THE NEOCLASSICAL MODEL, CORPORATE RETAINED EARNINGS, AND THE REGIONAL FLOWS OF FINANCIAL CAPITAL

RePEc:wpa:wuwpur:0410007 - 2004-10-27

Stanley C. W. Salvary, Canisius College

ABSTRACT

Regional capital expenditures, which reflect regional flows of financial capital, are a function of the aggregate of individual firms' behavior. Hence, the allocational efficiency of the regional flows of financial capital may be affected by the manner--internal versus external--in which financial capital becomes available to manufacturing firms. Allocational inefficiency could obtain since corporate retained earnings - funds that are internally available to large firms - are only minimally subject to the market rationing process. Even though the capital market is cleared, it may do so without providing for the efficient allocation of financial capital. The existence of differential rates in regional financial markets may reflect the costs associated with the use of funds in a truncated or discontinuous national capital market. Accordingly, equilibrium experienced in the capital market may exist under non-Paretian conditions.

This paper attempts to determine whether the allocation of regional financial capital flows is efficient as suggested by the neoclassical model (NCM). Specifically, the study attempts to ascertain whether the corporate retained earnings model (CREM) is a good predictor of the regional flow of financial capital. In line with the NCM, it is hypothesized that regions *with high growth rates of annual manufacturing value added (Mgs) experience low annual capital investment-output ratios (ACIs) and low variability in financial capital flows (low variability of annual capital investment-output ratios - VACIs).* As per the CREM, it is postulated that regions *(states) with high growth rates of annual manufacturing capital expenditures (Cgs) experience high ACIs and high VACIs.* Surrogate measures of financial capital flows and the volatility of such flows were used. The test results, which may not be generalizable beyond the study period, suggest that the CREM may be a better predictor of the regional flow of financial capital than the NCM and that the financial capital rationing process for regional manufacturing investments may be inefficient. The finding, that corporate earnings retention influences the flow of financial capital, does suggest that the NCM does not always hold. This study should enhance the understanding of regional flows of financial capital and the “state-region” and “industry region” models used in the study refine and extend the scope of regional economic analysis.

INTRODUCTION

Since annual manufacturing capital expenditures within the US regions represent investment decisions made at the margin, they are subject to the neoclassical prediction that regional flows of financial capital are guided by marginal rates of return. This research attempts to determine whether the spatio-temporal flows of financial capital, among the various economic regions of the US, adhere to the neoclassical prediction. It is argued in this study that: *The flow of financial capital reflected in regional manufacturing investments is in part determined by a sub-par marginal rate of return. Thus, regional manufacturing growth, which is a function of investment, may not be predictable using the neoclassical marginal* *analysis*. While operating in accord with a rationing process, equilibrium in the capital market does not imply an efficient allocation of resources. Therefore, an economy may not experience Pareto-Optimality despite the fact that it may enjoy equilibrium. It can be deduced that equilibrium in the US economy can and does exist under non-Paretian conditions.[1]

The capital availability model advanced in this paper (See Exhibit 1) *is one in which all financial capital regardless of location is considered as part of the national pool of available financial capital. Financial capital from each region within the economy flows to the national pool, then an allocation of the financial capital pool occurs. In which case, some regions experience net financial capital inflows and others experience net financial capital outflows.* Essentially, the flow of financial capital--from the national pool to a region--is represented by the amount of financial capital which is available to that region at any given time for investment. The fact that some firms operate only in one region does not mean that those particular firms are restricted to investing in only one region. While a firm may choose to reinvest (by replacing worn out physical facilities or expanding existing facilities), it does have the option as any other firm to invest in other regions. For instance, should there be an increase in the wage rates in a region relative to the nation, that firm might shift production to another region; that is, new investment would be undertaken away from the plant in the high-cost area.

EXHIBIT 1

THE CORPORATE EARNINGS MODEL (CEM)

EVENT	CHARACTERISTIC
Origination of Retained Earnings	Corporate income earned within the various industry regions and reported by corporations domiciled within the various state regions.
Collection of Financial Capital	Corporate income from the state regions give rise to (flow into) the national pool of financial capital.
Distribution of Financial Capital	Corporate investment decisions in the industry regions.
Destination of Financial Capital	Corporate investment in plant assets are located in the state regions.

Manufacturing capital expenditures, which imply the availability of financial capital which in turn represents the flow of financial capital, represent but one segment of the total financial capital available to regions for investment. The *industry regions* selected for study are those regions in which one of three industries (Food - SICC 20); Chemical - SICC 28; or Electrical - SICC 36) is the *dominant industry* - the driving force of the *state regions*. The manner in which the industry regions were selected - significant contribution to U.S. manufacturing and wide dispersion of the industry throughout state regions [Salvary 1977] - precludes any selection bias.[2] Consequently, the role of the *state region* economy in terms of the plant investment decision of the *dominant industry* can be examined given the availability of corporate income from all industries in the *state regions*. Basically, growth of corporate income in a state region and growth in the output of the region's dominant industry should result in increased investment in plant assets in the state region. However, the model of financial capital flows, advanced in this study, is affected by frictions.

Model Frictions

As reported in the section: "Corporate Sources and Uses of Funds" in the *Statistical Abstract of the United States* [1969;1979;1990], over the thirty-two year period (1960-1991) a very significant portion of new investment is internally financed. From 1960 through 1971, internally generated funds amounted to $52.7 billion and externally secured funds amounted to $33.2 billion on average of total financing. For the period 1960 through 1991, the lowest portion of total capital expenditures financed by internally generated funds was 77.2% in 1970; the highest portion of this source of financing was 124.1% in 1963 (Appendix A). The role of corporate earnings retention--internally generated funds--as the primary source for financing of manufacturing capital expenditures is a continuing trend as earlier works have emphasized [Rumelt 1974; Sherman 1968; Brittain 1966; Donaldson 1961; Cottle and Whitman 1959; Meyer and Kuh 1959; Drobovolsky 1951; Lintner 1949]. Use of internally generated funds has a significant effect on the rationing of financial capital, because this financing is only minimally subject to the scrutiny of the capital market [Rumelt 1974,155; Donaldson 1961,51-52].

The neoclassical prediction holds that the flow of financial capital is directed by ex-ante/ex-post marginal rates of return. *In this study, it is argued that the source of the funds--internal vs external--influences the allocation process.* Given the preponderance of internal financing, only a small portion of available investment funds flows through the primary capital market in search of investment opportunities; thus, the neoclassical prediction may not hold. If one accepts that this residue of investment funds is efficiently allocated, then one is left with the possibility of inefficient allocations resulting from the bigger portion of investment funds - the internally generated funds. So even though the capital markets are cleared, allocation of financial capital may not be in accordance with the neo-classical model. If that condition holds, then manufacturing investment patterns within the U.S. economy may not reflect an efficient allocation of financial capital.

In this study, the test for allocational efficiency focuses on the marginal rate of return as the factor which guides the flow of financial capital as captured by regional manufacturing investments.[3] Variables (e.g., regional interest rates, rate of unionization, change in tax rates, education, and infrastructure) may influence the flow of financial capital and produce differentials in regional manufacturing capital investments [Garofalo and Malhotra 1992; Moomaw and Williams 1991]. Since frictions [Wheat 1986; Blair and Premus 1987; Bartik1991] in state regions (e.g., income tax, per capita income, unemployment, and public spending) may produce manufacturing growth disparities among the various regions in the U.S., tests were conducted using these variables to minimize the confounding effects that can be attributed to them.

Due to the fact that the economy has experienced institutional (e.g., foreign direct investment in the 1980s)[4] and technological changes, it is possible that studies covering different time periods may reflect a different picture for each period; thus, this study's results may not be generalizable beyond the study period. While new and different industries may replace older industries, policy implications would not be affected since the focus is on the efficiency of the flow of financial capital as suggested by the neoclassical model. The rest of this paper consists of six sections: Prior Research, Testable Hypotheses, Data, Methodology and Variables, Empirical Tests of Hypotheses and Results, Effects of Potentially Confounding Variables, Implications, and Summary and Conclusion.

PRIOR RESEARCH

In an extensive review article which was in great part a critique of the neoclassical model, Gertler [1984] maintained that, based on both empirical and theoretical works, financial capital flows are not sensitive to interest rate differentials; that is the flow of financial capital is not truly responsive to the price mechanism. Thus, financial capital does not necessarily flow to the highest available return. Also, in a mathematically elegant theoretical work built around two regions, Webber [1987,73] concluded that "net flows of capital do not imply an absence of equilibrium nor are those flows necessarily in the direction of the region offering the greater return." Webber [1987,74] called for empirical investigation to determine whether changes in the location of production are induced by changes in the relative profitability of production in regions.

The empirical evidence (Appendix A) is quite clear that internal financing is a major source of capital expenditures. A priori there is no reason to believe that internal financing will not satisfy marginal theory according to the neoclassical model. Nevertheless, corporate retained earnings constitute captive funds which are insulated from the capital market rationing process. The absence of those funds from the general rationing process truncates the marginal efficiency of capital curve (MECC); as such, it becomes discontinuous if corporate retained earnings finance investments projects that are not in harmony with the MECC. Arguments in support of inefficiency have been presented by Rumelt [1974], Williamson [1970], and Donaldson [1961]. These researchers maintain that: (1) firms with large amounts of internally generated funds are not aware of the most profitable options; (2) even if they are aware, they are not in a position to take advantage of such options; and (3) the securities market does not act as a corrective device in those cases.

An empirical study, covering the 1970s and 1980s, supports the earlier findings on the 1950s and 1960s that large corporations earned lower rates of return on earnings retained than on externally secured funds [Mueller and Reardon 1993,450]. Opler et al. [1999, 35], who focused on publicly traded U.S. firms from 1971-1994, found that firms with high excess cash spend more on acquisition of other business and have higher capital expenditures, regardless of whether or not they had good investment opportunities. Harford's [1999,1995] finding, that firms which had accumulated large amounts of cash reserves made value decreasing business acquisitions, supports Opler et al. [1999]. *Emerging from this stream of empirical research is the "corporate retained earnings" model (CREM), which may be a better predictor of regional financial capital flows than the "neoclassical" model (NCM), if it can* *be demonstrated that internal financing impedes the flow of financial capital to regions with higher marginal rates of return.*

While both models may converge, they do differ in terms of the criteria for investment. The NCM posits that there is a *universal investment opportunity set* (UIOS) and financial capital will flow in search of the *'best'* investment opportunities within that set. The CREM posits that the firm has captive funds and *the firm's search is limited* to its own opportunity set and it would invest in all projects with positive net present values. However, the *firm's investment opportunity set* (FIOS) is but *a subset* of the UIOS. Assume that Firm A's FIOS contains opportunities with returns that are less than Firm B's FIOS. Assume further, the financial capital requirements of both firms (A and B) are equal and that all opportunities for both firms satisfy the minimum test for investment. Assume on one hand, that the CREM is in place, there is limited financial capital available, and that firm A has more retained earnings than does firm B and all its investment projects are less profitable but more riskier than B's projects. In this setting, firm A can fund all its projects while firm B can only obtain funds (externally and internally) for fifty percent of its projects. Assume on the other hand, that the NCM is operational, corporate earnings retention is non-existent, and the best returns will be funded first. In this situation, since all of firm B's projects are expected to generate higher risk-adjusted rates of return than those of firm A, then all of firm B's projects would be funded whereas only part of firm A's projects would be funded.

The difference between the two models is that the allocation of financial capital, in the case of the NCM, is on the basis of *a universal efficiency test*; in the case of the CREM, allocation is on the basis of *a local minimum profitability test*. A minimum profitability (cost of capital) is adhered to in the CREM, however, such test is limited to the FIOS. If the NCM holds, financial capital is allocated efficiently across the UIOS. In the absence of convergence, if the CREM dominates the NCM, then financial capital would not be allocated efficiently across the UIOS and, even at a lower level of efficiency, possibly financial capital may not be efficiently allocated across the FIOS.

