, *Studies in Family Planning*, 9, 89-148.
- Michener, Ron and Carla Tighe. (1992). "A Poisson Regression Model of Highway Fatalities," *American Economic Review Papers and Proceedings*, May, 452-456.
- Mouskopf, Josephine and Wallace T. Dudley. (1984). "Fertility and Replacement: Some Alternative Stochastic Models and Results for Brazil", *Demography*, 21, 4, 519-536.
- Olsen, R. J. (1980). "Estimating the Effect of Child Mortality on the Numbers of Births" *Demography*, 17, 429-443.
- Palloni, Alberto. (1990). "Fertility and Mortality Decline in Latin American," *Annals of American Academy of Political and Social Science*, 510, 126-44.
- Palloni, Alberto, and Marta Tienda (1992). "Demographic Responses to Economic Recessions in Latin America Since 1900", *Sociological Inquiry*, 62 (2), 246-70.
- Pebley and Bixby (1997). "Demographic Diversity & Change in Central America" Isthmus, Santa Monica, CA: RAND.
- Perkins, H. Dwight, Radelet Steven, Snodgree R. Donald, Gillis Malcolm, and Michael Roemer (2001). *Economic of Development*. Fifth Edition, W.W. Norton & Company, New York, N.Y.

- Psacharopoulos, George, and Zafiris Tzannatos (1992). *Women's Employment and Pay in Latin America*. Washington, DC: The World Bank.
- Rios, Roberto J. (1991). "Economic Development and Family Size," *American Economist*, 35 (2), 81-5.
- Schultz, T. Paul (1978). "Fertility and Child Mortality Over the Life Cycle: Aggregate and Individual Experience", *American Economic Review*, 68, 208-215.
- Stycos, J. Mayone. (1982). "The Decline of Fertility in Costa Rica: Literacy, Modernization and Family Planning," *Population Studies*, 36 (1), 15-30.
- Stycos, J. Mayone (1978). *Pattern of Fertility Decline in Costa Rica*, Ithaca: International Population Program, Cornell University.
- Stycos, J. Mayone (1968). *Human Fertility in Latin America: Sociological Perspectives*. Ithaca: Cornell University Press.
- Tiefenthaler, Jill (1994). "A Multisector Model of Female Labor Force Participation: Empirical Evidence from Cebu Island, Philippines" *Economic Development and Cultural Change*, 42 (4), 716-42.
- Todaro, P. Michael (1997). *Economic Development*. New York, NY: Addison Wesley.
- Tolnay E. Stewart (1996). "Structural Change and Fertility in the South, 1910 to 1940," *Social Science Quarterly*, Vol. 77, No 3, 559-576.
- Zhang, Junsen (1990). "Socioeconomic Determinants of Fertility in China: A microeconomic analysis," *Journal of Population Economics*, 3, 105-23.
- ____ (1994). "Socioeconomic Determinants of Fertility in Hebei Province, China: An Application of the Sequential Logit Model" *Economic Development and Cultural Change*, 34 (1), 67-90.

THE EFFECTS OF MACROECONOMIC FACTORS ON THE RETURNS OF SEVERAL MAJOR STOCK INDICES

Mark Gius* and Janalynne S. Gius**

ABSTRACT

The present study attempts to examine the role of macroeconomic factors in the determination of stock index returns. Results indicate that, when alternative stock index returns are omitted, macroeconomic factors have a strong influence on returns. However, when alternative stock return variables are included, macroeconomic factors are no longer significant. These results differ from the results of most prior studies in this area. In addition, no other study in this area has ever examined the relationships between the returns of the various stock indices.

1. INTRODUCTION

During the bull market of the last decade, the interest in stock market fluctuations and the factors that may have an effect on those fluctuations has increased considerably. Investors and researchers alike are interested in determining what macroeconomic variables have an impact on stock returns and prices. There have been numerous studies of the impact of macroeconomic variables on stock price indices (Cheung and Lai, 1999; Priestly, 1997; Mukherjee and Naka, 1995; Fitzpatrick, 1994; Asprem, 1989; Wasserfallen, 1989; Chen, Roll, and Ross, 1986).

The methodologies employed by previous studies are varied, and the results are mixed. Cheung and Lai (1999) looked at long-term movements of stock prices in three European markets. They attempted to determine if stock price comovements are associated with the comovements of macroeconomic variables. Cheung and Lai used monthly data for the time period 1979-1992; the three nations they examined were France, Germany, and Italy. The authors found that stock price movements can be partly explained by the comovements of several macroeconomic variables.

Priestly (1997) examined the relationship between seasonality, stock returns, and several macroeconomic variables. Using monthly stock return data from the UK for the period 1968-1993, Priestly found that the relationship between stock returns for a select group of corporations and several macroeconomic variables is rather complex and can be affected by a variety of seasonality and institutional constraints.

- ❖ The views expressed in this paper are those of the authors alone and are not the views of Phoenix Investment Partners, Ltd., its parent company nor any of its subsidiaries, nor of Quinnipiac University.

* Department of Economics, Quinnipiac University, Hamden, CT.

** Phoenix Investment Partners, Ltd.

Mukherjee and Naka (1995) used a vector error correction model to determine if the Japanese stock market is cointegrated with several macroeconomic variables. Employing an index of the average of the closing prices of all shares listed on the Tokyo Stock Exchange as the dependent variable, the authors' data set consisted of monthly index prices for the period 1971-1990. The authors' results suggested that a cointegrating relationship exists between the stock price index and several Japanese macroeconomic variables.

Fitzpatrick (1994) looked at the relationship between the total return on the S&P 500 index and various macroeconomic variables. Using monthly data for the period 1968-1987, Fitzpatrick found no significant relationship between the macroeconomic data and the return on the S&P 500.

Asprem (1989) examined the relationship between stock indices, asset portfolios, and macroeconomic variables in ten European countries. The author's results indicated that several macroeconomic variables have statistically-significant effects on stock prices in several European countries. The author used quarterly data for the period 1968-1984.

Wasserfallen (1989) looked at the relationship between various macroeconomic variables on stock price indices for Great Britain, West Germany, and Switzerland. Using quarterly data for the period 1977-1985, the author found little or no relationship between the macroeconomic variables and the stock indices. The author believed that this lack of a statistically-significant relationship is due to a low signal to noise ratio.

Chen, Roll, and Ross (1986) attempted to determine if innovations in macroeconomic variables are risks that are rewarded by the market. In order to test this hypothesis, the authors used monthly data for the period 1953-1983 and the return on the NYSE index as their dependent variable. The authors found that several of the macroeconomic variables were significant in explaining expected stock returns.

The present study will differ from these prior studies in several important ways. First, the present study will examine the returns from four different US equity indices: the Dow Jones Industrial Average, the Russell 2000, the Wilshire 5000, and the S & P 500. No prior study, to our knowledge, has ever examined this many US equity indices. Second, as noted above, this study will focus on returns; hence, cointegration should not be an issue. Third, the present study will use the most recent data of any study to date; the data set in the present study encompasses the years 1980 to 1999. Finally, while many prior studies used quarterly data, the present study will use monthly data, which should increase the possibility of capturing any relationships between the macroeconomic variables and the equity index returns.

2. EMPIRICAL TECHNIQUE

According to Fitzpatrick and other researchers in this area, changes in macroeconomic conditions affect the stock market (Fitzpatrick, 1994, p.70). In order to determine if relationships between macroeconomic factors and stock returns exists, the following two equations are estimated:

$$\begin{aligned}
Y_D = & \alpha_0 + \alpha_1 INFL + \alpha_2 STI + \alpha_3 LTI + \\
& \alpha_4 INTDIF + \alpha_5 DI + \alpha_6 HWANT + \alpha_7 IND + \\
& \alpha_8 NAPM + \alpha_9 RT + \alpha_{10} CONS + \alpha_{11} GOLD + \\
& \alpha_{12} OIL + \alpha_{13} UR + u
\end{aligned} \tag{1}$$

$$\begin{aligned}
Y_D = & \alpha_0 + \alpha_1 INFL + \alpha_2 STI + \alpha_3 LTI + \\
& \alpha_4 INTDIF + \alpha_5 DI + \alpha_6 HWANT + \alpha_7 IND + \\
& \alpha_8 NAPM + \alpha_9 RT + \alpha_{10} CONS + \alpha_{11} GOLD + \\
& \alpha_{12} OIL + \alpha_{13} UR + \alpha_{15} Y_S + \alpha_{16} Y_R + \alpha_{17} Y_W + u
\end{aligned} \tag{2}$$

