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Payback Adjusted Net Present Value

Alka Bramhandkar*
Jeffrey Lippitt**

INTRODUCTION

In most discussions of capital budgeting, the net present value (NPV) method is hailed as the best method for ranking mutually exclusive projects. The NPV approach uses the firm specific weighted cost of capital (WACC) as the discount rate to evaluate the present value of the future cash flows of a project. Subtracting the cost of the investment from this present value yields the net benefit of the project, above and beyond the cost of the capital invested in the project. Managers rarely rely upon a single method of evaluating projects. The NPV method is generally accompanied by several other methods. One method commonly included in the analysis is the payback method. The payback method measures the length of time it takes for the future cash flows of the project to return the initial capital that is invested in the project. Longer payback periods are viewed as an indication of a less favorable project. Most discussions of payback methods have focused upon its shortcomings and the dangers of relying upon it. These limitations range from ignoring the time value of money to omitting the cash flows beyond the payback period. It is often illustrated that a project with a short payback can have a negative NPV, meaning that the project would pass the payback test, but even so, be unacceptable.

In practice, we see the payback method being commonly used, even given its well known shortcomings. Explanations for this persistence are that payback is a simple technique that is easily understood by most managers and that its calculation is relatively simple. These explanations require that we accept two very unlikely conclusions. First, we must believe that managers are unable to understand the "complex" calculations incorporated in the net present value (NPV), even though these same managers routinely deal with hedging transactions using derivatives, the tax and risk issues associated with international operations, and many more challenging issues. Second, we are asked to accept that managers who have computers on the desks, in their briefcases, and even in their pockets; are concerned with the difficulty of calculating NPV. Neither of these conclusions seems reasonable, so we must look elsewhere for an explanation of payback's persistent use in practice. The model proposed in this paper is based upon the conclusion that managers continue to use payback because it provides them with useful information that is not embedded in the NPV method.

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Our paper begins with a brief literature review, then compares and illustrates the NPV and payback methods. Our model is then presented with its application to an example of two mutually exclusive projects and we end the paper with a conclusion with some practical advice to the managers.

LITERATURE REVIEW

Just as the textbooks on corporate finance do not devote much space to the subject of risk adjusted cost of capital, the scholarly work in this area has also been hard to find. One of the earlier papers by Bhandari, N. (1981) basically framed the issue in terms of the uncertainty associated with forecasting all components of cash flows and presents a summary of five generally accepted methods to account for the uncertainty. These methods include the Certainty Equivalent, the risk adjusted Weighted Average Cost of Capital (WACC), the simple average method incorporating probabilities of varying economic conditions, the expected value method, and the sensitivity analysis. The second paper that has relevance to our work summarizes the survey results of 313 European CFOs on their use of capital budgeting evaluation techniques among other related issues. Not surprisingly, Brounene, Jong, and Koedijk (2004) reported that despite the ease at which NPV and internal rate of return (IRR) methods can be applied to an investment decision, many small firms and firms managed by older CFOs rely on the payback method (survey reported a range of 50.9% to 69.2% of the firms) to select the best project. The paper by Soares and Coutinho (2007) focuses on the post-audit study of capital budgeting forecasts. Using a large database, collected by the Portuguese government to award investment incentives, the authors report that one of the main variables often overestimated (by an average of 9%) by managers was sales with its resulting impact on the profit level. On the other hand, the managers were able to predict the operating costs accurately but could not estimate the investment expenses correctly probably due to the delays in initial starting of the projects. They observed that other firm specific variables such as type of industry or size had no effect on the error rate.

The closest research paper to our work was published in 1989 by Butler and Schachter. After presenting an example to illustrate the bias in the net present value calculations and extending it to a general case, they showed how the bias can be corrected. They discussed four approaches which include:

a. An ad-hoc approach

   Managers reduce the NPV by arbitrarily reducing the expected cash flows or increasing the discount rate.

b. An options-based approach

   This is an application of the certainty equivalent method which is commonly covered in most texts on advanced corporate finance.

c. Analytical expectations and numerically evaluated expectations

In this method, a ratio of the expected value of the estimated present value to the true value is calculated. This conversion factor is used to adjust the present value of the cash flows. The correction factor is project specific.

d. Unbiased estimation of present value: An analytical approximation

In this method, the authors proposed using the Taylor Series expansion to identify the corrected discount rate. Although this method is more complex it may be preferred by managers who may be less familiar with the properties of sampling distribution.

In summary, the work so far confirms the uncertainty that managers need to acknowledge in their cash flow forecasting but offers no solution to handle such risk in the evaluation procedure used.

MODEL

The documented use of payback method by managers implies that there are factors affecting the value of capital budgeting projects, related to time, other than the time value of money. One such factor is undoubtedly risk. Most textbooks describe the adjustment of the WACC to reflect different levels of risk associated with various projects as a footnote. If a chapter is devoted to the topic of risk analysis, explanations include sensitivity analysis, scenario analysis, & Monte Carlo simulation. These methods yield results that indicate using risk premium to account for the type of project being considered but not the risk premium associated with time. Rarely any mention is made of the reality that most managers are unable to estimate long term cash flows with accuracy and must therefore use a higher discount rate which should be adjusted to increase with successively longer time periods.

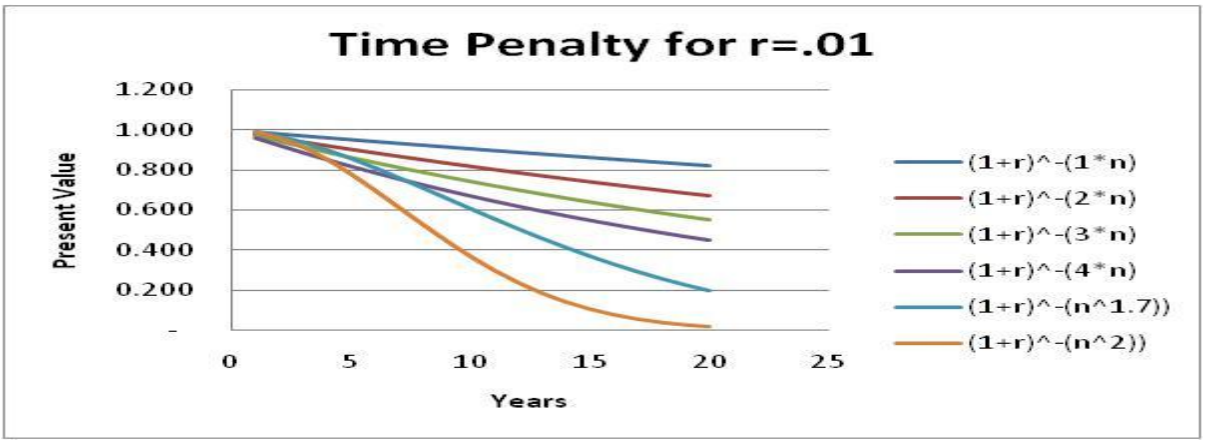
To illustrate this, let's consider four projects that a hypothetical firm with a cost of capital of 14% is considering. Each of these projects requires an initial investment of $100 and results in single future cash flow. Each project's cash flow occurs at a different time.

TABLE I

Project	**1**	**2**	**3**	**4**
Future Cash Flow	143	212	408	1512
Year Until Future Cash Flow	2	5	10	20
Present Value of a $ Factor	0.7695	0.5194	0.2697	0.0728
Present Value of Cash Flow	110	110	110	110
Cost of Project	100	100	100	100
Net Present Value	10	10	10	10

In the end we show that the application of this technique to an example of two mutually exclusive projects with significantly different expected lives.

CHART I



The net present value model incorporating payback can be implemented in many ways. The standard discount rate used in the NPV method is usually a sum of risk-free rate, risk premium, maturity and liquidity premium. The rate expressing time preference (penalty rate, r) is additional premium that needs to be incorporated in the calculations over and above the standard discount rate. The chart I above demonstrates several formulations for the additional discount factor with several different levels of severity. It shows the relationship between years and present value of the cash flow to be received at any given time. For any given formulation as the penalty rate (r) increases, the penalty becomes more severe. In addition, as we select a model with a larger magnitude exponent for (1+r), the model becomes more severe.

The process for choosing the correct formulation of the graph is very subjective. Examining the chart above, we can see that using a value of .01 for the rate and n for the power, after 20 years, the decay reduces the present value of the cash flow to about 80% of its unadjusted value. By increasing the exponent 3*n, after 20 years the present value of the cash flow is reduced to only about 40% of its unadjusted value. Using an exponent of n^2, after twenty years of decay the cash flows are worth close to nothing. This may seem extreme to some, but many managers that are sensitive to payback would probably agree that a project should not depend upon cash flows that are more than 20 years out to make it successful. This chart demonstrates the effect of changing the exponent. The appendix includes several additional charts that demonstrate the effect of varying the rate used.

One can visually choose both a rate and an exponent that captures payback preferences of the decision maker by examining these graphs, or the decision maker can be presented with a series of hypothetical projects and asked to make choices between them. An analysis of these choices can then yield values for both the proper rate and exponent. While this process for selection is subjective, application of the decay function on a consistent basis across individual projects will result in uniform application of the subjective preferences. When considering the weakness of the subjective process used to develop the decay function, it should be remembered that managers are currently making very subjective tradeoffs when they separately consider payback and net present value to arrive at a decision. This method is explicit and uniform, which gives it an advantage over the traditional approach.

CAPITAL BUDGETING CASE

We will now consider a case where a company is considering two mutually exclusive capital projects. These projects have cash flows as listed below.

TABLE II

Cash flows	**Project 1**	**Project 2**
Investment	(50,000)	(50,000)
1	10,000	16,000
2	10,000	16,000
3	10,000	16,000
4	10,000	16,000
5	10,000	16,000
6	10,000	
7	10,000	
8	10,000	
9	10,000	
10	10,000	
11	10,000	
12	10,000	
13	10,000	
14	10,000	
15	10,000	
16	10,000	
17	10,000	
18	10,000	
19	10,000	
20	10,000	

Using traditional capital budgeting techniques with a cost of capital of 10%, we can analyze these projects and get the following results:

TABLE III

Project	**1**	**2**
Net Present Value	35,136	10,653
Internal Rate of Return	19%	18%
Payback	5	3.1
Discounted Payable	6.3	3.9

Project 1 is better in terms of both NPV and IRR, but trails in both payback and discounted payback. Project 1 is inviting, but given the very long duration of the project it is unwise to ignore the payback. Detailed calculations are presented in appendix I.

CONCLUSION

There is little doubt that the decision process still requires a significant subjective component. In choosing both r and the model, we greatly affect the results. Appendix II presents results under three levels of r. However, it is much easier to implement a firm wide policy using this approach. Just as a company specifies a cost of capital for the firm or sometimes by division, they can also specify both model and r.

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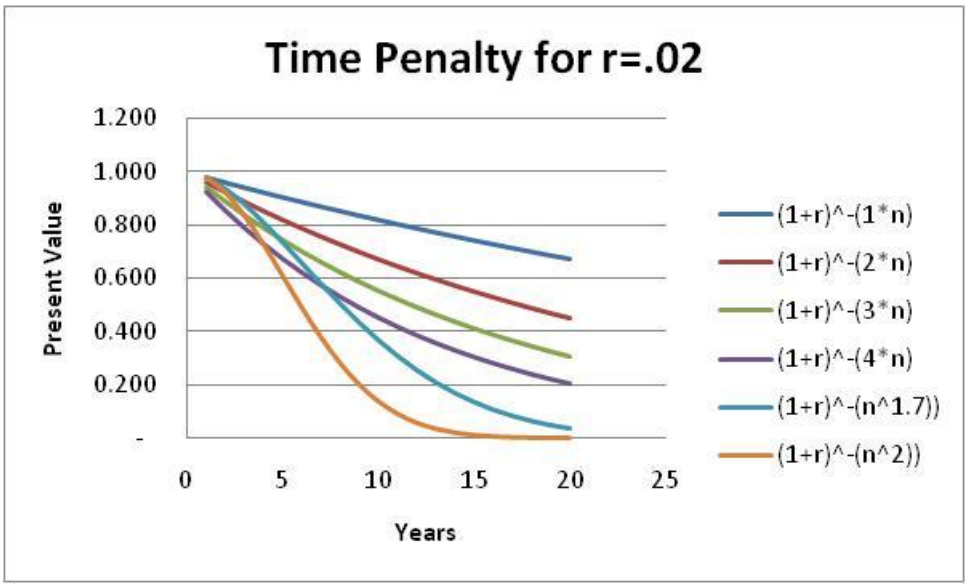
APPENDIX I

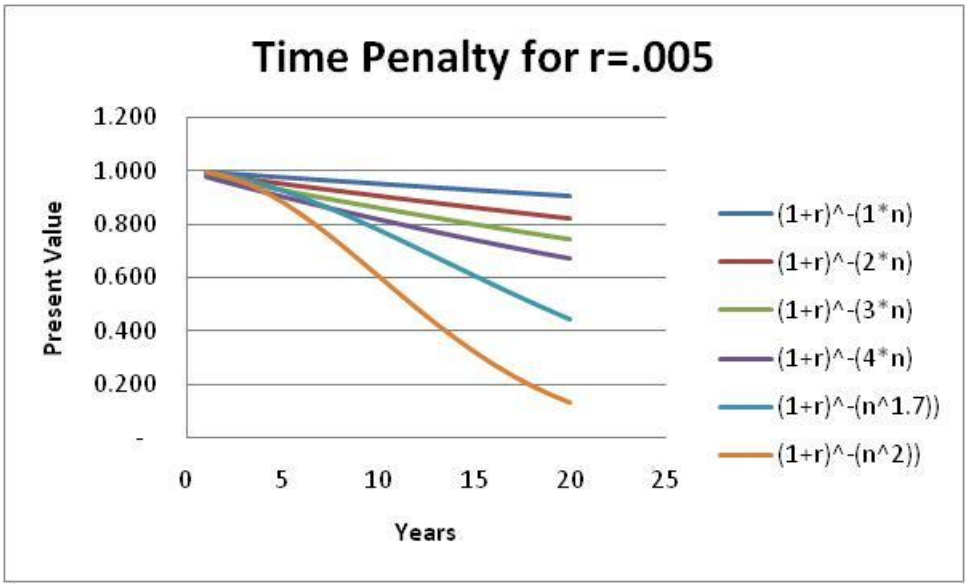
					Traditional		Payback Adjusted	
Cash flows	**Project 1**	**Project 2**	**PV$**	**pvr$**	**pvp1**	**pvp2**	**pvp1r**	**pvp2r**
Investment	(50,000)	(50,000)						
1	10,000	16,000	0.909091	0.990099	9,091	14,545	9,001	14,401
2	10,000	16,000	0.826446	0.96098	8,264	13,223	7,942	12,707
3	10,000	16,000	0.751315	0.91434	7,513	12,021	6,870	10,991
4	10,000	16,000	0.683013	0.852821	6,830	10,928	5,825	9,320
5	10,000	16,000	0.620921	0.779768	6,209	9,935	4,842	7,747
6	10,000		0.564474	0.698925	5,645		3,945	
7	10,000		0.513158	0.614119	5,132		3,151	
8	10,000		0.466507	0.528971	4,665		2,468	
9	10,000		0.424098	0.446651	4,241		1,894	
10	10,000		0.385543	0.369711	3,855		1,425	
11	10,000		0.350494	0.299995	3,505		1,051	
12	10,000		0.318631	0.238628	3,186		760	
13	10,000		0.289664	0.186075	2,897		539	
14	10,000		0.263331	0.142236	2,633		375	
15	10,000		0.239392	0.106584	2,394		255	
16	10,000		0.217629	0.078294	2,176		170	
17	10,000		0.197845	0.05638	1,978		112	
18	10,000		0.179859	0.039799	1,799		72	
19	10,000		0.163508	0.027541	1,635		45	
20	10,000		0.148644	0.018683	1,486		28	
	19.43%	18.03%			85,136	60,653	50,770	55,167
					50,000	50,000	50,000	50,000
		Net Present Value			35,136	10,653	770	5,167

	Traditional		Payback Adjusted	
	1	**2**	**1**	**2**
Present Value of Future Cash Flows	85,136	60,653	50,770	55,167
Cost of Investment	50,000	50,000	50,000	50,000
Net Present Value	35,136	10,653	770	5,167

APPENDIX II

Alternative values for r and their Graphs





Institutional Economics in the Age of J.P. Morgan

Dr. William T. Ganley*

ABSTRACT

The cornerstone of early Institutional Economics was an analysis of the cyclical behavior of American capitalism during the era of corporate mergers and acquisitions. The foundation was in the work of Thorstein Veblen, in and around the turn of the 20th century. J.P. Morgan was the most prominent investment banker in the late 19th and early 20th centuries. By some accounts, Morgan served as the "unofficial central banker" for the federal government throughout most of that era. Veblen was fascinated by Morgan and his role in financial markets, and this influenced his analysis of corporation finance in *The Theory of Business Enterprise.* His observations of Morgan's investment banking activities became the central component of his theoretical explanation of Industrial Capitalism and the cyclical behavior of the modern industrial economy.

This paper analyzes the role of J.P. Morgan during the merger era of the last quarter of the 19th century. Next, the paper will review Veblen's observations about Morgan and his place in the realm of American corporation finance. Major developments in the U.S. securities markets during the Morgan era are analyzed. The central role of financial markets in the literature of early Institutional Economics is critically analyzed in this paper. Finally, a modern interpretation of Veblen's theoretical structure is provided, and his anticipation of later 20th century theoretical developments is underscored.

INTRODUCTION

J. Pierpont Morgan dominated the image of American financial markets in his era in a manner which has never been replicated in the past 100 years. To the American public, he was the personification of financial capitalism, for better or worse. The perception of his financial and economic power was even greater than his actual power, which was substantial and profound. For purposes of this paper, the Age of J.P. Morgan will be defined chronologically, from the early 1870s to the creation of the Federal Reserve System. The latter part of this age saw the transition of the securities market in the United States, what has been called the first speculative era. [Mitchell 2007].

Institutional Economics was born in the writings of Thorstein Veblen during the 1890s. His theoretical insights into the workings of industrial capitalism and finance sparked the development of a new school of economic thought. Veblen diverged significantly from the mainstream economic theories of neoclassical economists like Alfred Marshall and Irving Fisher. The strength of Veblen's theoretical approach was the focus on the interactions and fluctuations of the modern industry economy and the dynamics of financial markets. This analysis provided much greater attention on the role of investment banking in the merger movement in the U.S. and the increased speculation in common stocks in American securities markets. Stock market activity played a major role in Veblen's theory of business finance.

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Some historians date the "Age of Morgan" from the mid-1880s, with direct entry of the Morgans (Pierpont and his father Junius) into railroad cooperative management – a serious attempt to build an American railroad cartel. My preference is to select an earlier date to mark the inception of the J.P. Morgan age: the early 1870s, when Morgan pushed the House of Morgan into the market for federal government debt issues. Why go back to the decade of the 1870s to date the Morgan era? This venture into U.S. Treasury refinancing activities marked the beginning of J.P. Morgan's influence on Wall Street and London that survived beyond his own death.

BACKGROUND

In the modern financial world with a global financial structure in place, it may seem hard to look back to the investment scene a century and a half ago; during that time period, European financial centers, particularly London, dominated investment and finance. From the American perspective, major financial investments required an external source of funding. At the beginning of the 19th century, U.S. manufacturing and commercial activities were regional in nature and scope; therefore, regional and local investors were usually more than sufficient for the provision of investment funds. As cotton production expanded in the Southern states, the expansion of credit demands exceeded the capacities of regional financial markets. European, especially British, credit markets became a source of funds for the expansion of Southern cotton plantations.

George Peabody established the first significant American merchant bank in London's financial district in 1838. He managed to make his firm a prominent merchant bank through alliances with the Rothschilds and the Barings, the two leading international investment banks, and as the American voice in London that condemned the repudiation of bond debt by various states in the U.S. Peabody learned how to survive, and ultimately to strive, in an environment where American securities were often considered a joke.

> "London was the sun of the financial solar system. Only Britain had a huge surplus of funds in a capital-short world, and sterling was the currency of world trade; its official use dated back to William the Conqueror. In the afterglow of the Napoleonic Wars, bankers of the City – London's financial district – were self-styled potentates, often with access to more money than governments and companies they financed. Firms such as Barings and Rothschilds maintained an imperial reserve, omitting their names from doorways and letterheads, refusing to solicit business or open branches, and demanding exclusive client relations. Statesmen from Europe and Latin America trooped humbly to their doorsteps [Chernow 1990, p. 3].

After years of success, George Peabody decided he needed an American junior partner: enter Junius Spencer Morgan, J.P. Morgan's father. Here was a New England patrician with an excellent business reputation in dry goods and imports. After a few years on Wall Street, Junius Morgan entered the dry goods business in Hartford, Connecticut and eventually in Boston pp. [Strouse 2000, pp. 30-37]. Junius Morgan moved his family to London in 1854 as a partner to George Peabody. As a result, John Pierpont

Morgan, then a sixteen-year old, was exposed to international finance and culture, the two areas he would immerse himself in for the rest of his life.

When Peabody retired to become a renowned philanthropist (ironic, since he had been a Silas Marner-type hoarder of money all his life), Junius Morgan took over the firm and it became J.S Morgan and company. By then he had made sure that his son John Pierpont had an unusual combination of German university education in languages a stern moral education and apprenticeship in the financial world. From the time he was a young man in the business world until his father's retirement, Pierpont Morgan would serve as the New York agent and correspondent for the Peabody-Morgan merchant bank in London and their respective affiliates and business partners. While the Junius-Pierpont relationship was a fascinating one, we turn now to J. Pierpont Morgan's age in the world of finance.

THE AGE OF J.P. MORGAN

From the early days of the Republic through the entire 19th century, American economic expansion needed financial capital from outside the U.S. There was plenty of homegrown financial capital, and the financial markets, especially Wall Street, dated back to the early Dutch settlers. However, American economic growth was so great and the growing economy had such infrastructure needs that the American demand for capital was greater than the domestic supply. American financiers were never in short supply, but the prerequisite for the sophisticated growth of American financial markets was a financier who could straddle Wall Street and European financial markets.

John Pierpont Morgan was the perfect fit for American finance in the late 19th and early 20th centuries. Born in 1837 into a family where both sides of the family tree could trace their American roots to the first half of the 17th century, J.P. Morgan handled the rough and tumble world of financial speculation on Wall Street as well as he did the upper aristocratic financial circles of London or Paris. Morgan's name was synonymous with Wall Street wheeling and dealing from early in his well-groomed career.

J.P. Morgan was only 36 years old when he gained his first major success in investment banking. He successfully got his firm, Drexel, Morgan and Company the inside track on a share of the U.S. federal government's debt issue (government bonds to pay for government debt) in 1873. This fifty percent share of the $300 million bond issue was the first time a Morgan company had ever participated in an underwriting of national federal debt pp. [Chernow 1990, pp. 35-36]. This was to be the first phase of Morgan's financial relationship with Washington; the House of Morgan would continuously participate in funding federal debt issues. Pierpont Morgan often traveled to Washington to consult with Presidents, Vice-Presidents and numerous Secretaries of the U.S. Treasury. He played a behind-the-scenes role in cabinet appointments, and even presidential nominations.

A few years earlier Morgan had taken on the infamous Wall Street speculator in railroad securities, Jay Gould. Gould was one of the most notorious financial speculators of the 19th century; often known for stock manipulation and shady dealing. At issue was the control of a small upstate New York railroad that

ran between Albany and Binghamton, the Albany and Susquehanna. Although it only ran 140 miles through the Catskill Mountains, its major financial asset was its rail links to the coal fields in Pennsylvania. Morgan beat Gould at his game: finding the right judge and paying off local officials to gain control of the railroad [Chernow 1990, pp. 30-32].

Railroad competition in the U.S. in the 19th century was simple to interpret. If a rail line appeared profitable, a new railroad might build a parallel tract to compete. Even if the direct competition did allow for profitable operations for the second line, competitive strategy might still justify the investment in the second line. Quite often the second parallel line was built to serve as a new route to connect an existing rail company with larger markets. Competition in the same rail market led to extreme rate competition, which made it very difficult to sustain profits, or even to break even. Investors were interested in building new lines because they projected control over railway markets in the long term; however, these investments often proved not to be profitable.

The expansion of railroad lines was usually funded by the issuance of bonds to European investors. The common stock of the railroad was owned by smaller groups of investors, and by speculators, who expected to gain control over other rail lines and build a bigger, profitable railroad line through consolidation. The model was Commodore Vanderbilt with the New York Central: the name itself reflected the consolidation of nine small upstate New York lines.

The scale of railroad finance vastly surpassed any industry in the U.S. economy by the mid-nineteenth century:

> "Investment in private railroad securities amounted to $1.1 billion by 1859, not including the value of government land grants and loans." [Strouse 2000, p. 131].

Pierpont Morgan began buying up bankrupt railroads to control the industry through cooperative arrangements: the cartelization of American railroads. Contemporary observers and historians referred to it as the "Morganization" of railroads [Chernow 1990, pp. 66-67].

> "The lengthy catalogue of railroads that fell under his control included the Erie, Chesapeake and Ohio, Philadelphia and Reading, Santa Fe, Northern Pacific, Great Northern, New York Central, Lehigh…..Virtually every bankrupt road east of the Mississippi eventually passed though such reorganization, or Morganization….33,000 miles of railroads – one-sixth of the country trackage…Railroads then comprised 60 percent of all issues on the New York Stock Exchange." [Chernow 1990, pp. 67-68].

By the second half of the 19th century, the New York Central was one of the four major East-West trunk lines in the U.S. After Cornelius Vanderbilt died, the family-controlled New York Central passed into the control of his son, William Henry Vanderbilt. The railroad covered over 4500 miles and was the main carrier between New York City and Chicago [Strouse 2000, p.197]. In 1879, the younger Vanderbilt (he was 58) had J.P. Morgan take the New York Central public through the sale of common stock. Morgan and his investment syndicate allies took seats on the New York Central board of directors, with the goal of the reduction of railroad competition [Strouse 2000, p. 198].

In that era, the early 1880s, the reduction of competition in the railroads did not work, but it was the first step toward later attempts to control the industry. By the 1890s fierce opposition to competition and private sector internal control was the essence of J.P. Morgan's approach to sound financial markets. There was no need for government regulation or control in the private sector. The investment banks would provide the managerial control and corporate strategy. No wonder Thorstein Veblen believed that the "immaterial capital" of J.P. Morgan's business deals had an almost spiritual quality to them.

Morgan was one of the first prominent Wall Streeters to think seriously about the stocks of industrial firms; in this he anticipated the merger wave of the late 1890s. For most of the 19th century there were very few securities issued by industrial businesses because they were either too small or so large, like Standard Oil, that they could handle their own long-term finance. Electric power companies emerged as large capital-intensive industrial businesses with a great need to issue stock. In 1892 he facilitated the merger of two of the biggest electric power companies: Edison General Electric, Thomas Edison's company, and the Thomson-Houston Electric Company. The two were merged to create the modern day General Electric, with Thomas Edison losing out in the control of GE. Morgan's relationship with Edison was so strong that Edison continued to use Morgan's investment banking house in his other business ventures [Strouse 2000, pp. 311-313].

The single biggest financial deal anyone put together in that speculative era was the first billion dollar corporation. Morgan saw there would always be competition in the steel industry, so in 1901 he pulled together the three largest American steel companies into one merger. Although Andrew Carnegie initially resisted the deal, Morgan sweetened the pot and the U.S. Steel Corporation was created, capitalized at $1.4 billion. This was by far the largest company of its day, and continued to dominate the steel industry into the 1970s. The deal was Morgan's idea from start to finish, and demonstrated his power in investment banking, as well as the power of investment banking over the rest of the business community.