For instance there is evidence [Maksimovic and Phillips 1999; Winter 1999] on lower rates of discounting of investment projects within the FIOS due to internal financing. In particular, Maksimovic and Phillips [1999, 32-33] found that "firms invest in industries in which they have a comparative advantage" and "no evidence that conglomerates *significantly subsidize* the growth of inefficient divisions. This [finding] is consistent with optimal resource allocation decisions by conglomerates ... having a discount because of lower efficiency, ... Less-efficient firms can exist in equilibrium because of industry decreasing returns-to-scale." (*Emphasis* added) The existence of *subsidizing* intimates at inefficient financial capital flows within the FIOS. Furthermore, Maksimovic and Phillips [1999, 4] maintain: "Thus, ... seemingly inefficient behavior by conglomerates is consistent with profit maximizing."

As the case of any other study, the variables in this study hinge on the task at hand. For instance, Varaiya and Wiseman [1981] were interested in estimating the capital stock of specific U.S. metropolitan areas and needed estimates of depreciation to arrive at the capital stock estimates. Anderson and Rigby [1989] built on Varaiya and Wiseman's work to estimate the capital stock in six Canadian regions. Gertler [1986] focused on the stability of the spatial distribution of fixed capital over time and the extent to which local and regional growth are determined by manufacturing versus non-manufacturing investment. In those studies, estimation of the capital stock is the main concern. In this study, the concern is with regional flows of financial capital. Since capital expenditures are indicative of the availability of financial capital--financial capital flows, such expenditures, as well as the relationship between growth in capital expenditures and growth in corporate income, are the basis for the test of financial capital flows. As background for the formulation of testable hypotheses, three issues are explored: (1) Regional Investment and Growth; (2) Institutionalized Behavior; and (3) Marginal Theory Contradictions.

Regional Investment and Growth

In the theoretical and mathematically elegant work, Siebert [1969,5] maintains that: "The growth rate of a region depends on the allocation of resources in space at a certain moment in time, and it is therefore strongly influenced by the individual location decisions." But what influences the location decisions? Siebert [1969,127-128] postulates that the movement of capital from one region to another depends on the difference in the rates of return in the regions.[5]

Robertson [1958] and Durbin [1949] have provided very good reasons for the failure of the marginal rate of return to fully determine the distribution of investment funds. Some of those reasons are differences among industries and the capacity of management, the risk of changing markets and techniques, and the lack of institutions to enable the discovery of marginal products. Disequilibrating factors also provide a clue why the marginal rate of return does not fully guide the investment decision. For instance, "growth poles," as developed by Perroux [1955], attract most of the available capital. In general, even in the presence of certain diseconomies due to over saturation of investments, economic operators tend to over estimate the benefits obtainable from the external economies arising from the growth poles [Hirschman 1970,106].

In accord with the CREM, the above discussion suggests that while the investment decision must satisfy some minimum rate of return, interregional flow of financial capital is not guided by the NCM - the marginal rate of return. Given the failure in most studies to offer unambiguous explanations, "financial capital allocational inefficiency" emerges as an explanatory variable for capital inputs resulting in significant regional manufacturing growth-rate-differentials, due to the inability of the secondary market to act as a rationing mechanism for *internally available funds*.

An analysis of the efficiency of the growth experienced by U.S. regions conducted by Borts and Stein [1964] was transformed into an analysis of firms' investment and growth behavior [1964,169]. However, their pursuit of this issue was abortive because of the basic assumptions underlying their framework [Borts and Stein 1964,172]:

1. All entrepreneurs have access to whatever capital needed to construct new plants.
2. Location decisions are determined solely by the marginal rate of return.
3. Reliance is placed on the recent past rather than seeking out investments based upon the highest expected marginal rate of return.

The deficiency of #1 can best be understood in light of the limitations on the supply of capital as pointed out by Hamberg [1956,112]. Assumption #2 ignores the mobility of consumption goods. Firms with national operations do not have to move into any given region, unless there are compelling reasons. These firms can increase their output in response to a regional demand for their products in any of many different regions depending upon the circumstances.[6] In many instances, owing to economies of scale it would be much more profitable to expand in the region with a low rate of return on investment [Isard 1960,235-239] rather than move to a region with a high rate of return. Assumption #3 is the most plausible assumption. It reflects the entrepreneur's concern for peculiarity of the new location and uncertainty of market demand [Estall 1966,86-109; Isard and Cumberland 1948]. The recent past presumably refers to ex post marginal rates of return; this implies that ex post marginal rates of return are used as surrogates of ex ante marginal rates.

Institutionalized Behavior

In general, investment in the literature is studied as an economic aggregate. In the model developed by Almon, Buckler, et al. [1974,59], the investment function is derived from the following equation:

$$K^* = aQr^{-\sigma} \quad (1)$$

K* = The firm's desired capital investment in plant and equipment
a = A constant
Q = The firm's output
r = The firm's cost of capital
σ = The elasticity of substitution of capital for labor

The critical variables in this model are Q (output) and r (the cost of capital). Q and r constitute the basic economic model--demand and supply. Q is representative of the demand side--the amount of capital necessary to maintain the level of output; and r is representative of the supply side--the amount of capital that would be made available.

Kalecki [1954,92-95] and Hamberg [1956,34] have clearly emphasized the significance of capital availability in the investment decision (as affected by firm size and earnings retention), and the inaccessibility of the capital market to small firms. On the role of capital in economic growth theory, Hamberg [1971,34] is quite emphatic concerning the non-existence of "perfectly elastic supply schedules of capital." It is not that marginal analysis is faulty, it is merely that the economic climate changes over time, and renders certain analyses inadequate under certain circumstances. Presently, the capital market fails to act effectively as a rationing device due to certain institutionalized behavioral patterns of firms (i.e., the preference of internally generated over externally generated funds) and institutional financiers (e.g., in 1969 "significant portions of all [the 200 largest] institutional portfolios were invested in a relatively small number of stocks of the same large, well-known companies" [US Congress,1971,1331-1333]).

Marginal Theory Contradictions

Almon, Buckler et. al. [1974, 55], for the period 1954-1971, found serious timing differences among some industries in their investment in plant and equipment. Moomaw and Williams [1991], for the period 1954-1976, found highly variable growth rates of capital inputs across US regions. The effect of institutionalized behavior may be inferred from these empirical works. Differences in investment timing [Almon, Buckler et al.] and the high degree of variability in capital input growth rates [Moomaw and Williams] may be due to the fact that capital is not readily available to all firms; those findings might reflect the inefficiency of financial capital rationing in accordance with the CREM. These findings are assessed in light of earlier studies discussed below.

Borts and Stein [1964] applied a method of predicting regional and industrial growth based on the theory of competitive industry. Their study consisted of two regions--New England and the rest of the U.S. They arrived at an estimate of the relative marginal rate of return on investment between regions to predict which region would have had the greater growth of employment [Borts and Stein 1964,117]. They concluded in part that: "The relative growth . . . of a New England industry is determined by the relative return on investment . . . [Borts and Stein 1964,181]."

Romans [1965,101], with a similar position to that of Borts and Stein, hypothesized that the existence of differentials in regional rates of return would initiate capital movements which would lead to a convergence among regional rates of return. Romans, using eight (8) regions--New England, Mid-East, Great Lakes, Plains, Southeast, Rocky Mountain and Far West--assumed that there were no differences in the quality and skills of the labor force among the regions. Romans [1965,102] concluded that there may be disequilibrating forces which affect regional allocation of resources; however, these forces exert only a minor effect on the interregional flow of funds. The work of Olsen [1971] (time period observed 1800-1920) lends support to the existence of disequilibrating forces. In that study, it was hypothesized that: (1) capital will move from regions where the rate of return is relatively low to regions where it is relatively high; and (2) capital would move into a region if the regional rate of return was higher than the national average, and out of the region if it was lower. However, the two hypotheses were not supported [Olsen 1971,134-136].

The findings of Romans [1965] and Olsen [1971] contradict marginal theory. Those findings provide an adequate starting point for the further development of a predictive model of regional financial capital flows based upon the NCM.

TESTABLE HYPOTHESES, DATA, METHODOLOGY, AND VARIABLES

This study is related to: (a) Webber's [1987] call for empirical investigation to ascertain whether changes in the relative profitability of production in regions induce changes in the location of production; and (b) three questions posed by Gertler [1986/1984]. Gertler [1986,532]: (1) What are the forces and factors which affect the dimensions of spatial and temporal change (e.g., price and availability of financial capital)? Gertler [1984,74]: (2) "How volatile is investment in a given industry in a given place over time? (3) "How consistent is this volatility from region to region?" Webber's concern and Gertler's questions (2) and (3) are addressed in this study.

The motivation for this study is the belief that the preeminence of retained earnings in the financial capital rationing process may limit/constrain the role of the predictive ability of the NCM - the "neoclassical" model. This study is conducted under the assumption that the NCM holds, thus tests are conducted to ascertain if there is any merit to the CREM ("corporate earnings" model) as an impediment to the NCM. Five variables are used in testing the predictive ability of the NCM: (1) growth rate of manufacturing value added (Mg), (2) growth rate of manufacturing capital expenditures (Cg), (3) growth rate of corporate income (Ig), (4) annual manufacturing capital investment-output ratio (ACI), and (5) variability of annual manufacturing capital investment-output ratio (VACI). Specifically, ACI is a measure of efficiency in the use of financial capital - high ACIs are indicative of inefficient flows of financial capital and low ACIs are indicative of efficient flows of financial capital. VACI is a measure of regional capital flow adjustments to rates of return on investment - high variability is indicative of inefficiency and low variability is indicative of efficiency. The formulation of the testable hypotheses is presented below.

Testable Hypotheses

The underlying assumptions are: (1) U.S. regions are open economies, with interregional flows of financial capital in accordance with the NCM. (2) Investment decisions in each region are influenced by: (a) economies of scale attainable (E_a), (b) labor factor cost (L_r), and (c) the rate of return attainable (R_r). (3) Prices are competitive, and transportation costs determine the movement of commodities among regions.

According to the NCM, regional manufacturing growth is a function of the marginal rate of return on investment and reflects a capital rationing process that is allocationally efficient. If the NCM holds, then regions experiencing the high rates of return should attract the greater amount of capital. Also, if those high rates of return are sustained over a period of time, then those regions will enjoy relatively stable amounts of financial capital inputs over the observed period. However, regions with low rates of return will reflect more volatile amounts of financial capital inputs over the same period. As per the CREM, *while high growth rates for corporate income (an absolute measure) do not signify high rates of return (a relative measure) on investment opportunities, high growth in corporate income could lead to high growth in regional manufacturing investments*, resulting in high *average annual capital investment-output ratios (ACIs)* and high *variability in those ratios (VACIs).* Such a condition would be indicative of inefficiency in the flow of financial capital. Given the foregoing, seven hypotheses are developed to test the predictive ability of the NCM vis-a-vis the CREM:

H1*: Regions (states) with high growth rates of corporate income (I_gs) are regions with high growth rates of annual manufacturing capital expenditures (C_gs).*

H2*: Regions (states) with high growth rates of annual manufacturing value added (M_gs) are regions with high growth rates of corporate income (I_gs).*

H3*: Regions (states) with high growth rates of annual manufacturing value added (M_gs) are regions with high C_gs.*

H4*: Regions (states) with high growth rates of annual manufacturing value added (M_gs) experience low annual capital investment-output ratios (ACIs).*

H5*: Regions (states) with high growth rates of annual manufacturing value added (M_gs) experience low variability in financial capital flows (low variability of annual capital investment-output ratios - VACIs).*

***H6**: Regions (states) with high growth rates of annual manufacturing capital expenditures (C_gs) experience high annual capital investment-output ratios (ACIs).*

***H7**: Regions (states) with high growth rates of annual manufacturing capital expenditures (C_gs) experience high variability in financial capital flows (high variability of annual capital investment-output ratios - VACIs).*

H2, H4, and H5 are to ascertain the efficiency in the flow of financial capital in accordance with the NCM. H1, H6, and H7 are to ascertain the impact of the CREM. H3 is neutral.