where Y_D denotes the total return for the Dow Jones Industrial Average, Y_S denotes the total return for the S&P 500, Y_R denotes the total return for the Russell 2000, Y_W denotes the total return for the Wilshire 5000, $INFL$ denotes the inflation rate calculated from the Consumer Price Index for all urban consumers (Chen, Roll, and Ross, 1986; Mukherjee and Naka, 1995), STI denotes the real return on the 3-month Treasury Bill, LTI denotes the real return on the 30-year Treasury Note, $INTDIF$ is the difference between the short term and long term real bond yields (Chen, Roll, and Ross, 1986), DI denotes disposable monthly income, $HWANT$ denotes the index of help wanted advertising in newspapers, IND is the index of industrial production (Wasserfallen, 1989; Priestly, 1997; Chen, Roll, and Ross, 1986; Mukerjee and Naka, 1995), $NAPM$ is the National Association of Purchasing Managers Composite Index for Manufacturing, RT denotes retail sales, $CONS$ is the consumer sentiment index compiled by the University of Michigan, $GOLD$ is price of gold, OIL is the spot price of West Texas Intermediate crude (Chen, Roll, and Ross, 1986), UR is the civilian unemployment rate, and u is a normally-distributed random error term. All data is monthly.¹ All variables are expressed in terms of monthly percentage changes. All dollar figures are expressed in terms of constant dollars, base year 1982-84. The time period for the data is January 1980 through July 1999 for a total of 235 observations.

Theory suggests that equity index returns are related to general economic activity. In order to best capture the level of economic activity, a variety of macroeconomic indicators are included in equations (1) and (2). In addition, a number of the variables in the above equations were included because prior research has indicated that they may have an effect on equity index returns. Generally, variables were included that captured one of the following aspects of the economy: prices, employment, production, interest rates, sales, income, and the returns on other investments. Theory suggests the following: as prices rise, returns fall; as production rises, returns rise; as interest rates rise, returns fall; as sales rise, returns rise, as income rises; returns rise; and as returns on other investments rise, returns fall (Mukherjee and Naka, 1995; Chen, Roll, and Ross, 1986).

Data were obtained from various sources. The equity returns data and bond yields data were obtained from the Frank Russell Performance System. Retail sales data were obtained from the Census Bureau; disposable income was obtained from the Department of Commerce; the industrial production index was obtained from the Federal Reserve; the unemployment rate and the consumer price index

were obtained from the Bureau of Labor Statistics; the spot oil price was obtained from the Wall Street Journal; the price of gold was obtained from Kitco; the help wanted index was obtained from the Conference Board; the NAPM index was obtained from the National Association of Purchasing Managers; and consumer sentiment was obtained from the University of Michigan.

Equation (1) includes as explanatory variables only macroeconomic factors; equation (2) includes the returns of the three other stock indices. Each of the above equations is estimated for each stock index; hence, a total of eight equations are estimated.

3. RESULTS AND CONCLUDING REMARKS

Given that stock index returns were employed as the dependent variable, cointegration of variables was not an issue. According to Harris (1995) and Charemza and Deadman (1992), cointegration refers to the problem that arises when non-stationary variables are used in regression analysis. Non-stationary variables have different means at different points in time. Stationary variables fluctuate around a mean and have a finite variance. Typically, non-stationary variables are present when the current values of a variable depend upon last period's value. This typically happens in macroeconomic data, such as GDP or the Consumer Price Index; it may also occur when stock prices are examined. For example, it is reasonable to assume that the average price of a stock in one month is related to the average price for the stock in the previous month; a trend is present. If ordinary least squares is used to estimate a non-stationary variable, spurious correlations due to this trending may result, thus implying relationships between variables in a regression equation that do not exist (Harris, 1995, p.19).

In the present model, all of the variables are expressed in terms of percentages. A priori, it is reasonable to assume that the total return of the S&P 500 this month is not related to last month's total return on the S&P 500. The same reasoning applies to all of the other variables in the two models estimated in the present study as well. Thus, theory suggests that all of the variables employed in the present study are stationary variables. Since cointegration should not be an issue in the present study, equations (1) and (2) are estimated using least squares. Serial correlation is not present in any of the regressions for equation (2). However, serial correlation is present in the Wilshire regression and in the Russell regression for equation (1); a first-order autoregressive procedure is used to correct for serial correlation.

Concerning collinearity between explanatory variables, results suggest that multicollinearity should not be a problem for either equation. Theory suggests that if R^2 is high but few explanatory variables are statistically significant, then multicollinearity may be present. For all regressions for equation (1), R^2 is relatively low, and many explanatory variables are statistically significant; hence, multicollinearity is not present. In order to confirm this hypothesis, pair-wise correlations between variables were estimated for all explanatory variables. According to Gujarati, if a pair-wise correlation is above 0.8, then multicollinearity may be a serious problem (Gujarati 1988, p. 299). None of the pair-wise correlations for the explanatory variables for equation (1) were at this level. However, for equation (2), most of the R^2 's are relatively high, and few of the variables are statistically significant. This indicates that multicollinearity may be present. In order to verify this result, pair-wise correlations were estimated for all variables included in equation (2). These results indicate that a high level of correlation exists between

the returns on the Russell and the returns on the Wilshire. Although potentially serious, the two regressions where these variables both appear as explanatory variables have relatively low R^2 's. Hence, multicollinearity is not an issue for equation (2) either.

Results for equation (1) are presented on Tables 1 through 4; results for equation (2) are presented on Tables 5 through 8. The results for equation (1) suggest that, contrary to the results of many other studies, macroeconomic factors have statistically-significant effects on the returns of the various stock indices. Inflation and the short-term bond yield are statistically-significant and negative for all four indices. The long-term bond yields, the interest rate differential, and the unemployment rate are statistically-significant and positive for all four indices. Other variables are significant for individual regressions, but none are statistically significant for all four regressions. These results suggest that interest rates have a very strong influence on the returns of the major indices. Apparently, short-term bond returns and stock returns are negatively related, possibly indicating that any increase in short term real bond returns will send the markets down. However, the greater the long term bond return, the higher is the stock index return. In addition, bad economic news in the form of an increase in the unemployment rate actually causes the returns of the indices to increase.

Table 1
Regression Results for Equation (1)
Dow Jones Industrial Average

Variable	Coefficient	Test Statistic
CONSTANT	2.6563	2.023
INFL	-240.71	-1.652
STI	-377.98	-2.303
LTB	377.60	2.300
INTDIF	378.21	2.304
DI	19.036	0.502
HWANT	-13.596	-1.418
IND	-113.91	-2.539
NAPM	5.2184	0.857
RT	-43.162	-1.796
CONS	14.855	2.324
GOLD	-6.0691	-0.848
OIL	0.5028	0.131
UR	0.56041	1.947

Notes:

$R^2 = .14203$

F Test Statistic = 2.81

Durbin-Watson Test Statistic = 2.103

95% Significance - *

99% Significance - **

Table 2
Regression Results for Equation (1)
Wilshire 5000

Variable	Coefficient	Test Statistic
CONSTANT	0.13565	0.074
INFL	-341.99	-1.988*
STI	-410.75	-2.161*
LTI	410.23	2.157*
INTDIF	411.10	2.162*
DI	17.784	0.457
HWANT	-21.411	-2.133*
IND	-79.002	-1.582
NAPM	9.1384	1.351
RT	-15.221	-0.607
CONS	26.189	3.779**
GOLD	-7.909	-0.975
OIL	1.8432	0.416
UR	1.2383	3.172**

Notes:

$R^2 = .22662$

F Test Statistic = 4.98

Durbin-Watson Test Statistic = 1.954

95% Significance - *

99% Significance - **

Table 3
Regression Results for Equation (1)
Russell 2000

Variable	Coefficient	Test Statistic
CONSTANT	0.33422	0.194
INFL	-366.54	-2.063
STI	-468.23	-2.364*
LTI	467.81	2.360*
INTDIF	468.71	2.365*
DI	27.117	0.631
HWANT	-33.680	-3.069**
IND	-106.63	-2.011*
NAPM	11.979	1.665
RT	-15.410	-0.561
CONS	25.599	3.430**
GOLD	-8.8017	-1.029
OIL	-1.9149	-0.413
UR	1.0437	2.787**

Notes:

$R^2 = .21852$

F Test Statistic = 4.75

Durbin-Watson Test Statistic = 1.972

95% Significance - *

99% Significance - **

Table 4
Regression Results for Equation (1)
S&P 500

Variable	Coefficient	Test Statistic
CONSTANT	-0.21375	-0.211
INFL	-309.53	-2.758**
STI	-447.83	-3.542**
LTI	447.82	3.540**
INTDIF	447.84	3.541**
DI	9.2294	0.361
HWANT	-6.6206	-0.896
IND	-72.328	-2.092
NAPM	-17.814	-3.798**
RT	-43.968	-2.374
CONS	-0.90609	-0.184
GOLD	-2.2769	-0.413
OIL	-3.6141	-1.222
UR	0.36971	1.668

Notes:R² = .22262

F Test Statistic = 4.87

Durbin-Watson Test Statistic = 2.16939

95% Significance - *

99% Significance - **

When the returns of the other indices are included as explanatory variables, however, the results change considerably. These results suggest that other stock index returns have strong explanatory power in determining the returns from the various stock indices. In order to understand these relationships, it is first necessary to understand the market capitalizations that are contained in each index. The Dow contains all large cap firms. The Russell is all small cap. The S&P 500 is mostly large cap, although there are some mid-cap and small cap firms in this index. Finally, the Wilshire is a mix of large, mid, and small cap firms. The relationships exhibited in the regressions are directly attributable to the market capitalizations of the various indices. Those indices that have similar capitalizations have returns that are positively related to one another, while those indices that have different capitalizations have returns that either are not related to one another or are negatively related to one another.

Given the above, the following relationships can be ascertained from the results. First, the returns from the Russell and the Wilshire are positively related to one another; the level of relationship is actually quite large. This relationship is expected given that, of the four indices studied, the Wilshire is the only one that has a significant number of small cap firms represented. The S&P 500 is positively related to the Dow and is not related to either the Wilshire or the Russell. Once again, this result is reasonable, given that both the Dow and the S&P 500 are primarily large cap indices.

Table 5
Regression Results for Equation (2)
Dow Jones Industrial Average

Variable	Coefficient	Test Statistic
CONSTANT	2.4282	3.054
INFL	34.473	0.382
STI	-13.368	-0.130
LTI	13.231	0.129
INTDIF	13.286	0.129
DI	-0.35965	-0.016
HWANT	10.067	1.689
IND	-28.542	-1.033
NAPM	0.42832	0.111
RT	-30.442	-2.065*
CONS	-2.0526	-0.510
GOLD	-0.0272	-0.006
OIL	3.3081	1.415
UR	-0.1051	-0.584
S&P 500	0.15197	2.815**
RUSSELL	0.78064	7.942**
WILSHIRE	-0.1498	-1.475

Notes: $R^2 = .68994$

F Test Statistic = 30.32

Durbin-Watson Test Statistic = 2.16254

95% Significance - *

99% Significance - **

Table 6
Regression Results for Equation (2)
Wilshire 5000

Variable	Coefficient	Test Statistic
CONSTANT	0.0478	0.089
INFL	-23.464	-0.392
STI	-17.009	-0.249
LTI	16.889	0.247
INTDIF	16.917	0.248
DI	-7.431	-0.487
HWANT	7.5885	1.922
IND	1.0563	0.057
NAPM	-2.1816	-0.855
RT	1.1242	0.114
CONS	5.2854	1.994*
GOLD	-0.54048	-0.188
OIL	1.766	1.137
UR	0.25486	2.153*
DOW	-0.066	-1.475**
RUSSELL	0.94863	25.715**
S&P 500	-0.0603	-1.662

Notes: $R^2 = .90587$

F Test Statistic = 131.12

Durbin-Watson Test Statistic = 1.98901

95% Significance - *

99% Significance - **

Table 7
Regression Results for Equation (2)
Russell 2000

Variable	Coefficient	Test Statistic
CONSTANT	-0.57114	-1.163
INFL	-17.359	-0.317
STI	-17.440	-0.280
LTI	17.525	0.281
INTDIF	17.574	0.282
DI	8.0019	0.574
HWANT	-11.199	-3.145**
IND	-3.2604	-0.194
NAPM	3.0637	1.317
RT	6.6419	0.736
CONS	-0.82427	-0.337
GOLD	-0.39031	-0.148
OIL	-2.3348	-1.649
UR	-0.0803	-0.735
DOW	0.28745	7.942**
S&P 500	0.03287	0.988
WILSHIRE	0.79279	25.715**

Notes: $R^2 = .92659$

F Test Statistic = 171.97

Durbin-Watson Test Statistic = 2.15833

95% Significance - *

99% Significance - **

Table 8
Regression Results for Equation (2)
S&P 500

Variable	Coefficient	Test Statistic
CONSTANT	-0.82704	-0.828
INFL	-273.50	-2.494
STI	-381.40	-3.075**
LTI	381.44	3.074**
INTDIF	381.38	3.073**
DI	4.5163	0.159
HWANT	-3.6914	-0.500
IND	-50.333	-1.482
NAPM	-18.619	-4.072**
RT	-33.119	-1.820
CONS	-1.7243	-0.347
GOLD	-1.4255	-0.266
OIL	-3.5140	-1.219
UR	0.34252	1.551
DOW	0.23075	2.815**
WILSHIRE	-0.20769	-1.662
RUSSELL	0.13554	0.988

Notes: $R^2 = .28136$

F Test Statistic = 5.33

Durbin-Watson Test Statistic = 2.15935

95% Significance - *

99% Significance - **

ENDNOTES

1. Monthly data was used primarily because this was the only time period for which all of the necessary data was available. Although weekly and daily quotes are available for the stock indices, the smallest time period for which most of the macroeconomic data is available is monthly.
2. Although the R^2 's for equation (1) regressions appear to be low, they are not unreasonable when compared to the R^2 's of prior studies. In Asprem (1989), R^2 's range from .04 to .62, and in Wasserfallen (1989), they range from .00 to .22.

REFERENCES

- Asprem, Mads, "Stock Prices, Asset Portfolios and Macroeconomic Variables in Ten European Countries," *Journal of Banking and Finance*, vol. 14, September 1989, pp. 589-612.
- Charemza, Wojciech and Derek Deadman, *New Directions in Econometric Practice*, Edward Elgar Publishers: England, 1992.
- Chen, Nai-Fu, Richard Roll, and Stephen Ross, "Economic Forces and the Stock Market," *Journal of Business*, vol. 59, Fall 1986, pp. 383-403.
- Cheung, Yin-Wong and Kon S. Lai, "Macroeconomic Determinants of Long-Term Stock Market Comovements Among Major EMS Countries," *Applied Financial Economics*, vol 9, February 1999, pp. 73-85.
- Fitzpatrick, Brian, "Stock Prices and Macroeconomic Data," *Journal of Applied Business Research*, vol. 10, Fall 1994, pp.69-81.
- Francis, Jack Clark and Frank J. Fabozzi, "The Effects of Changing Macroeconomic Conditions on the Parameters of the Single Index Market," *Journal of Financial and Quantitative Analysis*, vol. 14, June 1979, pp. 351-370.
- Gujarati, Damodar. *Basic Econometrics*, McGraw-Hill: New York, 1988.
- Harris, R., *Using Cointegration Analysis in Econometric Modelling*, Prentice Hall: New York, 1995.
- Mukerjee, Tarun and Atsuyuki Naka, "Dynamic Relations Between Macroeconomic Variables and the Japanese Stock Market: An Application of a Vector Error Correction Model," *The Journal of Financial Research*, vol. 18, Summer 1995, pp. 223-237.
- Priestly, Richard, "Seasonality, Stock Returns, and the Macroeconomy," *The Economic Journal*, vol. 107, November 1997, pp.1742-1750.
- Wasserfallen, Walter, "Macroeconomic News and the Stock Market," *Journal of Banking and Finance*, vol. 13, September 1989, pp. 613-626.

THE ECONOMIC IMPACT OF A COLLEGE: A REGIONAL ANALYSIS OF SUNY ONEONTA

Ilan Alon^{*}, Barry P. Warren^{}, and Jeramie Barber^{**}**

ABSTRACT

Using the College at Oneonta and its affiliated operations, the purpose of this study is to estimate the economic impact of a college on its region. The paper presents a methodology for analyzing the output and employment impacts, as well as the tax revenue associated with spending in a particular industry. We found a local output multiplier of 1.33 and a regional multiplier of 1.47, as well as a local employment multiplier of 24.6 and a regional employment multiplier of 25.9 for every \$1 million spent by the institution. We also found that about 15.5 percent of the College's spending returns to local, state and federal government agencies in the form of taxes. The paper concludes that the economic impact of a college on its surrounding communities can be substantial, affecting the region's potential for future economic growth.