There were so many other deals that Morgan either created or participated in that it would take a book to detail them all. However, most historians have marveled over an entirely different feat of J.P. Morgan – his role in the financial panic of 1907. With a financial panic in full swing, and fear of another depression, Morgan singlehandedly eased the fears of the market by forming an informal syndicate of Wall Street bankers to keep the commercial banking system going and stem the slide in stock market prices.

Later economic historians have argued that in essence Morgan had acted as the central bank of the United States before one had been created in 1913: the Federal Reserve System. The public was delighted that J.P. Morgan had stopped the Panic of 1907, yet it was appalled that one man had so much power over the economy. Since that day no one person has ever held that much power over the American economy.

VEBLEN'S INSTITUTIONAL ECONOMICS

In retrospect it has been easy for economic theorists, and even historians of economic thought, to marginalize Thorstein Veblen's theoretical contributions to economics. In the late 1890s his analytical writings began the foundations of what was to become Institutional Economics. This was expanded in his *Theory of Business Enterprise* in 1904 and other writings over the next several decades. His focus was on the emergence of industrial capitalism and its impact on economic institutions and economic behavior. Over the course of the first three decades of the 20th century, his work attracted enough followers to constitute a major school of thought in economics, particularly in America. Throughout the 1920s and 1930s Institutional Economics represented an alternative paradigm to Neoclassical economics.

Much has been written about why Institutional Economics lost the intellectual wars within economics [Yonay 1998; Hodgson 2005]. In the past decade even more has been written about the divergence between Veblen's original formulation of institutional analysis and the historical paths of those considered the followers of the Veblenian legacy. However, none of that is part of our purpose in the present paper. Here we turn back to the original attraction of Veblen's theoretical work: an explanation of the merger wave and the evolution of financial markets in advanced industrial capitalism. Financial panics and the fluctuations of the business cycles were part of Veblen's empirical analyses. He wrote *The Theory of Business Enterprise*_during the Rich Man's Panic of 1903 and his analysis reflected the very volatile economic movements in the American economy in the late 19th and early 20th centuries.

As the 21st century began, the neoclassical models of economics and finance appeared to have inadequate explanations for the stagnancy of financial markets. Theorists turned to the historically dependent, bubble models to analyze and explain the collapse of the U.S. stock market in 2000, and its stagnation for the next several years. The collapse was accompanied by news of financial fraud, the corruption of accounting standards, pie-in-the-sky profit projections and the flow of false financial information. The tendency to treat each case as an aberration from standard finance lost much of its appeal. Yet if we turned back 100 years to Thorstein Veblen's *The Theory of Business Enterprise* we would find an interesting and robust analysis of present day corporation finance. Today, as the U.S. financial markets appear ready to collapse in a manner similar to the 1870s and 1930s, a visit back to the Veblenian model of earlier eras is more than called for: it is a necessity.

Unlike Alfred Marshall or Irving Fisher, Thorstein Veblen was never bound by the constraints of either physics envy or general equilibrium methodology. According to Veblen the giant corporations of the late 19th and early 20th centuries were not primarily interested in profit-maximization through the production and sale of products. Veblen put corporation finance as the centerpiece of his analysis of large, acquisition-minded companies. In Veblen's analysis, the corporate finance structure was capitalized on the earnings capacity of the corporation as a going concern [Veblen 1904, p. 137]. The capital of the company included not only its material capital but also its immaterial or intangible capital, measured by goodwill. This was one of the criticisms Veblen made about Fisher's theory of capital. He argued that

Fisher erroneously excluded immaterial capital from his definition of capital [Veblen 1998, p. 154]. American markets for securities had changed significantly in the J.P. Morgan era. Stock issued by industrial firms had become the new source of wealth and the cause of the fluctuations of the economy. The "speculation economy" began in earnest during the 1890s [Mitchell 2007, pp. 7-12]

The role of investment banking in corporation finance drew special attention from Veblen; he claimed that successful investment bankers had their own unique form of "goodwill," even though it was difficult to quantify [Veblen 1904, p. 171]. J.P. Morgan and Company was the prototype in investment banking, "and more unequivocally, the good-will of the head of that firm." [172]. Veblen extended this notion of the goodwill of a captain of finance to captain of industry like Andrew Carnegie in the steel industry. For Veblen this type of goodwill could be used over and over again, and was spiritual in nature:

> "But goodwill on this higher level of business enterprise has a certain inexhaustibility so that its use and capitalization in one corporation need not, and indeed does not, hinder or diminish the extent to which it may be used and capitalized in any other corporation……Like other good-will…it is of a spiritual nature, such that, by virtue of the ubiquity proper to spiritual bodies." [Veblen 1904, p. 173].

Corporate management had to make sure the "putative earnings" of a company were valued as highly as possible by the securities market. This was to be the case even if there was a substantial discrepancy between the putative earnings capacity and actual earnings. What is now called expected future earnings was the foundation of Veblen's theory of corporation finance. The ability to manipulate perceptions in the stock market was the essence of this management:

> "It follows…that under these circumstances the men who have the management of such an industrial enterprise, capitalized and quotable on the market, will be able to induce the putative and actual earning – capacity, by expedients well known and approved for the purpose, partial information, as well as misinformation, sagaciously given out at a critical juncture, will go far toward producing a favorable temporary discrepancy of this kind, and so enabling the managers to buy and sell securities of the concern with advantage to themselves [Veblen 1904, pp. 156-157].

How familiar this all sounds in the 21st century: the manipulation and falsification of financial information to lead investors in a direction determined by corporate managers and investment bankers. J.P. Morgan had spent twenty years trying to control the railroad industry; his goal was to stabilize the value of railroad securities. The control of industrial markets was always directed at the value of corporate securities.

There was no reason to believe the interest of corporate managers and the permanent interest of the corporation would coincide. Clearly, in Veblen's view, the management self-interest and the broader community interests in efficiently produced output would seldom coincide. The business interest of managers demanded the manipulation of the stock price of the company, not the production and sale of products [Veblen 1904, p. 159]. Stock prices would be pushed up or down by effective management.

These manipulations of the value of stock carried a risk to the company but little risk to the managers. Veblen commented that managers had less to risk because they held limited shares of stock [Veblen 1904, 167]. From his perspective, such market manipulation was not necessarily difficult:

> "Indeed, as near as one may confidently hold an opinion on so dark a question, the certainty of gain, though perhaps not the relative amount of it, seems rather more assured in the large-scale manipulation of vendible capital than in business management with a view to a vendible product." [Veblen 1904, p. 166].

FINANCIAL MARKET DYNAMICS

Was Veblen projecting future trends in the stock market, or the actual events of his own day when he analyzed stock market manipulation? Overcapitalization of a corporation going public was called "watering the stock" in Veblen's day; it was a common practice. In the 19th century, capitalization meant the nominal value of the stocks and bonds, as stated in its corporate charter:

> "A corporation's capitalization might not, and typically did not, reflect either the amount of the securities that it actually issued, nor their value as they traded on the market. Yet, a corporation's capitalization commonly was used as a proxy for its size." [Lawrence 2007, p. 58].

The expression "stock watering" or "overcapitalization" meant the following: the company stock issue was greater than the cash value of the balance sheet assets of the company. The expression "watering stock" came from an earlier practice in the sale of cattle: a herd driven to market with little water was "watered" last before the weigh-in in order to bloat the cattle and increase their weigh-in weight [Lawrence 2007, p. 59]. It is important to note that the practice was widespread, and today in corporation finance would not mean anything about a public issue of stock. Veblen followed the business practice of the use of the term "goodwill" as a way to explain the difference between the value of stock and the value of tangible assets; he referred to it as a form of immaterial capital.

The primary use of the process of overcapitalization was to provide incentives for investors and those who promoted mergers or consolidation. This biggest deal of the J.P. Morgan era was the formation of the U.S. Steel Corporation, the largest steel company in the world. This was the first billion dollar corporation, capitalized at $1.4 billion. Measured in terms of total economic activity in 1901, the deal would have been 7% of the gross domestic product. Andrew Carnegie received $240 million to merge his company with two other large steel producers; the total expenditures of the federal government in 1901 were $350 million [Strouse 2000, pp. 402-404]. This feat of early 20th century finance took twelve weeks for J.P. Morgan to put together. The overcapitalization was of a sizeable magnitude: tangible assets of the consolidated company, $676 million and overcapitalization of $727 million:

> "The Morgan syndicate took 1.3 million shares (common stock) as its fee, which it dumped on the market for ….$62.5 million…Economists of the time….left no doubt that promoters' and bankers'

> profits were to come from the sale of stock, not from holding the stock and receiving dividends." [Mitchell 2007, pp. 68-69].

What Veblen drew attention to was new to the merger era: investment bankers for shares in the old companies with shares in the new corporation, which was created. Other prominent economists of the day, like Marshall and Irving Fisher, ignored these developments in capital markets. Those economists with an interest in the phenomena were obsessed with the "stock watering problem," not with the evolution of financial markets; only Thorstein Veblen grasped the significance of overcapitalization in the fluctuations of the economy.

These financial developments were not unique to the U.S. Steel deal that J.P. Morgan put together. At the heart of the deal was the capacity to organize an investment syndicate. In 1879, Pierpont Morgan organized an underwriting syndicate for the last Civil War debt refunding. Two critical long-term consequences occurred as a result of this project. The first was straightforward: the end of the House of Morgan's dependence on foreign banks, like the Rothschilds. The House of Morgan would control the funding projects, often allied with other Wall Street banks [Strouse 2000, p. 186]. The second was to create the financial institution which moved from that era to the present day:

> "The syndicate system, under which groups of bankers shared selling, profits, and risks, came to serve as the prototype for underwritings of large securities issues….After 1879 the aggregation of the great sums of money was absolutely essential for the conduct of human affairs….and the head of the syndicate – the man with resources and temperament capable of conducting them – was about to concentrate the greatest financial power in the history of the world." [Strouse 2000, p. 187].

CONCLUSIONS

Thorstein Veblen's theoretical analysis of corporation finance during the Age of J.P. Morgan was one of the few explanations of industrial capitalism to focus on business decision-making and the role of investment banking. While he constructed a grand theoretical framework based on the evolution of institutions, Veblen's analysis was grounded in empirical observations, both systematic and causal. His goals were threefold: (1) apply Darwinian evolutionary analysis to the economy; (2) provide an explanation of business cycle trends and (3) explain the link between individual business decisions to the economy as a whole. Some heterodox economists have suggested that Veblen was a predecessor of John M. Keynes and Keynesian theory. Clearly it is worth exploring, as we have tried to do in earlier papers.

Veblen understood at least as well as Keynes that there was a direct link between business investment decisions, financial markets and the overall activity of the aggregate economy. Like Keynes, Veblen believed that the flow of financial information and the level of uncertainty could serve as a destabilizing force in the economy. However, Veblen saw the concentration of financial power and the

capacity to manipulate information in financial markets in a manner not central to traditional Keynesian economic theory. The flow of investment capital was controlled significantly by the institutions of investment banking, especially the firms with links to international financial markets like Morgan; certainly not the seamless, smooth-flowing process envisioned by Irving Fisher in his general equilibrium approach.

The Darwinian world of industrial capitalism was reflected in business failures and business consolidations in American industry. At the very time Neoclassical economic theory was beginning the long process of rigorous interpretation of very competitive markets, the evolution of the real economy moved toward monopoly trust control and informal cartelization. While there has been an almost romantic sense of the Gilded Age's "captains of industry," the harsh reality was Wall Street control of industrial growth. By the turn of the 20th century there were public outcries against the "money trust" of Wall Street, the personification of which was J. Pierpont Morgan. Institutional Economics had the only substantial analysis of what evolved in the economy. The original movement of Institutional Economics toward the biological models of evolutionary analysis was in stark contrast to the atomistic framework that Neoclassical Economics borrowed from physics.

Thorstein Veblen was never critical of the scientific metaphors of physics. There was first the sense that they served as a poor theoretical foundation to explain industrial capitalism. Veblen understood, better than Alfred Marshall and Irving Fisher, the distinctions in scientific modeling between the biological and physical sciences. Financial panics were never captured by the neoclassical theories, either of the Age of J.P. Morgan or our era of housing bubbles and securitization. Veblenian attention to investment banking as the core of the economic system is as true today as it was a hundred years ago. In our modern era, the efficient market theories of neoclassical finance have yet to explain irrational exuberance or bursting financial bubbles. Now, in a real financial panic, it is only heterodox economics that offers a theoretical explanation as well as policy solutions.

The Age of J.P. Morgan created the institutional environment for the merger movement as a direct result of securitization. In this case, the securitization was the acceptance of the common stock of industrial firms as a major investment vehicle. Today it is hard to understand that the common stock of industrial business was too risky and not mainstream enough for financial markets until the turn of the 20th century. It was not until Pierpont Morgan and a handful of investment bankers made industrial common stock a "reasonable investment" asset that the U.S. stock market transformed itself into its modern format. Thorstein Veblen was the only economic theorist to grasp the transformation that had taken place. Without an appreciation of the financial environment at the very beginning of the 20th century, it is very difficult to comprehend Veblen's *The Theory of Business Enterprise*. It should be reread with that in mind, as we search for new answers in the latest financial panic of the 21st century. Once again mainstream economics has feeble interpretations of financial and economic events. It is ironic that neoclassical economists debate how to restore or rebuild confidence in financial markets. Post Keynesian, Marxists and Institutionalists have written about the sequence of events as they have unfolded in the past decade.

The point of this paper is that Thorstein Veblen's analysis of the interaction between financial markets and industrial activity remains a highly productive guide to our modern economic world.

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The Importance of the Private Legal Sector versus Aggregate Pressure Group Power for Income inequality: A Cross-State Analysis

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ABSTRACT

Previous rent-seeking research correlates the aggregate power of multi-sector pressure groups with income inequality among the American states. Other research correlates the intra-sector power of specific economic interests with economic development pathologies. Several studies conclude that the legal sector is a rent-seeking interest that generates development pathologies such as lower rates of growth and, possibly, economic bias. No previous study systematically compares the separate roles of multi-sector pressure groups versus the legal sector as predictors of income inequality. This research documents the importance of legal sector power as an autonomous predictor of income inequality.

WHAT IS THE LEGAL SECTOR?

The Bureau of Economic Analysis defines the legal sector as an autonomous source of "gross state product". The legal sector is bounded by several restrictive criteria: (1) It includes for-profit law firms and those who work for them. It includes contingency fee tort lawyers, but not government personnel. (2) The "legal sector" excludes "public service" lawyers working for government or non-profit membership organizations, following models set by Barack Obama. (3) The "legal sector" also excludes wage lawyers providing counsel for businesses in other sectors (such as real estate, manufacturing, and other separate autonomous producers of goods and services).

The legal sector is also a special interest group. The legal sector includes lawyers working as members of a self-regulated white collar guild. The legal sector enjoys monopoly roles in and over the judiciary and other government agencies and bureaus. It enjoys monopoly rights in enforcing professional recruitment standards for prospective lawyers and acceptable business practices for practicing lawyers - enforced by ABA-endorsed rules and government regulations.

Legal sector income generates private wealth through wages, firm profits, and other private earnings. The legal sector is an autonomous source of gross-state product. It is separate and distinct from public service jobs in public administration or non-profit membership organizations. It is similar to – but not the same as – jobs in other private businesses and for-profit firms.

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INTRA-SECTOR VERSUS MULTI-SECTOR RENT-SEEKING INTERESTS: A LITERATURE REVIEW

What are the effects of income inequality due to intra-sector interests like the legal sector versus intra-sector interests on income inequality?

Many different studies emphasize the importance of the legal sector as a major source of economic development pathologies. Since the legal sector is "rent-seeking", it is a major cause of economic distortions. This theory is emphasized by Schleifer and Vishny (1988), Magee et al (1989), and Brumm (1999).

Other research identifies multi-sector groups or pressure group regimes as the major source of economic development pathologies. Shugardt, Tollison, and Yan (2003), for example, predict rent-seeking groups generate certain outcomes, which can be measured through correlations or regression analysis. Rent-seeking groups create negative externalities for economic development. They increase income inequality. Thus the scope of their power correlates positively and significantly with Gini coefficients for income inequality among the households in a state.

Other economists identify multi-sector pressure group power as the primary source of negative externalities for economic growth and prosperity. Mancur Olson (1982) popularized a focus on aggregate pressure group power as a predictor of negative externalities for economic development. He argued that economic power resources for collective pressure group coalitions in aggregate lead to "economic ossification". He predicted a positive correlation between aggregate pressure group power resources and economic pathologies, including lower rates of growth and other forms of underdevelopment.

He and other economists proceeded to test this hypothesis with data for nations and states[1]. Some conclude that the evidence fits the Mancur Olson hypothesis that aggregate pressure group regimes produce efficiency costs, lower growth rates, and other economic development pathologies.

Many urban theorists use qualitative data to argue that multi-sector pressure group "regimes" exert influence on economic development outcomes. In particular, they suggest that these regimes are dominated by "business" interests who create economic bias and inequality in urban settings. This qualitative research validates empirical research that correlates inter-sector pressure group power with income inequality among states (Shughart et al, 2003).

However, the Shughart el al (2003) study only measures inequality effects from multi-sector pressure groups in aggregate. It does not study negative externalities from the legal sector in particular. Among these, quite a few indicate major effects.

To measure the power resources of the legal sector, several studies use the absolute or relative number of lawyers in a nation or state. These studies report significant correlations that link legal sector personnel with future economic underdevelopment. The studies explain the relationship as an example of rent-seeking (Scleifer and Vishny, 1988; Magee et al, 1989; Murphy et al, 1991; Brumm, 1999). They emphasize the rent-seeking effects of the legal sector - both at the national and sub-national level of

governance. They measure adverse production effects that harm other sectors and/or society as a whole. Based on their research, one would predict major effects on economic development from the legal sector.

However, just because the power of inter-sector pressure group coalitions correlates with income inequality does not prove that the intra-sector power of lawyers separately correlates with inequality.

Even if the legal sector is a rent-seeking interest, prior research never shows it has a separate effect versus pressure groups in aggregate. Many students of pressure group politics assume that all interests pursue rent-seeking. All types of sectors engage in active lobbying efforts. All types of organizations support government rules and regulations that benefit their members. The ABA [American Bar Association] and the ATLA [American Trial Lawyers Association] are not unique. Such arguments imply that the legal sector is not alone in rent-seeking. It is simply part of the whole. It is not distinct.

If rent-seeking is generic, the legal sector would not have any autonomous influence on development outcomes. Controlling for inter-sector power, the correlation of legal sector power with inequality would be null.

A null theory permeates many law review studies. A null theory implies that the" partial" correlation of legal sector wealth with income inequality will be null, controlling for indices of aggregate power resources controlled by organized interests collectively.

Legal sector "apologists" vehemently reject the notion that the legal sector is ever "rent-seeking". Some argue that the legal sector consistently helps, not hurts, economic development (Epp, 1991; Cross, 1992a; 1992b; 2008). Others emphasize a null hypothesis. It generates no adverse effects on development outcomes. This null theory of legal sector rent-seeking is widely accepted by many social scientists who do not publish in law reviews.

Most political scientists who study courts and judicial politics assume that the effects of influence and pressure by the legal sector on government and the economy are favorable, and, at worst, benign. Typical studies of judicial behavior focuses only on public sector lawyers. However all lawyers are portrayed as serving the common good and the public interest, including private lawyers.

Typical American government texts imply that social equity and economic benefits for society require more resources for the legal sector - not less. They favor more lobbying efforts by lawyers and law firms - not less. The texts favor more power for the legal sector over government and the economy, not less. They fixate on the public face of the legal sector.

Most state and local government texts also focus on the public face of lawyers. They ignore possible negative effects from the private face of the legal sector. They implicitly validate a null or benign theory of legal sector power. Only one major text book even cites an opposing point of view. Dye (2008) summarizes an argument that legal sector power may actually harm the economy. However, Dye does this on only a few pages of a very long text.

A few students of state government and politics use econometric methods to study pressure group impacts. Kenneth Hunter (1999), and Virginia Gray and David Lowery (1988) use OLS MRA (regression analysis) to analyze interest group impacts. Both conclude that the effects of pressure groups are null, at

least when measured by the aggregate number of lobbyists. For them, lobbying efforts measure aggregate pressure group power resources controlled by Mancur Olson – style collective interest. They conclude that these aggregate power resources (controlled by Mancur Olson inter-sector pressure group regimes) have little or no impact on economic development outcomes (Gray and Lowery, 1988).

Several other studies measure correlations between the "density" of registered lobbyists and economic outputs. Their outputs include both policy choices and economic growth. These studies conclude that the correlations of lobbyists and economic development are generally null. This is true even for specific sub-sets of lobbyists and the adoption of specific economic development policies to maximize group self-interest goals (Hunter, 1999). Such research supports a null theory of pressure group power. If the legal sector is like special interests in general, it also has little or no impact.

THE NEED FOR NEW RESEARCH

Most research on "special interests" ignores the unique status of the legal sector. In many respects the legal sector has far more power resources than other interests. These include a monopoly of power in and over government agencies, bureaus, and indeed entire branches of government. They also include powers of self-regulation enforced by courts to a degree not available even to other elite white collar guilds. Thus one suspects that the legal sector has autonomous impacts on economic development that excel rent-seeking impacts by interests in aggregate, since aggregate interests often produce countervailing powers that cancel each other out. In fact, a wide range of studies both argue and document that legal sector rent-seeking leads to development pathologies (Scleifer and Vishny, 1988; Magee et al, 1989; Murphy et al, 1991)

However, prior empirical research on rent-seeking is extremely limited. Studies of legal sector impacts do not distinguish between different types of lawyers. Few, if any, carefully differentiate public sector and private sector lawyers into two distinct groups. Few, if any, actually measure the extent to which the accumulation of private wealth by the private legal sector leads to, and correlates with, income inequality. Most studies focus only on growth outcomes, not inequality outcomes. This study will.

Most of the research on rent-seeking in development economics focuses on cross-national comparisons or case studies. Much less research focuses on states, and that research fails to differentiate multi-sector versus intra-sector interests.

Studies by Buscaglia (1997a; 1997b; 1995; et al, 1995), Mauro (1995), Schleifer and Vishny (1998), and Magee et al (1989) show that in many nations, the legal sector is a rent-seeking elite. Monopoly powers for the legal sector impose disproportionate costs on the poor. What about the U.S.?

To provide guidance for further research both in economics and political science, the present study offers new evidence to clarify the relative importance of intra-sector elites versus aggregate pressure group regimes. The analysis goes beyond prior studies of aggregate pressure group regimes, including the ground-breaking research by Shugardt, Tollison, Yan (2003).

ECONOMIC EVIDENCE FOR 48 STATES

For this analysis the sample includes only the 48 contiguous states. Multiple factors force the exclusion of D.C., Alaska, and Hawaii from an analysis of income inequality in 2000. If D.C. were a state, if would have the greatest degree of income inequality of any state. It also has the largest share of private sector wealth acquisition by lawyers, measured by the percent Gross State Product controlled by the legal sector. These scores are extreme outliers and thus excluded from the analysis. Among the states, Alaska has the least income inequality. It also has the lowest percent Gross State Product controlled by the legal sector. Thus Alaska is also an extreme outlier and excluded from the analysis.

There is another reason for this sample of only 48 contiguous states. Namely, Mancur Olson, among others, argues that the "age" of a regime strongly affects either how strong a pressure group regime is, or how the power of pressure group affects outcomes. Alaska and Hawaii are the "youngest" states. They were the last two states to join the present union. Of course, D.C. would be newer still if it were a state. From the point of view of the 'age" of a state, D.C. has not even been born yet.

From the point of view of age, D.C., Alaska, and Hawaii have extreme values on age. Thus they are omitted from this analysis as extreme outliers for yet another reason.

Moreover, D.C., Alaska, and Hawaii are also unique in physical geography. D.C. is uniquely small. In contrast, both Alaska and Hawaii are uniquely large in land mass and distance between borders. Moreover, Alaska and Hawaii are uniquely isolated from other states. D.C., Alaska, and Hawaii have other unique historical and geographical traits. As outliers they are omitted from this analysis. This leaves the 48 contiguous mainland states. They form a relatively homogenous sample more suitable for econometric analysis. In effect this sample controls for age, size, and location constraints.

Table 1 summarizes the central tendency and dispersion for all variables used in this analysis, based on the distribution of scores among the 48 states only. These variables are use to test a hypothesis that legal sector power correlates with income inequality among the American States differently from aggregate pressure group power.

The outcome variables both measure income inequality in 2000. The Gini coefficient measures inequality among all households in the state. The other index measures inequality between only the richest and poorest households in the state. The 2000 outcomes are lagged by a minimum of three years with respect to pressure group indices.

Three indices measure pressure group resources. One measures intra-sector power resources, in this case power resources for the legal sector, during 1990 to 1997. The other two measure inter-sector power resources. Lobbying resources for organized groups collectively is measured for 1997. Aggregate (perceived) pressure group power is measured for the 1980s, based on research by Hrebenar and Thomas (1999). States are classified by the relative power of their pressure group regime, and then assigned a score of 1 to 4 from minimum to maximum power. The present study uses the same data

reported by Shugardt, Tollison, and Yan (2003), who measured each category separately. The present composite index is named the Hrebenar-Thomas-Harrison 1– 4 hierarchical scale.

TABLE 1:
Description of key variables for 48 contiguous (mainland) states

	Minimum	Maximum	Mean	Std. Deviation
OUTCOMES: INDICES OF INCOME INEQUALITY FOR 2000				
Percent range index for Gini coefficient in 2000	5.44	65.99	30.8248	14.08907
The percent ratio of mean incomes for the richest 20 percent to the poorest 20 percent of households in 2000	885.23	1859.20	1233.8519	219.27123
THREE INDICES OF PRESSURE GROUP POWER RESOURCES				
INTRA-SECTOR: % legal sector share of gross state product during 1990 to 1997	.62	2.59	1.1361	.37594
INTER-SECTOR AGGREGATE: The impact and influence of the overall collective pressure group system in aggregate during the 1980s (Hrebenar -Thomas - Harrison 1– 4 hierarchical scale)	1.0	4.0	2.562	.8970
INTER-SECTOR AGGREGATE: The ratio of lobby registrations in 1997 to total state legislators	.63	17.72	5.0939	3.15363
LAND, LABOR, AND CAPITAL ECONOMIC ENDOWMENT FACTORS				
Per capita square miles of (dry) land area 2000	.00	.20	.0257	.04011
% high school graduates among adults 25 and over in 1990	64.30	85.10	75.9917	5.51311
Per capita deposits (in millions) of deposits in FDIC insured banks and savings and loan institutions 1999	7.57	66.50	13.4668	8.44201
HISTORIC INCOME BASELINES FOR CENTRAL TENDENCY AND DISPERSION (40 YEARS IN PAST)				
Median family income in 1960	2884	6887	5290.27	976.424
Gini index for 1960 (scale of 1 to 1000)	394.0	510.0	436.354	28.0011

Two variables measure the historical income distribution in the state. Median family income summarizes the central tendency of income in 1960, four decades in the past. They dispersion of income is measured by a Gini coefficient of inequality for 1960. The need for attention to historical income variables is stressed in a wide range of research to test neo-classical economic predictions.

Other predictors measure the land, labor, and capital resources of each state. Their importance as “determinants” and “endowment factors” has been clear from Adam Smith’s research on economic development through the “new institutional economics” of the present. For this research, per capita dry land in each state measures “land” endowments. Presumably states with more open space will have more growth potential (omitting Alaska where much of the land is covered by ice, snow, or permafrost). “Labor” endowments are measured by the percent of the adult population 25 or more with at least a high school education. Presumably mass education improves the quality of the labor force, and its ability to implement new technologies that improve labor productivity. “Capital” endowments are measured

indirectly by median family income in 1960. More directly, a separate index measures liquid capital in the late 1990s namely deposits in FDIC institutions.