Data

Data on manufacturing value added and manufacturing capital expenditures were available from the study by Salvary [1977].[7] Corporate income in a given state is a function of the corporations that are incorporated in that state. Accordingly, corporate income taxable in a given state is an indicator of the availability of funds to manufacturing corporations, as well as to other industries, within that state. To calculate corporate income, data on corporate income taxes paid and income tax rates were obtained from the *Statistical Abstract of the United States* [1961-1972] and *Corporation Manual: Corporation Statutes* [1960,1962,1964,1966,1967, 1970,1971].

The study's hypotheses were tested using a readily available data set for the period: 1960-1971. The time frame of this study is within Moomaw and Williams' [1991] study period: 1954-1976. The data for manufacturing value added and manufacturing capital expenditures exclude the years 1965 and 1966; thus for those variables, ten years of data were used. Since the aggregate data for those years are consistent with the rest of the data (Appendix B), their omission should not influence the results. The study's time frame (1960-1971) appears ideal for testing the hypotheses, as the following reasons indicate. (1) Weber and Domazlicky [1999] reported that during the period 1977 - 1983, state manufacturing exhibited a labor-using bias, and during the period 1983 through 1989, state manufacturing displayed a capital-using bias. (2) As reported in Garofalo and Yamarik [2002], for the only time during the period 1947 through 1995, the real capital stock series moved in tandem between 1961 and 1971 across the regions (northeast, north-central, south, and west). (3) In the US, between 1924 and 1990, the longest period of economic expansion was from February 1961 through December 1969 (106 months); the next longest period (92 months) extended from November

1982 through July 1990 [Stat. Abs. 1994, 557]. (4) Between 1948 and 1988, the period 1960 through 1971 reflected the least volatile period in terms of the rates of change in the general level of prices [Boschen 1990, 84:Fig.4-1]. (Appendix C and Appendix D.)

Thirty-one state-regions are the units of observation over the study period. The state-regions, used to test the efficiency of financial capital flows, were selected based on a dominant-manufacturing-industry selection process [Salvary 1977].[8] That selection process enables an *industry-region* approach to determine the variability/volatility of financial capital flows within and among industries. Of the initial thirty-one, only twenty-two state-regions were amenable to the formation of three industry-regions: Food (SICC 20); Chemical (SICC 28); and Electrical (SICC 36) [Salvary 1977].[9]

Methodology

Two types of regions are used in this study: (1) state-regions and (2) industry-regions. A *state-region* is a region in physical space linked by a common administrative unit which influences economic development. An *industry-region* is a region in economic space linked by a *common dominant industry* which influences regional manufacturing growth [Salvary 1977]. Gertler [1984,74]: "How volatile is investment in a given industry in a given place over time?) The state-region permits an analysis of the volatility of financial capital flows. "How consistent is this volatility from region to region?" The industry-region (a different dimension to regional analysis) enables an assessment of the consistency in the volatility of regional financial capital flows.

To track financial capital flows in response to the rates of return, two variables are used: ACI and VACI. ACI and VACI are used to ascertain the efficiency (NCM) or the inefficiency (CREM) in the regional flow of financial capital. ACI is measured by dividing the annual manufacturing capital expenditures by the annual manufacturing value added; this approach allows the measure to be standardized. VACI (the coefficient of variation of ACIs) is a measure of the volatility of the flows of financial capital for each region over the study period. *To identify or classify regions by response to corporate earnings* (I_g), $M_{g\ \text{and}}$ C_g are used; where C_g (the variable reflecting the flow of financial capital) is a relative magnitude of manufacturing capital expenditures over time.

Growth rates for serial data were calculated using "exponential growth curve theory" [Glover 1930,470], which is expressed as: $\mathbf{Y = ar^x}$. ($\mathbf{Y}$ = the dependent variable; $\mathbf{a}$ = a constant; $\mathbf{r}$ = rate of growth; and $\mathbf{x}$ = the time period.) The exponential function is used because it is seemingly superior to the logarithmic function for serial data [Chiang 1964,281]. Correlation analysis is used to test for statistical significance; the F test is used to test for significance of variance.

Variables - Output and Investment

Growth rates of manufacturing value added for thirty-one regions (states) are detailed in Table 1 for regions' total manufacturing, chemical and allied products, electrical and electronics, and food and kindred products for the study period. With 1960 as the base year, total manufacturing value added was adjusted for price level changes using the Gross National Product Implicit Price Deflator. Also, the individual industry's Wholesale Price Index was used to adjust the manufacturing value added for each of the three (chemical, electrical, and food) industries.

Decisions for replacement and expansion are made at the margin. It is assumed that such investments are made in periods of steady or rising demand. However, replacement by a national firm will not necessarily be made in the original location but at the optimal location. Given the above, gross "new" capital expenditures and not net "new" capital expenditures are used. As mentioned earlier, the U.S. economy expanded from February 1961 through December 1969, thus in the study period, business fluctuations are not a cause for concern. The same applies to capacity utilization, since it moves in tandem with business fluctuations.

Growth rates of manufacturing capital expenditures (Cgs) for total, chemical, electrical, and food manufacturing for thirty-one states are also given in Table 1. Cgs in all industry regions were greater than the growth rates of manufacturing value added (Mgs). However, while average growth rates in the Chemical and Electrical industry regions for capital expenditures were 133% and 147% of average growth rates of manufacturing value added, for the Food industry region the average capital expenditures was 260% of the average growth rate of manufacturing value added. Food manufacturing seems to be more capital intensive than chemical and electrical manufacturing.

TABLE 1

GROWTH RATES OF MANUFACTURING VALUE ADDED AND MANUFACTURING CAPITAL EXPENDITURES: TEN YEAR PERIOD 1960-1964, 1967-1971 (N=10)

Region: Industry/State		Exponential Growth Rates (%) of Manufacturing: Value Added (Mg)		Capital Expenditures (Cg)	
		Total	*Industry*	*Total*	*Industry*
Chemical:	Alabama	7.6	16.5	12.4	17.3
	Louisiana	7.1	13.3	17.2	18.7
	New Jersey	3.3	9.7	8.6	9.1
	South Carolina	7.6	10.6	15.6	25.6
	Tennessee	8.5	9.3	14.1	10.0
	Texas	7.8	9.3	14.9	15.0
	Virginia	5.9	6.5	12.3	5.1
	West Virginia	2.8	5.0	8.1	3.0
Industry Average			***8.9***		***11.9***
Electrical:	Arizona	11.6	23.8	16.3	--
	California	5.2	9.4	9.4	8.4
	Connecticut	3.6	5.4	8.5	6.9
	Illinois	4.3	6.5	10.8	10.1
	Indiana	4.8	8.7	10.5	7.6
	Kentucky	8.3	14.1	12.4	16.0
	Massachusetts	2.7	5.5	9.3	11.3
	New Hampshire	4.8	9.5	15.7	9.8
Industry Average			***8.7***		***12.8***
Food:	Colorado	6.0	6.9	20.1	17.3
	Florida	9.1	10.2	11.2	13.1
	Georgia	8.1	5.4	16.5	13.5
	Idaho	7.9	8.2	8.4	9.3
	Iowa	6.3	5.5	11.4	12.1
	Kansas	5.8	1.1	9.6	12.3
	Maryland	2.6	5.2	8.8	18.5
	Minnesota	6.1	2.8	12.1	11.0
	Missouri	5.0	2.6	10.1	5.0
	New Mexico	5.6	1.8	20.3	--
	North Dakota	12.9	8.5	17.7	13.6
	Oklahoma	5.5	4.1	16.0	--
	Oregon	5.8	4.5	10.9	25.2
	Utah	2.6	1.3	9.1	5.0
	Wisconsin	4.1	4.1	8.1	9.3
Industry Average			***3.7***		***9.6***
US Average		*5.0*		*11.3*	

Source: Salvary [1977, 72-74,91-93].

EMPIRICAL TESTS OF HYPOTHESES AND RESULTS

Tests of the seven hypotheses and the results are presented below. Empirical tests were conducted assuming a perfectly competitive financial capital market. The critical variables are: I_gs (growth rates of corporate income), M_gs (growth rates of manufacturing value added), C_gs (growth rates of manufacturing capital expenditures), ACIs (annual manufacturing capital investment-output ratios), and VACIs (variability of ACIs).

In connection with the first hypothesis, if corporate earnings heavily influence investment, then growth in regional corporate income should be accompanied by a corresponding growth in regional manufacturing capital expenditures. Corporate earnings/income (Appendix E) for each state was estimated as follows: the annual amount of corporate income tax paid to each state was divided by the specific state's corporate income tax rate (Appendix F). H1 holds that there exists a significant statistical relationship between growth rates of regional corporate income (I_gs) and growth rates of regional manufacturing capital expenditures (C_gs).

***H1**: Regions (states) with high* I_gs *are regions with high* C_gs.

Tables 2 and 3 provide information for the test of H1. This test establishes the relationship between the availability of financial capital within the state regions and the investment within the dominant industry regions. Financial capital flows in an optimal or sub-optimal manner to finance investments in regional manufacturing plant and equipment. Both personal and corporate incomes were included in the income tax data for New Mexico. Thus, while there are twenty-six states (of the initial sample of thirty-six states) with income tax rate data from 1960-1971, only twenty-five of them had usable data to enable the computation of corporate income.

On a pooled basis (Table 2), the finding is not significant. H1 is not validated. However, on an industry region basis (Table 3), the finding is significant for the food region at the .01 level of significance. For the chemical region, the finding is significant at the .02 level of significance, but the sign is negative. Consistent with the NCM, the finding on the food industry region has captured the efficiency in the flow of financial capital moving out of areas to finance investments with presumably better rates of return.

TABLE 2

CORRELATION ANALYSIS: CAPITAL EXPENDITURES AND CORPORATE INCOME

Region: Industry/State	Growth Rates (%) of Manufacturing Capital Expenditures (Cg) Total	Capital Expenditures (Cg) Industry	Corporate Income (Ig) Total
Chemical:			
Alabama	12.4	17.3	9.8
Louisiana	17.2	18.7	9.3
South Carolina	15.6	25.6	7.7
Tennessee	14.1	10.0	8.6
Virginia	12.3	5.1	9.2
West Virginia	8.1	3.0	13.7
Electrical:			
California	9.4	8.4	5.6
Connecticut	8.5	6.9	8.2
Illinois	10.8	10.1	9.9
Indiana	10.5	7.6	1.1
Kentucky	12.4	16.0	7.5
Massachusetts	9.3	11.3	23.5
Food:			
Colorado	20.1	17.3	7.6
Georgia	16.5	13.5	8.1
Idaho	8.4	9.3	14.0
Iowa	11.4	12.1	8.4
Kansas	9.6	12.3	7.5
Maryland	8.8	18.5	7.4
Minnesota	12.1	11.0	6.2
Missouri	10.1	5.0	2.7
North Dakota	17.7	13.6	14.0
Oklahoma	16.0	--	6.0
Oregon	10.9	25.2	2.3
Utah	9.1	5.0	1.9
Wisconsin	8.1	9.3	5.6
Correlation	***-0.03908 (n=25)***	***-0.07464 (n=24)***	

The diametrically opposite findings for the food and chemical industry regions suggest an industry capital investment preference for the food region. The findings pertaining to the chemical and electrical regions offer support for the CREM.