I. INTRODUCTION

The study seeks to understand the economic impact of the College at Oneonta and its affiliated operations (hereon referred to as "The Institution") on the local and regional economies using IMPLAN. IMPLAN is an economic analysis system designed to measure the direct, indirect and induced effects of industry spending on economic output and employment.

Economic output is the value of goods and services provided by the Institution and is equal to the sum of payments to workers, interest payments, taxes, and profits. For the purposes of this study direct effects can be defined as the expenditures made in the study area by the Institution; the indirect effects represent the jobs and production located within the study area which are used to produce the direct effects; and the induced effects are the jobs and production required to fulfill the demands for goods and services of people employed by the Institution who live in the study area.

The remainder of this paper is organized as follows. Section II provides the background on SUNY College at Oneonta, Oneonta, and greater Oneonta area. Section III explains IMPLAN. Section IV reviews previous attempts to estimate the economic impact of a college or a university. Section V describes the data collection methodology. Section VI presents the results, while section VII summarizes the implications and conclusions of the study. Finally, Section VIII discusses the limitations of the study.

II. SUNY COLLEGE AT ONEONTA, ONEONTA AND GREATER ONEONTA AREA

For 110 years, the faculty, staff, alumni, and students of the College at Oneonta have made significant contributions to the economic, social, intellectual, cultural, and recreational quality of life in

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^{*} Department of Business and Economics, State University of New York Brockport.

^{**} Center for Economic & Community Development, State University of New York Oneonta.

Otsego and surrounding counties. Today, the College at Oneonta is a major and comprehensive higher education institution enrolling more than 5,300 students and is a growing source of jobs and income for a significant number of individuals, businesses, and households.

Currently, the College is the largest employer in the City and Town of Oneonta and the second largest employer in Otsego County. In fact, in fiscal year 2000-2001, the College plans on hiring 40 new faculty that will further enhance the College's critical role as a catalyst for economic growth and prosperity in the region. Also, the College and its students are one of the largest purchasers of goods and services from local businesses.

Two study areas were examined using the IMPLAN economic modeling system. The first study area is defined narrowly as Oneonta, encompassing both the City and Town of Oneonta (i.e., the area covered under the 13820 zip code). The second study area is the greater Oneonta area, which includes Chenango, Delaware, and Otsego Counties. Using a larger geographical area is theoretically more accurate because the location of workers, supporting industries and service providers, and consumers extends beyond the local area. While institutional spending has the greatest impact on the local economy, its economic impact will spillover into adjacent counties. Smaller rural areas have greater leakage of economic activity and, thus, smaller multipliers. Table 1 below presents descriptive statistics of the two study areas.

Table 1: Descriptive Statistics About the Study Areas

Study Area	Population	Employment	Households	Industries	Average Household Income
Oneonta	18,913	15,403	6,209	118	\$50,996
Greater Oneonta Area	160,878	77,322	59,601	217	\$48,901

Source: U.S. Census of Population and U.S. Bureau of Labor Statistics

III. IMPLAN IMPACT ANALYSIS

What is IMPLAN?

IMPLAN is a licensed software program that can access proprietary data collected by a Minnesota group of economists for the purpose of evaluating the economic structure of a region. This study uses IMPLAN (Impact Analysis for Planning) regional impact analysis software to calculate the local and regional economic impacts of SUNY Oneonta. The original IMPLAN model was created by the US Bureau of Land Management to measure the economic benefits of alternative land management and development policies. A group of economists (the IMPLAN group) at the University of Minnesota took over the model and currently maintain it (www.implan.com). IMPLAN is a fundamentally sound methodology for estimating the economic impact of spending in a particular industry on the local and regional economies (Goodman and Feser, 2000).

Traditional applications of IMPLAN include studies of the impacts of watershed projects, wetland reservation programs, plant materials programs, forestry incentives programs, justification for local cost sharing, conservation policy, resource policy analysis, and state and regional planning (NRCS, 2000). Increasingly, IMPLAN is being used by other governmental and nongovernmental agencies such as universities, development agencies, consulting firms, and policy makers. The widespread use of the program has led the IMPLAN group to sponsor yearly conferences, which show the use of IMPLAN in a wide variety of applications including industrial targeting, economic development, and tourism.

What is the theoretical underpinning of IMPLAN?

Economists know that aggregate income equals aggregate spending. That is, if we add up the incomes of entrepreneurs, landowners, capital holders, and workers, they will equal the total spending of consumers, businesses, government and foreigners. For this reason, there is a symbiotic relationship between producers and consumers. For example, households provide the labor input to firms in exchange for wages. These wages, in turn, fuel the demand for goods and services produced by these firms. Economic leakages occur because of savings, imports and taxes, while injections occur through investment, exports, and government spending. The economy is in balance when leakages equal injections.

Input-output models trace the flow of purchases and expenditures on goods and services. According to these models, income receipts (such as sales) equal expenditures (such as payroll and taxes). Profits balance expenditures with receipts. In other words, whatever is not spent on the factors of production is profit.

The IMPLAN study of the Institution is grounded in input-output (I/O) analysis and its purpose is to analyze the impact of Institutional spending on the regional economy. The seminal work on the topic of I/O was developed by Wassily Leontief (1953) who won a Nobel Prize in Economics for developing the system into a formal set of equations, which determines the multipliers and describes the complex economic relationships among industries, government, and households.

Where does IMPLAN data come from?

Data used by IMPLAN are taken from a wide variety of local, regional and national data sources. Data files contain information on 528 potential industries (3 or 4 level SIC code breakdown), governmental transfers and taxes, regional exports and imports, factors of production, commodity trade, and household spending patterns. The output of the program includes information on the output and employment multipliers at various levels of analysis, tax receipts, and value added by employees, proprietors, and corporations. The SAM multiplier, which will be discussed later, primarily uses information from the Bureau of Economic Analysis (BEA), the Regional Economic Information System (REIS), the Bureau of Labor Statistics (BLS), and Consumer Expenditure Survey (CES) (For more on the data IMPLAN uses see Minnesota IMPLAN Group, 1999).

How does IMPLAN work?

Constructing a model using IMPLAN involves a number of steps. First, one needs to develop a study area. Data matrices for individual counties and cities are purchased from IMPLAN. More than one county or city, at the zip code level, can be integrated into a defined region. Once the study area is defined, the program generates statistics on the population, employment, number of households, area in square miles, number of industries, income per household, total personal income, and the year the data was collected. We used a matrix that was last updated on 9/23/1999.

Information is also available on the number of households for differing income ranges, regional output, value added by factors of production, employment by industry, institutional commodity demand, household commodity demand, government commodity demand, institutional sales, and IMPLAN to SIC classification bridge. The program also allows the user to custom design the aggregation of industries he/she wants to analyze, including 1-digit and 2-digit SIC codes.

After the study area is constructed, the analyst focuses on developing the regional economic impact model. The program develops social matrix accounts (SAM) to calculate a wide range of industry-

specific impacts on various institutions and industries within the study area. The social accounts contain information on the local economic interactions in terms of the flow of dollars from purchaser to producers within the region.

Various advanced options are available for the researcher, who can edit the production model (commodities purchased by an industry required to produce its output), the by-products of industries (primary and secondary commodities produced by an industry), the trade flows (the transfer of goods between the region and the rest of the world) and institutional transfers (non-market monetary flows including taxes, government transfers, and savings).

Only after one builds a study area and an industry model can he/she proceed to evaluate the impact of an economic event, e.g. the impact of a capital project. The researcher can identify one or more economic events along with the specified industry within which the event will take place and choose the bases for analysis, i.e., commodity vs. industry. IMPLAN multipliers are sensitive to the characteristics of the industry, but not to the unique characteristics of individual firms within a particular industry. This is because industry averages of employment, production, imports and exports are used to generate the economic multipliers. Once the industry specific data is collected, the program is ready to analyze the economic impacts of a firm's spending on the value added to labor income, other property income, and indirect business taxes, as well as employment and output impacts.

The multipliers obtained from IMPLAN are specific to the area being studied as well as the chosen industry.

What are economic multipliers?