PARTIAL CORRELATIONS OF PRESSURE GROUP POWER RESOURCES WITH INCOME INEQUALITY: THE RELATIVE IMPORTANCE OF THE PRIVATE LEGAL SECTOR VERSUS MULTISECTOR PRESSURE GROUP COALITIONS

Table 2 reports partial correlation coefficients obtained by various indices of pressure group power resources. Each correlation is measured "ceteris paribus". The "ceteris paribus" relationships factor out five control variables. One set of controls measures the land, labor, and capital resources of each state. The other controls measure the state's historical average income and income inequality in the distant past. To simplify comparisons of relative importance, the partial correlations produced by each index of pressure group power resources do not include controls for each other. Each pressure group predictor is entered into the estimation equation separately.

TABLE 2

"Partial" correlations of three pressure group power resource indices with Gini coefficient and rich/poor income gap, net of five control variables. The five control variables measure neo-classical economic endowment factors of land, labor, and capital during 1990 to 1999, plus median family income and income inequality for 1959-60.

		(Private) Legal sector economic power index for 1990 to 1997	The overall impact and influence of the aggregate pressure group system	The Lobbyist/ Legislator Ratio in 1997
Percent range index for Census Gini coefficient in 2000	r	0.723	0.062	-0.032
	sig	.000 ***	0.691 ns	0.837 ns
The percent ratio of mean incomes for the richest 20 percent to the poorest 20 percent of households in 2000	r	0.767	0.049	-0.139
	sig	.000 ***	0.754 ns	0.375
The percent ratio of mean incomes for the richest 40 percent to the poorest 40 percent of households in 2000	r	.765	.056	-.102
	Sig	.000***	.722 ns	.517 ns

REGRESSION COEFFICIENTS FOR ALL COEFFICIENTS - CONTROLLING FOR EACH OTHER

Partial correlation coefficients make it easy to compare the relative importance of different predictors, even if measured with different metrics. Larger absolute values for correlation coefficients show they explain more variation in income distributions. The correlations for legal sector power are always larger than the correlations for aggregate pressure group power. They are also more statistically significant.

The same pattern of results applies to three different indices of income inequality. Gini coefficients, the ratio of incomes for the top 20 to the bottom 20 percent of households, and the ratio of incomes for the top to bottom 40 percent of households all show the same hierarchy.

Legal sector power is always more important than either index for aggregate pressure group power.

To be specific, the correlation of legal sector economic power resources with income inequality is always significant at the .001 level of probability. It is never significant for either index of aggregate pressure group power.

The evidences shows larger beta coefficients for legal sector power resources than for either index of aggregate pressure group power. The absolute and relative importance of legal sector power for explaining income inequality is clear.

TABLE 3

Multivariate regression analysis of the 0-100 Gini range index of 2000 income inequality (48 contiguous states)

	Unstandardized Slope	Standardized Coefficients		
PREDICTORS	B	Beta	t	Sig.
% legal sector share of gross state product during 1990 to 1997	20.632	0.551	6.549	0.000
The impact and influence of the overall collective pressure group system in aggregate during the 1980s (Hrebenar-Thomas-Harrison 1– 4 hierarchical scale)	0.692	0.044	0.472	0.640
The ratio of lobby registrations in 1997 to total state legislators	-0.198	-0.044	-0.473	0.639
Per capita square miles of (dry) land area	67.430	0.192	2.382	0.022
% high school graduates among adults 25 and over in 1990	-1.544	-0.604	-5.374	0.000
Per capita deposits (in millions) of deposits in FDIC insured banks and savings and loan institutions	-0.243	-0.145	-1.930	0.061
Median family income in 1960	0.007	0.472	2.325	0.025
Gini index for 1960 (scale of 1 to 1000)	0.242	0.482	2.664	0.011

Interpretation of Slope: One percent more economic power for the legal sector (measured by percent share of total gross state product) correlates with 20.61 percent more income inequality (on a scale of 0 to 100 between minimum and maximum gin indices)

This relationship is statistically significant at the .001 level of probability. There is almost no probability of error in rejecting the null thesis that the relationship is due to chance. The relationship of legal sector economic power is vastly more significant than the relationship with income inequality obtained by either other index of pressure group power resources (which measure resources for the collective pressure group system in aggregate).

Table 3 takes the analysis up a notch. It reports a full multiple regression analysis. Every relationship achieved by each predictor is measured controlling for the other predictors. Thus the discrete index for legal sector power is measured controlling for the aggregate power of all pressure groups collectively.

Again the relationship of legal sector power is highly important, as measured by both a large beta coefficient and a small sig coefficient.

However, this time the relationship is measured controlling for the indices of aggregate pressure group power. The evidence is clear. The relationship of legal sector power with income inequality is

separate and distinct from the collective power exercised by all other pressure groups in aggregate. Intra-sector power plays a separate role from inter-sector power.

The outcome variable in table 3 measures differences in income for every single household versus every other household. It measures aggregate inequality among all households in all income classes. The evidence confirms the general pattern. Where the power of the legal sector is greater, as measured by its share of gross state income, the degree of overall income inequality in the future tends to be greater. On average, places with greater legal sector power in the past become places with more income inequality in the future.

CONCLUSIONS

Among the states, the legal sector varies in how aggressively it maximizes private wealth, as measured by the ratio of its private earnings relative to gross state product. Nationwide, there is a positive correlation between private wealth accumulation by the legal sector and income inequality. A lagged relationship links legal sector power from 1990 to 1997 with income inequality in 2000.

Like labor unions, the legal sector has two faces. The private face is often ignored. This makes it hard to identify problems and cures. Both faces are important.

The public service legal sector can protect and promote a rule of law that benefits economic development. Public service lawyers can work to protect the quality of state court systems in ways that help the poor. The public face of the legal system – measured by the rule of law and the quality of state court systems – can promote equity goals.

The private face of the legal sector is “the dark side of the force”. Rent-seeking research in the New Institutional Economics shows negative externalities for nations and states from legal sector power. However prior research did not contrast inter-sector and intra-sector power, nor private and public sector lawyers.

This research focuses on a rent-seeking prediction that private wealth accumulation by a private legal sector harms economic development. This prediction contradicts competing null or benign theories of legal sector power. The rent-seeking prediction fits the evidence, when one measures the economic power of the private legal sector by its share of gross state product.

Many prior studies discount the importance of intra-sector pressure groups. Early research by Mancur Olson and others emphasizes the importance of collective pressure group regimes for income levels. Later research by Shugardt, Tollison, and Yan suggests that collective pressure group regimes may be the main force for income inequality, not more focused interests.

This research rejects that hypothesis, at least for 48 states, a given set of predictor variables, and a specific decade for analysis. The available evidence documents the importance of intra-sector rent seeking for income inequality, even with controls for inter-sector pressure group power.

Further research is needed to identify other contexts where private wealth acquisition by the legal sector correlates with income inequality, reforms necessary to improve the public face of the legal system, and different analytical tools to clarify the how and why.

ENDNOTES

1. Mancur Olson.1982. The Rise and Decline of Nations. New Haven, CT.: Yale University Press. Olson emphasizes macro-level rent-seeking that involves "institutional sclerosis" and "cumulative distortions". Over time aggregate pressure group power increases. This inter-sector power produces economic benefits for group members. However, society suffers.

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Determinants Of Demand For Different Types Of Investment Goods

John J. Heim*

ABSTRACT

Separate U.S. investment demand functions are developed and econometrically tested using 1960-2000 data for (1) plant and equipment, (2) residential housing, and (3) inventory investment. The models explain 90% of the variance in plant and equipment demand, 85% of housing demand for and 67% of inventory demand. Results are contrasted with a previous study of total investment demand. Findings indicate regression coefficients for a total investment's determinants will not be the sum of the regression coefficients in the separate parts, unless the determinants of each of the parts are exactly the same. For investment, they are not.

1. INTRODUCTION

A previous study (Heim 2008) indicated total demand for U.S. investment goods is driven by

- the current growth rate of the economy (an "accelerator" effect),
- the size of available depreciation allowances,
- credit constraints due to the "crowd out" effects of government deficits,
- interest rates, particularly the prime interest rate
- Corporate profits, and
- the exchange rate.

However, that study did not develop separate demand functions for each of three component parts of investment: plant and equipment, residential housing, and inventory investment

Do these findings for demand overall hold equally for each type of investment? This paper attempts to answer this econometrically by developing demand functions for each type of investment, using data for the period 1960 - 2000. Table 1 below shows trends in U.S. investment and its component parts.

TABLE 1: COMPONENTS OF REAL U.S. INVESTMENT 1960 – 2000 (Billions of 2000 Dollars)

Year	Total Investment	Business plant & equipment	Residential Housing	Inventory Investment .
1960	$ 266.4	$ 140.0	$ 157.2	$ 9.0
1970	426.8	260.1	192.3	4.8
1980	644.0	435.6	239.7	- 7.6
1990	893.3	594.5	298.4	13.8
2000	1,735.5	1,232.1	446.9	56.5
% Total	100%	64.3%	35.7%	2.8% .

Source: Economic Report of the President 2005, Appendix Tables B1, B7

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Overall, from 1960 - 2000, total investment in real 2000 chained dollars averaged 14% of GDP, a significantly smaller percentage than consumption (67%) and government purchases of goods and services (21%). Net exports accounted for the remainder, averaging (-2%) for the period.

2. THEORIES OF DEMAND FOR INVESTMENT GOODS

Keynes' theory of demand for investment goods (Keynes, 1936, pp. 135-151) noted that expectations, interest rates, profitability, stock value, and capacity utilization affected demand. Terragossa (1997) noted depreciation allowances could be important. Spencer & Yohe (1970) and Heim (2008) noted "crowd out". Heim (2008) also found exchange rates could be important.

Residential housing demand is principally a demand by consumers. Keynes (1936), found consumer spending affected by income, taxes, wealth and interest rates. Du Reitz (1977) found average age of the population important. Rosser (1999), found how long you had been in the work force important, and whether you were living with a partner and had children.

Temin (1977) reports little relationship between credit conditions and inventory investment. However, Carpenter, Fazzari and Peterson (1998) provides "new evidence of the importance of financing constraints". Lovell (1964) found the accelerator effect important. King (2003) notes Keynes felt inventory investment should be affected by the same things that affect fixed investment, but also the availability of finance and expectations of sales. Choi and Kim (2001) also note that "inventory fluctuations are largely attributable to unexpected sales shocks, limiting explanatory power.

3. METHODOLOGY

The following eight variables constitute this study's initial hypothesis as to the determinants of demand for plant, equipment and inventories. The hypothesis to be tested is:

(1) $I_{P\&E,INV} = \alpha + \beta_1 (ACC) + \beta_2 (DEP) + \beta_3 (r_{PR} * Y_{-2}) + \beta_4 (T_G - G) + \beta_5 (DJ) + \beta_6 (CAP) + \beta_7 (PROF) + \beta_8 (XR)$

The model of residential housing demand is:

(2) $I_{RES} = \alpha + \beta_2 (Y - T_G) + \beta_1 (ACC) + \beta_3 (r_{MORT} * Y_{-2}) + \beta_4 (T_G - G) + \beta_5 (DJ) + \beta_6 (H_{PRICE}) + \beta_7 (POP) + \beta_8 (XR)$

Variable definitions for both (1) and (2) are provided below.

3.1 DATA USED

Regressions were estimated using 1960 – 2000 data taken from the *Economic Report of the President, 2002*. Data values used are real, not nominal.

Variable (Abbrev. Used)	Table	Definition
Total Investment Goods (I)	B2	plant and equipment, residential housing, Δ inventories
Business Fixed Investment (BUSI)	B18, B7	Nominal deflated using table B7 P&E deflator
Residential Fixed Investment (RESI)	B18, B7	Nominal values deflated using table B7 residential housing costs deflator
Inventory Investment (INV)	B18, B7	Nominal deflated using table B7 business P&E deflator
Accelerator (ACC)	B2	Yearly change in the level of the GDP (ΔY)
Depreciation (DEP)	B26	Yearly business depreciation of fixed plant and equipment
Government Purchases (G)	B2	Total Federal State and Local spending (minus transfer payments). Deflated using Table B7 deflator.
Taxes (T_G)	B82	Consolidated Federal, State and Local Government Receipts (exclusive of transfer payments, deflated using chained 1996 dollars. (Table B7),
Crowd Out (T_G-G)		Taxes (T_G) minus G
Taxes (T_{EX})	B82	T_G - (.26*real GDP), where (.26*real GDP) is the rate at which taxes grow due to income growth. This variable defines exogenous taxes.
Dow Jones Composite Average (DJ)	B95	A measure of how much investment can be financed by a given amount of new stock issuance. (Proxy for Tobin's "q")
Interest rate ($r*Y_{-2}$)	B73	The "real" prime interest rate, i.e., nominal value minus the average of the past two years CPI inflation (Table B60) This is modified by Y to reflect economy size ($r*Y_{-2}$).
Capacity Utilization (CAP)	B54	Manufacturing output as a % of capacity
Corporate Profitability (PROF)	B28	A measure of business profitability.
Exchange Rate (XR_{AV0123})	B110	The Federal Reserve's Real Broad Exchange Rate, averaged over the current and past three years
Business and Personal Income, After Taxes (Y-T_G)	B2, B82	Real GDP minus the portion of taxes used by government to purchase goods and services
Housing Prices, Relative to Income (H_{PRICE})	B2, B3 B34	Census data on nominal house prices deflated using GDP deflator, divided by real per capita disposable income.
House Buying Cohort Size (POP)	B34	Age 16-24 cohort as % of 65 and over cohort. Used To obtain estimate of the net effect on housing demand of changes in the ratio of a major demographic: cohorts who are net house buyers versus net sellers.

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3.2 THE ECONOMETRIC TESTING PROCEDURE

Fully specified models, which included all hypothesized investment determinants, were used to estimate marginal effects (regression coefficients) on investment of each of its determinants. "Stepwise" regression was also used to determine how much each variable contributed to total variance.

To determine the appropriate time lags to use with a variable, individual variables were tested by adding them, with from +3 to -3 year lags, to a preliminary model containing two explanatory variables investment theory suggested important: the accelerator and crowd out. The lag selected was the one

which added the most to explained variance, unless the sign on the variable was theoretically wrong, or the result suggested the direction of causation was backward.

The stepwise procedure is also to assess the stability (robustness) of the marginal effect estimates (regression coefficients) as variables are added or subtracted from the model. Results shown later in this study will show the more variance a regression currently explains, the less likely marginal effect estimates will change when additional variables are added. Hence, for incompletely specified regressions, in which important explanatory variables are left out, the possibility of overstating the marginal effects of a variable, or its statistical significance, are substantial, and results are subject to major change when the omitted variable is added (Goldberger, 1961).

We enhance the likelihood of stable regression coefficients by reducing intercorrelation between explanatory variables using "first difference" rather than "levels" of the data when estimating coefficients, and also reduce autocorrelation problems (Griffiths, Hill, Judge, 1993), and may reduce nonstationarity.

Investment and the explanatory variables (Y) or (ACC = Y_t - Y_{t-1}), are simultaneously determined, since I_t is part of Y_t. Two Stage Least Squares is used to avoid this simultaneous equations bias (Griffiths, Hill, Judge, 1993)). Evidence of heteroskedasticity was found in preliminary testing. Newey West heteroskedasticity corrections were made (Newey West, 1987).

4.1. FINDINGS: DETERMINANTS OF BUSINESS DEMAND FOR PLANT AND EQUIPMENT

Preliminary testing indicates that using the income modified version of the interest rate variable ($\Delta r_{t-2or3} * Y_{t-4or5}$) compared to just (Δr_{t-2or3}) better explains the variation in interest rate effect when the overall economy size changes, as expected. The form chosen caused virtually no change in other regression coefficients during tests. Preliminary testing also indicated that the two variable form of the government deficit (the crowd out measure) was the most appropriate, since their effects on P&E investment differ. Both had negative effects on P&E investment, but spending increases had 1.5 - 2.0 times the effect of same size tax cuts. Other regression coefficients were unaffected by the form of crowd out used.

The most unexpected finding in preliminary tests, given the findings we later report for total investment, was that the two period lagged interest rate variable, was not found even mildly statistically significant. However, the three period lagged version was found very significant (t =2.4 – 3.8).

Table 2 tests the Keynesian and other hypothesized determinants of plant and equipment investment and allows examination of the stability of regression coefficients when changes are made to the model tested. Estimates become more stable as additional variables are added. The most stable results seem to occur when adding variables to models already explaining about 90% of the variance.

Our test findings in table 2 below indicate that all our hypothesized determinants of investment in plant and equipment are systematically related to it, except (prior year levels) of capacity utilization.

TABLE 2: VARIATION IN ESTIMATES AS VARIABLES ARE ADDED TO THE P&E MODEL .

R^2/Adj.R^2 (DW)	ΔDJ_{t-1}	$\Delta PROF_{t-1}$	$\Delta T_{G(t)}$	ΔG_t	ΔDEP_{t-1}	$\Delta XR_{avt-(t-3)}$	$\Delta ACC=\Delta Y_t$	$\Delta r_{t-3}*Y_{t-5}$	ΔCAP_{t-1}
β (t-stat.*)	$\beta_{1T}(t)$	$\beta_{1G}(t)$	$\beta_3(t)$	$\beta_2(t)$	$\beta_4(t)$	$\beta_5(t)$	$\beta_6(t)$	$\beta_7(t)$	$\beta_8(t)$
2 variable crowd out; (r income modified);									
48/48% (1.3)	1.37(11.3)								
67/66% (1.5)	1.30(14.5)	.50 (5.1)							
75/73% (1.2)	.98 (9.3)	.40 (3.9)	.22 (4.0)	- .01 (-0.1)					
82/80% (1.2)	.69 (8.9)	.36 (4.1)	.26 (5.5)	- .26 (-2.2)	. 67 (3.6)				
89/88% (2.1)	.54 (6.3)	.50 (4.9)	.26 (5.4)	- .39 (-4.3)	.86 (8.4)	4.22 (4.1)			
91/89% (2.0)	.55 (6.2)	.54 (5.2)	.23 (5.2)	- .35 (-3.9)	.85 (6.3)	4.18 (4.1)	.04 (3.1)		
93/91% (2.0)	.66(8.6)	.48 (5.5)	.21 (5.7)	- .35 (-3.5)	.83 (7.2)	3.87 (4.4)	.05 (3.8)	-.64 (-3.7)	
93/91% (1.8)	.65 (8.6)	.43 (4.6)	.19 (5.3)	- .37 (-3.8)	.89 (7.6)	3.79 (4.0	.06 (3.8)	-.53 (-2.7)	1.19 (1.5)
(The regression below modified to use ($Y-T_G$) Defn. of ACC variable instead of $ACC_t=Y_t$ used immediately above)									
92/90% (1.8)	.57 (7.6)	.45 (4.8)	.26 (7.5)	- .39 (-3.9)	.87 (8.1)	3.97 (3.9)	.06 (3.5)	-.51 (-2.4)	.33 (0.5)

*t-Statistics OF 2.0, 2.7 =5%, 1% Significance Levels Respectively.

Table 3 below uses the stepwise addition and subtraction regression procedures to calculate both the maximum and the minimum amount of variance attributable to any one explanatory variable.

TABLE 3: RANGE OF POSSIBLE CONTRIBUTIONS TO EXPLAINED VARIANCE IN P&E MODEL

Variable	Method: Stepwise Addition		Stepwise Subtraction
DJ_{-1}	47.7%		25.8%
$PROF_{-1}$	19.2	-	7.3
$(T, G)_{(2\ VAR.)}$	8.3	-	17.8
DEP_{-1}	7.0	-	9.6
XR_{AV}	7.1	-	17.2
$ACC_{(Y)}$	1.7	-	N.A.*
r_3y_5	1.4	-	N.A.*
$CAP_{-1\ OR\ -2}$	0.1%	-	16.8%

*Negative R^2 due to lack of constant term

Table 3 indicates the four variables whose movement was most related to change to the changes in P&E investment are:

- A company's stock value, a Tobin's q proxy, (DJ_{-1})
- company profits ($PROF_{-1}$)
- availability of credit (the crowd out variables Tand G) and
- the exchange rate. XR_{AV}

These are important findings since two of these variables (profits, credit availability) are policy - controllable, implying P&E investment can be stimulated by appropriate public policy. Depreciation, which explained a moderate amount of variance, is also policy controllable via tax preference effects.

The accelerator and interest rates, though statistically significant, explained little of the variance in P&E. This can occur when a variable does not vary much over time, or has but a small marginal effect.

Finally, Table 3 results suggest that capacity utilization is so intercorrelated with other variables, it shows no contribution to explained variance if entered last in a regression, or a significant amount if entered first. Hence, it is difficult to make any judgments as to its actual impact in the period studied.

4.2 DETERMINANTS OF DEMAND FOR RESIDENTIAL HOUSING

Table 4 tests the Keynesian and other hypothesized determinants of residential housing demand and allows examination of the stability of regression coefficients when changes are made to the model tested. Estimates become more stable as additional variables are added. The most stable results seem to occur when adding variables to models already explaining about 80% of the variance.

The results are clearly consistent with the hypothesis that disposable income, credit crowd out, the income modified mortgage interest rate, wealth, and housing prices are significant determinants of housing demand. Less clear was whether the ratio of 15-24 year olds in the population to those 65 and over was a factor. The statistic was significant when the interest rate used was not income modified; when the interest rate was income modified, it wasn't. The exchange rate was not found significant.

Preliminary tests suggested that there is an accelerator affect on housing demand as well as business investment demand. Including the accelerator variable added 2% to explained variance. Testing the accelerator variable indicated the disposable income version $\Delta(Y\text{-}T_G)$ worked best.

The results for the two variable formulation of the government deficit/crowd out problem shown in Table 4 suggest that raising the government deficit by raising government spending or cutting taxes has about the same effect on demand for residential investment.

Neither the one or two variable form of the crowd out variable, or the use (or not) of an economy size modifier seem to affect the marginal effect estimates for the other variables in the model. Using stepwise regression, Table 5 below provides estimates of how much the total variation in residential investment can be attributed to any one variable, using both addition and subtraction variants of the method.

Explaining the most variance in residential housing demand were: 1) the price of housing relative to per capita income (P_{HOUSE}), 2) crowd out, and 3)mortgage interest rates. The results also suggest that three other variables also had a more minor effect: consumer wealth, (DJ_{-2}); demographic changes in the population (POP), and the exchange Rate (XR_{AV0123}). The estimated effect of disposable income ($Y\text{-}T_G$), varied so much with order of entry that little can be said with confidence about its contribution.

TABLE 4: VARIATION WHEN ADDITIONAL VARIABLES ARE ADDED TO THE HOUSING MODEL

R^2/Adj.R^2 (DW) B (t-stat.**)	$\Delta P_{HOUSE(t)}$ $\beta_{1T}(t)$	$\Delta T_{G(t)}$ $\beta_{2T}(t)$	ΔG_{tt} $\beta_{2G}(t)$	$\Delta r_{MORT} Y_{-4}$ $\beta_3(t)$	ΔACC_t $\beta_4(t)$	$\Delta(Y-T_{G(t)})$ $\beta_5(t)$	ΔDJ_{t-2} $\beta_6(t)$	ΔPOP_{16-24} $\beta_7(t)$	$\Delta XR_{AVt-(t-3)}$ $\beta_8(t)$
(r income modified); 2 separate (T_G, G) crowd out variables used;									
37/37% (1.3)	-.042(-6.0)								
68/66% (1.7)	-.047(-7.8)	.24 (8.7)	-.14 (-1.6)						
74/72% (1.7)	-.042(-6.1)	.23 (8.5)	-.12 (-1.8)	-1.54 (-2.4)					
79/76% (1.4)	-.031(-3.4)	.23 (6.7)	-.11 (-1.7)	-1.60 (-2.8)	.08 (3.0)				
80/77% (1.4)	-.027(-3.4)	21(5.6)	-.21 (-2.3)	-1.98 (-3.7)	.06 (1.8)	.04 (1.4)			
82/79% (1.5)	-.026(-3.4)	.23 (5.3)	-.21 (-2.3)	-1.96 (-3.7)	.06 (1.8).	05 (1.9)	-.17 (-1.6)		
83/79% (1.5)	-.023(-3.1)	.23 (5.0)	-.22 (-2.1)	-2.15 (-5.0)	.06 (2.2)	.06 (2.2)	-.19 (-1.7)	136.5(1.3)	
83/78% (1.5)	-.021(-2.4)	.22 (5.3)	-.24 (-2.4)	-2.13 (-4.6)	.05 (2.0)	.07 (2.4)	-.22 (-2.0)	122.2(1.1)	.70 (1.2)
83/78% (1.6) ***	-.017(-1.7)	.17 (3.6)	-.23 (-2.2)	-2.19 (-4.5)	.05 (1.7)	.07 (2.5)	-.17 (-1.5)	147.5(1.4)	.70 (1.2)
(Same as above except for consistency with P&E, INV models, Acc=ΔY, DJ_{-1} is used, and the lag on mort*Y is -2. Using this formulation reduces biasing effects of multicollinearity when adding component parts of investment together, by reducing the number of explanatory variables by two. Virtually the same results are obtained for each variable in the residential demand model.)									
83/79% (1.8)	-.015(-1.5)	.19 (5.4)	-.20 (-1.5)	-2.22(-5.4)	.05 (1.7)	.07 (2.2)	-.19 (-2.0)	158.5(1.6)	.62 (1.1)
83/79% (1.5)	-.022(-3.1)	.23* (5.7)	(N.A.)*	-2.10 (-5.3)	.06 (2.1)	.06 (2.8)	-.22 (-2.1)	121.3(1.1)	.67 (1.3)
(r not income modified)									
85/81% (1.6)	-.017(-2.3)	.24 (7.3)	-.27 (-2.9)	-13.06(-6.9)	.05 (2.0)	.06 (2.4)	-.27 (-2.7)	201.5(2.2)	.80 (1.7)
85/82% (1.5)	-.018(-3.2)	.24* (7.5)	(N.A.)*	-12.73(-7.8)	05 (2.2)	.06 (2.6)	-.27 (-2.7)	197.1(2.2)	.73 (1.8)

Δ Acc= $\Delta(\Delta(Y-T_G))$
(*) Government Deficit Reported As One Variable (T_G-G)
(**) t- statistics of 2.0 = 5% significance; t - statistics of 2.7 = 1% level of significance.
(***) Same as immediately preceding equation, except accelerator = $\Delta(\Delta Y)$, not $\Delta(\Delta(Y-T_G))$

TABLE 5: RANGE OF POSSIBLE CONTRIBUTIONS TO EXPLAINED VARIANCE IN HOUSING MODEL

Variable	Stepwise Addition		Range of Variation Subtraction
P_{HOUSE}	37.1%		11.9
$(T, G)_{(2\ VAR.)}$	31.4	-	25.2
MORT	7.2	-	10.8
$ACC_{(Y-TG)}$	4.4	-	9.7
DJ_{-2}	1.4	-	0.3
$(Y-T_G)$	1.9	-	24.6
POP	1.6	-	0.9
XR_{AV0123}	0.8%	-	2.0

4.3 DEMAND FOR INVENTORY INVESTMENT

Table 6 below presents the results of regressing inventory investment on the determinants hypothesized earlier and allows examination of regression coefficient stability as variables are added in stepwise fashion to the model. With only five or six variables in the model, and only 2/3 of the variance explained, there is less coefficient stability than for plant and equipment and housing investment. Nonetheless, overall, coefficients stay reasonably stable Neither the form of the crowd out variable, or the use of an economy size modifier affected other regression coefficients in the same model.