TABLE 3

CORRELATION ANALYSIS - CAPITAL EXPENDITURES AND CORPORATE INCOME

Region: Industry/State		Growth Rates (%) of Manufacturing Capital Expenditures (Cg) Total	Capital Expenditures (Cg) Industry	Corporate Income (Ig) Total
Chemical:	Alabama	12.4	17.3	9.8
	Louisiana	17.2	18.7	9.3
	South Carolina	15.6	25.6	7.7
	Tennessee	14.1	10.0	8.6
	Virginia	12.3	5.1	9.2
	West Virginia	8.1	3.0	13.7
Electrical:	California	9.4	8.4	5.6
	Connecticut	8.5	6.9	8.2
	Kentucky	12.4	16.0	7.5
	Massachusetts	9.3	11.3	23.5
Food:	Colorado	20.1	17.3	7.6
	Georgia	16.5	13.5	8.1
	Iowa	11.4	12.1	8.4
	Minnesota	12.1	11.0	6.2
	Missouri	10.1	5.0	2.7
	Wisconsin	8.1	9.3	5.6
Correlation Coefficient:				
	Chemical (n=5)	***-0.3931******	***-0.4165*****	
	Electrical (n=4)	***-0.2263***	***0.1212***	
	Food (n=6)	***0.5520*****	***0.8526****	
	Pooled (n=15)	***-0.0786***	***0.1085***	

*Significant at .01 level. **Significant at .02 level. ***Significant at .5 level.

Growth in manufacturing value added is a function of the availability of financial capital criterion; accordingly, H2 posits a positive relationship between M_gs and I_gs.

H2: *Regions (states) with high M_gs are regions with high I_gs.*

Table 4 provides a ranking of I_gs and ranking of M_gs by state-regions. The diametrically opposite findings for the food and chemical industry regions suggest an industry capital investment preference for the food region. The findings pertaining to the chemical and electrical regions offer support for the CREM.

TABLE 4

CORRELATION ANALYSIS - MANUFACTURING VALUE ADDED AND CORPORATE INCOME

Region: Industry/State		Growth Rates (%) of Manufacturing Value Added (Mg) Total	Industry	Corporate Income (Ig) Total
Chemical:	Alabama	7.6	16.5	9.8
	Louisiana	7.1	13.3	9.3
	South Carolina	7.6	10.6	7.7
	Tennessee	8.5	9.3	8.6
	Virginia	5.9	6.5	9.2
	West Virginia	2.8	5.0	13.7
Electrical:	California	5.2	9.4	5.6
	Connecticut	3.6	5.4	8.2
	Kentucky	8.3	14.1	7.5
	Massachusetts	2.7	5.5	23.5
Food:	Colorado	6.0	6.9	7.6
	Georgia	8.1	5.4	8.1
	Iowa	6.3	5.5	8.4
	Minnesota	6.1	2.8	6.2
	Missouri	5.0	2.6	2.7
	Wisconsin	4.1	4.1	5.6
Correlation Coefficient:				
	Chemical (n=5)	***-0.7810****	***-0.0900***	
	Electrical (n=4)	***-0.8000*****	***-0.6000*****	
	Food (n=6)	***0.8255****	***0.7140*****	
	Pooled (n=15)	***0.3220***	***0.0530***	

*Significant at .02 level. **Significant at .1 level. ***Significant at .5 level.

The data therein are used to determine the relationship between I_gs and M_gs. The findings for H2, which are similar to the findings for H1 but are much more pronounced, offer some support for the CREM.

H3 holds that since investment is a necessary condition for growth in manufacturing output, then a priori there exists a significant statistical relationship between C_gs and M_gs. That is, growth in regional manufacturing capital expenditures should be accompanied by a corresponding growth in regional manufacturing value added. The emphasis is on availability and not on the allocational efficiency of financial capital, hence H3 is neutral.

H3: Regions (states) with high M_gs *are regions with high* C_gs.

Using Spearman rank correlation for the industry groups in Table 1, the coefficient of rank correlation is .4611 for M_gs and C_gs. This finding is statistically significant at the .01 level and is consistent with the a priori expectation. Also, data in Table 5 were subjected to regression analyses. The results are significant, and the third hypothesis is statistically validated.

TABLE 5

REGRESSION STATISTICS AND ANALYSIS OF VARIANCE FOR Mgs AND Cgs

Panel A: Regression Statistics

Multiple R	R^2	Adjusted R^2	Standard Error	Observations
0.3627	0.1316	0.1016	4.5364	31

Panel B: Analysis of Variance

	Coefficient	Standard Error	t Statistic	P-Value
Intercept	4.3960	1.7321	2.5380	0.0168*
Beta	0.2830	0.1350	2.0962	0.0449*

Panel C: Correlation

Industry Region	*Chemical*	*Electrical*	*Food*
Correlation Coefficient	0.8473**	0.8871**	0.6354*

* Significant at the .05 level. ** Significant at the .01 level.

Low annual capital investment-output ratios (ACIs) are indicative of efficient investment-output ratios and high ACIs reflect inefficient investment-output ratios. A priori, regions with low ACIs would be regions with high rates of return on manufacturing assets. According to the NCM, efficient flows of financial capital require high rates of return to attract financial capital, thus H4 holds that there exists a significant inverse relationship between M_gs and ACIs.

***H4**: Regions (states) with high* M_g*s experience low ACIs.*

While excess capacity accommodates growth for a short period of time, sustained growth requires a stable flow of financial capital to finance plant and equipment. Since stability of financial capital flows is identified with high growth of manufacturing investment, H5 (the a priori expectation) holds that there exists a statistically significant inverse relationship between variability in annual regional manufacturing capital investment-output ratios *(VACIs)* and M_gs.

H5: *Regions (states) with high* M_g*s experience low VACIs.*

Based upon the data in Table 6, tests of the fourth and fifth hypotheses were conducted to support the NCM. The items that are underlined are those instances wherein which the NCM holds. The findings reveal that the signs are not in the right direction. While the findings for both H4 and H5 are not statistically significant, the results provide mild support for the CREM.

TABLE 6

RANK CORRELATION ANALYSIS
MEAN (ACI) AND VARIATION (VACI) OF RATIO OF ANNUAL MANUFACTURING CAPITAL EXPENDITURES TO MANUFACTURING VALUE ADDED AND GROWTH RATE OF MANUFACTURING VALUE ADDED OF THE DOMINANT INDUSTRY FOR THE PERIOD: 1960-1964,1967-1971 (n=22)

Region/*State*	ACI $\bar{X}$	VACI *CV*	M_gs
Chemical: Alabama	.1290	.4720	16.5
Louisiana	.2734	.5365	13.3
New Jersey	.0741	.0909	9.7
South Carolina	.1294	.5355	10.6
Tennessee	.1052	.2112	9.3
Texas	.1777	.2422	9.3
Virginia	.1159	.2051	6.5
West Virginia	.1275	.1932	5.0
Electrical: California	.0514	.1284	9.4
Connecticut	.0402	.1169	5.4
Illinois	.0437	.0228	6.5
Indiana	.0525	.2114	8.7
Kentucky	.0396	.2651	14.1
Massachusetts	.0487	.1806	5.5
New Hampshire	.0537	.1299	9.5

TABLE 6 (Continued)

RANK CORRELATION ANALYSIS
MEAN (ACI) AND VARIATION (VACI) OF RATIO OF ANNUAL MANUFACTURING CAPITAL EXPENDITURES TO MANUFACTURING VALUE ADDED AND GROWTH RATE OF MANUFACTURING VALUE ADDED OF THE DOMINANT INDUSTRY FOR THE PERIOD: 1960-1964,1967-1971 (n=22)

		ACI	VACI	M_gs
Region/*State*		$\bar{X}$	*CV*	
Food:	Colorado	.0605	.2149	6.9
	Florida	.0764	.1897	10.2
	Georgia	.0713	.1683	5.4
	Iowa	.0648	.1620	5.5
	Minnesota	.0551	.1488	2.8
	Missouri	.0604	.1837	2.6
	Wisconsin	.0591	.1252	4.1
Correlation Coefficient:				
	Chemical (n=8)	***0.4167*****	***0.7023******	
	Electrical (n=7)	***0.1786***	***0.6250******	
	Food (n=7)	***0.7500*****	***0.5714*******	
	Pooled (n=22)	***0.2964***	***0.5082****	

*Significant at .01 level. **Significant at .02 level. ***Significant at .1 level. ****Significant at .5 level.

H6 and H7 focus on the impact of the CREM. ACI is a measure of the availability (flow) of financial capital and VACI is a measure of regional capital flow adjustments to rates of return. High ACIs indicate inefficient flows of financial capital. High VACI is indicative of inefficiency. As per the CREM, due to expected sub-par marginal rates of return on financial capital to underwrite investment projects throughout the FIOS, *there should be a positive relationship: between C_gs and ACIs and between C_gs and VACIs* for pooled and industry region data.

H6*: Regions (states) with high C_gs experience high ACIs.*

H7*: Regions (states) with high C_gs experience high VACIs.*

The data in Table 7 are used to test hypotheses 6 and 7 to ascertain the relationship between Cgs and ACIs and between Cgs and VACIs. Except for ACI in Electrical, the coefficients of rank correlation are statistically significant and the signs are in the right direction. H6 and H7 are supported. The findings lend support to the CREM.

TABLE 7

RANK CORRELATION ANALYSIS
MEAN (ACI) AND VARIATION (VACI) OF RATIO OF ANNUAL MANUFACTURING CAPITAL EXPENDITURES TO MANUFACTURING VALUE ADDED AND GROWTH RATE OF MANUFACTURING CAPITAL EXPENDITURES OF THE DOMINANT INDUSTRY
FOR THE PERIOD: 1960-1964,1967-1971 (n=22)

	Manufacturing Industry		
	ACI	VACI	C_gs
Region/State	$\bar{X}$	*CV*	
Chemical:			
Alabama	.1290	.4720	17.3
Louisiana	.2734	.5365	18.7
New Jersey	.0741	.0909	9.1
South Carolina	.1294	.5355	25.6
Tennessee	.1052	.2112	10.0
Texas	.1777	.2422	15.0
Virginia	.1159	.2051	5.1
West Virginia	.1275	.1932	3.0
Electrical:			
California	.0514	.1284	8.4
Connecticut	.0402	.1169	6.9
Illinois	.0437	.0228	10.1
Indiana	.0525	.2114	7.6
Kentucky	.0396	.2651	16.0
Massachusetts	.0487	.1806	11.3
New Hampshire	.0537	.1299	9.8
Food:			
Colorado	.0605	.2149	17.3
Florida	.0764	.1897	13.1
Georgia	.0713	.1683	13.5
Iowa	.0648	.1620	12.1
Minnesota	.0551	.1488	11.1
Missouri	.0604	.1837	5.0
Wisconsin	.0591	.1252	9.3
Correlation Coefficient:			
Chemical (n=8)	***0.6667****	***0.7024****	
Electrical (n=7)	***-0.3214***	***0.3928***	
Food (n=7)	***0.6071*****	***0.5714******	
Pooled (n=22)	***0.3269***	***0.5550****	

*Significant at .01. **Significant at .05. ***Significant at .1. ****Significant at .5.

The items that are underlined suggest instances wherein which the NCM holds.

The next tests focus on the ACIs, VACIs, and Igs. Data in Table 8 are used to ascertain the relationships between Ig and ACI, and between Ig and VACI.[10] Quite noticeable is the fact that regions with high ACIs and high VACIs are concentrated in the chemical industry-region, while regions with low ACIs and low VCIs are found in the electrical and food industry-regions, with the lowest ACIs and lowest VACIs concentrated in the electrical industry-region. The findings are not statistically significant.