Economic multipliers are designed to capture the direct, indirect, and induced economic impacts of spending in a particular industry. For example, the Institution spends money on labor, capital, and land as well as on purchases of goods and services from a variety of vendors. The College has a direct impact on these factors of production and on the affected industries. These industries and households, in turn, generate demand for additional goods and services produced by other sectors in the economy. The result is a multiplicative effect, which is additional to the original direct spending. This study captures both the direct as well as the additional demand from indirect and induced impacts generated by the Institution's spending.

The multiplier used in this study, which is referred to as the social accounting matrix or SAM multiplier, measures direct, indirect, and induced effects on output and employment in various industries. The SAM multiplier was used to calculate the impact of the Institution on the local and regional economies because this multiplier includes information on (1) flow of dollars from purchasers to producers within the region, (2) flow of dollars between the region and the outside world, and (3) non-industrial transactions such as payment of taxes and government transfers. For households, the SAM multiplier accounts for job commuting, social security tax payments, household income, taxes, and savings. For a complete discussion of SAM see IMPLAN (2000a).

The multiplier shows how industry output is changed by a given change in Institutional expenditure. Three types of multipliers are calculated:

1. Type I multiplier – measures direct and indirect effects inter-industry effects only.
2. Type II multiplier – measures direct and indirect effect internalizing household expenditures as an industry.
3. Type SAM multiplier – measures direct, indirect and induced effects including all information on payments to factors and institutions, including households and government.

Three effects are examined:

1. Direct effect – changes in industry in which final demand changed
2. Indirect effect – changes in inter-industry purchases derived from final demand
3. Induced effect – changes in household spending due to earnings from increased or decreased Institutional spending.

What are the advantages of IMPLAN?

IMPLAN was used in this study for economic impact assessment modeling because:

1. It is designed to build economic models to estimate the impacts of economic changes in states, counties, or small communities (e.g., zip code level);
2. It accounts for economic leakages such as imports, taxes and savings;
3. It calculates direct, indirect and induced effects on the local and regional economies; and
4. It adjusts for industry-specific variations in purchasing patterns.

IMPLAN overcomes the deficiencies of previous input-output economic models because it captures industry-level linkages (e.g., local purchases of labor, supplies, materials), as well as economic leakages (i.e., loss of dollars out of the local economy) due to imports, taxes and savings. This is particularly important when examining an institution like the College at Oneonta that operates in a rural area. This is because small rural communities typically lack a sufficiently diversified economy to retain income from economic activity. This situation can be altered as the community expands retail opportunities, promotes growth in business services, and encourages local public and private sector organizations to purchase goods and services locally.

A close contender to IMPLAN is the BEA's Regional Industrial Multiplier System (RIMS). Both models are based on input-output matrices, but slight variations exist in terms of the output, access, data sources, turnaround time, price, reports and other features. The main advantages of IMPLAN over RIMS are: (1) it is more flexible, allowing the user to adjust the regional purchase coefficients, specify the multiplier type, and internalize any number of institutions, (2) it is more practical and interactive, allowing the user to reconfigure regional data and run multiple variations of the same study during the same day, with a marginal cost of zero, (3) it offers additional features such as a complete set of social accounting matrices and user-specified varying levels of sector aggregation. From a practical standpoint, the program is cheaper, faster and more flexible (IMPLAN 2000b). The disadvantage of IMPLAN is that some in-house knowledge of and experience with input-output models are necessary.

What are IMPLAN's Key Assumptions?

A discussion of a model will be incomplete without some references to its assumptions. There are several key assumptions that are made when calculating the direct and derived demand of an industry on the local economy.

1. Constant returns to scale – production function is linear and an increase in output will result in demand for inputs increasing proportionately.
2. No supply constraints – supply is unlimited and access to inputs is only limited by the demand for the final product.
3. Fixed commodity input structure – price changes do not cause firms to substitute their inputs and changes in the economy will affect an industry's output but not its input mix.

4. Homogeneous sector output – proportion of commodities produced by an industry is constant regardless of total output.
5. Industry constant technology – the same technology is used by all production in an industry and each industry has a primary product, and all other products are byproducts (For more about the assumptions see Minnesota IMPLAN Group, 1999).

IV. ECONOMIC IMPACTS OF A COLLEGE

The unique economies of university towns offer a diverse retail environment, sporting events, and a multitude of socio-cultural functions. These economies exhibit strong seasonal fluctuations, due to shifting student populations, but milder cyclical fluctuations created by the macroeconomy (Federal Reserve Bank of Atlanta 2000). This is because cutbacks in university funding tend to lag the business cycle and a surge in college demand can occur at the beginning of a recession when cyclical unemployment begins to increase. Because colleges and universities are labor-intensive industries they have a strong multiplier effect, particularly because of the induced effect. Academic institutions that are located in small cities fuel their local economies, provide a cushion against recessions, generate jobs, and often increase the future tax base of a region by providing graduates to their local economies.

For this study, other colleges and universities were contacted through mail, fax, and telephone. These higher education facilities then provided economic impact information from studies that they had conducted. In a few cases, the directors of the projects were contacted personally and asked for a more in-depth explanation of their findings and the process by which they had conducted their studies.

There are few studies (particularly ones employing input-output models) which examine the direct, indirect and induced impacts of universities on local economies. Some colleges and universities measure only the direct impacts on their communities. New Hampshire Higher Education, for example, publicizes the number of degrees awarded, direct employment, and the direct impact of its affiliated institutions on the New Hampshire economy. Direct economic impact is measured as the total value of volunteer hours, capital expenditures, institutional financial aid, student and family expenditures, salaries, wages and benefits, and annual operating budgets (NHCUC, 1999).

When multiplier studies are conducted, the methodology is often not revealed, perhaps to insulate the authors from criticism. A study conducted by Bowling Green State University on the impact of Ohio's public universities on Ohio's economy, for example, cited three unpublished studies: a 1992 Cleveland State University economic impact study which found an employment multiplier of 40; a 1992 University of Minnesota study which found an employment multiplier of 45; and a 1992 North Carolina at Chapel Hill study utilizing a multiplier of 38.61. Bowling Green State's study utilized an employment multiplier of 40 and an output multiplier of 2. Commonality of use was the justification for the multipliers used (Bowling Green State University, 1996). The scope of these studies was statewide, rather than local. Colleges and universities have an interest to inflate their economic impact since they are subject to political scrutiny and dependent on public funding. Thus, the use of available state-level or national multipliers is often preferred because they are larger.

Other regional economic studies conducted by colleges and universities discovered multipliers that are in line with our estimates, but the smallest level of analysis was typically at the county level. For example, a study conducted by the Terry College of Business (1999) on the economic impact of the University of Georgia on the Athens Area, showed a local output multiplier of 1.44 and an employment multiplier of 10.41. The University of Alabama's Center for Business and Economic Research estimated an expenditure multiplier for its county (Tuscaloosa) of 1.5 (Federal Reserve Bank of Atlanta, 2000).

Student spending in the local economy can be significant and have a ripple. The study of the University of Alabama found that about 41 percent of its total output impact was generated by student expenditures. In Tuscaloosa county alone that accounted for \$254 million. The University of Florida

estimated that about 14 percent (\$263 million) of its total output was spent by its off-campus students (Federal Reserve Bank of Atlanta 2000).

Universities attract visitors for cultural events, concerts, sporting and athletic events, graduations and commencements, open houses, alumni weekends, academic and business conferences, and educational programs. These visitors spend money locally and expand the economic output in the area. The University of Florida estimated that about \$19 million was sent by visitors in 1993-4. Much of this amount stayed in the Gainesville area and most of it (95 percent) stayed within the state (Federal Reserve Bank of Atlanta, 2000).

The State University of New York at Oneonta has used increasingly sophisticated methods to estimate its economic impact. The previous studies used general multipliers developed by the U.S. Department of Commerce, Bureau of Economic Analysis, to measure the impact of education institutions. The studies, therefore, used an output multiplier of 2.1 and an employment multiplier of 40.1. The present study provides more conservative estimates because it accounts for leakages into savings, imports and taxes. Using IMPLAN methodology, the present study finds an output multiplier of 1.33 and an employment multiplier of 24.6 for Oneonta, and regional output and employment multipliers of 1.47 and 25.9, respectively, for the tri-county area around Oneonta.

Only one known study, conducted for James Madison University (1999), investigated the impact of a university on the local and regional economies using IMPLAN. The study found a regional output multiplier 1.59 and a state output multiplier of 2.17. It also found that for each million dollars of additional institutional spending by the university, 23 jobs are created in the county and 33 jobs are created in the state.