Found related to current year changes in inventory levels were:

Δ in the (current year) rate of growth of the economy - the accelerator: (ACC_0),

Δ in depreciation reserves to finance inventories (DEP_0),

Δ in access to credit to finance inventories, measured by deficit/crowd out variables ($T_{G(0)}$, G_0)

Δ in interest rates modified to reflect the size of the economy($r_{PR-2}Y_{-4}$)

Δ in consumer demand (C_0)

TABLE 6: VARIATION WHEN ADDITIONAL VARIABLES ARE ADDED TO THE INVENTORY MODEL.

R^2/Adj.R^2 (DW) B (t-stat.**)	ΔACC_0 $\beta_{1T}(t)$	$\Delta T_{G(0)}$ $\beta_{2T}(t)$	ΔG_0 $\beta_{2G}(t)$	$\Delta r_{PR-2}Y_{-4}$ $\beta_3(t)$	ΔC_0 $\beta_4(t)$	ΔDEP_0 $\beta_5(t)$
(r income modified);						
47/47% (2.9)	.14 (6.0)					
58/56% (2.6)	.12 (5.0)	.15 (3.4)	-.19 (-3.4)			
60/56% (2.5)	.12 (5.2)	.13 (3.5)	-.14 (-1.7)	-.41 (-1.3)		
63/58% (2.6)	.14 (5.7)	.16 (3.7)	.00 (0.1)	-.48 (-1.5)	-.05(-2.0)	
67/62% (2.4)	.17 (5.3)	.17 (3.5)	.02 (0.1)	-.70 (-1.9)	-.16(-2.7)	.54 (2.4)
65/61% (2.4)	.16 (5.4)	.17*(4.0)*	(N.A.)*	-.58 (-1.8)	-.12 (-2.7)	.51 (2.5)
(r not income modified;						
67/62% (2.5)	.17 (5.3)	.16 (3.5)	.01 (0.1)	-3.24 (-1.9)	-.16(-2.7)	.55 (2.3)
65/61% (2.4)	.16 (5.6)	.15* (4.1)*	(N.A.)*	-2.75 (-1.9)	-.12 (-2.7)	.52 (2.4)

Δ Acc = Δ (Δ (Y))

(*) Government Deficit Reported As One Variable (T_G-G)

(**) t- statistics of 1.8 = 8% significance; 2.0 = 5% significance; 2.7 = 1% level of significance.

The first four seem quite sensible. More puzzling is the 5th variable, consumption. Changes in the level of consumer demand seemed to be negatively related to changes in inventories (likely dominated by consumer goods). Our hypothesis as to why this occurs is fundamentally Keynesian: production increases lag demand increases, causing inventory decline. If so, one might expect similar negative relationships between inventory change and the other components of the GDP: I, G and X. However, these additional variables were not significant, perhaps because changes in inventories due to them are relatively small, as they are smaller parts of the GDP. Also, since roughly 1/3 of the total fluctuation in inventory investment seems to be random, smaller movements in inventory due to changes in P&E or housing investment, government purchases, or exports may isolate from the random influences

Table 7 below utilizes the stepwise addition and subtraction methods to estimate contributions to explaining variance by each variable. The two most important variables related to inventory investment were the accelerator (ACC_0) and credit 'crowd out" variables (T, G).

TABLE 7: RANGE OF CONTRIBUTIONS TO EXPLAINED VARIANCE IN INVENTORY MODEL

Variable	Stepwise Addition	Range of Variation Subtraction
$+ACC_{(Y-T)}$	47.0%	35%
$+(T, G)_{(2\ VAR.)}$	11.0	- 17
+C	2.0	- 5.8
$+r_2Y_4$	3.0	NA*
$+DEP_0$	4.0	9.O
Total Expl. Variance:	67.0%	67.8%

* Negative R^2 due to lack of constant term

The results also suggest that, though they seem statistically related to inventory investment, the following variables were less influential:

- changes in consumer demand which inversely affect inventories
- changes in the prime interest rate which affects production (and inventory) today.
- Availability of depreciation reserves for inventory purchases.

4.4. SUMMARY AND CONCLUSIONS

Table 8 summarizes our findings as to the determinants of P&E, housing, and inventory investment. For comparison, the estimated effects of variables found related to total investment (TOT[4]) in a separate study (Heim 2008) are included. Also for comparison, table 8 shows the estimated effects on from a regression of total investment (TOT[5]) on all the variables found to influence any of the 3 parts.

TABLE 8: SUMMARY OF REGRESSION RESULTS FOR THE THREE PARTS OF INVESTMENT

R^2/Adj.R^2 (DW)	ΔT_G $\beta_{1t}(t)$	ΔG $\beta_{1G}(t)$	ΔACC_t $\beta_3(t)$	ΔDEP_t $\beta_2(t)$	$\Delta r_{PR-2}Y_{-4}$ $\beta_4(t)$	ΔDJ_{t-1} $\beta_5(t)$	$\Delta PROF_{t-1}$ $\beta_6(t)$	$\Delta XR_{AV(t-t-3)}$ $\beta_7(t)$	ΔCAP_{t-1} $\beta_8(t)$
(P&E)[1] .93/91%(1.8)|	.19 (5.3)	- .37 (-3.8)	.06 (3.8)	.89 (7.6)		.65 (8.7)	.43 (4.6)	3.79 (4.0)	1.19 (1.5)
(INV)[2] .67/62% (2.4)	.17 (3.5)	.02 (0.1)	.17 (5.3)	.54 (2.4)	- .70(-1.9)				
(RES)[3] .83/78%(1.5)	.22 (5.3)	- .24 (-2.4)						.70 (1.2)	
Sum of 1,2,3 ($\Sigma\beta_i$)	.58	-.59	.23	1.43	- .70	.65	.43	4.49	1.19
90/87%(2.2) (TOT[4])	.43 (4.4)	- 39 (-2.2)	.29(8.5)	.86 (3.0)	-1.17(-2.5)	.50 (3.2)	.38 (2.6)	3.77 (2.2)	.17 (0.2)

TABLE 8 (CON'D.)

(Table.8 Continued)	$\Delta P_{HOUSE(-1)}$ $\beta_9(t)$	$\Delta(Y-T_{G(t)})$ $\beta_{10}(t)$	ΔPOP_{16-24} $\beta_{11}(t)$	ΔC_t $\beta_{12}(t)$	$\Delta r_{PR-3}Y_{-5}$ $\Delta r_{Mor(0)}*Y_{-4}$ $\beta_{13}(t)$	$\beta_{14}(t)$	ΔDJ_{t-2} $\beta_{15}(t)$	$\Delta ACC_{t(Y-TG)}$ $\beta_{16}(t^*)$
(P&E)[1]					- .53 (-2.7)			
(INV)[2]				-.16 (-2.7)				
(RES)[3]	- 021(2.4)	.07 (2.4)	122.24 (1.1)			-2.13(-4.6)	-.22(-2.0)	.05 (2.0)
Sum of 1,2,3($(\Sigma\beta_i)$) (TOT[4])	-.021	.07	122.24	-.16	- .53	-2.13	-.22	.05

(**) t- statistics of 2.0 = 5% level of significance; 2.7 = 1% level of significance.
Sources: [1]Table 2; [2]Table 6; [3]Table 4; [4]Total regression results (TOT[4]) taken from Heim, 2008, p.10.

In evaluating the Table 8 results, we notice that the three different parts of total investment have some common determinants: the accelerator (ACC) and crowd out variables, (T_G, G). Hence we should them related to total investment. Should the three separate effects for a variable to equal the separately estimated total effect on investment? The answer appears to be yes for functions whose component

TABLE 9: ESTIMATES WHEN SAME DETERMINANTS ARE HYPOTHESIZED FOR EACH PART

R^2/Adj.R^2 (DW) β (t-stat.*)	$\Delta T_{G(t)}$ $\beta_{1t}(t)$	ΔG_t $\beta_{1G}(t)$	ΔACC_t $\beta_3(t)$	ΔDEP_t $\beta_2(t)$	$\Delta r_{t-2}*Y_{t-4}$ $\beta_4(t)$	ΔDJ_{t-1} $\beta_5(t)$	$\Delta PROF_{t-1}$ $\beta_6(t)$	$\Delta_{XRAV(t-t-3)}$ $\beta_7(t)$	ΔCAP_{t-1} $\beta_8(t)$
87/84% (2.2) (P&E)	.19(4.2)	- .34 (-3.2)	.07 (3.5)	.80 (4.6)	.22 (0.7)	.59(5.2)	.35 (2.8)	3.28 (2.8)	2.12 (2.3)
70/61% (1.7) (RES)|	.10 (4.0)	.04 (0.4)	.12 (6.6)	.10 (0.4)	- .95 (-1.6)	- .07 (-0.6)	-.01(-0.1)	1.20 (2.1)	-1.79 (-1.3)
61/50% (2.6) (INV)	.15 (3.3)	- .08 (-0.8)	.11 (3.9)	-.05 (-0.3)	- .56 (-1.6)	- .04 (-0.3)	-.01 (-0.1)	-.66 (-0.9)	- .81 (-0.8)
Sum of Parts(TOT)	.44	- .38	.30	.85	- 1.29	.48	.33	3.82	- .48
90/87% (2.1)(TOT[1])|	.44 (4.7)	- .39 (-2.4)	.30 (9.1)	.85 (3.0)	-1.29 (-2.5)	.48 (3.1)	.34 (2.5)	3.83 (2.2)	- .48 (-0.5)

[1]The dependent variable TOT[1] = the sum of P&E, RES and INV values.

parts have the same determinants (e.g., table 9 example). The answer appears to be no if they are not. Our work for different parts of investment indicates they are not, and so results to do not add. Table 9 shows regressions for each part of total investment. Each part uses the same explanatory variables. Regression coefficients in each add to the coefficient in the total investment regression.

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How Falling Exchange Rates Have Affected The U.S. Economy And Trade Deficit

John J. Heim**

ABSTRACT

Falling exchange rates increase import prices, creating (1) A *substitution* effect that increases demand for domestic goods and (2) An *income* effect that reduces total real income, and therefore demand for, both domestic and foreign goods. Using 1960 - 2000 data U. S., this paper finds the income effect dominates, causing a net negative effect on the GDP. The 12.5 point (12%) fall in the exchange rate 2000-2007, is estimated to have caused a decline in economic growth of ¾ percent per year, and a 1.5% drop in the and the trade deficit as a percent of GDP.

1. INTRODUCTION

Falling exchange rates, by raising import prices, may decrease import demand and increase demand for domestic goods (the substitution effect). Or might we purchase less domestic goods as well as less imported goods, because higher import prices are paid for in part by reducing domestic consumption (the income effect). This paper seeks to answer this question. The effect of the Federal Reserve's Real Broad exchange rate index on U.S. demand for consumer and investment goods and services is estimated econometrically. The estimates are used to assess the impact on the GDP of the decline in U.S. exchange rate that occurred 2000 - 2007. Also examined is how associated reductions in the trade deficit reduce transfers of ownership of U.S. assets to others, as is usually required to pay for trade deficits.

2. METHODOLOGY

Data were taken from the *Economic Report of the President, 2002, 2001 or 1997*. Exchange rate values 1960 - 1970 were assumed constant at 1970 levels, per the Bretton Woods protocols. All data are in 1996 dollars. Regressions were estimated using 1960-2000 data. Regression coefficients with a t-statistic of 1.8 were significant at the 8% level, 2.0 at the 5% level and 2.7 at the 1% level Two stage least squares was used. Newey-West heteroskedasticity corrections were made. Separate equations for domestically produced, imported, and total demand for consumer and investment goods were estimated. Import statistics definitions are taken from Heim (2007). Investment imports are defined as imports of capital goods, industrial supplies & materials (M_{ksm}). Total imports (M) minus investment imports are defined as consumer goods imports ($M_{m\text{-}ksm}$).

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3. THE CONSUMER DEMAND MODEL:

This paper assumes that the determinants of the demand for consumer goods are those suggested by Keynes (1936), plus two other variables. Keynes argues in chapter 8 of the General Theory of Employment, Interest and Money (1936, pp.95-96) that income, wealth, fiscal policy (taxes) and possibly the rate of interest might influence consumption. In chapter 9 he also notes the need for saving might affect the level of consumption spending. Also, a "crowd out" variable is added, similar to the one used in investment studies to control for periods of limited credit availability which may occur in response to government deficits. Second, we also add an exchange rate variable. Heim (2008A) found that regression results on a modified Keynesian function of the following type explained about 90% of the variance in consumer spending in the 1960 - 2000 period:

$$C = \beta_1 + \beta_2 (Y\text{-}T_G) + \beta_3(T_G - G) - \beta_4 (PR). + \beta_5 (DJ)_{-2} + \beta_6 (XR)_{AV0123}$$

where

$(Y\text{-}T_G)$ = Disposable income defined as the GDP minus the government receipts net of those used to finance transfer payments

$(T_G - G)$ = The government deficit, interpreted as a restrictor of consumer as well as investment credit. It was found highly significant in a preliminary study (Heim 2008A), and is regressed as two separate variables because of earlier findings of differential effects.

PR = The Prime interest rate for the current period. It is deflated to get the "real" rate using the average of the past two year's CPI inflation rate.

DJ_{-2} = A stock market wealth measure, the Dow Jones Composite Average, lagged two years

XR_{AV0123} = The trade - weighted exchange rate (XR An average of the XR value for the current and past three years is used to capture what preliminary studies showed was slow, multiyear process of adjustment to exchange rate changes (Heim, 2007)

The regression results for consumer demand were as follows:

$\Delta C_0 = .66\Delta(Y\text{-}T_G)_0 + .49\Delta T_{G(0)} + .04\Delta G_0 - 6.92\ \Delta PR_0. + .62\ \Delta DJ_{-2} + 2.83\ \Delta XR_{AV0123}$ R^2=92%

(t) (29.2) (5.7) (0.3) (-3.2) (4.9) (3.2) D.W.= 2.0

$\Delta(M_{m\text{-}ksm})_0 = .11\Delta(Y\text{-}T_G)_0 + .30\Delta T_{G(0)} - .20\ \Delta G_0 - 5.00\ \Delta PR_0. + .34\ \Delta DJ_{-2} + 3.03\ \Delta XR_{AV0123}$ R^2=85%

(t) (6.3) (5.0) (-2.0) (-3.5) (4.5) (5.6) D.W.= 1.8

$\Delta(C\text{-}\ M_{m\text{-}ksm})_0 = .55\Delta(Y\text{-}T_G)_0 + .19\Delta T_{G(0)} + .24\ \Delta G_0 - 1.92\ \Delta PR_0. + .28\Delta DJ_{-2} - .20\ \Delta XR_{AV0123}$ R^2=74%

(t) (16.2) (1.5) (1.3) (-0.6) (1.9) (-0.2) D.W.= 1.8

4. THE INVESTMENT DEMAND MODEL

The investment model includes variables traditionally thought to influence investment. See, for example, Jorgenson (1971). Imported investment goods are defined as imported capital goods and imported industrial supplies and materials.

$$\Delta I_D = (\Delta I - \Delta M_{ksm}) = \beta_{D1}\,\Delta ACC + \beta_{D2}\,\Delta DEP + \beta_{D3}\,\Delta CAP_{-1} + \beta_{D4}\,\Delta T_G - \beta_{D5}\,\Delta G - \beta_{D6}\,\Delta r_{-2} + \beta_{D7}\,\Delta DJ_{-2} + \beta D_{I8}\,\Delta PROF_{-2} + \beta_{D9}\,\Delta XR_{AV0123}$$

$$\Delta I_M = (\Delta M_{ksm}) = \beta_{M1}\,\Delta ACC + \beta_{M2}\,\Delta DEP + \beta_{M3}\,\Delta CAP_{-1} + \beta_{M4}\,\Delta T_G - \beta_{M5}\,\Delta G - \beta_{M6}\,\Delta r_{-2} + \beta M_{I7}\,\Delta DJ_{-2} + \beta_{M8}\,\Delta PROF_{-2} + \beta_{M9}\,\Delta XR_{AV0123}$$

The variables included in these equations are

ΔACC = An accelerator variable $\Delta(Y_t - Y_{t-1})$

ΔDEP = Depreciation

ΔCAP_{-1} = A measure of last year's capacity utilization

$\Delta PROF_{-2}$ = A measure of business profitability two years ago

The other variables have the same meanings as in the consumption equations, with lags as noted.

To strengthen the estimate of the exchange rate effect, we control for other major variables that might also affect investment. Econometric estimates of the investment model (Heim 2008b) show the following:

$$\Delta I = .28\Delta ACC + 1.37\Delta DEP + .69\Delta CAP_{-1} + .52\,\Delta T_G - .61\Delta G - 8.46\Delta r_{-2} - .10\,\Delta DJ_{-2} + .35\,\Delta PROF_{-2} + 4.97\,\Delta XR_{AV0123} \quad R^2 = .89$$
$$t = \quad (6.9) \quad (4.7) \quad (0.4) \quad (5.3) \quad (-3.4) \quad (-3.5) \quad (-0.4) \quad (2.0) \quad (4.2) \quad DW = 2.3$$

$$\Delta(M_{ksm}) = .05\Delta ACC + .46\Delta DEP + 1.25\Delta CAP_{-1} + .07\,\Delta T_G - .14\Delta G + 1.12\Delta r_{-2} + .30\,\Delta DJ_{-2} - .11\,\Delta PROF_{-2} - .40\,\Delta XR_{AV0123} \quad R^2 = .64$$
$$t = \quad (1.9) \quad (4.5) \quad (1.4) \quad (2.0) \quad (-1.7) \quad (0.7) \quad (3.4) \quad (-1.09) \quad (-0.7) \quad DW = 2.1$$

$$\Delta(I - M_{ksm}) = .24\Delta ACC + .91\Delta DEP - .15\Delta CAP_{-1} + .45\,\Delta T_G - .47\Delta G - 9.59\Delta r_{-2} - .40\,\Delta DJ_{-2} + .47\,\Delta PROF_{-2} + 5.37\,\Delta XR_{AV0123} \quad R^2 = .88$$
$$t = \quad (7.8) \quad (3.0) \quad (-0.4) \quad (6.0) \quad (-2.9) \quad (-7.3) \quad (-1.9) \quad (4.1) \quad (4.1) \quad DW = 2.1$$

The coefficients on the accelerator variable (ACC) represent the marginal propensity to invest in domestic (MPI_D) vs. imported (MPI_M) investment goods. Results indicate that the accelerator effect of a decline in current year real income on investment is principally on domestically produced investment goods, with demand decreasing $ 0.24 billion for every billion decrease in the size of the change in current year GDP. Demand for imported goods on the other hand only decreases $0.05 billion. There appears to be a $5.37 billion decrease in demand for domestically produced investment goods for every one - point decline (~ 1%) in the Federal Reserve's trade weighted broad exchange rate. We hypothesize that this reflects the effect on investment due to the drop in real savings caused by declining real income associated with the exchange rate decline. This income effect seems to swamp the substitution effect to cheaper domestic goods we would expect to see here. Similarly, the steep decline in income may cause some shifting to imports ($0.40B) despite the fact that their price has recently risen, because they are still

cheaper than U.S. investment goods, though at higher U.S. income levels, perhaps not as desirable on other grounds, e.g., quality.

5. THE EXPORTS DEMAND MODEL (USING THE REAL BROAD XR INDEX)

A lower exchange rate increases the demand for exports. A rough estimate of this effect can be obtained by regressing exports on the 4-year average exchange rate above and the growth in the American GDP over the 1960-2000 period. The GDP serves as a proxy for the growth in our major trading partners' economies, which systematically affects export demand.

$\Delta X_0 = .04\ \Delta(Y)_0 - 1.55\ \Delta XR_{AV0123} + .54\ \Delta AR(1) + .44\ \Delta AR(3)$ $R^2 = 48\%$

(t) (2.0) (-3.8) (2.4) (2.5) D.W.= 1.8

6. THE TAX GROWTH MODEL

Part of tax growth is endogenous, i.e., tied to income growth. Below we estimate the effect of a change in total income on the part of government revenues raised to purchase goods and services.

$\Delta T_G = .26\ \Delta(Y)$ $R^2 = 47\%$

(t) (7.7) D.W.= 1.4

The consumption and investment equations above show a positive effect on demand of an increase in tax revenues, presumably by reducing credit crowd out. Hence, in calculating the full effects of a change in GDP due to exchange rate changes, it is important to also measure the change in income resulting from changes in taxes collected as income grows. If we define tax changes that are government - enacted, ie, exogenous, as approximately ΔT_{EX}, we have $\Delta T_G = .26\ \Delta(Y) + \Delta T_{EX.}$ (We say "approximately, because T_{EX} also contains the regression error term.

7. A MODEL FOR CALCULATING A KEYNESIAN SPENDING "MULTIPLIER" THAT ALSO INCLUDES ACCELERATOR AND CROWDOUT EFFECTS

The following definitions and derivations of the multiplier and accelerator are presented, using simplified versions of our above consumption and investment equations for ease of exposition:

(1) $Y = C + I + G + (X-M)$

(2) $C = c_0 + (c_1 + m_{c1})(Y-T_G) + (c_2 + m_{c2})\ T_G + (c_3 + m_{c3})\ G$ (Consumer Demand)

where $(Y- T_G)$ is total income generated producing the GDP minus taxes; $c_1 + m_{c1}$ are the marginal propensities to consume domestic and imported goods, $c_2\ T_G + c_3\ G$ represent the consumer credit crowd out variables resulting from government deficits. The disaggregated form of the deficit is used.

(3) $I = I_0 + (I_1 + m_{I1})\ \Delta Y - (I_2 + m_{I2})\ r + (I_3 + m_{I3})\ T_G + (I_4 + m_{I4})\ G$ (Investment Demand)

where ΔY is an "accelerator" variable, r is the real interest rate, $(I_1 + m_{I1})$ are the marginal propensities to purchase domestically produced or imported investment goods in response to a change in the GDP, and

(I_2 + m_{I2}) are the marginal propensities to invest in these goods when interest rates change. I_3 T_G + I_4 G represent the investment credit crowd out variables, again disaggregated.

(4) $M = M_C + M_I = m_0 + m_{c1} (Y-T) + m_{I1} \Delta Y - m_{I2} r + (m_{c2} + m_{I3}) T_G + (m_{c3} + m_{I4}) G$ (Import Demand)

i.e., the demand for imported consumer or investment goods is driven by the same variables as is domestic demand. Substituting (2), (3) and (4) into equation (1) gives

(5) $Y = (c_0 + I_0 - m_0) + c_1 (Y - T_G) + I_1 \Delta Y - I_2 r + G + X + (c_2+I_3) T_G + (c_3+I_4) G$

From which we can derive the theoretical "M/A/C" multiplier value and a Keynesian "IS" curve:

(6) $\Delta Y = \left| \frac{1}{(1-c_1-I_1-[-c_1+c_2+I_3][.26])} \right| [- c_1 \Delta T_{EX} - I_1 \Delta Y_{-1} - I_2 \Delta r + \Delta G + \Delta X + (c_2+I_3) \Delta T_{EX} + (c_3+I_4) \Delta G]$

the numerical value of THE "M/A/C" multiplier is 1/ (1-.55-.24-.02) = 5.26

8. INCOME AND SUBSTITUTION EFFECTS OF A DECLINING EXCHANGE RATE

Economic theory suggests both the income and substitution effects of a declining exchange rate should be negative for imports, causing decreased purchases of imported consumer and investment goods. For domestically produced goods, it suggests the income and substitution effects should work in opposite directions: substitution effects increasing domestic demand, income effects decreasing it.

Our statistical results for consumption are fully consistent with this theory. The initial income effect of an exchange rate - induced $1 billion decline in disposable income reduces demand for domestic consumer goods by $0.55 billion and imports by $0.11 billion, and reduces savings by $0.34 billion (MPS = .34 = 1-MPC_D-MPC_M). Multiplier effects increase these estimates, as we will show in the next section. In addition, the substitution effect, as measured by the coefficients on the exchange rate variable, reduces consumer imports by $3.03 billion and increases domestic demand for consumer goods by $0.20 billion, for each single point decline in the exchange rate.

In the regressions for investment goods, the income effect is shown by the coefficient on the accelerator variable. The income effect caused by a $1 billion decline in economic growth in the current year causes a small decline in imported investment goods ($0.05 billion), and a larger decline in the demand for domestically produced investment goods ($0.24 billion). Using the exchange rate coefficient as a measure of substitution effects, this variable in the investment imports equation shows a negative sign suggesting declining exchange rates raise demand for imports, contrary to substitution effect theory. Domestic investment demand declines markedly ($5.37 billion), with a one point decline in the exchange rate, also counter to substitution effect theory. This probably indicates overwhelming dominance of negative income effects on investment, forced by the large decline in savings, not completely captured by accelerator variable in the equation. Increased import purchases we attribute to a "Wal-Mart" effect – substitution to less desirable, but more affordable good when income goes down.

In the consumption model, the regression coefficients on the exchange rate variable in both the total consumption and consumer imports equations are statistically significant. The coefficient in the domestic consumption equation is not. However, it is exactly the same as that obtained by subtraction of the statistically significant estimates for imports from that for total consumption. Hence, these coefficients seem reliable for use. For the investment equations, the situation is much the same.

A one point decrease in the Federal Reserve's "Broad" trade-weighted real exchange rate index (approximately a 95 hundredths of one percent (0.95%) decrease in its 2000 level) could increase import prices by the same percent, if passed entirely through to the consumer. However, evaluation by Federal Reserve staff of the "pass through" of exchange rate changes suggests import prices only change about half as much as the exchange rate change (Hellerstein, Daly & Marsh, 2006). In the year 2000, U.S. total real imports (1996 dollars) were $1,532 billion. A one index point (0.95%) decrease in the exchange rate, then, would be expected to increase import costs by half this percentage, or $7.28 billion, decreasing real incomes in the U.S. by the same amount. Real disposable income decreases the same amount, since there is no tax effect: nominal (taxable) income is the same; only real income has decreased.

9. THREE METHODS FOR CALCULATING THE IMPACT ON THE GDP OF A CHANGE IN THE EXCHANGE RATE

Three separate methods, all yielding the same results, are used to compute the effect of a one index point change in the exchange rate on the GDP (Y):

Method 1: Use marginal effects estimates from the above investment and consumption regressions to estimate the initial drop in real income. The M/A/C multiplier (5.26) is applied to the result.

Method 2: Use the method favored in many large scale econometric models of the economy (Fair 1986, Pindyck & Rubinfeld 1991). This involves separately estimating ΔC_D, ΔI_D, ΔG and ΔX (using the equations above), and simply summing the results to get ΔY.

Method 3: Formally Construct a Keynesian IS curve, and predict ΔY from its determinants and the multiplier implied by the function. It is a slightly more formal presentation of Method 1.

Each of the methods serves as a check on the estimates obtained from the others.