TABLE 8

CORRELATION ANALYSIS: VARIABLES - Igs, ACIs, AND VACIs
STATES IN SAMPLE ASSESSING CORPORATE INCOME TAX
PERIOD: 1960-1964,1967-1971 (n=10)

Region Industry/State	Total Manufacturing ACI	Total Manufacturing VACI	Industry Growth Rates Manufacturing ACI	Industry Growth Rates Manufacturing VACI	Corporate Income Ig(%)
Chemical:					
Alabama	.0858	.1833	.1290	.4720	9.8
Louisiana	.1430	.3895	.2734	.5365	9.3
South Carolina	.0997	.1951	.1294	.5355	7.7
Tennessee	.0792	.0953	.1052	.2112	8.6
Virginia	.0760	.1063	.1159	.2051	9.2
Electrical:					
California	.0581	.0172	.0514	.1284	5.6
Connecticut	.0534	.0880	.0402	.1169	8.2
Kentucky	.0707	.2206	.0396	.2651	7.5
Massachusetts	.0492	.0955	.0487	.1806	23.5
Food:					
Colorado	.0770	.2701	.0605	.2149	7.6
Georgia	.0742	.1603	.0713	.1683	8.1
Iowa	.0662	.0876	.0648	.1620	8.4
Minnesota	.0564	.0797	.0551	.1488	6.2
Missouri	.0487	.0924	.0604	.1837	2.7
Wisconsin	.0565	.1026	.0591	.1252	5.6
Correlation:					
Pooled (n=15)	***-.0183***	***.0350***	***.0323***	***.0698***	
Chemical (n=5)	***.0470***	***.1857***	***.2613***	***-.0809***	
Electrical (n=4)	***-.6147*****	***-.0009***	***.2974***	***.1019***	
Food (n=6)	***.8556****	***.3902***	***.4932***	***.0766***	

* Significant at .02 level. **Significant at .5 level.

Table 9 provide data on ACIs and VACIs. According to the NCM, low ACIs are expected to be positively associated with low VACIs; the reverse is true under the CREM.

TABLE 9
TIME SERIES DATA:
RATIO OF MANUFACTURING CAPITAL EXPENDITURES TO MANUFACTURING VALUE ADDED: MEAN (ACI), STANDARD DEVIATION, AND COEFFICIENT OF VARIATION (VACI)
PERIOD: 1960-1964,1967-1971 (n=10)

	Total Manufacturing			Industry Manufacturing		
	ACI		VACI	ACI		VACI
State	$\overline{X}$	*SD*	*CV*	$\overline{X}$	*SD*	*CV*
Chemical						
Alabama[a]	.0858	.0157	.1833	.1290	.0609	.4720
Louisiana	.1430	.0557	.3895	.2734	.1467	.5365
New Jersey	.0570	.0053	.0929	.0741	.0067	.0909
South Carolina[a]	.0997	.0195	.1951	.1294	.0693	.5355
Tennessee	.0792	.0075	.0953	.1052	.0222	.2112
Texas	.1060	.0164	.1551	.1777	.0430	.2422
Virginia	.0760	.0080	.1063	.1159	.0238	.2051
West Virginia	.0972	.0127	.1306	.1275	.0246	.1932
Electrical						
California[a]	.0581	.0010	.0172	.0514	.0066	.1284
Connecticut*	.0534	.0047	.0880	.0402	.0047	.1169
Illinois[a]	.0621	.0010	.0161	.0437	.0010	.0228
Indiana	.0827	.0155	.1874	.0525	.0111	.2114
Kentucky[a]	.0707	.0156	.2206	.0396	.0105	.2651
Massachusetts	.0492	.0047	.0955	.0487	.0088	.1806
New Hampshire	.0628	.0142	.2261	.0537	.0066	.1299
Food						
Colorado	.0770	.0208	.2701	.0605	.0193	.2149
Florida	.0833	.0142	.1704	.0764	.0145	.1897
Georgia[a]	.0742	.0119	.1603	.0713	.0120	.1683
Iowa	.0662	.0058	.0876	.0648	.0105	.1620
Minnesota	.0564	.0045	.0797	.0551	.0082	.1488
Missouri[a]	.0487	.0045	.0924	.0604	.0111	.1837
Wisconsin[a]	.0565	.0058	.1026	.0591	.0074	.1252
Correlation: ***Pooled (n=22)***			***.7169****			***.7242****
Chemical (n=8)			***.8958*****			***.6091******
Electrical (n=7)			***.5478*******			***-.0173***
Food (n=7)			***.7396*****			***.3259***

[a] Industry is a dominant (second most important) industry in the state but not *the* dominant industry.
*Significant at .01 level. **Significant at the .05 level. ***Significant at the .1 level. ****Significant at the .5 level.

In Table 9, for *pooled (total manufacturing) data*, the coefficient of correlation is .7169 (significant at .01). For *individual industry groups*, the coefficients of correlation are: .8958 for chemical (significant at .05); .5478 for electrical (significant at .5); and .7396 for food (significant at .05). The signs are positive (the right direction) in all cases. For *pooled (industry manufacturing) data*, the coefficient of correlation is .7242 (significant at the .01 level). For *individual industry-regions*, the coefficients of correlation are: .6091 for chemical (significant at .1); -.0173 for electrical (not significant); and .3259 for food (not significant). The signs are positive, except for the electrical industry in which case it is negative. In this test, the effect of the CREM is present in the case of the electrical industry.

Table 10 presents the ten states with the largest cumulative ten year capital expenditures among the thirty-one states observed. Each industry-region is represented.

TABLE 10

THE TEN STATES WITH THE LARGEST ABSOLUTE CUMULATIVE TEN YEAR CAPITAL EXPENDITURES FOR PERIOD: 1960-1964, 1967-1971

State-Region	IR	Ten Year Cumulative Capital Expenditures (000,000)	Rank	Exponential Growth Rate of Total Manufacturing Value Added	Rank	Exponential Growth Rate of Total Capital Expenditures	Rank
California	E	$12,257	1	5.2%	5	9.4%	7
Illinois	E	$11,345	2	4.3%	7	10.8%	5
Texas	C	$10,500	3	7.8%	3	14.9%	3
Indiana	E	$ 7,809	4	4.8%	6	10.5%	6
New Jersey	C	$ 6,718	5	3.3%	9	8.6%	9
Masachusetts	E	$ 3,930	6	2.7%	10	9.3%	8
Louisiana	C	$ 3,810	7	7.1%	4	17.2%	1
Wisconsin	F	$ 3,664	8	4.1%	8	8.1%	10
Tennessee	C	$ 3,600	9	8.5%	1	14.1%	4
Georgia	F	$ 3,238	10	8.1%	2	16.5%	2
US Average				5.0%		11.3%	

Source: Salvary [1977, Table 82, 186]. (C = Chemical; E = Electrical; F = Food.)

Since growth rates for manufacturing value added in smaller manufacturing states will be larger than those in large manufacturing states, a strong negative relationship is expected to exist between large capital expenditure bases and high growth rates in manufacturing value added (M_gs and C_gs). The coefficient of correlation between: (1) levels of capital expenditures and the exponential growth rates of industry capital expenditures is -.1504; and (2) levels of capital expenditures and the exponential growth rates of industry manufacturing value added is -.2602 (significant at 0.5). In both cases, the sign is in the right direction but the strength of the association is not as was expected. This weak finding does suggest the impact of the CREM. (In addition, the coefficient of correlation between expenditures and total state manufacturing added is -.3 and between expenditures and total state capital expenditures is -.2.) To obtain a better appreciation of the foregoing findings, consideration has to be given to the effects of the main potentially confounding variables which have been mentioned earlier in this study.

EFFECTS OF POTENTIALLY CONFOUNDING VARIABLES

To assess the possible effects of confounding variables, several tests were conducted using four (income tax, per capita income, unemployment, and public spending) possible explanatory variables which may have confounding effects on the study's findings. The income tax effect is considered first separately and then the remaining variables are introduced.

Tax Effect

The use of a tax classification scheme (high, medium, and low rates) enables the inclusion of more regions (Table 11). States were categorized by high, medium and low C_gs and tax rates. States without a corporate income tax are included in the low tax category. Since the economic incentive from a low corporate income tax is expected to be quite pervasive, a test is conducted to determine whether higher C_gs are experienced in the regions (states) with the lower tax rates. Surprisingly, many of the high C_gs were located in the medium and high tax rates categories.

F test for data in Table 11 are presented in Table 12. The F value is 2.26. The null hypothesis is not rejected. No significant differences exist among the means of the three classified groups of state-regions. Accordingly, the tax incentive is not a satisfactory explanation of differential growth in manufacturing investments.

TABLE 11

STATES CLASSIFIED BY 1970 CORPORATE INCOME TAX RATES

Low Tax Rate 0 -> 4%		Medium Tax Rate 4.1 -> 6%		High Tax Rate 6.1%+	
State	**Cg**	**State**	**Cg**	**State**	**Cg**
Florida	11.2	Alabama	12.4	Arizona	16.3
Illinois	10.8	Colorado	20.1	California	9.4
Indiana	10.5	Georgia	16.5	Connecticut	8.5
Louisiana	17.2	Idaho	8.4	Iowa	11.4
Missouri	10.1	New Jersey	8.6	Kansas	9.6
N. Hampshire	15.7	New Mexico	20.3	Kentucky	12.4
Oklahoma	16.0	North Dakota	17.7	Maryland	8.8
Texas	14.9	Oregon	10.9	Massachusetts	9.3
		South Carolina	15.6	Minnesota	12.1
		Tennessee	14.1	Wisconsin	8.1
		Utah	9.1		
		Virginia	12.3		
		West Virginia	8.1		
Mean = 13.55		*Mean = 13.40*		*Mean = 10.59*	

TABLE 12

ANOVA SUMMARY: STATES CLASSIFIED BY 1970 CORPORATE INCOME TAX RATES

Source of Variation	SS	df	MS	F
Between Groups	55.810	2	27.905	2.26
Within Groups	345.719	28	12.347	
Total	401.529	30		

Additionally, the twenty-two states comprising the three industry-regions are classified according to tax rates in Table 13 and the F test are presented in Table 14.

TABLE 13

STATES COMPRISING INDUSTRY-REGIONS CLASSIFIED BY TAX RATES

Tax Rate 0 -> 4%		**Tax Rate 4.1 -> 6%**		**Tax Rate 6.1%+**	
State	**DCg**	**State**	**DCg**	**State**	**DCg**
Florida	13.1	Alabama	17.3	**California**	8.4
Illinois	10.1	*Colorado*	17.3	**Connecticut**	6.9
Indiana	7.6	*Georgia*	13.5	*Iowa*	12.1
Louisiana	18.7	New Jersey	9.1	**Kentucky**	16.0
Misssouri	5.0	South Carolina	25.6	**Massachusetts**	11.3
New Hampshire	9.8	Tennessee	10.0	*Minnesota*	11.0
Texas	15.0	Virginia	5.1	*Wisconsin*	9.3
		West Virginia	3.8		
Mean =	*11.33*	*Mean =*	*12.71*	*Mean =*	*10.71*

(DCg = Dominant Industry Cg) (Regions: Underlined = Chemical; Bold = Electrical; Italics = Food)

TABLE 14

ANOVA SUMMARY: STATES COMPRISING SAMPLE FOR INDUSTRY REGIONS CLASSIFIED BY 1970 CORPORATE INCOME TAX RATES

Source of Variation	SS	df	MS	F
Between Groups	15.8856	2	7.9428	0.2756
Within Groups	547.5318	28	28.8175	
Total	563.4174	30		

The F value is .2756. The null hypothesis is not rejected. No significant differences exist among the means of the three classified groups of state-regions. This finding is consistent with the finding for the data in Table 11 - the tax incentive is not a satisfactory explanation of manufacturing investments.