Many universities also focus on their qualitative contributions to the economy. For example, Bowling Green State University focuses, in part, on the positive impact it has on workforce development, sponsored research, and the standard of living. Using U.S. Census Bureau reports, the university argues that college graduates make about \$12,000 a year more than high school graduates. The Federal Reserve Bank of Atlanta (2000) cited a study by the University of Alabama that made a similar argument: lifetime earnings increase by \$409,000 for a bachelor's degree, \$540,000 for a master's degree, and \$777,000 for a doctorate degree. By creating college graduates, therefore, colleges and universities increase the standard of living in and future tax base of their communities. Other intangible benefits include availability of educated and skilled labor, access to advanced technologies, and a host of cultural and sporting events.

Universities have the potential to improve the social conditions of their localities. The State University of New York at Oneonta, for example, emphasizes its contributions to the quality of life in its community through recreational sites, availability of a library, contributions to non-profit organizations, the presence of various training programs, and a variety of cultural events. In small communities with limited resources, such contributions enhance the lifestyles of the residents.

While many benefits accrue to communities hosting colleges and universities, there are costs associated with these benefits. Colleges and universities may have an adverse impact on revenues because they require a heavy investment in infrastructure and higher spending on public goods but are tax exempt (Federal Reserve Bank of Atlanta, 2000). University students incur not only the costs of attending college but also the opportunity costs associated with lost earnings. Other negative externalities include increases in noise pollution, environmental pollution, and crime. As a whole, however, studies have shown a significant positive economic impact of colleges and universities on the surrounding communities (Federal Reserve Bank of Atlanta 2000).

V. INSTITUTIONAL DATA COLLECTION

Our team collected output and employment data from the Institution for academic year 1999-2000 and used IMPLAN to provide estimates for the output and employment multipliers. The study examines the College as an institution that encompasses the following two areas:

- **The College's state operating budget** which includes all funds received as a result of tuition payments, room and board fees, and associated state aid for College operations (e.g., utilities).
- **The College's affiliated operations** which include the Alumni Association, College Foundation, Facilities and Physical Plant Department, Organization of Ancillary Services, Research Foundation, Student Association, and SUCO Children's Center. For each of these economic components of the College, the study examined budgetary (e.g., expenditures) and employment information.

For each economic component in the model, information was collected on mission, funding sources, total operating budget, number of paid staff, salaries of staff, and total non-personnel expenditures (e.g., supplies and equipment) made within the specified study area. All expenditure and employment data collected for this study was for fiscal year 1997-1998, which was the most recent year for which complete information was available.

In most instances, administrators were able to provide detailed financial information based on budgets and annual reports. However, in a few instances, due to an inability to sort purchase orders or to track subcontractors, administrators were only able to provide estimates. A detailed summary of the salary totals, non-personnel expenditure totals, and the total monies expended in the study area by economic component is provided in Table 2 below.

Table 2: Total Direct Expenditure Impact

Economic Component	Total Expended in Greater Oneonta Area
Alumni Association	\$ 137,379.66
The College Foundation	\$ 263,236.00
Facilities & Physical Plant: Capital Projects Dept.	\$ 1,000,000.00
Organization of Ancillary Services	\$ 3,991,403.00
The Research Foundation	\$ 1,704,530.14
State Operating Budget	\$ 28,030,617.88
Student Association	\$ 460,862.30
SUCO Children's Center	\$ 642,234.00
Sub Total	
	\$ 36,230,262.98

The following are short explanations of the economic components of the College at Oneonta. Information was collected for these components with respect to their expenditure and employment impact within the study area termed the greater Oneonta area (i.e., Chenango, Delaware, and Otsego Counties).

The Alumni Association of the College at Oneonta

The Alumni Association's mission is to "actively and effectively promote interest, support, pride, and awareness of the College at Oneonta alumni, faculty, staff, and friends." The Alumni Association sponsors fund raising activities and events on behalf of the College through a variety of means including an annual phonathon, matching gifts programs, general mail appeal, undergraduate alumni fees, investment income, and other miscellaneous programs. From these sources the Alumni Association derives its operating budget. The Alumni Association also sponsors (and cosponsors) many special events such as Reunion Weekend, Parents' Weekend, receptions, and lectures that bring thousands of visitors to the campus throughout the year. Some of these visitors utilize local services including motels, restaurants, and general business services. However, the magnitude of this important economic impact on the study area was not measured in this study.

State University College at Oneonta Foundation

The mission of the State University College at Oneonta Foundation Corporation is to raise and administer gifts and grants to enhance the academic status of the College through endowment, scholarships, and institutional programs. The Foundation administers the College's endowment, which totaled \$9,700,000 in fiscal year 1997-1998, and awarded over 400 endowed and annual scholarships.

Facilities and Physical Plant Department: Capital Projects Budget

The Facilities and Physical Plant department manages, constructs, repairs, and maintains campus facilities on the College campus. The department conducts many of these activities by means of funding provided through the college capital projects budget. The college capital projects budget is funded through a variety of sources including the State University Construction Fund, Dormitory Authority of the State of New York, private donations (generated from fund raising activities conducted by the Alumni Association, the College Foundation, and the College Advancement office), and other state financing programs.

Organization of Ancillary Services

The Organization of Ancillary Services is a not-for-profit corporation which operates under a contract with the College at Oneonta to provide dining services, college retail and textbook store operations, debit card services for meals and identification, vending and copying services. The funding to operate the Organization of Ancillary Services is generated from monies collected from student dining plans and revenue from sales generated by college stores, vending and copying machines.

The Research Foundation of SUNY at Oneonta

The mission of the Research Foundation of the College at Oneonta is to "coordinate, communicate, and work with grant personnel to achieve the objectives of their grants; provide effective and efficient service to grant personnel; and to ensure that the grants are operated within the constraints of the Research Foundation and sponsor regulations, and policy guidelines." The Research Foundation receives its funding through administrative overhead charges assessed on grants and contracts.

The economic impact of the Research Foundation occurs in two ways. First, Research Foundation staff members administer the grants and contracts acquired by personnel of the College (e.g., faculty grants) and the Foundation (e.g., ESCORT Program). Second, many of the grants and contracts administered by the Research Foundation implemented in the study area have salary and non-personnel expenditures (e.g., supplies and equipment). Other grants and contracts administered by the Research

Foundation are implemented outside the study area in New York State and throughout the nation and are not included in this study.

State Operating Budget of the College at Oneonta

The mission of the College at Oneonta is to "foster the individual student's intellectual, personal, and civic development. The College is dedicated to excellence in teaching, advisement, and scholarly activities, and the cultivation of a campus environment rich in opportunities for participation, personal challenges, and service."

The employment generated by the College's state operating budget totals 825 jobs with 717 of these jobs (or 86.9%) being filled by persons who reside in the greater Oneonta area. The total payroll for these 717 employees total \$23,361,467. The College expended \$4,669,150 in non-personnel expenditures (e.g., supplies and equipment) during the 1997-1998 fiscal year. In summary, the total state operating budget of the College in 1997-1998, including salaries and non-personnel expenditures in the study area, was \$28,030,617, which accounted for 69.8% of the total state operating budget.

Student Association of the College at Oneonta

The Student Association is a separate entity within the College with 501(c)(3) non-profit status with a Board of Directors consisting of students elected by the student body. The Student Association's mission is to provide support for a variety of academic and social activities (e.g., lectures and concerts), student transportation services (e.g., Oneonta Public Transit), newspapers, a radio station, and athletics for the benefit of the students attending the College at Oneonta. The Student Association receives its funding from student activity fees paid by students as part of the cost of attending the College.

The SUCO Children's Center

The SUCO Children's Center is a separate entity within the College with 501(c)(3) non-profit status. The mission of the SUCO Children's Center is to provide on-site childcare to children of SUNY students and state employees. The Center also cares for children from the local community, as space is available. The Center derives its operating budget from a number of sources including: (1) tuition from the parents of children who use the facility; (2) Federal Block grant funds for day care; (3) a grant from the College at Oneonta for general operations; (4) a grant from the United Way of Delaware & Otsego Counties; and (5) other government grants.

VI. RESULTS

The study areas for the project were Oneonta and the region constituting Chenango, Delaware, and Otsego Counties. Table 3 below shows the total impact of the Institution on the two study areas as determined by the IMPLAN analysis. Institutional spending has a total annual economic impact of about \$30.6 million on Oneonta and \$53.4 million on the greater Oneonta area. IMPLAN calculated an output multiplier for Oneonta of **1.33** and an employment multiplier of **24.6**. The output multiplier measures the total value added to the local economy that results from the operation of the Institution and its effect on the overall economy. The employment multiplier measures the additional employment in the local economy that supports the Institution's economic activity. For the greater Oneonta area, the output and employment multipliers are **1.47** and **25.9** respectively. As a result, for every \$1 million of spending by the Institution, 24.6 jobs are created in Oneonta, or a total of 25.9 jobs in the greater Oneonta area. Thus, most of the new jobs created by Institutional spending in the tri-county area will be located in Oneonta.