9.1. METHOD 1

$ 7.27B Initial Y Decline from: $ -7.28B (M price Increase @ .50 x ΔM prices)

+ .80B (.11MPC_M x -7.28 Initial $\Delta(Y-T_G)$ =Portion of 7.28 not spent on U.S. goods) (Note: -7.28 +.80 = -6.48)

- 5.37B (I_D: Decrease in investment)

+ .20B (C_D: Sub. effect increase in C_D)

+ 2.83B (C_D Effect Due to upward ΔMPC_D: 3.03 decline C_M – 0.20

Direct Substitution to C_D)

$+1.55B (X: - Increase in exports)

$ - 7.27B (Initial real income (Y) decline)

x 5.26 Multiplier/Accel/Crowd Out (M/A/C)Effect

$ 38.24B Decline in Real Income (Y) after Multiplier/Accel/Crowd Out (MAC)Effects

- 8.26B ΔTaxes due to M/A/C Effect @ Historic .26 Rate = .26(38.24 – (7.28-.80=6.48))
where 6.48 is the portion of the initial non-taxable 7.28 decrease in
real income affecting domestic demand =$(MPC_D + MPI_D)(7.28) = (.55 + .34)(7.28)$
. . where we assume the $MPS = MPI_D$

$ 29.98B $\Delta(Y\text{-}T_G)$ = Decline in disposable income

Also, let

- 1.57B = ΔC_D Due to Crowd Out Effect Caused By Decreased Taxes = (.19)($-8.26B)

- 2.48B = ΔC_M Due to Crowd Out Effect Caused By Decreased Taxes = (.30)($-8.26B)

+/- 3.03B = ΔC_{DorM} Due to +/-.20B Direct Substitution Effect & +/-2.83 Indirect Sub. Effect Due to ΔMPC_D

With this information we can summarize the changes in consumption and saving resulting from the increase in disposable income of $29.98 as follows:

$ -29.98B $\Delta(Y\text{-}T_G)$	$29.98B $\Delta(Y\text{-}T_G)$	$ 29.98B $\Delta(Y\text{-}T_G)$
x .55 MPC_D	x .11 MPC_M	x .34 MPS
$-16.49B ΔC_D (Inc. Effect)	$ - 3.30B ΔC_M (Inc. Effect)	$ -10.19B Δ Savings (Reduction
- 1.57B Crowd Out Effect	- 2.484B Crowd Out Effect	in Domestic Funds Available
+ 3.03B Substitution Effect	- 3.03B Substitution Effect	to Fund Investment)
$-15.03B Total ΔC_D	$ - 8.81B Total ΔC_M	

9.2. METHOD 2:

From our earlier regression equations, we see three variables through which investment is affected by changes in the exchange rate:

1. the decrease in the accelerator income variable in the investment equation due to the decrease in gross real income caused by the downward change in the exchange rate $\mathbf{XR_{AV0123}}$
2. the decline in tax collections because of the decline in real income, all of which was taxable, except the initial decrease caused by the 0.5%% increase in import prices, and
3. through the one -point change in the exchange rate variable.

Hence, the estimated decline in domestic investment (I_D)and imported investment goods (I_M)will be

$\Delta I_D = \Delta(I\text{-}M_{ksm})$ =.24 ΔACC +.45 ΔT_G + 5.37 ΔXR_{AV0123} = $ -18.27B

$\Delta I_M = \Delta(M_{ksm})$ = .05 ΔACC +.07 ΔT_G - .40 ΔXR_{AV0123} = $ - 2.09B

By similar reasoning, we see the changes in the demand for domestic and imported consumer goods:

$\Delta C_D = \Delta(C\text{-}M_{m\text{-}ksm})$ $=.55\ \Delta(Y\text{-}T_G)$ $+.19\ \Delta T_G$ $-(0.20+2.83)\ \Delta XR_{AV0123}$

=$-15.03B (same result as method 1)

and

$\Delta C_M = \Delta(M_{m\text{-}ksm})$ $=.11\ \Delta(Y\text{-}T_G)$ $+.30\ \Delta T_G$ $+\ 3.03\ \Delta XR_{AV0123}$

=$-8.81B (same result as method 1)

So, by Method 2 we have

$\Delta Y = \Delta C_D + \Delta I_D + \Delta G + \Delta X$ (+ Exogenous ΔXR rate effects on real income due to price decreases

i.e., $-6.48 = (MPC_D + MPI_D)(-7.28)) = -(4.00 + 2.48))$

= $ -38.24 (Same result as Method 1)

9.3. METHOD 3:

Using the formal Keynesian "IS" curve method for calculating the GDP shown in Section 7 above:

$\Delta Y = \Delta C_D + \Delta I_D + \Delta G + \Delta X$ (plus exogenous change -6.48)

$=(.55\Delta(Y\text{-}T_G) + .19\Delta T_G - (0.20 + 2.83)\Delta XR_{AV0123}) + (.24\ \Delta ACC + .45\ \Delta T_G + 5.37\Delta XR_{AV0123}) + \Delta G + \Delta X - 6.48$

= $ - 38.24 (Same result as by Methods 1and 2)

10. EXCHANGE RATE EFFECTS ON THE TRADE DEFICIT AND GDP

The estimated decline in the trade deficit of a one index - point decline in the U.S. real broad exchange rate is the sum of the resulting decrease in imports and the increase in purchases of U.S. exports

$ 8.81B - Decline in C_M

2.09B - Decline in I_M $ 2.48B - Initial Δ Savings = (.34 MPS)(-7.28 Initial ΔY)

1.55B - Increase in X 10.19B - MAC Induced Subsequent Δ Savings =.34 $\Delta(Y\text{-}T_G)$

$12.45B - Decrease in the Trade Deficit $12.67B - Decrease In Growth of Domestic Owned Wealth

The initial decline in real savings ($2.48B) stemming from the exchange rate drop forces a comparable decrease in investment. This initial decrease in domestic investment and the initial decline in domestic consumption ($6.48), and other effects noted in Method 1, generate a subsequent decline in disposable income of 29.98 of which 34% = 10.19 is a decline in savings. Hence the savings decline totaled $12.67B.

The estimated decrease in the trade deficit ($12.45) is less than the decline in U.S. saving ($12.67B) due to the exchange rate drop. This means the declining exchange rate cut U.S asset growth (savings) more than the cut in the trade deficit reduced the need to transfer U.S. assets to foreigners. This makes the trade deficit reduction a somewhat pyrrhic victory.

The decrease in domestic demand causes a substantial drop in the GDP. The associated trade deficit, though it declines in dollars, barely declines as a percent of GDP. Using baseline measures of the real GDP, exports and Imports data for the year 2000, we see only about one tenth of one percent decrease in the trade deficit as a percent of GDP when the trade weighted exchange rate index falls one point, as noted in Table 1:

Table 1: Exchange Rate Effects

				Trade Deficit	
	Real GDP	Imports	Exports	Dollars	(% of GDP)
Actual 2000 Data	$9224.00	$1532.00	$1132.00	$400.0	4.3%
Effect of 1Pt. Drop XR	9185.76	1521.10	1133.55	$387.6	4.2%.
Effect of 12.5Pt Dr.XR	8746.00	1395.75	1151.40	$244.3	2.8%

In the period 2000 – 2007, The U.S. real broad exchange rate actually dropped 12.5 index points. This drop would have been associated with a decrease in the trade deficit as a percent of GDP by 1.5 percentage points, from 4.3% to 2.8%, or about $156B, (ceteris paribus). This decrease would have been accompanied by a 5.2% decrease in the GDP or $478B in year 2000 dollars over the seven years (again, ceteris paribus). or an average of $68.3B a year over the seven years. Using the numbers from Method 2, multiplied by 12.5, we have:

$\Delta Y = \Delta C_D + \Delta I_D + \Delta G + \Delta X$

$\$-478 = \$\ -238B - \$\ 259B + 0 + \$\ 19B$

The real GDP actually grew 18.7% during 2000 - 2007. Had the exchange rate decline not occurred, it might have grown by 5.2%more, to 23.9%, increasing average annual growth rates from 2.7 to 3.4%.

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A Time for a Change in Economic Theory?

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ABSTRACT

Economic theory has gone through four major transformations since the 1600s in response to social and biophysical forces. We may be witnessing the beginnings of a fifth transformation as mainstream economics, committed to market efficiency and economic growth, may not be able to successfully address the dilemma of financial fragility and looming recession in the context of the reductions of material production and consumption needed to achieve a sustainable economy on a finite and non-growing planet.

INTRODUCTION

Economic theory has seen four major transformations since the 1600s. *Mercantile thought,* which dominate theorizing from the 17th to the middle of the 18th centuries gave way to *Classical Political* Economy by the late 1700s. Classical political economy was itself supplanted by *Marginalism* by the 1870s which solidified itself into a coherent *Neoclassical Economics* by the 1890s. Neoclassical thought reigned supreme until the middle of the Great Depression of the 1930s, eventually giving way to *Keynesian Economics.* Keynesian thought was brought into the neoclassical mainstream (Samuleson's Grand Neoclassical Synthesis) by the 1960s and remained the intellectual center of the profession until the era of stagflation in the 1970s. By the late 1970s and early 1980s the principles of Keynesian economics lost sway in the profession and were replaced by a new variant of neoclassical economics, often referred to as *Supply-Side Economics,* or *Economic Fundamentalism.*

Often time's economic theory changes because of social forces. For example, neoclassical economics lost its dominance during the years of the great depression (1929-1939) for three fundamental reasons. The abstract neoclassical framework could not explain prolonged and severe depression. The policies they advocated (fiscal restraint, tight money, liquidation of assets) were counter-productive. Finally an alternative viable explanation of the causes of, and the solutions to, the depression came from the writings of John Maynard Keynes. But other times the changes in economic theory are a result of changes in the relation between humans and nature. Specifically I want to focus this paper on a forgotten principle: how human beings have appropriated and harnessed energy. Energy plays a far greater role in the economy that most texts have considered in the past or are considering at the current time. Most of what we consider productivity increasing technological change is accompanied by a net increase in the use of fossil fuels (Cleveland, *et al.*1984, Hall, *et al.* 1986). As the time of the end of cheap oil approaches we can no longer ignore the role that energy plays in both the economy and economic theory.

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Furthermore, the coming of peak oil coupled with the constraints imposed by looming climate change may serve as the basis to reconsider the basic premises of scarcity and economic growth that form the underpinnings of contemporary economics.

TIME FOR ANOTHER CHANGE IN ECONOMIC THEORY?

We may well be witnessing the beginning of the end of economic fundamentalism, or the belief that market outcomes are efficient by definition, government intervention generally distorts efficient market outcomes, and market processes will self correct and result in "the greatest good for the greatest number. Economic fundamentalism, which has been dominant in economic theory for nearly 30 years, will, sooner or later, see the end of its ideological and intellectual reign because it can no longer "deliver the goods" the way it did when underlying economic and environmental conditions were different. A growing number of American citizens, politicians, and even some in the financial community now call for the reregulation of financial markets. Advocates of the "free market solution" have little new to offer. Long-held concerns about deficit spending are rapidly vanishing as the current economic malaise deepens. In the end the monetary "brains trust" will either borrow the money or print it. Unfortunately: "Simple solutions to the intractable problems of markets do not exist" (Perelman, 2006: 161).

Among the most intractable problems is the need for a market economy to grow into a biophysical system that is finite and non-growing. Market economies must grow to provide opportunity, employment, profitable outlets for investment and the necessities and amenities of life. Yet at the same time the human economy must operate within the biophysical limits that nature will allow in the long term. If, as Mathis Wackernagel and others estimate, human economic activity, or ecological footprint, (measured by the amount of land needed to provide our food, fiber, and energy), already exceeds biocapacity on a global basis, with some wealthy countries exceeding it by a factor of five, a fundamental dilemma arises. How can the economy grow to provide employment and opportunity, while simultaneously shrinking to live within nature's limits?

A BRIEF HISTORY OF PRIOR THEORETICAL TRANSFORMATIONS

Economic policy on theory emerged with the writings of the mercantilists (in the 1600s and early 1700s. Robert Heilbroner described mercantilism as an "extractive commercial nexus." Craft workers could extract the sunlight appropriated by the earth's biomass (i.e. trees) and fashion it into implements, lumber to build ships, and charcoal to smelt iron and other minerals. These ships voyaged to distant lands and extract precious metals that were returned to the imperial nation. The primary policy goal was to develop structures that resulted in a positive balance of trade, and value theory was grounded in the process of exchange.

By the middle of the 1700's this doctrine fell into disfavor, along supplanted by doctrines advocating the idea that value was determined prior to market by the cost of production. The earliest example was the French Physiocratic School. They contended value was the result of the natural bounty of the land and the application of agricultural labor. Physiocracy provided the first biophysical model. Not only was the economy grounded in the natural bounty of the land, but their famous *Tableau Oeconomique* was patterned after the flow of blood in the human body.

The most famous critique of mercantilism was Adam Smith's *An Inquiry into the Nature and Causes of the Wealth of Nations.* Smith, like every other Classical Political Economist, based his theory on the labor theory of value. Value and price were determined by the amount of human labor time embodied in production. Smith, writing before the consolidation of the industrial revolution, had difficulties reconciling fluctuating market price with the natural price determined by labor values. To reconcile the natural price determined by labor values with fluctuating market prices Smith had to develop subsidiary theories of wages, profits and rents. This did not lead him to abandon a cost of production perspective it just muddied his value theory. Smith was, above all, a pre industrial philosopher. The augmentation of the wealth of a nation was driven by organizational changes, specifically the division of labor, rather than by technology. Smith makes scant mention of "fire engines" although they were invented in 1698. Although Smith was well aware of its existence he attributed little productivity augmentation to this new technology. His only mention was in the context of the division of labor leading workmen to invent better machinery.

Ricardo and Marx wrote at a time in which they could observe, not just visualize, the industrial revolution. The industrial revolution depended upon the prior increase in agricultural productivity, the extensive use of mechanically powered machinery; the introduction of fossil fuels for power and energy, the widespread use of chemically synthesized elements, as well as advances in metallurgy. (Cameron, 1989, Rosenberg 1972).

Despite improvements in British agricultural productivity the later years of the 18th century witnessed substantial increases (136% from 1770 to 1813) in the price of food (Rubin 1979). Debates about food prices were at the forefront as Britain industrialized, not because of the dominance of agriculture as a sector, but because food prices determined the level of subsistence wages and low wages were essential to low cost production of mass production goods As population grew and urbanized more food was required to support more people. With cheaper food from the continent cut off more domestic land had to be put into cultivation. Since the best, or most accessible, land was used first the extension of cultivation required the utilization of poorer quality lands. The conventions of British land used at the time allowed the worst land in cultivation to pay no rent. As even poorer quality lands were employed the former no rent margin now paid rent to the aristocracy. Moreover, additional human labor was required to improve the inferior lands, thereby raising the cost of food production in terms of labor expended. Ricardo's two great contributions to economic theory, diminishing marginal returns and comparative advantage were grounded in this debate. As output increases the entire aggregate income is eventually distributed between wages and rents, and the process of accumulation comes to an end, ushering in the dreaded

and dull stationary state. Ricardo set out to establish the idea that value was created by embodied labor even after private property appeared in land and capital stock. To be more precise, Ricardo posited that value depended upon embodied labor and scarcity, but relegated scarcity to *nonreproduceable commodities.* He showed little interest in these and concentrated on those goods that could be produced. From a biophysical standpoint Ricardo was clearly dealing with the notion of *absolute scarcity*, rather than with the idea of relative scarcity that permeates neoclassical thought. He makes no mention of unlimited wants and relegates nonreproduceable commodities to the status of being rare and uninteresting.

By establishing that the price of food was determined by the application of human labor to land *of the lowest quality* Ricardo was able to show that rent was a deduction from the economic surplus produced by labor that accrued to those who possessed land of higher quality. Ricardo addressed the problem that so vexed Smith by holding capital to be dated or congealed labor. Price now resolved to the component parts of wages and profits. Any increase in wages resulting from higher food prices simply diminished profits. However, Ricardo's abstract model only functioned adequately in the simplified world where all capital was circulating capital. Adapting this theory to the realities of emerging large scale production and the industrial revolution stymied him. If two firms have different capital-labor ratios an increase in wages will have a more profound impact upon the more labor intensive process. In order to equalize the profit rate the prices of labor intensive goods must increase relatively to those produced in capital intensive processes. But goods that possess equal amounts of embodied labor are supposed to command the same price. Ricardo was never able to solve the problem. In fact he died at his desk while working on it.

Marx, more than any other political economist of the classical period, had a keen insight into the role played by fossil fuels in the expansion of the scale of production. Only large-scale production made possible by fuels that could transcend the organic limitations of the human body, wind and water, would reveal the internal dynamic of capital as self-expanding value." This increase in scale unleashed vast potentials for increases in labor productivity that simply did not exist before the age of fossil fuels and before the machine age.

However mechanization also unleashed the tendency for the rate of profit to fall. An increase in the scale of production necessitates the investment in long lived fixed capital that only transfers its value to the final product. If the increase growth in the capital labor ratio exceeds the rate of increase in labor productivity profits will tend to fall. But a capitalist has little choice than to increase investments in fixed capital to increase productivity. Therefore the constraints of competition force capitalists to behave in manners contrary to their own will. While Marx technically resolved Ricardo's dilemma, the resolution was dangerous to the existing power structure. The labor embodied theory was a valuable tool in establishing the primacy of a hard working entrepreneurial class over that of a moribund rent-seeking aristocracy. In Marx's hands it no longer served to perpetuate a class of exploiting industrial capitalists.

The labor theory of value actually fell out of favor with the emerging capitalist class long before the publication of Marx's *Capital.* Writers such as William Thompson and Thomas Hodgskin reasoned that since labor was the source of all value that labor should receive the entire proceeds. Their followers took

direct action to achieve their goals and the period of the 1830s was characterized by labor unrest and mass strikes. Marx held just the opposite view. He begins his *Critique of the Gotha Programme* by asserting that labor is not the sole source of wealth. “Nature is just as much the source of use-values (and surely these are what make up material wealth!) as labour” (Marx. 1974: 341). Fossil fuel driven mechanization also played a role in extracting and processing the use-values created by nature and without some return to capital the reinvestment in new productivity-enhancing would grind to a halt. A society in which all remuneration accrued to workers would be a moribund stationary state. Marx’s vision of socialism was quite different. It did not call for the elimination of exploitation but social, rather that private, control over the economic surplus. However, both of these positions, despite their distinct political differences, were dangerous as they were fundamentally grounded in the notion of class conflict. The rise of neoclassical economics was not simply a reaction to Marx. For example there is no evidence that William Stanley Jevons ever read Marx. Jevons’ dispute was with the labor theory of value in general. “When at length a true system of economic science comes to be established, it will be seen that that able but wrong-headed man, David Ricardo, shunted the car of economic science onto a wrong line—a line, however, on which it was further urged toward confusion by his equally able but wrong-headed admirer, John Stuart Mill” (Jevons 1888: 72).

Marginalists and later neoclassicals however, were looking for more than accurate relative prices. Instead they were searching for a general theory that was applicable to any social system at any point in time. As such they de-emphasized the importance of the institutional context in which economic and social activity occurs, especially the role of class processes. This approach brought a wholesale shift in object and methods. While classical political economy focused on the point of production Marginalists and neoclassicals grounded their analyses in the processes of exchange. Classical political economists viewed value as being determined by objective processes grounded in the social division of labor. Neoclassical thought sees value (or price) as determined subjectively by mental, and not material, processes. In the end the dynamics of classical political economy were replaced by a search for static equilibrium. From the 1870s until the end of the 1920s marginalism was refined and synthesized into what we now call either neoclassical economics or welfare economics. Alfred Marshall developed a causal link between Jevons’ principles of utility and the construction of a demand curve. Vilfredo Pareto adapted F.Y. Edgeworth’s indifference curves to show that a series of voluntary exchanges will lead to an optimal allocation of consumer goods and productive inputs. John Bates Clark provided a non-exploitation based theory of distribution by refining marginal productivity and Philip Wicksteed freed Clark from the dreaded adding up problems (whereby more income could be distributed to factors than is produced) by substituting variable proportions for fixed ones. By 1920 A. C. Pigou had synthesized general and partial equilibrium approaches in his *Economics of Welfare.* The decade following the publication of Pigou’s great work was one of economic expansion, at least until the middle years of the decade when crucial sectors of the real economy (housing, automobiles, steel) began to decline. Yet despite the decline in the real economy financial speculation kept expanding. The long boom of the post WWI era was to come to a

crashing denouement in October of 1929. Orthodox economics, unable to explain the depths of the depression, fell upon hard times. Belief in the self-regulating market was temporarily suspended and replaced with two options: social democracy, and a more regulated capitalism, or fascism. A second world war ultimately decided the outcome for some thirty years.

Keynes considered himself a "moderate conservative," and accepted all of the classical Pigovian postulates except for Say's Law and the self-equilibration of the labor market on the basis of the real wage. Keynes largely shifted emphasis from wages as a cost of production to aggregate wages as the primary component of effective demand. Interest rates could no longer be called upon to equilibrate the market for loanable funds, as savings and investment were functions of different variables. Rather than calling forth greater saving, increases in the interest rate would choke off investment, reduce incomes and thereby reduce, not increase, savings (Perelman 2006:38). If Keynes did introduce anything truly revolutionary it was to bring the concepts of irrationality (or animal spirits), uncertainty, and disorder into the highly ordered, absolutely certain worldview of orthodox economics of rational short-term decisions made on the basis equilibrium prices as carriers of perfect knowledge and perfect foresight (Shackle 1967). Uncertainty simply could not be transformed into calculable risk (Keynes 1937).

Keynes returned to the problem of long period equilibrium, and once again confronted the dilemma that has vexed orthodox economic theory since the time of Ricardo: How does one properly value long-term fixed capital assets under conditions of uncertainty? This recognition allowed Keynes to give primacy to the investment process as the motive force to changes in the level of effective demand. Yet economic policy in the post depression years focused mostly on augmenting consumption. Moreover, the work of Keynes was sanitized to remove traces of disorder. Savings as a joint function of the income and interest rates gave us the real side of IS-LM analysis, although Keynes himself was adamant that the system should remain open. Robert Solow removed the dangerous notion of explosive oscillations and potential secular stagnation inherent in the work of Hansen, Harrod and Domar. Solow also substituted a technical process for a social contradiction between the needs for a rather high MPS to stimulate investment and a low MPS to stimulate consumption. Samuelson took the process one step further relegating the volatility of the interaction of the multiplier and the accelerator to a rather simple second order difference equation. Finally Samuelson safely contained Keynes by means of the "Grand Neoclassical Synthesis," whereby markets efficiently allocated resources and equitably distributed incomes. Keynesian economists needed only to fine tune the level of aggregate demand by means of subtle adjustments in monetary and fiscal policy.

A number of institutional arrangements evolved in the immediate post war era that helped establish the United States as an international power and as a growing and prosperous domestic economy. The Bretton Woods accords took the world off the gold standard and placed economic productivity growth as the base for fiat money. The United States clearly had the world's most productive economy and the dollar became the world's key currency. The Employment Act of 1946 required the government to utilize the new tools of Keynesian demand management to achieve "reasonably" full employment and stable

prices. The mechanism to achieve these goals was by means of economic growth. In addition, 1948 witnessed the signing of the epoch-making contract between the United Auto Workers and General Motors, establishing “productivity bargaining” as the norm. Increases in productivity translated into increases in wages. Regular wage increases turned into increased consumption and increased investment in residential structures, thereby maintaining effective demand and stimulating economic growth, as well as linking the interests of unionized workers to further increases in productivity growth. Finally the era saw the continuation of growth in domestic oil reserves as discoveries of new domestic sources of oil were greater than the depletion of older sources. Oil was increasingly utilized as an agricultural input both directly to power agricultural machinery and to dry crops, and indirectly as the petrochemical feedstock of herbicides, pesticides and fertilizer. Using 1996 as a base year, the use of durable equipment rose from 70 in 1948 to 142 1969, direct energy inputs increased from 66 to 94, and the use of agricultural chemicals nearly tripled in the same time period. Despite myriad fluctuations farm output nearly doubled by the beginning of the 1970s (Economic Report of the President. 2004).

After a theoretical reign of some thirty years Keynesian economics lost credibility in the profession, largely due to its inability to explain, or prescribe policy for, stagflation. The set of institutions that allowed the prosperity of the golden age began to decay. The capital labor accord could not withstand declining productivity. Industrial dominance declined as Europe and Japan rebuilt and newly industrialized nations added to basic capacity in fundamental industries such as steel production. As the productivity base of the United States fell, so too did the basis for monetary hegemony, and the Bretton Woods accords collapsed in 1971 when U.S. President Richard Nixon unilaterally announced that the dollar was no longer convertible to gold. Moreover, the U.S. production of oil peaked in 1970, verifying the position of M. King Hubbert, who predicted this event in 1956. From now on the United States would be a net oil importer. At home the energy return on investment began a precipitous decline. Having extracted the least costly, highest quality oil first, the remaining domestic supply declined in quality. The yield per effort began a long and secular decline. In 1970 drilling in deep water and hostile climates yielded approximately 17 barrels per foot. By 1980 that had fallen to less than seven (Hall, *et al.* 1986). After the peak the units of energy needed to extract, transport and refine the oil began to rapidly decline. In 1970 the estimate EROI for all hydrocarbons was 42:1. By 1981 it had fallen to 8:1 (Hall, *et al.* 1986). Imported oil was simply more cost effective, but the loss of a cheap domestic supply made the nation more vulnerable to dislocations in the world market. Furthermore the potential ability to raise productivity by simply throwing more cheap oil at the process began to see limits.

Productivity grew at an average annual rate of 2.7% in the golden age years of 1949-59. This growth rate slowed slightly to 2.1% from 1959-69. But once the domestic oil supply peaked in 1970 and the postwar social structure of accumulation began to disintegrate the rates of productivity growth plummeted, taking Keynesian credibility with them. Average annual productivity growth fell to 0.3% per year (Bowles, *et al*. 1990). Most mainstream studies have a difficult time explaining the decline in productivity growth by standard measurements.

However two heterodox approaches offered better results. Bowles *et al.* proposed a model of productivity, with social factors such as the increase in corporate control and the increase in work intensity, innovative pressure, and the role of citizen protest accounting for accounting for 84% of the decline in the productivity from 1948-1973 (Bowles, *et al.* 1990). Culter J. Cleveland and co-authors approach productivity from a thermodynamic perspective, asserting that economic production is work, and work requires free energy. Their linear regressions attributed 98% of the variation in real GDP from to the rate of change of fossil fuel use (Cleveland, *et al.* 1984). While seemingly opposite explanations, one must ask: what role does fossil fuel use play in the intensification of work intensity. Certainly the telecommunications led extension of the working day into former drive time and downtime that is now accessed by the internet would not be possible in the absence of substantial electricity, wi-fi and microwave grids. This connection deserves further study.

With productivity in decline and labor and material costs rising, the economy became vulnerable to simultaneous recession and inflation. With the U.S. no longer being an oil exporter and with the exporters now organized into an effective cartel (OPEC) the timing of economic downturns with “oil shocks” became a permanent feature of the economy. In 1973 Saudi oil was withheld from the U.S. market as a result of the resupply of Israel during the October war. Within the year the economy plunged into the worst economic downturn since the Great Depression. In 1979 Iranian oil no longer flowed to the US. Within eighteen months the even more severe recession of 1981-82 commenced. As oil prices collapsed the long period of 1980s prosperity emerged. A recession followed the run-up in oil prices surrounding the first Gulf War, and prosperity returned in the 1990s as oil prices fell to $10 per barrel. Prices peaked again in 2000 as OPEC cut back on production and a recession soon followed.

Keynesian policy offered no relief. Expansionary policy was offered to counteract rising unemployment resulted in increased inflation. Contractionary policies exacerbated unemployment. Rather than a smooth Phillips curve relation both macroeconomic problems spiraled upwards. The large integrated corporations of the 1970s did not compete on the basis of marginal cost, but rather on cost markup pricing designed to achieve target rates of profit determined by financial interests. As interest rates rose in accord with tight money policy, those additions to prime cost were passed along in the form of higher consumer prices. In that sense tight money policy actually exacerbated, rather than corrected inflation (Wachtel and Adelsheim. 1977).

The program known as “Supply Side Economics” was advanced to address the causes of productivity decline and input cost increase. Remilitarization became part of the answer to the raw materials shortages as well as to effective demand. The National labor Relations Board was staffed by those hostile to the notion of collective bargaining, and enforcement of environmental laws declined. Taxes fell on upper incomes as the progressivity was removed from the tax codes, while payroll taxes increased. The process of deregulation commenced during the Carter administration was augmented and extended to financial markets, as the Garn-St.Germain Act removed the New Deal era restrictions on investments for

the Thrift industry. Tight money policy was advanced to quell inflation. The Federal Funds Rate rose from 5.82 at the trough of the 1974-75 recession to 16.38 in 1982 (Economic Report of the President. 2004).