Combined Effect of Other Variables

The four variables (change in tax rate, per capita income, unemployment, and public spending) were incorporated in a regression model. Multiple regression analysis was performed using six equations (Table 15) with C_g as the dependent variable.

TABLE 15

MULTIPLE REGRESSION RESULTS: OTHER FRICTION VARIABLES

Equations	R^2	a	b_t	b_i	b_u	b_s
1. Tax Change + (18 States)	0.1529	8.6545	-0.0017	0.7944	-0.1867	-0.3100
T Value for Ho		0.79	0.00	0.85	-0.79	-0.55
p Value of T		0.4454	0.9976	0.412	0.4434	0.5893

States with Tax Increase: Alabama, Arizona, Connecticut, Georgia, Illinois, Indiana, Iowa, Kansas, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New Mexico, South Carolina, Tennessee, Utah and West Virginia.

Equations	R^2	a	b_t	b_i	b_u	b_s
2. Tax Change 0 or - (13 States)	0.7303	35.0806	1.4030	-1.1769	-0.5516	-1.1776
T Value for Ho		4.47	1.86	-1.48	-2.60	-2.69
p Value of T		0.002	0.099	0.178	0.032	0.027

States with No Change or Tax Decrease: California, Colorado, Florida, Idaho, Kentucky, Louisiana, Missouri, North Dakota, Oregon, Oklahoma, Texas, Virginia and Wisconsin.

Equations	R^2	a	b_t	b_i	b_u	b_s
3. Chemical Region (8 States)	0.8355	73.9573	-1.1726	-1.7655	0.3966	-3.0885
T Value for HO		3.04	-1.29	-2.33	0.76	-1.92
P Value of T		0.055	0.287	0.102	0.504	0.150
4. Electrical Region (7 States)	0.9305	-39.0170	-0.2451	2.0030	-0.3516	2.4123
T Value for HO		- 2.82	-1.15	2.30	-1.94	2.42
P Value of T		0.106	0.369	0.147	0.191	0.136
5. Food Region (7 States)	0.8159	6.3132	0.6138	0.5601	-0.9080	-0.3735
T Value for HO		0.35	0.91	1.60	-2.46	-0.28
P Value of T		0.760	0.458	0.250	0.132	0.803
6. Large Capital Flows (10 States)	0.5733	16.2971	-0.6587	-0.1859	-0.6377	-0.4012
T Value for HO		0.89	-0.94	-0.26	-1.61	-0.45
P Value of T		0.413	0.388	0.804	0.168	0.674

HO = Null Hypothesis; a = Intercept; b_t = Change in Tax Rate; b_i = Per Capita Income Growth Rate; b_u = Rate of Decline in Unemployment; b_s = Rate of Change in Total Public Spending; p value = Probability of T

Source: The per capita income growth rate, rate of decline in unemployment, and the rate of change in public spending were obtained from Salvary [1977].

The independent variables are: (1) change in tax rates--1970 less 1960 (b_t); (2) per capita income growth rate (b_i); (3) rate of decline in unemployment (b_u); and (4) rate of change in public spending (b_s). In the first two regression models, the state-regions were divided into: (a) states with tax increases in 1970 over 1960 (equation 1), and (b) states with no change in tax rates (equation 2). The p values obtained for both sets of multiple regression coefficients were not significant. C_gs were not influenced in any significant manner by the four variables. This point is accentuated further by the .01 level of significance for the intercept in regression model 2. This finding suggests that there could be some association between the intercept and the tax characteristic of the sample states, since the sample states in equation 2 were zero tax states or states with tax rate declines.

At the disaggregated levels (equations 3 through 5), the explanatory power of the independent variables increased; however, the p values of the regression coefficients were also insignificant. The findings (R^2s) from these tests suggest that the other identified variables are influential in directing the flow of financial capital. More importantly is the magnitude of the intercept in each of the regression equations--models 3 and 4. Furthermore, the intercept is positive for equation 3, while it is negative for equation 4. It is quite probable that the results (both the sign and magnitude of the intercept) in equation 3 reflect the insular influence of corporate retained earnings being directed to the particular industry-regions for investment in manufacturing capital expenditures. The findings in this section lend some support to the conclusions arrived at concerning the tests of the hypotheses.

POLICY IMPLICATIONS AND RECOMMENDATION

On theoretical and empirical grounds [Henderson and Liebman 1992; Herber 1971, 104-105], a spending or tax change (e.g., investment tax credit and depletion allowance) may improve or worsen societal welfare by moving society closer or further away from the locus of optimal inter-sector resource allocation. Thus, a comprehensive concept of fiscal rationality must include the government's ability in its revenue-generating and expenditure activities to influence allocational, distributional, stabilization, and economic growth effects. As many studies have indicated [Committee of New England 1954; Ingram 1968; Business Week 1976], since tax wars among the states to promote capital formation have been in several instances counter productive, states have limited ability to promote capital formation within their borders. In this regard, Deller [1993] recommends a coordinated effort among the three levels of government: "Prior to the late 1970s a strong case could be made for limited government intervention, today the evidence of regional divergence strongly suggests a more active role for federal, state, and local governments in formulating effective economic development and growth policies."

While not addressing regional growth, Heller's [1967, 49-50] caution is highly relevant:

> Yet, if we manage to solve tolerably well the macroeconomic problem of keeping the economy moving along the path of its non-inflationary potential, both President and the public will have no choice but to learn their microeconomic lessons. For then--apart from the ticklish job of timing and tuning fiscal-monetary policy to keep supply and demand in balance and to avoid the excesses that destroy expansions--we return to the classical problems of the fully employed economy. One claim on resources must come at the expense of others, and the microeconomic issues of efficient allocation comes strongly to the fore.

Corporate earnings retention is a significant factor in the rationing of financial capital and empirical studies have revealed that the secondary capital market has only a minimal effect on this process. Unfortunately, the US Congress has not adopted a comprehensive fiscal policy effort to efficiently allocate resources. Lacking government fiscal policy to mediate the problem arising from the earnings retention policy of large corporations, the interregional flow of financial capital is inhibited. Given the findings of the study, economic policy makers should give due cognizance to such institutional behavior; failing to do so can only result in regional policies that would exacerbate rather than ameliorate regional economic problems.

Policy Recommendation

To dampen/minimize the effect of corporate retained earnings as an impediment to the free flow of financial capital, the following recommendation is offered. The Federal government should provide a tax incentive to corporations that distribute more than 80% of their earnings annually. This incentive would induce corporations to resort to the market more often for the financing of new projects, which normally would be financed with retained earnings. If corporate earnings retention is considerably reduced, more firms will have access to financial capital since the capital market will have a greater role in the allocation of financial capital. In addition, corporate managers will have less discretionary control over investment funds; hence, there should be less sub-optimal investments.

SUMMARY AND CONCLUSION

Empirical tests were conducted on the bases of the "neoclassical model" (NCM) that the interregional flow of financial capital, in context of the Universal Investment Opportunity Set (UIOS), is determined by the marginal rate of return. The NCM was counterpoised against the "corporate retained earnings" model (CREM), which, while can be optimal along the Firm's Investment Opportunity Set (FIOS), is in great part sub-optimal in context of the UIOS, which is the realm of the NCM. The findings do suggest that CREM somewhat pre-empts the role of the NCM in the regional flow of financial capital. The variables used in this study are exponential growth rates of regional manufacturing value added (M_gs), and exponential growth rates of regional manufacturing capital expenditures (C_gs), regional annual capital investment-output ratios (ACIs), annual variability of regional manufacturing investment-output ratios (VACIs), and exponential growth rates of corporate income (I_gs).

In this study, consistent with the NCM, investment was modeled as a function of the marginal rate of return. It was posited that regional financial capital flows (evidenced by regional annual capital expenditures) would be related to marginal rates of return. In this manner, capital flow variability would be evidence of adjustment of financial capital flows to the rate of return. The evidence does not fully support the NCM**.** *The results of the study do suggest that the CREM does have an impact on the predictive ability of the NCM; that is, regional flows of financial capital are influenced in part by corporate retained earnings.*

The study's findings on regional financial capital flows do not support an efficient financial capital rationing process. Since this study covers a short period of time, the results of this study may not be generalizable beyond the study period.

Contribution and Innovation**:** Evidence is presented on the limitation of the neoclassical model to predict given economic frictions. The study offers a different approach to the modeling of the regional flows of financial capital and extends the scope of regional economic analysis. *The state-region permitted an analysis of the flow of financial capital in geographical space and the industry-region enabled an analysis of the flow of financial capital in economic space*. The state-regions and industry-regions provided insights on the volatility of investment in a given industry in a given place over time and from industry-region to industry-region. These constructs provide for a refinement and extension of the scope of regional economic analysis.

Future Research: (1) Technology may explain the peculiar findings for the electrical and chemical industries. An examination of differences in level of technology available between the two industries may shed light on the current findings. (2) The firm-type (local, regional, or national) dominance of regional manufacturing is another plausible explanation for the limited predictive ability of the NCM.

ENDNOTES

1 For an extensive discussion of various types of equilibria, see Marschak and Selten [1974, 241-243].

2 The number of states and the selection process compares favorably to the number of states and selection process found in the study by Kottman [1992], which addressed the question of whether regional differentials in returns to financial capital drive changes in regional employment.

3 Beeson and Huston [1989], whose study for the period 1959-1972 in which the state is the basic unit, indicated that a significant portion of the variation in manufacturing efficiency across states is identified with differences in labor force characteristics, industrial structure, and urbanization level. Garofalo and Malhotra [1992] in their study, which covered the period 1974-1978 with cross-sectional time series data, concluded that interest rate change and change in the rate of unionization can alter regional employment and capital formation. Their study contained thirty states which were divided into two (north and south) regions, with fourteen states comprising the northern region and sixteen states comprising the southern region. Moomaw and Williams [1991], using change in the tax rates--the difference between 1976 rates and 1960 tax rates, concluded that tax changes do have a significant statistical effect on manufacturing output growth. They also concluded that states can influence their manufacturing growth rates by improving education and the infrastructure.

4 There were 1,197 foreign manufacturing plant locations in the US between 1978 and 1987. In 1987, Chemical, Petroleum, Food, and Electrical accounted for 66 percent of total foreign assets in manufacturing [Ondrich and Wasylenko 1993, 27,32]. The location of foreign direct investment in the US is driven primarily by the presence of market size and agglomeration effects in the states chosen for the plant site [Ondrich and Wasylenko 1993, 138].

5 The work of Siebert [1969] is a fertile source of hypotheses for empirical testing. No attempt is made in this study to test beyond the predictive ability of the NCM versus the CREM.

6 See Carlton [1979, 43-44] for several factors which influence location decisions of new branch plants (e.g., the presence of technological expertise, and high unemployment rate).

7 The data were obtained from the *Annual Survey of Manufactures* (1959-1960,1961,1962,1964-1965,1966,1968-1969, 1970-1971) and the *Census of Manufactures* (1963 and 1967) [Salvary 1977].

8 The factors used to determine the dominance of an industry were: significance of the industry's output to US 1971 manufacturing; dispersion of its output throughout the US; and growth as a controlled variable over the period: two growth industries versus one no growth industry [Salvary 1977, 39-44]. Twelve states (Alaska, Hawaii, Maine, Michigan, Mississippi, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Vermont, and Wyoming--and the District of Columbia) were excluded because the dominant industry in each of those states (e.g., automobile in Michigan) is not widely dispersed. Owing to problems with the data, two additional states (South Dakota and Nebraska) have been excluded from the original thirty-eight states in the Salvary [1977] study, leaving thirty-six states.

9 Those SICCs were the second, fourth, and fifth (respectively) largest contributors to US manufacturing output in 1960 (approximately 29% combined) and in 1970 (approximately 30% combined). They ranked second, first, and fifth (respectively) in capital manufacturing expenditures in 1960 (approximately 39% combined) and 1970 (approximately 32% combined). These industries accounted for approximately 23% of total manufacturing employees in both years. In manufacturing output for 1989, these industries ranked first, third, and fourth respectively [Kurian 1994, 246].