As Table 3 below shows, the indirect and induced employment impact of Institutional spending creates approximately 1,386 jobs in the greater Oneonta area. As a result, when the direct employment (1,101), indirect employment 92, and induced employment 193 are combined, the total employment impact rises to 1,386.

TABLE 3: Economic Impact of the Institution on the Regional Economy

	Oneonta	Greater Oneonta Area
Output		
Direct	\$22,933,554	\$36,230,262.98
Indirect	\$4,096,880	\$6,005,326
Induced	\$3,559,253	\$11,197,119
Total	\$30,589,686	\$53,432,707.98
Employment		
Direct	621	1,101.0
Indirect	63	92
Induced	68	193
Total	752	1,386

The economic and employment multipliers for the greater Oneonta area are larger than for Oneonta because of economic spillovers. Some of the Institution's spending spills over to adjacent locations because, for example, some employees reside there or because these locations provide travel corridors for students and their families. However, as Table 3 shows, the indirect economic impact in the Oneonta area is slightly greater than in the greater Oneonta area due to the more complex business and industry linkages in Oneonta. The induced economic impact is higher in the greater Oneonta area since this measure captures the economic impact on households – the largest number being in the greater Oneonta area.

Results of the IMPLAN analysis reveal that only a modest amount of the Institution's economic activity spilled into surrounding areas. About 57 percent of the total economic-output impact on the greater Oneonta area is localized in Oneonta and over 56 percent of jobs were created in Oneonta. These numbers are obtained by dividing the total impacts of Oneonta by those of the greater Oneonta area (see Table 3). The economic leakages to surrounding counties are small. Clearly, the Institution has a very significant impact on Oneonta's job creation capabilities and prospects for future economic growth.

Industries Most Affected by Institutional Spending

While the total impact of the Institution's spending is a useful measure of economic impact, not all industries are affected to the same degree by institutional spending. To examine the economic impact at the industry level, it is possible to specify the industries that are significantly affected by the Institution's spending. The selection of the top 10 industry sectors was used to decide which industries to present in this report.

Table 4 below shows the total output impact affecting industry sectors in the greater Oneonta area and Oneonta. In both study areas the industry sectors with the greatest total output impact includes: construction, retail trade, and health services.

Table 4: Total Output Impact for Selected Industries affected by Institutional Spending

Industry	Oneonta Area ¹	Industry	Greater Oneonta Area ¹
Construction	\$1,597,483	Retail Trade	\$2,881,349
Retail Trade	\$1,014,908	Construction	\$2,400,654
Health Services	\$776,962	Real Estate	\$1,984,955
Professional Services	\$538,296	Health Services	\$1,759,751
Wholesale Trade	\$519,262	Banking	\$727,027
Real Estate	\$338,162	Professional Services	\$590,204
Banking	\$284,215	Insurance Carriers	\$545,350
Communications	\$277,665	Communications	\$542,354
Business Services	\$247,504	Wholesale Trade	\$528,937
Utilities	\$165,479	Printing & Publishing	\$495,216

¹Total output created includes both indirect and induced

With regard to employment impact, only those industries that generate at least 4 jobs due to Institution spending are reported in Table 5 below. In the greater Oneonta area those industries where the greatest numbers of jobs are created include: retail trade (85.7), construction (42.1), and health services (30). In the Oneonta area, the same 3 industries are also most affected including: retail trade (31.2), construction (28.5), and health services (12.1).

Table 5: Total Jobs Created for Selected Industries Affected by Institutional Spending

Industry	Total # of Jobs Created in Oneonta Area ¹	Industry	Total # of Jobs Created in Greater Oneonta Area ¹
Retail Trade	31.2	Retail Trade	85.7
Construction	28.5	Construction	42.1
Health Services	12.1	Health Services	30
Professional Services	8.6	Business Services	11
Utilities	7	Social Services	10.4
Personal Services	4.6	Personal Services	9.3
Business Services	3.9	Professional Services	8.9
		Real Estate	8.6
		Nonprofit Organizations	7

¹Total jobs created includes both indirect and induced

Tax Analysis

Because the Institution is a state-operated organization funded partially by taxpayers, it is important to examine the tax implications of Institutional spending. The Institution spends funds on labor, capital, and land as well as on other industries. These income-generating industries provide a tax base for government. It is estimated that the Institution provides tax revenues of about **\$8.26 million** for government. About 15.5 percent of Institution spending returns to government in the form of taxes with a significant portion of them being federal and state income taxes. State and local governments collected approximately \$2.3 million in tax receipts. Table 6 below shows the tax impact of Institutional spending by source.

Table 6: Tax Impact of Institutional Spending

Tax Impact	Amount of Tax Revenues
Household Expenditures	\$3,472,630
Employee Compensation	\$3,357,672
Indirect Business Taxes	\$952,190
Corporations	\$375,789
Proprietary Income	\$100,907
Total	\$8,259,188

VII. CONCLUSIONS AND DISCUSSIONS

To summarize, the Institution accounts for about \$30.5 million of economic output (e.g., sales) and about 752 jobs in Oneonta and \$53.4 million and about 1,386 jobs in the greater Oneonta area. Every \$1 million of spending by the Institution creates 24.6 jobs in the Oneonta area and 25.9 jobs in the greater Oneonta area. Each one dollar of Institutional expenditure creates an additional .47 cents of expenditure in the greater Oneonta area. The Institution accounts for some of the demand for key industries such as real estate, business services, banking, health services, insurance services, and construction.

The IMPLAN model shows that Oneonta (City and Town) is the focal point of economic activities affected by Institutional spending in the greater Oneonta area, both from the standpoint of output and employment. The IMPLAN model derived a local multiplier of 1.33, which estimates that every dollar spent by the Institution is responsible for additional \$0.33 expenditure on goods and services in Oneonta. Retail trade, construction, and health services are the three largest regional beneficiaries of the SUNY Oneonta. The college also supports the banking and financial industry, the real estate market, and professional services.

Approximately 15.5 percent of the Institutional spending returns in the form of taxes to federal, state and local government agencies. Taxes on employee compensation, proprietary income, household expenditure, corporations, and indirect business taxes derived from Institutional spending amounted to about \$8.3 million.

Given the impact of SUNY Oneonta on the regional economy, there is a strong economic interdependence between the Institution and Oneonta. Expansion by the institution is contained in the area, partly through induced employee spending, which spurs economic development in various consumer services. As the City and Town continue to develop economically as the regional hub for retail, medical, and professional services, leakages should be reduced on the value of the local multipliers should be increased (since less import will be needed). Thus, the region can benefit even more from the Institutional spending, and the region can become more attractive to various Institutional stakeholders, such as students and faculty, and variety of other industries.

The larger question is: what is the economic impact of the SUNY system on the State of New York, the regional economy, and national economy. Since SUNY is one of the biggest University systems in the world, with a tremendous student population, many areas of expertise, and geographically diverse locations, the economic impact is likely to be substantial. To make an analogy: The Georgia University System, which consists of 34 institutions, generated a total state output impact of \$4.5 billion, about 2 percent of Georgia's gross state product (Federal Reserve Bank of Atlanta, 2000). Such a study can be of interest to public policy researchers, administrators, and government officials. Since state universities are often dependent on State public money, they need to demonstrate their contribution to the taxpayers.

VIII. LIMITATIONS

There is reason to believe that the upside impact of Institutional spending is greater the downside potential. We attribute this hypothesis to the fixed costs associated with running the organization, which by definition do not change proportionately with output. For example, the university cannot easily adjust the number of full-time faculty because many of them are tenured or tenured-tracked. Furthermore, unions are likely to block an attempt to reduce employees pay even in times of budget cuts. As such, the employment and induced impact of households' income is affected minimally by a decrease in the university's budget. The IMPLAN model is unable to capture this affect because of the constant return to scale assumption.