Yet the supply-side program had limited impact, despite the achieving political victory on nearly all of its aspects. Productivity growth averaged only at 1 percent between 1979 and 1989. Corporate profits averaged only one half of one percent higher in the decade of the 1980s than they did in the stagnant 1970s as debts, both domestic and foreign soared. The trade balance as a percent of GNP fell from 0.4% in 1948-66 to -1.8% in 1979-89. The Federal budget deficit increased by 125% in the same time period while the national savings rate fell from nearly 10% to a little over three percent. It hovers close to zero at the current time (Bowles, *et al.* 1990). Bowles and his colleagues attribute the somewhat lackluster performance to contradictory aspects of critical tradeoffs. The "monetarist cold bath" of high interest rates helped discipline labor to accept a reduction in wage growth. But the same high interest rates reduced investment and increased excess capacity, thereby depressing profit rates. High real interest rates strengthened the dollar but simultaneously increased dollar denominated raw material prices, thereby raising business costs (1990). These contradictions have not disappeared in the current era of the celebration of the "magic of the market."

SUMMARY AND CONCLUSIONS

Recent unemployment and GDP data indicate that the U.S. economy has entered another recession. This follows closely on the heels of yet another dramatic run-up in fuel prices, which peaked at $147 per barrel in July of 2008, and subsequently declined to less than $40 per barrel in January 2009. One awakes to the news of systemic financial fragility as well as volatile equities markets and frozen credit markets. The solution offered by the FED and the new administration is the time honored Keynesian path of growing one's way out of depression, in this case by providing sufficient liquidity to the credit markets so growth can proceed once again in the absence of domestic savings and consumer confidence can return. Will Keynesian economics be reaccredited as the market fundamentalist solution can no longer "deliver the goods?" Or will this be a minor bump in the road of smooth macroeconomic adjustment by means of transparent prices that carry sufficiently perfect knowledge?

My fundamental question lies deeper below the surface, buried in the biophysical benthos so inaccessible to mainstream economists and social critics. If we retain the same institutional structures based on the notion of self regulating markets, how will we cope with the problems the next generation will face: problems born of biophysical limits? If the end of the age of cheap oil arrives in the same historical time frame as climate disruption they will impose absolute, biophysical limits to continued growth. But under the current set of social arrangements desirable social and economic goals such as full employment, financial stability and retirement security are all dependent on economic growth. How to resolve this seeming contradiction will constitute a fundamental theoretical issue of our time.

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A Peek into a Pandora's Box: Firm-Level Demand with Price Competition vs. Quantity Competition

William Kolberg*

ABSTRACT

This paper explores the impact on firm-level demands under quantity competition tied to changes in the number of firms, product differentiation, and product group elasticity under price competition. It appears this deserves more attention. Some simple numerical analysis shows that inverse demand, compared with demand may be similar, more price elastic or less price elastic with increased competition beyond duopoly. Indeed, it appears increased competition may lead to the competitive result with quantity competition while under identical market conditions the result is monopolistic competitive under price competition, unless market demand is highly inelastic. The numerical results reported here suggest that the economic landscape containing the interesting dilemma in which price and quantity competition yield significantly different firm-level demands and different equilibria, may very well need to be expanded from competition among the few to include competition among the many as well.

INTRODUCTION

This paper explores the impact increased competition may have on the distinction between demand and inverse demand faced by an individual firm. In the case of duopoly, inverse demand is less price elastic than demand regardless of the degree of product differentiation. (See Singh and Vives 1984). Vives (1999) and (1987) suggests why the distinction between price and quantity competition when the product is differentiated among many firms has not been addressed extensively yet. If the residual price elasticity of demand faced by a firm is unbounded with increased competition, it leads to the competitive result with no distinction. If the residual price elasticity of demand remains bounded as the number of firms is increased, it leads to monopolistic competition, but cross-price elasticities will vanish as will any difference. The distinction would remain in kind as n is increased, but only diminish in degree at most. Also, in the less technically limiting case which includes cross effects terms, inverting the demand relationship may itself be daunting with increased numbers, impeding any comparison at all.

Nevertheless, Hackner (2000) explores the distinction between price and quantity competition with the possibility of many sellers when product quality varies across sellers. With the aid of some restrictive assumptions, he shows that when there are more than two firms, quality varies greatly, duopoly results may be reversed, suggesting further exploration in this arena may be justified.

This paper develops a method for analytically inverting log-linear or linear demand systems involving any number of firms under any degree of product differentiation. Some simple numerical analysis then shows that inverse demand compared with demand may be similar; or more or less price elastic with

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increased competition beyond duopoly. Indeed, it appears increased competition may lead to the competitive result with quantity competition while under identical market conditions the result is monopolistic competitive under price competition, unless market demand is highly inelastic.

THE DEMAND SYSTEM

Demands faced by individual firms are assumed symmetrical. Log-linear demand for a representative firm under price competition is as follows.

(1) $\ln q_i = b \ln p_i + g_n \ln p_j + ... + g_n \ln p_n + \ln C$

Where:

p_i is firm i's price;

q_i is firm i's quantity demanded;

b is the firm's price elasticity of demand;

g_n is pair-wise cross-price elasticity and

C is a constant, and

$i \neq j$.

We assume $b < 0, g_n > 0$ for substitutes, and

(2) $b + g_n(n\text{-}1) = m$

Here m is the market demand elasticity for the good produced by the product group[1]. Equation (2) states the net response of buyers to a 1% change in firm i's price will equal the market demand elasticity for the product group. This implies $|b| \geq g_n(n-1)$. These assumptions ensure that (1) may be inverted[2].

Inverting (1) yields:

(3) $\ln p_i = \beta_n \ln q_i + \gamma_n \ln q_j + ... + \gamma_n \ln q_n + \ln c$

Where:

q_i is the quantity offered for sale by firm i;

p_i is the willingness to pay for q_i;

β_n is firm i's quantity elasticity of demand;

γ_n is pair-wise cross-quantity elasticity; and

c is a constant.

With n = 2,

(4) $\beta_2 = \frac{b}{\left(b^2 - g^2\right)} < 0$,

(5) $\gamma_2 = \frac{-g}{\left(b^2 - g^2\right)} < 0$, and

With the number of firms, *n*, greater than 2, the analytical inversion process can degenerate into unmanageable complexity.

ANALYTICAL INVERSION OF THE DEMAND SYSTEM WITH *n* >2

For internal consistency, (2) implies that these elasticities must be unaffected by a change in the number of firms in the product group. Otherwise, omissions or double counting must be occurring. It may be that these elasticities are in fact affected by a change in *n*, but the impact must be distributed on both sides of (2) to preserve the equality[3]. This property is general and should apply no matter what functional form is used to model the firm's demand. This means that the character of (2) is completely determined by the nature of the product and is independent of *n*. We can then define

(6) $g = g_n(n-1)$

We will refer to *g* as the product group cross-price elasticity. It is the percentage change in the demand of the firm's competitors, as a group, in response to a one percent change in the firm's price holding other prices constant. This measures total substitution possibilities inside the product group. It should move along with $|b|$ in response to changes in product differentiation among firms inside the product group. It is similar to $|b|$ in this regard, but unlike $|b|$, it does not include added substitution opportunities outside the product group.

Applying the same reasoning used in the case of firm *i*'s demand function,

(7) $\beta_n + \gamma_n(n-1) = \mu$

holds under any conditions, where μ is the inverse market demand elasticity for the product group. It follows that:

(8) $\mu = 1/m$, also under any conditions.

It will be useful to define a criterion for measuring the degree of product differentiation under quantity competition[4]. Set n = 2, divide both sides of (7) by μ:

(9) $$\left(\frac{\beta_2}{\mu}\right)+\left(\frac{\gamma_2}{\mu}\right)=1$$

This implies:

(10) $$\left(\frac{\beta_2}{(\beta_2+\gamma_2)}\right)+\left(\frac{\gamma_2}{(\beta_2+\gamma_2)}\right)=1$$

The first term of both (9) and (10) is the own quantity portion of μ and the second term is the cross quantity portion of μ. With a perfectly homogeneous product, an increase in production from any firm will impact buyer willingness to pay equally, and all of the quantity elasticities will be equal. The own and cross quantity portions of μ will be 0.5 in (9) and (10).

With product differentiation, the firm will have some ability to isolate itself from the impact of an increase in production by another firm in the product group. The own quantity portion of μ will therefore be greater than 0.5 and the cross quantity portion of μ will be less than 0.5 in (9) and (10) for the case of a differentiated product. The nature of the product, therefore will be reflected in the relative size of shares in (9) and (10) for the case of n = 2.

For a fixed and given product group quantity elasticity, μ, as n is increased, each of the left side terms in (7) must be reduced proportionally, asymptotically approaching 0 as n approaches infinity. In the case of homogeneous products, this would correspond to perfectly elastic firm demand under perfect quantity competition. With differentiated products, the process would always preserve relatively larger absolute values for own quantity elasticity as compared to any single pair-wise quantity cross elasticity as n is increased. With symmetrical demand across firms, the relationship, (10), between β_n, and γ_n, in this process of increasing n, is preserved in that:

(11) $$\frac{\beta_n}{(\beta_n+\gamma_n)}+\frac{\gamma_n}{(\beta_n+\gamma_n)}=1$$

for any pairing of firm *i* with one of the other *n*-1 firms. This is because with symmetrical demands, the impact of increasing n is distributed proportionally across firms. It follows that the own quantity portion of any two firms' share of μ when $n > 2$ will always be equal to the own quantity share of total μ when $n = 2$.

(12) $$\left(\frac{\beta_n}{(\beta_n+\gamma_n)}\right)=\left(\frac{\beta_2}{\mu}\right)$$

This will be true despite the fact that:

$\beta_n < \beta_2$ and $\beta_n+\gamma_n < \mu$

This character of the firm's inverse demand will be completely determined by the nature of the product and the degree of product differentiation. Therefore, it will be independent of the number of firms. In addition, from (7) we know that all of the quantity elasticities, own and cross, must sum to equal the product group quantity elasticity, μ. Equations (12) and (7) provide two conditions which must hold for each firm's demand function under quantity competition with n firms in the product group. To solve (12) and (7) for β_n and γ_n, as a functions of the duopoly solution, first solve (12) for γ_n:

(13) $$\gamma_n=\beta_n\left(\frac{\mu}{\beta_2}-1\right)$$

Substitute (13) into (12), and factor out β_n:

(14) $$\beta_n=\frac{\mu}{\left(1+(n-1)\left(\left(\frac{\mu}{\beta_2}\right)-1\right)\right)}$$

With β_n from (14) γ_n may be found using (13). Equations (14) and (13) are the solution to (12) and (7). These relationships are perfectly general and should hold for any inverse demand system regardless of functional form.

The conversion of b to β_n expressed entirely in terms of the $n = 2$ case under price competition may be derived from (14) by substituting in (4) and (5) from the two firm inversion. This is because in this particular functional form, (4) and (5) express inverse demand elasticities in terms of the corresponding demand elasticities. Some algebra yields:

(15) $$\beta_n = \frac{1}{\left(1-(n-1)\frac{g}{b}\right)m}$$

In addition, given β_n, from (15), γ_n may be most easily determined by using (13) and substituting in (4) and (5) from the 2-firm inversion:

(16) $$\gamma_n = \beta_n\left(\frac{-g}{b}\right)$$

So any firm-level log-linear demand function with price competition among n firms, (1), may be converted into its corresponding inverse firm demand function with quantity competition among n firms, (1), preserving the appropriate relationship between firms and the nature of product as given by elasticities of the price competition demand function[5].

COMPARING DEMAND AND INVEARSE DEMAND WITH THE NUMBER OF FIRMS VARIABLE

Equations (15)-(16) can show how a change in the number of firms, product differentiation, and product group elasticity under price competition will translate into impacts on the corresponding quantity competition firm-level demand relationship.

Own Price Elasticity and the Number of Product Group Firms

Figure 1 compares price elasticity of demand under price competition and quantity competition when the product is differentiated. In order to do this $|1/\beta_n|$ using (15) is plotted along with $|b|$. In this example, $|b|$ is set at 11.5, g is set at 10, and therefore, $|m|$ = 1.5.

Here the residual price elasticity of demand remains perfectly bounded under price competition as the number of firms is increased, but appears to be completely unbounded under quantity competition as the number of firms is increased, other things equal. As a result, with very small numbers, inverse demand is more price inelastic than demand. Beyond 9 firms in this example, $|1/\beta_n| > |b|$, and as n increases further we would expect to find the competitive result with a sufficiently large but finite n. Under price competition, with identical market conditions the same process yields the monopolistic competitive result.

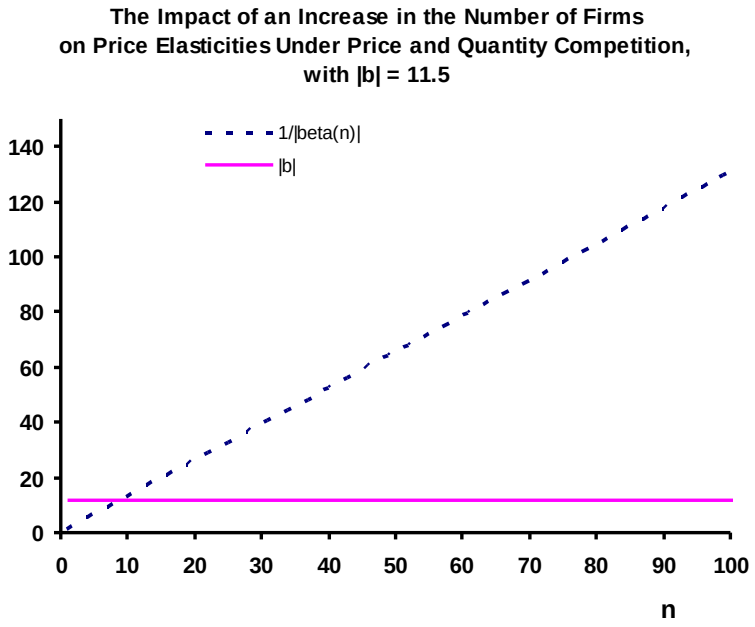

Figure 1

Own Price Elasticities and Changes in Product Differentiation within the Product Group

Changes in b rooted in changes in m is shared by all firms. Because of this, product differentiation distinguishing a firm's goods from other firms' in the product group under price competition will be defined for this study as changes in both b, and g, that preserve m unchanged[6]. Greater product differentiation measured this way has a significantly smaller impact on (15) as compared to the impact of a change in n. An increase in product differentiation will reduce both g and b. This will reduce the ratio $(-g/b)$ in (15), but only slightly, unless both $-g$ and b are relatively small. These conjectures are illustrated in Figure 2.

Again, results from equation (15) are inverted so that we can compare b with $1/\beta_n$. In this example m is held at -1.5. The elasticity calculations in Figure 2 are in absolute values. As expected, $|b|$ increases linearly as the degree of product differentiation is reduced. Vives (1999), p. 168, asserts that demand under price and quantity competition will be identical in the limit of monopolistic competition because cross effects will be absent there, or $b = 1/\beta_n$ in the notation of this paper. The results reported here are not at odds with this. They do, however, show that Vives conjecture holds only in the extreme limiting case. This situation is shown in Figure 2 as the point in the lower right corner where $|b|$ has been reduced to 1.5. Holding m constant, (2) implies at this point $g = 0$. Here $b = 1/\beta_n$. As the degree of product

differentiation is relaxed by the smallest possible degree, however, Figure 2 shows $|1/\beta_n|$ will "snap" away from $|b|$. It appears that even a small presence of cross effects in the firms demand relationship can translate into dramatic increase in $|1/\beta_n|$ in this process. This is why the expected asymptotic approach toward identical results for demand and inverse demands as n is increased from 2 does not happen. After the "snap", $|1/\beta_n|$ remains unresponsive to further reductions in product differentiation.

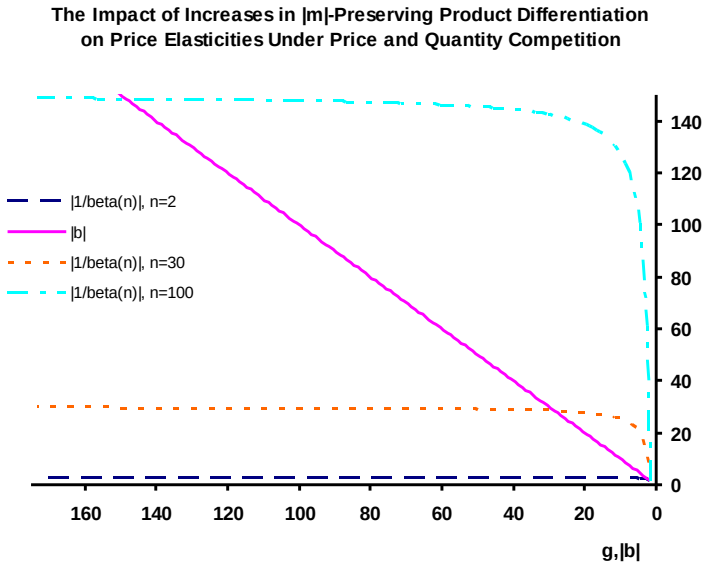

Figure 2

Own Price Elasticities and the Impact of Changes in Product Group Price Elasticity

A reduction in m, while preserving the degree of product differentiation may be accomplished by increasing g, while holding b and n constant in equation (15). Equation (15) suggests the impact of such an adjustment on β_n is ambiguous. This is illustrated in Figure 3 for $1/\beta_n$. In Figure 3, $|b|$ is set at 11.5, and g varies from 0 to 11.5, moving left to right. This implies $|m|$, will vary from 11.5 down to 0. With $n = 2$, $|1/\beta_n| < |b|$, with this process as expected. With larger n, however, it appears that $|1/\beta_n|$ may initially increase rather than decrease, so that it is greater than $|b|$ as $|m|$ is reduced modestly. Figure 3 suggests that this effect could be mitigated and may reverse if $|m|$ is reduced more dramatically. Indeed, as $|m|$ approaches perfectly inelastic, $|1/\beta_n|$ approaches perfectly inelastic as well, while $|b|$ remains unchanged! This means all of the results summarized with Figures 1 and 2 can be reversed with sufficiently inelastic market demand.

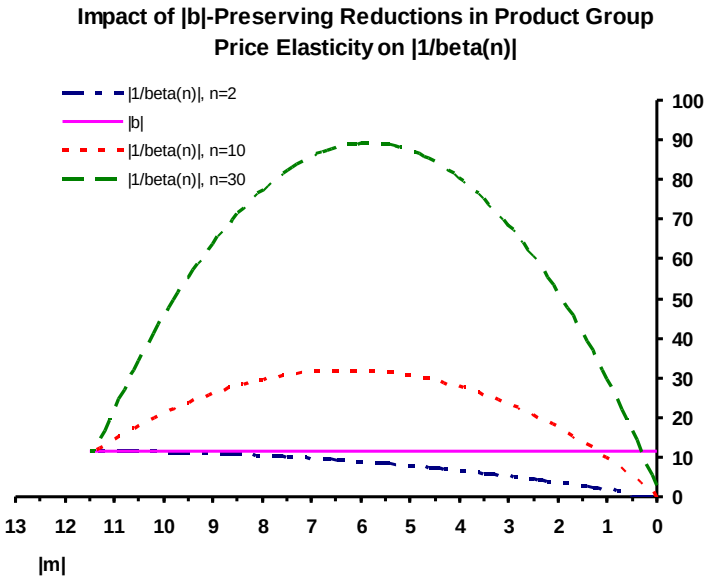

Figure 3

SUMMARY AND CONCLUSIONS

This paper explores the impact on firm-level demands under quantity competition tied to changes in the number of firms, product differentiation, and product group elasticity under price competition. It appears this deserves more attention. Some simple numerical analysis shows that inverse demand, compared with demand may be similar, more price elastic or less price elastic with increased competition beyond duopoly. Indeed, it appears increased competition may lead to the competitive result with quantity competition while under identical market conditions the result is monopolistic competitive under price competition, unless market demand is highly inelastic. The numerical results reported here suggest that the economic landscape containing the interesting dilemma in which price and quantity competition yield significantly different firm-level demands and different equilibria, may very well need to be expanded from competition among the few to include competition among the many as well.

ENDNOTES

1. Removing logs from both sides of (1), and (3) yields the linear demand system. When this is done, b, g, g_n, and m on the one hand, and β_n, γ_n, and μ, on the other are coefficients. All of the logic and method discussed in the log-linear example of the text transfers directly and generalizes to the linear case with elasticiites replaced with coefficients. This is not done in the text for space considerations.
2. See Cheng (1985).

3. Any impact on (1) or (3) tied to a change in n should therefore be restricted to an impact on the constant in each case, since impacts on elasticities would cancel. The specific form of the impact is an interesting issue, not explored here.

4. For consistent notation, β_n will be used to represent own quantity elasticity when $n > 2$. β_2 will represent own quantity elasticity when $n = 2$. Similarly, γ_n will represent pair-wise cross elasticity when $n > 2$. γ_2 will represent pair-wise cross elasticity when $n = 2$.

5. This would require additional information on the particular impact a change in n would have on C, and c, so that the constant may be inverted as well. These issues have no influence on this study and are not explored here.

6. This should show up under quantity competition as a redistribution of own vs. cross shares in (11).

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Pricing Weather-Based Irrigation Cost Insurance: Theory and Applications

Edouard B. Mafoua-Koukebene[*] and Calum G. Turvey[**]

ABSTRACT

This paper uses weather insurance to price irrigation cost insurance contracts for agricultural crops. County-level yield data are used to estimate the probability distributions of irrigated and dryland wheat yields. A micro-economic model of production is developed that illustrates the relationship between rainfall, crop yields, costs of irrigation and profits. Alternative micro-econometric models are estimated to establish the effects of weather variables on wheat yield on dry land, and on the costs of irrigation. Weather-based insurance premiums are estimated using Monte Carlo simulations.

1. INTRODUCTION

The purpose of this paper is to examine how weather insurance products can be used to protect farmers against irrigation costs during drought years. Farmers who invest in irrigation are investing in an explicit form of self insurance to eliminate production risks. The cost of self insurance is a random variable jointly determined by rainfall, another random variable. Several studies have explored the issue of rainfall insurance in agriculture, ((Bardsley, Abey, and Davenport (1984), Hazell, Oram and Chaberli (2001), Gautman, Hazell, and Alderman (1994), Sakurai and Reardon (1997), and Turvey (2000, 2001)), but there are no known studies dealing with weather insurance to protect farmers against the increased costs of irrigation in drought years.

The paper proceeds with the theoretical framework of modeling the irrigation cost insurance and the specification of the yield-weather models. Empirical estimation of the irrigation cost-weather model and computation of the cost insurance premiums follow. Finally, conclusions to our research are considered.

2. ECONOMIC MODEL OF IRRIGATION COST INSURANCE

In this section, we develop an economic model of irrigation cost insurance to illustrate the relationship between a weather variable (rainfall =ω), crop yields y (ω), costs of irrigation c (ω) and profits $\pi(\omega)$. That is

$$Y_{max} = \mathrm{y}(\omega_{good}) \quad (1)$$

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Since the maximum potential yield (y_{max}) acts as an absorbing barrier for all of the weather stated as good (ω_{good}), the marginal value product of irrigation above the threshold ω_{good} is zero. When rainfall falls below ω_{good}, the marginal productivity of rainfall increases at an increasing rate. Thus, the production function for output is

$$Y = \text{MIN}(y_{max}, f(\omega)) \quad (2)$$

where $y_{max} = f(\omega_{good}) > f(\omega)$. Therefore for $\omega < \omega_{good}$

$$\frac{\partial}{\partial \omega} f(\omega) > 0 \quad (3)$$

and

$$\frac{\partial^2}{\partial \omega^2} f(\omega) < 0 \quad (4)$$

which simply states that as water to the plants increases, plant growth increases but at a decreasing rate. We now consider the cost of irrigation C. The cost function is given by

$$C = \text{MAX}(0, c(\omega)) \quad (5)$$

.

If $\omega > \omega_{good}$ there is no need to irrigate so the cost is zero. Otherwise the cost increases as ω decreases. That is

$$\frac{\partial}{\partial \omega} c(\omega) < 0 \quad (6)$$

and

$$\frac{\partial^2}{\partial \omega^2} c(\omega) > 0 \quad (7)$$

.

The profit function can now be described in terms of the rainfall variable, output, and irrigation costs as

$$\pi = P\,\text{MIN}(y_{max}, f(\omega)) - \text{MAX}(0, c(\omega)) \quad (8)$$

where P is the price of the commodity. From (8), profits are given as Py_{max} if rainfall is adequate and $Pf(\omega)$-$c(\omega)$ if rainfall is inadequate. Furthermore, assuming that rainfall is inadequate, marginal profits obey

$$\pi_{\omega} = P\left(\frac{\partial}{\partial \omega} y(\omega)\right) - \left(\frac{\partial}{\partial \omega} c(\omega)\right) > 0 \quad (9)$$

.

Marginal profits are positive since the first term is increasing in ω, while the second term is decreasing in ω. In terms of risk and risk mitigation, the result states that as rainfall decreases, output will fall. In order to increase output, rainfall, in the form of costly irrigation, must be applied. Therefore in the years of drought, the dual effects of decreased yields and increased irrigation costs result in significant economic losses. Even if irrigation increases yields to its maximum level, the cost of irrigation remains as an

uncertain cost to the producers. The essential economic elements to this problem from drought are the potential yield loss from lack of rainfall and the costs of mitigation. Since the latter is a risk reduction response to the former, then the insurable quantity is not necessarily yield per se, but the cost of irrigation. The yield loss component is economically significant only if irrigation is too costly or not available. Then, we can calculate the loss in profit (or the indemnity) as follows:

$$Z = P\,(y_{max} - y(\omega)) + c(\omega) \tag{10}$$

If irrigation is not available then $c(\omega)=0$, and the indemnity is only given by the yield shortfall. This is $P(y_{max} - y(\omega))$ and this is similar to conventional crop insurance. If irrigation is available then irrigation may increase yields so that the term $P(y_{max} - y(\omega)) \rightarrow 0$, but in this case $c(\omega)>0$ and this becomes the insurable event.

Since both $y(\omega)$ and $c(\omega)$ are functions of rainfall (a random variable), then yield and cost uncertainty can be established by defining the probability distribution functions for y and c. Let $g(\omega)$ be the probability distribution function for rainfall, then the indemnity function for profits is calculated by taking the expected deviation from the maximum potential yield. In the current discussion this has been denoted by the

$$Indemnity = \int_0^{\omega_{good}} (P\,(y_{max} - y(\omega)) + c(\omega))\; g(\omega)\; d\omega \tag{11}$$

variable ω_{good}

When irrigation is not available then the insurance form is similar to conventional crop insurance (CI) as

$$CI = \int_0^{\omega_{good}} P\,(y_{max} - y(\omega))\; g(\omega)\; d\omega \tag{12}$$

The final insurance product under consideration is irrigation insurance. Since y_{max} is an absorbing barrier for $\omega>\omega_{good}$ then a strategy that provides irrigation in the amount of $\omega_{good} - \omega$ will have $y = y_{max}$ so that the first term in the general indemnity function (11) goes to zero leaving the irrigation cost recovery (ICR) indemnity function

$$ICR = \int_0^{\omega_{good}} c(\omega)\; g(\omega)\; d\omega \tag{13}$$

.