10 Seven of the twenty two states within the three industry regions did not have corporate income taxes for the period 1960-1962, *only fifteen state regions have usable data*.

APPENDIX A

SOURCES OF FUNDS FOR NON FARM AND NON FINANCIAL CORPORATIONS
(Current $ Billions)

Year	Internally Generated	Externally Generated	Capital Expenditures	Percent: Internal Funds/ Capital Expenditures
1960	34.4	12.9	32.5	105.8%
1961	35.6	18.9	31.1	114.5%
1962	41.8	19.2	34.3	121.9%
1963	44.3	19.3	35.7	124.1%
1964	49.4	18.6	41.3	119.6%
1965	55.4	31.2	49.1	112.8%
1966	61.1	38.0	63.0	97.0%
1967	61.5	32.5	64.9	94.8%
1968	61.7	48.1	67.4	91.5%
1969	60.8	56.9	74.3	81.8%
1970	59.1	43.4	76.5	77.2%
1971	67.1	59.6	78.8	85.1%
1980	199.7	120.8	254.2	78.6%
1984	336.4	155.0	399.1	84.3%
1985	351.9	112.3	375.3	93.8%
1986	336.8	184.7	353.9	95.2%
1987	376.1	168.9	365.8	102.8%
1988	404.4	182.3	394.5	102.5%
1989	404.9	144.4	421.4	96.1%
1990	381.5	89.1	403.2	94.6%
1991	391.5	81.0	365.6	107.1%

Source: *Statistical Abstract of the United States of America*, 1966,p.500; 1969,p.482; 1973,p.475; and 1992,p.522.

APPENDIX B

MANUFACTURING VALUE ADDED AND CAPITAL EXPENDITURES
(Current $ Billions)

	Manufacturing Value Added			Capital Expenditures		
Year	Chemical	Electrical	Food	Chemical	Electrical	Food
1960	14,380	13,069	19,661	1,258	619	1,108
1965	20,956	20,162	23,537	2,482	1,046	1,476
1966	22,656	23,482	24,896	2,898	1,388	1,692
1971	29,431	26,874	34,110	2,938	1,399	2,245

Source: *Annual Survey of Manufactures 1959-1960; 1966; 1970-1971.*

APPENDIX C

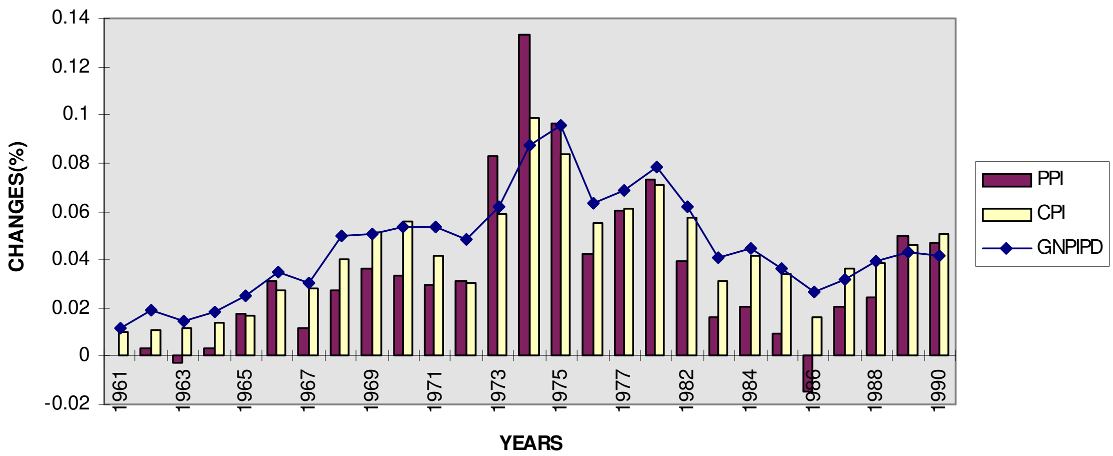
GROSS NATIONAL PRODUCT AND MANUFACTURING OUTPUT FOR YEARS 1960-1990

	Current ($Billions)			Constant ($Billions) 1987=100			
Year	Gross National Product 1	Manufac-turing Output 2	(2) As % of (1) 3	Gross National Product 4	Manufac-turing Output 5	% Change in (4) 6	% Change in (5) 7
1960	506.50	144.40	28.51	1948.08	455.57		
1961	520.10	144.20	27.73	1977.57	454.94	0.0150	-0.001
1962	560.30	158.80	28.34	2090.67	499.49	0.0570	0.098
1963	590.50	167.40	28.35	2170.96	528.13	0.0380	0.057
1964	632.40	180.30	28.51	2283.03	567.12	0.0520	0.074
1965	691.10	198.50	28.72	2433.45	613.49	0.0660	0.082
1966	747.60	218.00	29.16	2542.86	652.62	0.0450	0.064
1967	793.90	223.30	28.13	2620.13	660.96	0.0300	0.013
1968	864.20	244.30	28.27	2717.61	703.30	0.0370	0.064
1969	929.10	255.60	27.51	2781.74	708.89	0.0240	0.008
1970	992.70	252.20	25.41	2820.17	676.34	0.0138	-0.046
1971	1063.40	261.50	24.59	2866.31	680.34	0.0164	0.006
1972	1171.10	288.80	24.66	3010.54	727.93	0.0503	0.070
1973	1306.30	317.90	24.34	3162.95	734.62	0.0506	0.009
1974	1412.90	334.60	23.68	3146.77	670.26	-0.0051	-0.088
1975	1549.20	358.20	23.12	3148.78	648.46	0.0006	-0.033
1976	1700.10	402.80	23.69	3250.67	698.21	0.0324	0.077
1977	1918.30	464.80	24.23	3431.66	757.20	0.0557	0.085
1978	2163.90	518.70	23.97	3588.56	783.24	0.0457	0.034
1979	2417.80	563.20	23.29	3685.67	764.98	0.0271	-0.023
1980	2732.00	581.00	21.27	3810.32	695.49	0.0338	-0.091
1981	2957.80	643.60	21.76	3748.80	705.99	-0.0161	0.015
1982	3069.30	630.60	20.55	3662.65	664.49	-0.0230	-0.059
1983	3304.80	685.20	20.73	3789.91	710.47	0.0347	0.069
1984	3662.80	775.70	21.18	4020.64	787.96	0.0609	0.109
1985	4015.00	790.00	19.68	4253.18	794.99	0.0578	0.009
1986	4240.30	820.10	19.34	4375.95	837.38	0.0289	0.053
1987	4526.70	853.60	18.86	4526.70	853.60	0.0344	0.019
1988	4874.00	941.00	19.31	4691.05	918.19	0.0363	0.076
1989	5201.00	966.00	18.57	4797.97	895.76	0.0228	-0.024
1990	5567.00	1025.00	18.41	4930.91	906.19	0.0277	0.012

APPENDIX D

CONSUMER PRICE INDEX, PRODUCERS PRICE INDEX, AND GROSS NATIONAL PRODUCT FOR YEARS 1960-1990

FIGURE 1
CPI, PPI, GNPIPD



APPENDIX E

CORPORATE EARNINGS FOR SELECTED STATES FOR THE YEARS 1960-1971
(Millions of Dollars)

State/Year	1960	1961	1962	1963	1964	1965
Alabama	323.333	293.333	323.333	198.000	316.000	386.000
Arizona	136.000	122.000	112.000	140.000	184.000	218.000
Arkansas	178.000	216.000	206.000	212.000	222.000	276.000
California	3,820.000	4,970.909	5,287.273	5,660.000	7,360.000	7,570.909
Colorado	214.000	372.000	294.000	420.000	494.000	478.000
Connecticut	616.000	616.000	770.000	942.000	1,022.000	1,146.000
Delaware	150.000	134.000	146.000	178.000	200.000	204.000
Georgia	590.000	610.000	622.500	900.000	1,025.000	962.000
Idaho	61.053	57.895	54.737	56.842	64.211	136.667
Iowa	126.667	153.333	150.000	156.667	166.667	196.667
Kansas	240.000	245.714	257.143	311.429	308.571	328.571
Kentucky	288.571	322.857	300.000	310.000	332.857	417.143
Louisiana	457.500	432.500	582.500	437.500	552.500	685.000
Maryland	453.333	455.556	440.000	500.000	528.889	617.778
Massachusetts	421.286	514.412	487.805	530.673	617.886	727.273
Minnesota	530.667	496.000	466.667	502.667	537.333	600.000
Missouri	500.000	600.000	600.000	525.000	540.000	665.000
New Mexico	355.000	246.667	426.667	473.333	436.667	540.000
North Dakota	23.333	25.000	30.000	30.000	33.333	41.667
Oklahoma	305.000	367.500	365.000	572.500	422.500	427.500
Oregon	373.333	348.333	358.333	365.000	388.333	443.333
South Carolina	376.000	428.000	360.000	376.000	380.000	492.000
Tennessee	570.667	562.667	573.333	610.667	710.000	777.500
Utah	142.500	157.500	177.500	160.000	167.500	110.000
Virginia	634.000	574.000	606.000	638.000	684.000	796.000
Wisconsin	844.286	812.857	768.571	895.714	1,360.000	1,168.571

APPENDIX E
(Continued)
(Million of Dollars)

State/Year	1966	1967	1968	1969	1970	1971
Alabama	458.000	598.000	648.000	580.000	616.000	680.000
Arizona	203.030	218.182	222.727	274.242	316.667	409.091
Arkansas	416.000	502.000	392.000	373.333	436.667	433.333
California	7,887.273	6,465.714	8,268.571	8,464.286	8,394.286	7,614.286
Colorado	496.000	516.000	534.000	640.000	670.000	580.000
Connecticut	1,295.238	1,525.714	1,520.000	1,077.500	1,493.750	1,587.500
Delaware	260.000	254.000	232.000	251.667	223.333	200.000
Georgia	1,186.000	1,292.000	1,328.000	1,220.000	1,411.667	1,333.333
Idaho	141.667	160.000	133.333	166.667	185.000	216.667
Iowa	260.000	150.000	238.750	301.250	303.750	300.000
Kansas	648.571	531.111	437.778	446.667	428.889	555.556
Kentucky	518.571	578.571	520.000	562.857	564.286	571.429
Louisiana	795.000	860.000	857.500	865.000	872.500	1,275.000
Maryland	726.667	680.000	524.286	781.429	858.571	1,000.000
Massachusetts	736.142	829.268	2,228.000	2,468.000	2,910.667	2,706.667
Minnesota	1,004.000	614.298	581.642	729.038	938.824	941.176
Missouri	560.000	755.000	1,190.000	925.000	426.000	540.000
New Mexico	636.667	216.667	143.333	102.000	162.000	200.000
North Dakota	51.667	55.000	63.333	36.667	50.000	133.333
Oklahoma	557.500	537.500	605.000	552.500	687.500	625.000
Oregon	518.333	536.667	521.667	468.750	498.750	312.500
South Carolina	730.000	868.000	670.000	675.000	705.000	733.333
Tennessee	950.000	866.000	1,000.000	1,232.000	1,192.000	1,200.000
Utah	133.333	183.333	161.667	176.667	196.667	183.333
Virginia	958.000	986.000	976.000	1,350.000	1,348.000	1,300.000
Wisconsin	1,318.571	1,468.571	1,372.857	1,442.857	1,495.714	1,271.429

Sources: Corporation Manual: Corporation Statutes - 1960,1962,1964,1966,1967,1970,1971.
Statistical Abstract 1961-1972
State and Local Taxes: Significant Features 1968
State and Local Finances: Significant Features - 1966-1969; 1967-1970.