While the IMPLAN analysis is useful in estimating the economic impact of the Institution in the study area for a specific fiscal year, it does not provide a complete understanding of the Institution's total economic impact in the long run. This is because IMPLAN is a static-equilibrium model that is unable to capture dynamic effects. For example, the Institution can supply the local and regional economy with a relatively young and educated labor force at a time when labor markets are becoming increasingly tight. Also, the possibility of innovation or entrepreneurship is ignored in the IMPLAN model. This is potentially one of the largest economic benefits to a region in the long-term. An educational institution provides many of the resources needed by entrepreneurs as well as a promising environment for business growth through its employment and student population base.

We found that for some industries the local multipliers were greater than the regional multipliers. This situation was paradoxical because a given spending in Oneonta created a greater impact on output and employment in Oneonta than it did for the entire three-county area. The finding seemed theoretically illogical, at first, because the more imports are internalized into the region, the larger the multipliers should be. The way the data is regionalized causes this paradox. Because the regional purchase coefficients (RPCs) of larger areas are averages of the locations they constitute, an industrial location can have a local RPC that is greater than that of its region, resulting in a greater impact for each dollar spent (IMPLAN 1997). We resolved this paradox by segregating spending by location. Even though the multiplier for a given expenditure was greater in Oneonta for some industries, the total dollar and employment impact was greater at the tri-county level.

REFERENCES

- Bowling Green State University (1996), *Ohio's Education Portfolio*, Columbus: Inter-University Council of Ohio.
- Federal Reserve Bank of Atlanta (2000), "Higher Education Translates Into Big Business: The Unique Economies of University Towns," *EconSouth*, (Second Quarter), 8-13.
- Goodman, Robert and Edward Feser (2000), "Understanding the Economic Impact of Casinos I Missouri," retrieved 3-18-2000, www.usgri.org/miss.html.
- IMPLAN (2000a), "Elements of the Social Accounting Matrix," Technical Report TR-98002, retrieved 3-18-2000, www.implan.com/reports.
- IMPLAN (2000b), "BEA / RIMS data versus IMPLAN," retrieved 3-15-2000, www.implan.com/reports.
- IMPLAN (1997), "Why Are County Multipliers Larger Than State Multipliers," KBID # 20029, (October 31), retrieved 2-11-2000, www.implan.com/knowledgeBase/DisplayArticle.asp?KBID=20029.
- James Madison University (1999), "The Economic Impact of James Madison University on the Harrisonburg/Rockingham County Area and the Commonwealth of Virginia," retrieved 9-20-1999, www.jmu.edu/instresrch/resrchstud/economic/econimpt.htm.
- Leontief, Wassily (1953), *Studies in the Structure of the American Economy*. New York: Oxford University Press.

- Minnesota IMPLAN Group (1999). *IMPLAN Professional Version 2: Social Accounting & Impact Analysis Software*, Stillwater: MIG.
- NHCUC (1999), "Economic Impact '99: New Hampshire Higher Education Creates \$2.25 billion Economic Base," retrieved 3-18-2000, www.nhcuc.org/economic.htm
- NRCS (2000), "Current NRCS IMPLAN case studies," retrieved 3-18-2000, <http://waterhome.brc.tamus.edu/NRCSdata/implan/>
- Terry College of Business (1999), "Economic Impact of the University of Georgia on the Athens Area," *Georgia Business and Economic Conditions*, Selig Center for Economic Growth, University of Georgia.

REFEREES

1. Joseph Cheng
2. Jason Hecht
3. Barbara Howard
4. Elia Kacapyr
5. Michael McAvoy
6. John Piccione
7. F. Pan Shu
8. Wade Thomas
9. Martha Wojtowycz

NEW YORK STATE ECONOMICS ASSOCIATION (NYSEA)

53rd ANNUAL CONVENTION

FINAL PROGRAM

Fulton-Montgomery Community College
Johnstown, New York
October 13-14, 2000

Friday, October 13

8:00-10:00 PM

NYSEA Convention Opening Reception
Holiday Inn, 308 N. Comrie Ave.

Introduction: Peter Pasqualino, President, NYSEA

Welcome: Dr. Joseph Bulmer, President
Fulton-Montgomery Community College

Saturday, October 14

8:30-10:30 AM

Convention Registration & Continental Breakfast
(Classroom Bldg., Room 108, FMCC)
Compliments of Fulton-Montgomery Community College Foundation
Pick up final program, receipt/register, location directions, name tags.

8:30 am-2:30 PM

Textbook Display/Exhibits,
(Classroom Bldg., Room 108)

8:45 AM

Sessions Begin

10:45-11:00 AM

Break

10:45-11:45 am

Plenary Session

12:00-1:15 pm

Luncheon, Student Union
Compliments of Fulton-Montgomery Community College Foundation

Speaker: Marc Lieberman, Clinical Associate Professor of Economics,
New York University, *"Understanding the US Trade Deficit: the real story"*

Afternoon refreshments, Classroom Bldg., Room 108
Compliments of Fulton-Montgomery Community College Foundation

1:30 pm

Sessions Resume, Classroom Bldg.

Afternoon refreshments (Classroom Bldg., Room 108)
Compliments of ITP Southwestern Publishing

3:15-4:15 PM

NYSEA Business Meeting (Classroom Bldg., Room 106)

SESSION

9:00-10:30 AM LAW & ECONOMICS

Chair: Barbara Howard, SUNY Geneseo

"A Discursive Approach to Law and Economics," by Deborah Spencer,
SUNY Cortland

Discussant: Alfred M. Lubell, SUNY Oneonta

"Structured Judgments in New York State," by Ronald R. Reiber, Canisius College

Discussant: Wade Thomas, SUNY Oneonta

"Effects of the Federal Income Tax Deductions for Uninsured Losses" by
Joseph G. Eisenhauer, Canisius College

Discussant: Barbara Howard, SUNY Geneseo

SESSION

9:00-10:30 am HEALTH, EDUCATION, AND WELFARE

Chair: A. Dale Tussing, Syracuse University

"How Does the Termination of Parental Rights Impact Foster Care Dependence?"
by Kelly Noonan, Rider University, and Kathleen Burke, SUNY Cortland

Discussant: J. Dennis Chasse, SUNY Brockport

PLENARY SESSION

10:45-11:45 am WEB-BASED COURSES

Presented by: Prentice Hall Health and Welfare

SESSION

1:30-3:00 pm ECONOMIC EDUCATION

Chair: Joseph G. Eisenhauer, Canisius College

"What Should Economists Teach? Results of a Pilot Survey," by J. Dennis Chasse,
Charles Callahan, III, and Baban Hasnat, SUNY Brockport

Discussant: Mark L. Wilson, University of Charleston

***"Transfer Student Performance at a Comprehensive University: Results from
Introductory Economics Classes"*** by Mark L. Wilson, University of Charleston, and
Joachim Zietz, Middle Tennessee State University

Discussant: Charles Callahan, III, SUNY Brockport

***"Student Performance in Intermediate Microeconomic Theory: Does 'Diligence'
Matter?,"*** by William P. O'Dea, SUNY Oneonta

Discussant: Ronald R. Reiber, Canisius College

SESSION

1:30-3:00 pm **INDUSTRIAL ORGANIZATION—A TERM PROJECT**

Chair: F. Pan Shu, SUNY Potsdam

"An Industry Study Term Project," by F. Pan Shu, SUNY Potsdam

Discussant: Richard C. Insinga, SUNY Oneonta

"An Industry Study of the SIC 3651: 1997-1999," by Brian Maclutsky and David Pringle, SUNY Potsdam students

Discussant: Susanne Polley, SUNY Cortland

SESSION

3:15-4:15 pm **HISTORIC STRUCTURAL CHANGES IN THE US AND RUSSIAN ECONOMIES** **Chair:**

Richard C. Insinga, SUNY Oneonta

"The Lessons of Prohibition," by J. Dennis Chasse, SUNY Brockport

Discussant: David Ring, SUNY Oneonta

"Eight Years of Transition in the Russian Economy: The Emerging Private Sector," by Richard C. Insinga, SUNY Oneonta, and Tatyana V. Zelenskaya, Higher Business School, Russia

Discussant: F. Pan Shu, SUNY Potsdam

SESSION

3:15-4:15 pm **TOPICS IN APPLIED MICROECONOMICS**

Chair: Charles Callahan III, SUNY Brockport

"Earnings Premiums of Women and Minorities," by Robert Jones, Skidmore College

Discussant: Kelly Noonan, Rider University

"Regional Diversification and Economic Growth: A Portfolio Analysis" by Richard Dietz, Federal Reserve Bank of New York

Discussant: William P. O'Dea, SUNY Oneonta

N Y S E A