To estimate the indemnity schedules, we require information that is not readily available for underwriting purposes. Furthermore, yields, revenues or irrigation costs are not readily observable. Since rainfall is readily observable, a rainfall insurance policy can be designed to approximate the indemnities for crop, revenue, or irrigation cost insurance by using the following rainfall indemnity schedule (RIS);

$$RIS = z \int_0^{\omega_{good}} (\omega_{good} - \omega)\; g(\omega)\; d\omega \tag{14}$$

.

Z in equation (14) can be any value elected defined in the neighborhood of average cost of irrigation (AC):

$$z = AC = \frac{c(\omega)}{\omega} \quad (15)$$

By defining and empirically estimating $C=c(\omega)$, it is possible to map on this cost function the range of critical rainfall outcomes by defining the inverse function, $\omega = c^{-1}(C)$, and then derive an insurance premium.

3. CROP YIELD-WEATHER MODELS

3.1. Time-Series Yield-Weather Models

Wheat crop output is generally related through a production function to land, labor and capital. However, such a general function neglects the effects of weather variables on wheat yields. Based on the 1998 Kansas wheat performance test (Kansas State University, 1998), the critical weather factors are rain and heat. Therefore, we develop weather-crop models that link the year-to-year change in wheat yield (bu/acre) on dryland in year *t* (Δy_{dt}) to the year-to-year change in wheat yield (bu/acre) on irrigated land in year *t* (Δy_{it}), cumulative daily rainfall (inches) for the month *m* in year *t* (ΔR_{mt}) and cumulative degree-days above x degrees Fahrenheit for the month *m* in year *t* (ΔH_{mt}). Using this approach, we remove the effects of the trends in wheat yield and weather variables time-series data by calculating the first differences of the variables which illustrate the year-to-year changes. Our model and its variants are written as follows:

$$\Delta y_{dt} = \alpha_0 + \alpha_1 \Delta y_{it} + \sum_{m=1}^{4} \beta_m \Delta R_{mt} + \sum_{m=1}^{4} \gamma_m \Delta H_{mt} + \sum_{m=1}^{4} \delta_m \Delta (RH)_{mt} + e_t \quad (16)$$

where $\Delta y_{dt}=y_{dt}-y_{d,t-1}$, $\Delta y_{it}=y_{it}-y_{i,t-1}$, $\Delta R_{mt}=R_{mt}-R_{m,t-1}$, $\Delta H_{mt}=H_{mt}-H_{m,t-1}$ and $\Delta(RH)_{mt}=RH_{mt}-RH_{m,t-1}$. Using equation (16) the marginal responses of crop yields to year-to-year change in rainfall and heat are given by

$$\frac{\partial \Delta y_{dt}}{\partial \Delta R_{mt}} = \beta_m + \delta_m \Delta H_{mt} \quad (17)$$

and

$$\frac{\partial \Delta y_{dt}}{\partial \Delta H_{mt}} = \gamma_m + \delta_m \Delta R_{mt} \quad (18)$$

The effectiveness of specific-event weather insurance can be measured by the yield elasticity (δ_m) of rain and/or heat (expressions (17) and (18) must be positive).

3.2 Data Description

We used data on wheat crop yields from 1973-2001 for Ness County, Kansas (National Agricultural Statistics Service). Mean yields of wheat produced in irrigated land and dryland equal, respectively, to 45.75 bushels per acre (hereafter bu/acre) and 32.94 bu/acre. Irrigated wheat has the highest standard deviation (9.09 bu/acre) and the lowest coefficient of variation (19.87 bu/acre). Since the median values are greater than the mean values, wheat crop yields are found to be negatively skewed. Both yield distributions are also kurtotic.

We also used time-series data on daily precipitation and daily maximum temperature from 1951-2001 for the weather station of Ness County, Kansas (National Oceanic and Atmospheric Administration). The weather variables used, are cumulative daily precipitation in inches and cumulative degree-days (heat units) above 90 degrees Fahrenheit for critical months such as March, April, May, and June. The month of May shows the highest cumulative rainfall of 3.09 inches, followed by the month of June. The relative variability in rainfall is the highest during the month of March. The month of June is the hottest month with an average cumulative degree-day heat of 90 °F. The probability distributions of most weather variables are right-skewed and kurtotic.

There is a positive cross-correlation between irrigated wheat yield and dryland wheat yield (0.59). Wheat yields are positively correlated with rainfall in March and in April, and negatively correlated with rainfall in May and in June. Positive correlation coefficients in March and April indicate the importance of weather insurance for wheat farmers. Except for the month of June for dryland wheat yield, wheat yields exhibit a positive correlation with degree-days. The cross correlations between weather variables during the same month are negative.

3.3 Estimated Multiple Regression Yield-Weather Models

The base model of Equation 16 is referred to as model I. The Chow test was employed by restricting Model I through removal of interaction terms (Model II), heat (Model III), and rainfall (Model IV). In all cases, we failed to reject the restricted model. Table 1 presents the results of the four estimated crop-weather models. The R-squares of the models range from 0.47 to 0.75. Three models identify statistically significant effects of year-to-year changes in cumulative rainfall in the month of March and year-to-year change in irrigated wheat yield on year-to-year change in dryland wheat yields. By using the estimated parameters and the mean values of rainfall and heat for the month of March, we found that on the average, one inch increase in year-to-year change in rainfall during the month of March will increase year-to-year change in wheat yield on dry land by l.40 bu/acre.

Two models show statistically significant impacts of changes in heat during the month of June on changes in wheat yield. The positive effect of heat in June may be explained by the hot/dry conditions in

June that cause the crop to turn color and ripen much more rapidly (Kansas Agricultural Statistics Service, 2002).

Table 1: Estimated Regression Equations of Crop-Weather Models (1973-2001)

Variable	Model I		Model II		Model III		Model IV	
	Estimate	Std Error	Estimate	Std Error	Estimate	Std Error	Estimate	Std Error
Intercept	-2.84	2.22	0.22	1.52	0.15	1.74	-0.33	1.56
Irrigated Wheat	0.27	0.18	0.31	0.17	0.37	0.15	0.46	0.15
March Rain	1.46	0.81	1.67	0.76	1.43	0.73		
April Rain	-0.91	1.37	-0.59	1.30	-0.09	1.44		
May Rain	0.48	1.03	-0.67	0.76	-0.86	0.79		
June Rain	1.11	0.91	1.01	0.84	-0.36	0.68		
March Heat	-6.84	4.35	-5.17	3.98			-4.88	3.03
April Heat	-0.22	0.18	-0.12	0.16			-0.19	0.16
May Heat	-0.03	0.13	-0.07	0.12			0.07	0.10
June Heat	0.08	0.04	0.06	0.03			0.02	0.02
March Rain*Heat	-0.53	0.71						
April Rain*Heat	0.06	0.07						
May Rain*Heat	0.07	0.06						
June Rain*Heat	-0.02	0.11						
Number of Observations	29.00		29.00		29.00		29	
F-Statistic	3.28		4.19		3.96		5.87	
RMSE	7.84		7.91		9.13		8.24	
R-Square	0.75		0.68		0.47		0.57	

4. IRRIGATION COST–RAINFALL REGRESSION MODELS

4.1 Cross-Sectional Cost-Rainfall Models

The effects of weather on irrigation cost are analyzed as follows:

(19) $C = A\omega^{\beta}$

where C represents the total or energy cost of irrigation (assuming a constant elasticity cost function), A is an intercept multiplier, ω, is annual rainfall, and β is the cost elasticity of rainfall. The two coefficients of the model A and β are expected to be positive and negative, respectively. The marginal cost of rainfall is given by

(20) $\frac{\partial c(\omega)}{\partial \omega} = c'(\omega) = A\beta\omega^{\beta-1}$

The necessary condition for rainfall insurance to be effective is that c' (ω) < 0 so that rain has an impact on the cost of irrigation. For the empirical estimation, the constant elasticity cost function is written equivalently as

(21) $\ln C = \ln A + \beta \ln \omega$

Based on the above cost function, the effectiveness of the policy is measured by the cost elasticity of rainfall,β.

4.2. Estimating Premiums Rates for Irrigation Cost Insurance

After estimating empirically equation (21), it is possible to map on the cost function the range of critical rainfall outcomes. Strike levels of rainfall are calculated by inverting equation (19). To determine the critical rainfall values, energy and total costs of irrigation are held constant at their means in the first case. The rainfall strike level is determined by $\omega^{*} = \omega(C^{*}, A, \beta)$ outcomes. The inverse function is defined as follows:

(22) $\omega^{*} = \left(\frac{c(\omega)}{A}\right)^{\frac{1}{\beta}}$

(23) $\frac{\partial \omega^{*}}{\partial c} = \frac{1}{\beta}\left(\frac{c(\omega)}{A}\right)^{\frac{1-\beta}{\beta}}$

The actuarially fair insurance premiums or the various costs to buy the options are computed as follows:

(24) $premium = \frac{c(\omega)}{\omega} \int_0^{\omega^{*}} \left(\omega^{*} - \omega\right) g(\omega)\, d(\omega)$

for a put-like rainfall insurance policy, and

$$premium = \text{z} \int_0^{\omega^*} g(\omega)\, \text{d}(\omega) \tag{25}$$

for lump sum payments where z is a constant dollar amount. The structure of the first weather derivative in this study is that of a European put option, where the option price is the cost of the derivative for the wheat farmer (i.e., the cost of purchasing rainfall insurance), and the strike is the rainfall threshold below which an indemnity is triggered. The put option would increase compensation at an increasing rate as the option moved further into-the-money. The option-like rainfall insurance product is triggered as soon as the rainfall measure becomes in the money. Once this event happens a fixed payout is made. The difference between (24) and (25) is that with the former, the indemnity increases with reduced rainfall, whereas in the latter a lump sum payment of z is paid if rainfall falls below $\omega*$ with a probability $\int_0^{\omega^*} g(\omega)d(\omega)$.

4.3 Data and Model Specification

We used the 1998 Farm and Ranch Irrigation Survey (NASS/USDA) that provides cross-sectional data (48 U.S. states) on annual operating (maintenance and repairs, and energy) cost of irrigation. Unobserved heterogeneity is accounted for through the use of regional dummy variables. Average farm costs for machinery and repairs, energy and irrigation are $3,037.69, $6,157.75, and $9,195.44, respectively. The mean annual rainfall across all states is 39.17 inches. Computed correlations between rainfall and different categories of irrigation costs are negative. That is, a decrease in rainfall will most likely correspond with higher irrigation costs.

4.4 Estimated Irrigation Cost Models

We used the least-square dummy variable (LSDV) estimator to estimate the long-run cost function since the data includes regional differences in terms of climate. Equation (21) is modified and expressed as:

$$\ln C_f = \ln A + \sum_{r=1}^{n-1} \alpha_r D_r + \beta \ln \omega_f + \varepsilon_f \tag{26}$$

where C_f is the total variable farm cost of irrigation for the state farm average; α_r is the regional-specific fixed-effect; D_r is the regional-effect dummy variable. Since the number of regions n is small, the estimation of equation (26) is achieved (using OLS) by keeping the constant term and adding n-1 dummies; ω_f is the vector of observed rainfall; β is the unknown cost elasticity parameter; and ε_f is the error term which is independently and identically distributed (i.i.d.) across average (state) farms and uncorrelated with the rainfall variable. The coefficient on rainfall, β, is expected to be negative. The regional fixed-effects represented by different dummy variables associated with α_r are expected to be positive or negative.

Table 2 presents the parameter estimates of the LSDV regressions of the energy cost model and total irrigation for the Midwest. Since Kansas belongs to the Midwest region, the Midwest regional dummy variable was dropped. These estimates with all dummy coefficients set to zero gives an estimate for this particular region. Thus, estimated models may be interpreted as long-run cost models of irrigation for the Midwest region. Both models have low R-Square but most of their coefficients are significant at least at the 0.01 level of significance. The parameters of the cost elasticity of rainfall are negative (an increase in rainfall will decrease the cost of irrigation). Energy cost of irrigation is more sensitive to change in rainfall than the total cost of irrigation. This is due to its negative correlation (-0.45) with the rainfall variable.

Table 2: Estimated Regression Equations of Cost of Irrigation (Cross Sectional Data)

Variable	Total Cost		Energy Cost	
	Estimate	Standard Deviation	Estimate	Standard Deviation
Intercept	8.93	1.83	8.79	1.94
Rainfall	-0.04	0.52	-0.12	0.55
New England	-1.66	0.50	-2.29	0.54
South	-0.25	0.45	-0.35	0.48
Mid Atlantic	-0.64	0.50	-0.96	0.53
Southwest	1.26	0.57	1.36	0.61
West	0.39	0.45	0.51	0.48
Number of Observations	48.00		48.00	
F-Statistic	5.54		8.53	
RMSE	0.90		0.95	
R-Square	0.44		0.55	

4.5. Results for Irrigation Cost Insurance

We used data on Ness County precipitation from 1951 to 2001 and computed the mean of cumulative rainfall which is 21.39 inches with a standard deviation 5.57 inches. Substituting 21.39 inches into the regressions resulted in an estimate of c (ω) of $4,548.03 for energy and $6,684.07 for total costs of irrigation. Using equation (15), th c (ω) from 0% to 25%, we extract the rainfall strike levels using equation (22).

To illustrate how irrigation insurance might work. Suppose that a farmer wanted to protect irrigation cost increases above the mean of $6,684. She can do so by purchasing a rainfall insurance contract that pays $300 for every inch of rain below 21 inches. For example, if rainfall is measured at 15 inches, the indemnity would be 6 inches*$300/inch = $1,800 to cover the cost of irrigation. If drought was severe and actual rainfall was only 5 inches, the indemnity would be 16 inches*$300=$4,800. Assuming a normal probability distribution function for rainfall, Monte Carlo simulations of equations (25) and (26) were used to compute insurance premiums. Table 3 shows the insurance costs when the insurance is tied to the

energy costs of irrigation, while Table 4 reports the results for total irrigation cost. Two types of rainfall insurance products are used for illustration: the put option and the lump-sum payment option. Premiums for the put option are generated using equation (25). This will give the farmer the right to be compensated if the rainfall is below the strike level. For the lump sum option, the economic value of rainfall is assumed to be constant at the level of $2,000 and $1,000 for total cost and energy cost of irrigation, respectively. As shown in both tables, premiums are positively associated with strike levels of rainfall. To interpret these results consider the 10% increase row in Table 4. If an insured wants to protect or insure costs of about $5,002.83 then using equation (22) the corresponding level of rainfall to insure is 9.67 inches. Since, with a standard deviation in annual rainfall of only 5.5 inches per year, the cost of this insurance is low at only $0.90. For a lump sum payment of $1,000 if rainfall is below 9.67 inches, the insurance cost is $18. If, however, the farmer wanted to protect total costs in excess of the mean, then with a corresponding rainfall strike of 21.39 inches and an indemnity of $312.49/inch for each inch below 21.39 inches, the cost of insurance would be approximately $111.12. By accepting a deductible equivalent to a 5% increase in costs, the rainfall insurance falls considerably to a negligible $0.30/acre.

Table 3: Irrigation (Energy) Cost Recovery Indemnity for Ness County, Kansas

	Predicted Energy Cost ($)	Rainfall Strike Level (inches)	Premium Option Energy ($)	Premium Lump Sum Energy ($)
Mean	4,548.03	21.39	55.56	500.00
5% Increase	4,775.43	14.24	6.58	100.00
10% Increase	5,002.83	9.67	0.90	18.00
15% Increase	5,230.23	6.67	0.18	4.10
20% Increase	5,457.64	4.68	0.06	1.30
25% Increase	5,685.04	3.33	0.03	0.60

Table 4: Irrigation (Total) Cost Recovery Indemnity for Ness County, Kansas

	Predicted Total Cost ($)	Rainfall Strike level (inches)	Premium Option Total ($)	Premium Lump Sum Total ($)
Mean	6,684.07	21.39	111.12	1000.00
5% Increase	7,018.27	6.39	0.30	6.80
10% Increase	7,352.48	1.97	0.03	0.60
15% Increase	7,686.68	0.65	0.02	0.20
20% Increase	8,020.88	0.22	0.01	0.20
25% Increase	8,355.09	0.08	0.01	0.20

CONCLUSIONS

With a growing interest in weather-based insurance products, this paper has advanced the proposition that rainfall insurance can be used to insure against costly irrigation. It is intended to be illustrative and did not examine the efficacy of irrigation insurance relative to other forms of insurance such as crop insurance. The use of cross sectional models is far less desirable than using time-series costs for a particular farm, region or state. Nonetheless, this paper provides a reasonable starting point

for examining how weather-based insurance product can be used to mitigate excessive irrigation costs for farmers.

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Economic Crises and Altering Economic Culture: The Case of the Great Stagflation

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ABSTRACT

This paper explores the economic context of a change in culture from one of intervention to a culture that favored less government activity in the economy. The Great Stagflation (1965-1985) forced a reevaluation of economic policy that found interventionist policy wanting and proposed, in its place, a policy more consistent with free-market approaches. The paper then explores the consequences of the change in culture as demonstrated by the economic policies of the Nixon through Bush(2) administration approaches to economic issues.

INTRODUCTION

There are four factors associated with a change in economic culture (Rohrlich, 1987). The move away from widely held economic ideas first requires a notable contradiction between these ideas and changing economic circumstances. That is, reality forces a reevaluation of economic policy. Second, alternatives are sought and expounded. Next, an alternative policy formulation is adopted which addresses the changed reality. Finally, new ideas filter through to society as a whole, legitimating the new policies. The current paper investigates a series of crises in the 1970s and 1980s that rocked the world and resulted in the questioning of interventionist practices. The questioning of interventionist policies was followed by a move in culture and economic policy away from intervention.

The United States faced a series of economic crises starting in 1965 and running through the 1980s. These crises, like the crises of the 1930s and 1940s, precipitated a reevaluation of economic culture which found, in this case, the interventionist culture inadequate and proposed in its place the culture of laissez faire. The altered culture, in turn, motivated a change in economic policy and content. In the United States, reeling from the effects of the Great Stagflation, policy altered its focus to less intervention through deregulation, privatization, welfare reform and decreasing government expenditures, or at least slowing their rate of increase. In short, because of a series of economic crises the United States experienced economic decline during the 1970s and 1980s. The response by policy makers was to reduce the role of government in economic decision making and leave, to a greater extent, the allocation of resources to the functioning of a relatively "free" market place.

We begin with a brief discussion of the four events singled out as primary in motivating the reevaluation of interventionist culture and policy. These events will be considered under the rubric of the Great Stagflation which included the 1970s energy crises, the Vietnam War coupled with the growing

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responsibilities of the welfare state, the food crisis and the demise of the international financial structure. These events have been singled out for three reasons. In the first place, many of the economic ills of the period had their origins in these crises. In the second place, these crises were not successfully tackled by government intervention. Finally, this failure led not only to the perception that discretionary policy was inadequate but also to a growing belief that central authority was culpable in the persistence of crisis.

Economic events prompted first a move toward greater direction in the form of President Nixon's direct control of prices. These means included two price freezes in the early 1970s. It is commonly held that the Nixon policies failed to control prices. These policies were followed by the apparent chaos and indecisiveness of the Ford and Carter Administrations. Finally, the Reagan and Bush(1) Administrations attempted a reversal in policy through the deregulation of several key industries, welfare reform, as well as other policies designed to reduce the role of government in commerce. The Reagan-Bush(1) policies are investigated in some detail and indicate a reversal in tactics away from the economically active government characteristic of the US domestic economic policy since F.D. Roosevelt.

We then move to a discussion of policies under Clinton. Although less overtly laissez faire, the Clinton economy did support "freer" trade, the expansion of deregulation and welfare reform measures. On other fronts the Clinton Administration did little or nothing to reverse the moves made by Reagan-Bush(1).

Perhaps most notorious are the policies of Bush(2). He pursued additional deregulation of business and finance. In addition, he discouraged the application of existing regulations. Although this tactic had been employed by other US Presidents, it did not reach the levels witnessed under Bush(2).

There were several events that prompted or exacerbated the instability of the global economy beginning in the mid-1960s and continuing through the 1980s. These events generated substantial unemployment and inflation. The Crisis, which we term the Great Stagflation, were caused by the energy crisis 1973-74, the world food shortages of 1972-1973, the Vietnam War coupled with the growing responsibilities of the welfare state and the collapse of the Bretton Woods agreements.

The onset of the Great Stagflation is generally associated with the two oil price increases of the 1970s though rising unit labor costs were contributory. The oil embargo of 1973-74 nearly quadrupled prices while the restriction of supply surrounding the Iranian revolution (1978-79) doubled them. In the United States, for example, the index of the energy component of the CPI-U increased over the decade of the 1970s from 24.8 in 1969 to 86 in 1980, an increase of 246.8 percent. By 1985 the index had risen to 101.6 or an increase in the index of 309.7 percent in a little over 15 years or rise of about 20 percent per year on average. The oil crises precipitated a supply shock and sent the developed world into the gloomy depths of stagflation. In addition to this shock, a second aspect of the Great Stagflation was the apparent secular decline in productivity and resulting rise in per-unit labor costs. During the 1960s workers rejected, and government abandoned, the precedent of determining wage increments according the changes in productivity set in the aftermath of the Great Depression and WWII.

In the US, output per hour of all persons in the business sector increased at an average annual rate of 3.4 percent between 1947 and 1965. With the notable exceptions of 1983, 2002 and 2003, productivity

growth has not met the 1947-1965 average. In fact, it had suffered negative productivity growth in four of the years covered. Declining productivity coupled with rising real compensation resulted in steadily increasing unit labor costs. Rising unit labor costs contributed to the macroeconomic instability of the US economy during the period by putting upward pressures on both the unemployment and inflation rates.

The alternation in culture and, consequently, policy was facilitated by the apparent preoccupation of the media, politicians and public with declining productivity. In order to illustrate the extent of concern, Block and Burns (1986) calculated the number of column inches that the *New York Times* devoted to the issue of labor productivity. They reported that between 1966 and 1969 "the average was 1.3 column inches" jumping to "18.5 column inches per year" between 1970 and 1975 (Block and Burns, 1986, 774). The increased media attention was a result of, and a catalyst for, the alteration in economic culture. The increased attention helped feed the perception of crisis which proved useful to later policy makers in their attempts at remaking the face of domestic policy.

A second event that served to exacerbate the inflationary tendencies of the economy was the simultaneous increase in military and social spending under the Johnson administration. It is generally agreed that President Johnson's attempts at increasing both butter and guns without corresponding tax increases aggravated the inflationary tendencies of the economy.

While addressing the audience at the 1964 University of Michigan Commencement exercises, President Johnson inaugurated his view of "The Great Society." The Great Society would be one free of the evils of poverty. In an attempt to achieve his goals, he instituted far-reaching expansions of the US welfare state. Among the measures adopted during his tenure as president were Medicare, Medicaid, the Job Corps and federal aid to education. As McLure reported, government expenditures, excluding defense, accounted for nearly a third of the growth of GNP between 1965 and 1968. This spending went from $73.4 billion to approximately $103.2 billion or a 40.6 percent growth. There was a significant increase in social security benefits both in magnitude and in coverage, the minimum wage was raised and the government gave a 3.6 percent pay increase to over 1.5 million federal workers and authorized an across the board military pay increase of some 25 percent (Estey, 1972).

At the same time that Johnson was winning this substantial augmentation of welfare programs, the war in Vietnam was escalating. Many studies tie the onset of the inflationary tendencies that plagued the economy to the July 28, 1965 announcement of a large-scale increase in US involvement in Vietnam and the subsequent escalation in military spending. The combined effects of these two expansions in state expenditures were a worsening of the fiscal deficit which stood at $3.8 billion in 1966 and grew to $8.7 billion in 1967, with 1968 witnessing a budget deficit of $25.2 billion. The result was the largest increase in the CPI since the early 1950s and a questioning of the culpability of government in the crisis.

Congress and the public grew increasingly alarmed at the growth in deficit spending, inflation and unemployment. As Fulton has noted, "[q]uestions began to be raised…about the effectiveness of many of the domestic programs that had been launched...questioning about whether the federal government was

effective in much of what it was attempting…began..."(Fulton, 1981, 23). A tax surcharge in 1968 was successful in reducing the deficit but resulted in a worsening of unemployment

The destabilization of the economy was exacerbated by other events. The decade of the 1970s witnessed an unprecedented rise in food prices. The food component of the CPI-U rose over 116 percent (ERP, 2008, Table B60). To put this increase in perspective, the percent change in food prices for the decade of the 1950s was just over 18 percent and for the 1960s, 30.6 percent.

The increase in food prices has been attributed to changes in both supply and demand conditions in world grain markets. Briefly, growing world population, a dramatic rise in the Russian demand for food grain on international markets and the increased world consumption of grain-fed protein sources contributed to a large increase in the demand for grain. The increased demand was satisfied through a combination of rising prices and a reduction in world food reserves.

On the supply-side, US policy shifts and a series of poor harvests resulted in a reduction of available supplies of food grain. During much of the 1960s, the US had experienced food surpluses. In an attempt to reduce these surpluses in the latter 1960s, the US engaged in production restriction policies. The US government paid farmers not to plant crops and thereby removed thousands of acres from cultivation. In 1972 alone, the US government paid farmers "...over $3 billion not to grow crops" (Caldwell, 1977, 23).

In addition to this intentional restriction of supply, the depressed global harvests of 1970-1972 worsened the situation considerably. The price of wheat, for example, moved from $62 per metric ton in 1971 to $139 in 1973, or 124 percent in just 3 years. January, 1974, saw an additional increase in wheat prices of 54 percent. This unprecedented rise in wheat prices was repeated in other grains. The increase in world food prices further fed the US inflation rate.

Another event that aggravated the economic instability of the United States was the demise of the international financial structure. The postwar agreements signed at Bretton Woods came to an end in the late 1960s and early 1970s. Due to pressures on the US exchange rate and gold reserves, the US moved to a two tier gold standard in 1968. Pressures on US gold reserves continued resulting in President Nixon's August 15, 1971 National Economic Program (NEP) of which part was a ten percent devaluation of the dollar to relieve balance of payments pressures and stop the gold outflow which was depleting US reserves. Actual devaluation was around 8 percent, the price of gold was increased from 35 to 38 dollars an ounce and the band of acceptable exchange rate fluctuation was widened from 1 to 2.25 percent.

Despite these measures, pressures on US reserves continued and in 1973 President Nixon closed the gold window and abandoned Bretton Woods. Other countries, faced with the option of defending existing pars or moving to a flexible exchange rate regime, opted for the latter and the market determined exchange rates were the result. Originally seen as an emergency and temporary measure, the floating exchange rate became the characteristic feature of the international financial markets. The move to a "freely" determined exchange rate exacerbated US inflationary tendencies.

In addition to inflation, the US economy was increasingly plagued by unemployment. Worsening conditions resulted in a proliferation of the number of calls for a reduction in the economic powers of

central authority. Increasing unemployment rates also spurred demands for the discipline of the unfettered market mechanism. Government was considered responsible for the vicissitudes of the economic mechanism. Central interference with the market system was blamed not only for the onset of crisis, but for the persistence of inflation and unemployment as well.

Early government attempts to correct the growing difficulties were largely ineffective. The Council of Economic Advisers labeled the persistence of inflation a hydra-headed monster partly because it had remained immune to price controls. The magnitude of the crises seemingly overwhelmed governments' abilities to cope. Government policy was not only viewed as a failure but possibly a culprit in the escalation of inflationary and recessionary pressures.

Some economists attributed the persistence and severity of inflationary pressures in 1965 to misguided monetary policy (Cagan, 1979, 105), others blamed poorly constructed and failed fiscal policies (McLure, 1972, 71 and Blinder, 1979, 141). The growing belief in the ineptitude, and perhaps culpability, of government resulted in increasingly frequent calls for the reestablishment of the market mechanism free from intervention and a move on the part of policy toward a noninterventionist posture. In short, it was postulated that a change in economic policy was necessary as traditional policies used to tame the business cycle were proving ineffective.