APPENDIX F

CORPORATE TAX RATES FOR SELECTED STATES FOR THE YEARS 1960-1971

State/Year	1960 %	1961 %	1962 %	1963 %	1964 %	1965 %	1966 %	1967 %	1968 %	1969 %	1970 %	1971 %
Alabama	3.0	3.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Arizona	5.0	5.0	5.0	5.0	5.0	5.0	6.6	6.6	6.6	6.6	6.6	6.6
Arkansas	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0
California	5.5	5.5	5.5	5.5	5.5	5.5	5.5	7.0	7.0	7.0	7.0	7.0
Colorado	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Connecticut	5.0	5.0	5.0	5.0	5.0	5.0	5.3	5.3	5.3	8.0	8.0	8.0
Delaware	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0
Georgia	4.0	4.0	4.0	4.0	4.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0
Idaho	9.5	9.5	9.5	9.5	9.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Iowa	3.0	3.0	3.0	3.0	3.0	3.0	3.0	8.0	8.0	8.0	8.0	8.0
Kansas	3.5	3.5	3.5	3.5	3.5	3.5	3.5	4.5	4.5	4.5	4.5	4.5
Kentucky	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Louisiana	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Maryland	4.5	4.5	4.5	4.5	4.5	4.5	4.5	5.3	7.0	7.0	7.0	7.0
Massachusetts	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	7.5	7.5	7.5	7.5
Minnesota	7.5	7.5	7.5	7.5	7.5	7.5	7.5	11.3	11.3	11.3	8.5	8.5
Missouri	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	5.0	5.0
New Mexico	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	5.0
North Dakota	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Oklahoma	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Oregon	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	8.0	8.0	8.0
South Carolina	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0
Tennessee	3.8	3.8	3.8	3.8	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0
Utah	4.0	4.0	4.0	4.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Virginia	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Wisconsin	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0

*Estimates for: Arizona -1965; Massachusetts -1960-66,1971

Arizona - Progressive rate up to $6000

Arkansas - Progressive rate up to $25000

Iowa - Progressive rate up to $100000 Starting in 1967

Kentucky - Progressive rate up to $25000

Wisconsin - Progressive rate up to $6000

REFERENCES

Almon, Clopper, Jr.; Buckler, Margaret B.; Horwitz, Lawrence M. and Reimbold, Thomas C. (1974) *1985: Interindustry Forecasts of the American Economy*. Lexington; Toronto; London: D.C. Heath and Company, .

Anderson, William P. and Rigby, David L. (1989) "Estimating capital Stocks and Capital Ages in Canada's Regions: 1961-1981." *Regional Studies*: 117-126.

Bartik, Timothy J. (1991) *"Who Benefits from State and Local Economic Development Policies?* Kalamazoo: Upjohn Institute for Employment Research :17-62.

Beeson, Patricia A. and Husted, Steven. (1989) "Patterns and Determinants of Productive Efficiency in State Manufacturing." *Journal of Regional Science* (February).

Blair, John P. and Premus, Robert. (1987) "Major Features in Industrial Location: A Review." *Economic Development Quarterly 1* (February): 72-85.

Brittain, John A. (1966) *Corporate Dividend Policy*. Washington, D.C.: The Brookings Institution.

Borts, George H. and Stein, Jerome L. (1964) *Economic Growth in a Free Market*. New York; London: Columbia University Press.

Boschen, John F. (1990) "Price Level Stability through Currency Rather Than Inside Money." *Monetary Policy for a Changing Financial Environment*. Edited by William S. Haraf and Phillip Cagan. Washington, D.C.: AEI Press.

Business Week. (1976) "The Second War between the States." *Business Week* (June 29):50-59.

Carlton, Dennis W. (1979) "Why New Firms Locate Where They Do: An Econometric Model." *Interregional Movements and Regional Growth*. Edited by William C. Wheaton, Washington, D.C.: The Urban Institute.

Chiang, Alpha C. (1964) *Fundamental Methods of Mathematical Economics*. New York; London and other major cities: McGraw-Hill Book Company.

Committee of New England of the National Planning Association. (1954) *The Economic State of New England*. New Haven: Yale University Press.

Cottle, Sidney and Whitman, Tate. (1959) *Corporate Earning Power and Market Valuation 1935-1955.* Durham, North Carolina: Duke University Press.

Deller, Steven C. (1993) "Are Regional Incomes Diverging?" *Newsletter Number 202*, University of Wisconsin-Extension (August) .

Donaldson, Gordon. (1961) *Corporate Debt Capacity*. Boston: Harvard University Press.

Drobovolsky, Sergei P. (1951) *Corporate Income Retention 1915-1943.* New York: National Bureau of Economic Research, Inc.

Durbin, E.F.M. (1949) *Problems of Economic Planning - Papers on Planning and Economics*. London: Routledge & Kegan Paul Limited.

Estall, R.C. (1966) *New England - A Study in Industrial Adjustment*. New York; Washington: Frederick A. Praeger Publishers.

Garofalo, Gasper and Yamarik, Steven. (2002) "Regional Convergence: Evidence from a New State-by-State Capital Stock Series." *Review of Economics and Statistics*. (May):316-323.

Garofalo, Gasper A. and Malhotra, Devinder M. (1992) "A Regional Comparison of the Impact of Changes in Input Prices on Input Demand for US Manufacturing." *Regional Science and Urban Economics* (June):213-228.

Gertler, Meric S. (1984) "Regional Capital Theory." *Progress in Human Geography*: 50-76.

______________. (1986) "Regional Dynamics of Manufacturing and Non-Manufacturing Investment in Canada." *Regional Studies*: 523-534.

Glover, James W. (1930) *Tables of Applied Mathematics in Finance, Insurance, Statistics*. Ann Arbor, Michigan: George Wahr, Publisher.

Hamberg, Daniel. (1971) *Models of Economic Growth*. New York; Evanston; London: Harper & Row Publishers.

________. (1956) *Economic Growth and Instability*. New York: W.W. Norton & Company Inc.

Harford, Jarrad. (1999) "Corporate C ash Reserves and Acquisitions." *Journal of Finance* LIV-6 (December): 1969-1997.

Heller, Walter H. (1967) *New Dimensions of Political Economy*. New York: W. W. Norton.

Henderson, Yolanda K. and Liebman, Jeffrey B. (1992) "Capital costs, Industrial Mix, and the Composition of Business Investment." *New England Economic Review* (Jan/Feb): 67-92.

Herber, Bernard P. (1971) *Modern Public Finance: the Study of Public sector Economics*. Revised Edition. Homewood, Illinois: Richard D. Irwin, Inc.

Hirschman, Albert O. (1970) "Interregional and International Transmission of Economic Growth." *Regional Economics: Theory and Practice*. Edited by David L. McKee, Robert D. Dean, and William Leahy. New York: The Free Press. London: Collier Macmillan Limited.

Ingram, J. C. (1968) "State and Regional Payments Mechanisms." *Regional Analysis*. L. Needleman, Ed. Middlesex, England: Penguin Books.

Isard, Walter. (1960) *Methods of Regional Analysis*. Cambridge, Massachusetts; London: The M.I.T. Press.

________ and Cumberland, J. (1948) "Some Locational Factors in the Iron and Steel Industry Since the Early Nineteenth Century." *Journal of Political Economy* (June).

Kalecki, M. (1954) *Theory of Economic Dynamics*. London: George Allen & Unwin.

Kottman, Stacy E. (1992) "Regional Employment by Industry: Do Returns to Capital Matter?" *Economic Review - Federal Reserve Bank of Atlanta.* 77-5 (Sep/Oct): 13-25.

Kurian, George T. (1994) *Datapedia of the United States: 1790-2000*. Lanham, Maryland: Bernan Press.

Lintner, John. (1949) *Corporate Profits in Perspective*. Washington, D.C.: American Enterprise Association, Inc.

Maksimovic,Vojislav and Phillips, Gordon. (1999) *Do Conglomerate Firms Allocate Resources Inefficiently?* Working Paper 99-11. Center for Economic Studies, U.S. Bureau of the Census.

Marschak, Thomas and Selten, Reinhard. (1974) *General Equilibrium With Price-Making Firms*. Mathematical Economic 91. Berlin; Heidelberg; New York: Springer-Verlag.

Meyer, John R. and Kuh, Edwin. (1959) *The Investment Decision - An Empirical Study*. Cambridge, Massachusetts: Harvard University Press.

Moomaw, Ronald L. and Williams, M. (1991) "Total Factor Productivity Growth in Manufacturing: Further Evidence from the States." *Journal of Regional Science* (February):17-34.

Mueller, Dennis C. and Reardon, Elizabeth A. (1993) "Rates of Return on Corporate Investment." *Southern Economic Journal* (October).

Olsen, Erling. (1971) *International Trade Theory and Regional Income Differences - United States 1880-1950*. Amsterdam; London: North-Holland Publishing Company.

Ondrich, Jan and Wasylenko, Michael. (1993) *Foreign Direct Investment in the United States: Issues, Magnitudes, and Location Choice of New Manufacturing Plants*. W.E. Upjohn Institute for Employment research, Kalamazoo, Michigan.

Opler, Tim; Pinkowitz, Lee; Stulz, Rene; and Williamson, Rohan. (1999) "The Determinants and Implications of Corporate Cash Holdings." *Journal of Financial Economics* 52): 3-46.

Perroux, Francois. "Note on the Concept of 'Growth Poles' ". (1955) (Translated from French: "Note sure la Notion de'pole de croissance." *Economie Appliquee* as cited in *Regional Economics: Theory and Practice*. Eds. David L. McKee, Robert D. Dean and William Leahy. New York: The Free Press. London: Collier Macmillan, 1970.

Robertson, D. H. (1958) *Lectures on Economic Principle - Volume 11*. London: Staple Press.

Romans, J. Thomas. (1965) *Capital Exports and Growth Among U.S. Regions*. Middletown, Connecticut: Wesleyan University Press.

Rumelt, Richard. P. (1974) *Strategy, Structure and Economic Performance*. Published Dissertation. Boston: Harvard University Press.

Salvary, Stanley, C. W. (1977) *Regional Manufacturing Economic Growth: An Empirical Analysis of the Impact of the Dominant Industry Hypothesis*. Doctoral Dissertation. New York University.

Sherman, Howard J. (1968) *Profits in the United States*. New York: Cornell University Press.

Siebert, Horst. (1969) *Regional Economic Growth: Theory and Practice*. Scranton, Pennsylvania: International Textbook Company.

U.S. Department of Commerce. (1969, 1979, 1980, 1990, 1992, 1994) *Statistical Abstract of the United States*. Washington, D.C.: U.S. Government Printing Office.

Varaiya, Pravin and Wiseman, Michael. (1981) "Investment and Employment in Manufacturing in U.S. Metropolitan Areas 1960-1976." *Regional Science and Urban Economics*: 431-469.

Webber, Michael. (1987) "Rates of Profit and Interregional Flows of Capital." *Annals of the Association of American Geographers*: 63-75.

Weber, William L. and Domazlicky, Bruce R. (1999) "Total Factor Productivity Growth in Manufacturing: A Regional Approach Using Linear Programming." *Regional Science and Urban Economics* 29-1(January): 105-122.

Wheat, Leonard F. (1986) "The Determinants of 1963-1977 Regional Manufacturing Growth: When the South and West Grow." *Journal of Regional Science* 26 (November): 635-59.

Williamson, Oliver E. (1970) *Corporate Control and Business Behavior*. Englewood Cliffs, New Jersey: Prentice-Hall Inc.

Winter, Joachim K. (1999) Does Firms' Financial Status Affect Plant-Level Investment and Exit Decisions? Working Paper 99-1. Center for Economic Studies, U.S. Bureau of the Census.