Nicolas Spulber lent support to our assertion that the destabilization of the world economy challenged the dominant culture and forced a reevaluation of the interventionist policies of much of the globe when he wrote that the crises that engulfed the US between 1972 and 1984 forced a reevaluation of US interventionist policy. In his words, "[s]kepticism about the ability of the government to manage the economy…spread incessantly and helped finally to usher in a new administration which reshaped the national agenda and changed the priorities of the federal budget" (Spulber, 1989, 93-94). Destabilization precipitated a reversal in culture back toward the culture of laissez faire engendering, in turn, a reversal in economic policy as demonstrated by the move away from interventionist state policies.

THE DISMANTLING OF DIRECTION

As already noted, the economic events of the 1960s through 1980s fostered high and rising inflation coupled with severe unemployment. What was particularly alarming about this instability was the growing perception that these economic ills were impervious to government attempts at stabilization. Indeed, "the prospect that the [US]…might not be able to avoid…perpetual high rates of inflation was now seriously considered…and widely feared for the first time by the public" (Cagan, 1979, 4). This fear, at first, prompted calls for direct price controls by central authority. When these controls failed to reverse economic trends, the fear manifested itself in calls for less government intervention. Central authority was increasingly blamed for not only failing to correct the problems but for having a hand in the onset and persistence of the crisis. Like the crisis of the 1930s, populations responded by searching for a new

means of combating the economic woes of their nations. What they grabbed onto were the policies offered by Reagan, namely less government rather than more.

Government attempts to overtly curtail inflation and underconsumption date from the establishment of wage and price guideposts in 1962. When the guideposts were published in the *Economic Report of the President* in 1962, the President was reaffirming the practice of tying wage increments to productivity established in the 1948 UAW-GM agreement. The agreement "…became a model for other industries with strong unions, and 'productivity bargaining' became a key component of the new system of labor relations" (Block and Burns, 1986, 773). Although the guideposts held no statutory power, the Kennedy Administration did exert considerable pressure on industry to adhere to them by engaging in jawboning that is exerting its power of influence to force voluntary compliance with the guideposts. During his tenure as president, Kennedy successfully used jawboning against the steel industry and forced them to keep price increases within those mandated by the published guideposts. Inflationary pressures coupled with the Johnson Administration's own neglect of the guideposts resulted in their demise by August 1966.

There were early attempts to control the inflation resulting from the increasing defense and social program expenditures of the Johnson Administration. In February 1966, for example, the Federal Reserve contracted the money supply. Contractionary monetary policy was renewed in May when bank reserves had failed to decline as policy expected. The May contraction in reserves sent interest rates up sharply and resulted in a decrease in real GNP in the first quarter of 1967. The Reserve relaxed conditions toward the end of the year with resulting renewal of inflationary pressures. The Johnson Administration left office in 1968 having had little success in curbing the inflation and unemployment tendencies of the US economy as well as having dismissed wage and price guideposts as a means to such an end.

The Nixon Administration took office in early 1969. The new administration announced its economic objective as reducing inflation in the least painful method possible. It was generally believed by Johnson's and Nixon's economic advisers that a slow contraction of the economy would help to reduce inflation and that this method would entail a significant amount of time to completely eliminate the built up inflationary expectations of workers and employers. The gradual approach, which began with the 1968 tax surcharge, resulted in a recession but failed to curb inflation

The apparent inability of the government's gradualism policy to ameliorate high inflation and high unemployment led to greater support for price controls by the public, government officials and professionals. Even "…Federal Reserve chairman Burns had been pressing Congress and the administration for direct government influence in wage and price setting" (Cagan, 1979, 128). The business also seemed in favor of direct government intervention. The Business Council, in October 1970, "…criticized [the administration for] the lack of direct action on wages and prices (Kosters, 1975, 5). The Business Council wanted government assistance in order to reign in wage increases.

Throughout 1970 and 1971, the administration made piecemeal attempts at controlling inflation; it allowed the importation of oil to increase, it stopped steel prices from increasing by threatening to relax quotas, and it developed a wage review board in the construction industry. In August 1970, after these

attempts had failed to keep prices from increasing, the congress enacted legislation authorizing the president to use mandatory controls. In August 1971, with no improvement in sight, the Nixon administration exercised the power. The price controls were designed to have a dampening effect on inflation by reducing the anticipation of inflation by large corporations and unions (Cagan, 1979).

On August 15, 1971, President Nixon initiated the NEP. The policy had three components. The first was the closing of the gold window and the move toward flexible exchange rates and an import surcharge in an effort to reduce the current account deficit. The second aspect was a request that Congress initiate "…an investment tax credit and other tax charges to stimulate output and employment" (Kosters, 1975, 7). The third was a significant increase in intervention in the form of an unprecedented ninety-day freeze on wages and prices.

Phase II of the NEP ran from 11/14/71 to 1/11/73 and was characterized by a relatively heavy reliance on the self-regulation of business rather than direct monitoring and control by central authority. Wages were allowed to increase 5.5 percent and price increases were allowed under the condition of proved cost increases.

Continued deterioration of the economic health of the nation prompted a return to stricter control in Phase III (1/11/73-6/13//73), culminating in the reestablishment of a price freeze, this time for 60 days beginning on 6/13/73. By August of that same year, price and wage controls were considered largely ineffective and Phase IV (8/12/73-4/30/74) was instituted to reduce direct controls and allow market forces to determine prices and wages. At the height of controls, 44 percent of the consumer price index was covered by controls, by April 1974 this number had fallen to 12 percent.

It is generally agreed that the price control measures of the Nixon administration failed to restrain the growth of prices. As Jones had put it, "[f]rom almost three years of experience it appears that we have learned a lot about wage and price controls but not how to control wages and prices" (Jones, 1975, 1).

The decisive, whether successful or no, measures of the Nixon administration were replaced by the indecisiveness, contradictions and apparent chaos of the policies under Presidents Ford and Carter. As Spulber succinctly puts it, "[c]ontinuous policy hesitations and alterations of promises, regrets, and then retractions seemed to become the rule of the Presidency … A promise to fight resolutely against inflation was followed at short notice by tax increases and a rapid return of fire against recession; announcement of tax cuts were followed by cancellation of these same announcements; the stressing of the need for massive 'deregulation' was accompanied by expanding 'new style' restrictions" (Spulbur, 1989, 108-109).

Ford came to the presidency labeling inflation as "public enemy number one." Perhaps most illustrative of his impotence as far as the economic crisis was concerned was the recommendation he made at the close of a presidential conference on inflation held at his bidding in September 1974. He concluded the conference with the suggestion that all Americans should "'make a list of some 10 ways you can save energy and you can fight inflation. Little things that become habits…habits that you can abandon if we are all faced with this emergency. I suggest that each person exchange your family's list

with your neighbors, and I urge you to send me a copy'" (quoted in Blinder, 1979, 148-149). By January of 1975, Ford's emphasis shifted from inflation to unemployment and policy shifted to tax decreases rather than the tax increases proposed a year earlier.

President Carter also waffled on his diagnosis of the ills of the economy as well as the right policy to choose. Sometimes he emphasized inflation as the number one problem facing the nation and at other times he emphasized unemployment. Carter even tried to reintroduce price controls in the fourth quarter of 1978. The so-called "Pay-Price Standards" were voluntary guidelines for wage and price increases. The Pay-Price Standards, like their NEP predecessor, failed to deter the upward trend in prices.

Despite the contradictions and indecisiveness of the economic policies of these presidents, Ford and Carter did serve as stepping stones from the interventionist policies to the relatively free market approaches to policy which characterized the Reagan-Bush and subsequent administrations. Ford began the process with the first steps toward decontrolling oil prices and Carter carried it on with the deregulation of several industries including the airlines, railroads, trucking and depository institutions in 1980. In public perceptions the government was getting bigger but things were not getting any better. The economic crises shattered the public's confidence in the public sectors capacity to deal with unemployment and inflation. By the end of the Carter administration "...that a substantial portion of the public perceived the government as being too large, its involvement in the economy as too extensive, its budget as growing too fast, and its deficits as a major cause of persistent inflation" (Spulber, 1989, 108).

Other, more piecemeal, attempts at controlling inflation had occurred throughout the 1970s. The supply-restricting policies of the US farm program were relaxed and fertilizer was decontrolled in the early 1970s, oil prices made a move toward decontrol under Ford and were further decontrolled under Carter. Although all of these attempts helped to feed the change in economic culture and were reflective of the altering culture, the largest impact was no doubt made by Ronald Reagan. There were two general headings for Reagan's attack on the interventionist culture, namely, deregulation and welfare reform.

The Ford and Carter Administrations attempted several, and at times contradictory, policies all of which had little effect on economic trends. Carter's ambivalence, coupled with the Iran hostage crisis, the latter of which also fed the growing feeling that "...our government's leadership can't cope", led to his vilification in popular median and public opinion (Christian Science Monitor, April 30, 1980, 1). His public opinion polls were the lowest ever recorded for a president, up to that time, since polling began. They were lower than Nixon's or even than Truman's in 1951. Like the vilification of Hoover nearly 50 years earlier, the meritorious figure of Roosevelt was contrasted. In a similar vein, the vilification of Carter was contrasted with the meritorious figure of Reagan, probably the most popular president in American history.

The Reagan Program for Economic Recovery, presented to the American public in Reagan's February 1981 address to Congress, was comprised of four essential tasks. The first task, according to the Program, was a restrictive monetary policy in order to curb inflation and dampen inflationary expectations. A second prong of attack was a decrease in non-defense related government spending, or

at least a reduction in the rate of increase. Third, Reagan called for a substantial reduction in personal and business taxes in order to stimulate productivity and, fourth, regulatory relief in order to accomplish the same goal. The goals and the policy innovations they inspired made 1981 "...a watershed year in national domestic policy. The Reagan administration...turned federal domestic policy away from an activist, 'take-on-all-problems' approach to a new posture under which fewer problems were treated as national ones and many were left to private action or to state and local governments (Fulton, 1981, 21).

As indicated above, the US was suffering from low productivity, rising per unit labor costs and stagnant growth rates during the 1970s and 1980s. Reagan, along with his counterparts in much of the rest of the world, attributed the lack of productivity to the government's overregulation of business. It was asserted that government regulation of industry resulted in less than efficient production by diverting resources away from growth and efficiency augmenting. Within 24 hours of taking office, President Reagan had established the Task Force on Regulatory Relief with Bush(1) as its head. The purpose of the task force was to relieve business of overregulation in order to promote productivity growth.

There are not many world leaders that have the dubious honor of having an "ism" attached to their policy choices. Reagan, because of the impacts of his program, had this honor. No administration since Roosevelt had challenged the idea that government had both a role and a responsibility to ensure economic prosperity. Not even the republican administration of Eisenhower and Nixon had questioned this responsibility. The Reagan counter-revolution, despite its failure to carry out all of its proposals, did challenge this accepted premise. It is perhaps important to point out that it is the opinion of the current writer that Reagan did not change the culture single handedly, but that he was at least in part a symptom of the already altering culture. I do believe, however, that he went much further than what public opinion would have supported and in that way damaged the interventionist culture through his anti-government rhetoric.

On February 18, 1981, President Reagan outlined a four prong approach to the economic difficulties of the nation. The second prong also included deregulation of business in order to augment productivity, reduce per unit labor costs and restore growth. Deregulation involved more than simply legislating away regulation. Reagan accomplished much of the deregulation without legislative sanction through presidential decree, including the February 17, 1981 executive order requiring cost-benefit analysis for proposed regulation, appointing as heads of regulatory agene ices persons known for their antiregulation posture, the slashing of budgets for regulatory agencies and the firing of overzealous regulators. During his tenure in office, Reagan deregulated radio, decontrolled crude oil prices, terminated the council on wage and price stability, deregulated bus transportation and deregulated shipping (Weidenbaum, 1987, 14-15).

In short, deregulation was used by the Reagan Administration as a means of reinstituting growth in the economy. Reagan's deregulation campaign was a symptom of "...a broad campaign during the 1970s by business and political leaders who seized on declining rates of productivity growth as proof of the need for national policies to restrain wages and limit...growth of state spending (Block and Burns, 1986, 774).

Declining productivity was used by political elements to limit the wage gains of workers and to reduce the state legislation of business. Deregulation had, furthermore, received wide public acceptance. It was "...supported by a bipartisan coalition in both the legislative and executive branches of the federal government...Ralph Nader offered support...as did leaders of both political parties...(Weidenbaum, 1987, 12). Bush(1), Clinton and Bush(2) carried on the deregulation fervor utilizing moratoria on regulations, wider use of cost-benefit analysis and through the funding or de-funding of regulatory agencies. Reagan had made significantly progress in deregulating natural gas and oil, Bush(1), electricity, Clinton, Telecommunications, and perhaps most notoriously Banking and Finance Reform with the passage of the Financial Services Modernization Act. Bush(2) is perhaps less responsible for down-right deregulation than for the anti-regulation posture of his cabinet.

A second aspect of the Reagan program was welfare "reform" which attempted to reverse many of the programs instituted under President Johnson. Actual welfare reform can be dated from Nixon's "Family Assistance Plan" which was designed to move welfare recipients off the welfare rolls by using market incentives to stimulate work. Johnson's introduction or augmentation of several welfare programs consumed nearly a third of the growth of national income between 1965 and 1968. Although Nixon attempted welfare reform measures in an effort to reverse some of the programs achieved under the Johnson administration, he failed to have any real affect on trends in welfare spending. The first administration to succeed in reducing welfare spending was the Carter Administration under which "[t]he annual real growth rate of federal social program spending was more than halved...from its levels under Presidents Kennedy through Ford (Bawden and Palmer, 1984, 214). Even the Clinton Administration had undertaken significant welfare reform with the 1996 passage of the Personal Responsibility and Work Opportunity Reconciliation Act. Bush(2) built upon the 1996, the so-called welfare to work program, with the passage of his reform act in 2003.

Bawden and Palmer have provided data showing the average annual real growth rates in federal social program outlays over time. According to them, total spending under the Kennedy-Johnson Administrations for FY1961-FY1969 increased 7.9 percent. Under the Nixon-Ford Administrations, FY1969-FY1977 the rate of growth increased to 9.7 percent. Carter successfully reduced the growth rate of spending to 3.9 percent FY1977-FY1981. During his first term as president, Reagan reduced the growth rate even further to 1.5 percent, FY1981-FY1985. Although Reagan did not achieve his goals fully, which would have "...eradicated most of the hallmarks of the Great Society and would have shrunk the social insurance programs to a scope more nearly approximating their New Deal origins," he did significantly reduce the rate of increase of social spending (Bawden and Palmer, 1984, 350, 214).

Reagan had the ambivalent support of public opinion. A public opinion poll conducted by National Opinion Research reported a decrease in the number of respondents that believed that the federal government was spending too little on welfare, from 20 percent in 1973 to 13 percent in 1980. It also reported an increase in the number of respondents that believed government was spending too much on welfare from 51 percent in 1973 to 56 percent in 1980.

Bush(1) had attempted to carry on the legacy of the Reagan administration. Although its success is somewhat dubious, Mr. Bush did succeed in the "...presidential campaign of 1988...to make 'liberal' a dirty word." During the televised debates, Bush "...triumphantly accused his opponent Michael Dukakis of being 'a card-carrying member of the American Civil Liberties Union'" (Plowden, 1991, 411). Similar types of attacks have been made by other presidential candidates including the present one. Republican presidential nominee John McCain has labeled Democrat Barak Obama as having the most liberal voting record of anyone in the Senate.

The extent of the alteration in culture is also illustrated by the changes in the Democratic Party following the long and popular Reagan presidency. The party was in disarray until it redefined its focus generating 'new-style' democrats like William Clinton, distinguished from New Deal democrats by their relatively strong faith in market solutions. In fact "The Clinton years were defined by across-the-board reductions in government spending as a share of the economy's total spending, virtually unqualified enthusiasm for free trade, tepid and inconsistent efforts to assist working people in labor markets, and the deregulation of financial markets" (Pollin, 2008).

The Great Stagflation had effects far beyond the economic misery of unemployment and inflation. It generated a change in economic culture away from intervention and toward laissez faire. The change in culture found reflection in, and support from, altered economic policy during the Reagan-Bush(2) years. Economic cultures do not spontaneously generate, they shift in response to shifting real-life conditions. It is perfectly conceivable, therefore, that there will be a rebirth of the interventionist state, but only in response to a social crisis of the magnitude of a Great Depression or Great Stagflation. The current economic crisis may, indeed, prove to be of such a magnitude.

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The Problems and Improving Approaches in the Construction of Financial Ecological Environment in Northeast China

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ABSTRACT

Finance is the core of modern economy and to a society functioning normally. The basic premise to making the financial sector play a positive role is a better financial ecological environment. Existing problems in the financial ecological environment in Northeast China are the main "bottleneck" which prevents this region from realizing its revitalization. Therefore the governance of financial ecological environment inside and out is the key step to develop regional financial industry and then achieve the economic revitalization finally.

1. INTRODUCTION

Since 1978, especially the implementation of the strategic decision "Revitalize the Old Industrial Base of the Northeast" proposed by China's central government in 2003 has been providing a favorable turning point for Northeast China which was confronted with great economic system adjustment, and prompts local economy developing towards market economy gradually.

However, as other regions in China spending a certain period of time to achieve success during the system reform and the overall economic development, the economic revitalization of Northeast China will also experience a certain time. This process can be short or long. Under the premise of without violation of economic laws, the key point to control time is to face and find optimal approach to solve the problems on our way forward development.

Therefore, the author believes that there exists many problems during Northeast China towards its economic revitalization, and whether financial industry could function well or not is the fatal link. The development and its speed of financial industry depend on the quality of financial ecological environment.

Based on the presentation of financial ecological environment, the existing problems in the construction of financial ecological environment in Northeast China will be analyzed in this paper, and then put forward some improving suggestions as well.

2. THE CONNOTATION OF FINANCIAL ECOLOGICAL ENVIRONMENT

Financial ecology, expanded from the British ecologist A.G. Tansley’s ecosystem theory, mainly reflects the inherent logic, the development law and other synecology features, and the "order of

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structure" which has distinct structure and functional characteristics beginning to take shape in the economic activities of financial system. And financial ecological environment is a part of financial ecology.

Although domestic scholars have not yet given a consistent definition of financial ecological environment, the understandings are largely identical but with minor differences, and the connotation of it can be broad or narrow on the whole. That is, financial ecological environment includes cultural environment, economic environment, legal environment etc in a broad sense, and the social credit system, policy and legal environment etc in a narrow sense. Therefore, financial ecological environment means the environment, factors and the sum of which could exert influence on subsistence and development of finance subjects. It should generally include economic environment, policy and legal environment, credit environment, market environment and the environment formed by the main factors inner financial system.

The practical experience of economic development in advanced countries and that in China since 1978 shows that, the financial ecological environment is of fundamental, supportable, long-term and far-reaching significance to financial industry's existence and development. The quality of financial environment plays an important role in regional economy and social development. That is, a favorable financial ecological environment could provide for the financial sectors with enough funds, technology, information, institution, human resources, necessary terms of exchange, legal safeguard, references for honesty and other relevant services, thus promote to a healthy, orderly and effective development of financial industry; on the contrary, the inferior or imperfect financial environment will possibly induce the financial risks. As modern economy is the financial economy, it has become increasingly apparent that finance is the core of modern economy. Whether financial industry can be able to play its positive role in economic development entirely depends on the financial environment. As a result, if it is to say that finance is the "intermediate credit", "catalyst" or the important economic "levers" of national or regional economic and social development, the financial ecological environment should be a prerequisite for them. The development of national or regional economy lies in the development of financial industry, and the key to maintain a well-development financial industry is nothing but the favorable construction of financial ecological environment.

3. PROBLEMS OF FINANCIAL ECOLOGICAL ENVIRONMENT IN NORTHEAST CHINA

In China's vast territory, the remarkable imbalanced economic development among Eastern, Central, Western and Northeast china results in certain differences in the level of financial ecological environment among these regions. Compared to the other three parts, or for the support to local economic and social development which is promoted by its internal reform, coordination and integration, many problems of financial ecological environment in Northeast China come to light.

3.1 External environment of financial industry

According to the definition of financial ecological environment, external environment of financial industry mainly includes three elements: legal environment, local government and regional economic foundation.

3.1.1 Regional legal environment

China's Reform and Opening Up has been going on for 30 years, and the goal of which has always been moving towards the direction to establish the socialist market economic system during this 30 years, but the administrative power paramountcy, the replacement of power above law and the other similar behaviors which were prevalent in the planned economy period still can be seen everywhere, especially in Northeast China. Meanwhile, China's law is characteristic of its broad-brush outline, which tends to left lots of freedom in the law-executors' operations. To some extent, a great deal of phenomenon such as "non-observance of law, loose enforcement of law" appears in grass-roots areas due to this problem. Not only that, there still exist large number of legal vacancy or unprecise in the whole process of the financial operation, such as property rights, investment and withdrawal mechanism, innovation, integration, supervision, main business, self-regulation, bankruptcy protection and so on. At the grass-roots level, local regulations formulated to supplement the state laws or formulated according to regional features are still in great shortage, which is typical in Northeast China.

3.1.2 Local government

The thought of local governments in Northeast China is still conservative, and tends to seek quick benefits or success. As a result, these local governments can not quickly absorb new things, new institutions, new practices which always fail to be combined with regional conditions organically and effectively, or be short-sightedness, blindly pursue tasks been easily done, pursue political achievements, only for inauthentic image projects, and lack long-term, steady development, and other sense of responsibility for our people.

3.1.3 Regional economic foundation

Northeast China once was the heavy industry base of our country in the planned economic period. During the period of economic system reform, the historical burdens brought about lagging reform and slow-moving economic and social development, which blocked the normal development of financial industry and the emergence of financial innovation to certain extent.

3.2 Internal environment of financial industry

3.2.1 Regional credit environment

The problems are reflected in regional credit environment as follows:

- Imperfect credit system. The prominent problem of which is that the regional credit registry system generally can not be the fundamental support and important basis for banking system to make precise risk assessment of the loan, which makes internal funds in Northeast China can not be used effectively, and flow to other areas through the pool of funds in head office, hinder the normal movements of funds and reduce their fiduciary degree from other areas or countries nearby, and then cause capital "bottleneck" in the economic revitalization.
- Weak credit consciousness. Because of the long-term planned economy and the special place as China's old industrial base during this period, the ideologies of achieving at any price, neglecting cost, eating from the same big pot prevailed over Northeast China. By contrast, the commodity consciousness is lighter, and the thinking such as "Everything did by oneself", "Overcautious in borrowing" gradually formed to be model in their heads and then leaded their behaviors.

Owing to the imperfect credit environment, the banks always fail to make reasonable valuation of loan risks. Cheating in borrowing, chain debts, escaping from paying debts, forging or hiding in making reports, etc, frequently happen.

3.2.2 Regional financial property right

Centering on State-owned banking system is an important feature in China's financial environment, it means not only state-owned banks' large proportion in total quantity of credit in the region, but also that even if the establishment of a number of joint-stock system, local, private banks, it has a strong color of state-owned banks in the aspects of establishment, operation and management supervision. This is a new issue of undefined financial property rights which is caused with the reform of the financial system in the new period.

Due to the undefined financial property rights, property right is unclear, then it will cause risk bearer unclear, and even that market operation mechanism of sole responsibility and bearing risk by oneself cannot work effectively.

3.2.3 Regional financial institutions

Up to now, Northeast China's financial institutions are basically composed of four major state-owned banks and their branches, which are supporting economic and social development. It is lack of not only

other ownership banks and their branches, but also the regional banking institutions which can guide regional economic and social development. Meanwhile, non-bank financial institutions are still at the initial stage or yet to start, especially the foreign financial institutions and domestic medium and small financial institutions.

3.2.4 Regional financial intermediary

With the development of financial industry in Northeast China, it is lack of not only non-bank financial institutions which can provide services for the bank or match its business, such as trust company, financial leasing company, financial company, but also the accountant, lawyer, financial personnel and auditor firm, even the whole level and personnel quality is not high.

4. WAYS TO IMPROVE FINANCIAL ECOLOGICAL ENVIRONMENT IN NORTHEAST CHINA

The construction of Northeast China's financial ecological environment is the guarantee of healthy development in financial industry in this region, but also an important step in the strategic objectives to the implementation of "Revitalize the Old Industrial Base of the Northeast" proposed by central government.

4.1 Improving regional legal environment

As we all know, the essence of market economy is legal economy. It goes without saying that, as the core operation of modern market economy, modern financial should also be legal financial .Therefore, the construction of regional financial legal environment is the essential security for regional financial industry to avoid risk, maximize profits, and economic and social healthy development.

Construction of financial legal environment in Northeast China should take the principle of combination of cooperation and independent. Cooperation means that construction should be combined with the fundamental law and general law promulgated by central government; Independent means that according to the regional actual conditions and central government’s intention, local government should research and develop some local laws and regulations. Thus following market principle and combining with related environment, we can establish the laws and regulations system, which can not only embody cooperation and local characteristics, but also involve from financial market access, the main aspects of the operation, risk taking and bankruptcy to related environment’s self-discipline, development, responsibility investigation and so on.

4.2 Standardizing the behavior of local government

Local government in Northeast China should be the role of manager, supervisor, instructor and server in the process of construction of financial ecological environment. The role of manager, from the point of view of leadership, means they should manage and smooth the construction and related event; the role of supervisor, from the point of view of local community and people, means the right of supervision and accusation; the role of instructor, from the point of view of regulation of local economic and social development, means guiding the construction of financial environment and harmonizing the conflict; the role of server, from the point view of public servant, means responsible for financial environment's smooth operation.

4.3 Speeding up the economic development in the region

In view of Northeast China's special history in economic development, its development needs:

- Emancipating the mind. Learning from the experience of special economic zone in the process of reform and opening up in China, ideological emancipation must be promoted by open up. Therefore, taking further steps to reform and open in Northeast China, is practical basis for changing our thought from conservative and rigid into innovative and positive.
- Using flexible and various financing way, such as BOT, BOOT, BOO, PPP and so on, to solve the problem of the capital "Bottleneck" in economic and social development, and the long-term accumulation of "Triangle debts" which were left over by history.
- Exploiting and developing regional characteristic economy. For Northeast China, where is facing the challenge of adjusting economic structure, exploiting and developing regional characteristic economy is the key to acquire higher efficiency from the adjusting of economic structure.

Indeed, there have been many characteristic industries and products, which have played a role in Northeast China's economic and social development in the past. But now, some of them have lost not only their characteristics, but also the supporting role in regional economic and social development. So exploiting and developing regional characteristic industry and product in Northeast China, not only can show their talents in the economic and social development, but also should be an important strategic measure for dislocation and complementary development and win-win cooperation with other regions.

4.4 Perfecting credit environment

The construction of credit environment is one of major supporting system for financial industrial benign operation. Generally speaking, credit system construction includes corporate credit and personal credit. The corporate credit can be based on the current international principle of the "3F", "5P" and "5C";

personal credit's standards should mainly involve moral standing, debt paying ability, collateral security and so on. According to the corporate and personal credit system above, we can give the borrowers effective constraint and avoid the lenders' risk. In the process of the construction of credit environment and regional economic and social development, efforts should also be made to train and create the public credit consciousness and credit quality.

4.5 Improving the financial institutions system

According to the principle of market economy, the construction of financial institutions system should be presented as:

- Speeding up the reform of commercial operational mechanism in state-owned commercial banks.
- Developing diversified financial institutions. Construction of diversified financial institutions is not only the construction of institutions, but also the building of property rights system and operating mechanism.
- Developing fully medium and small financial institutions, and implementing of operating mechanism which is different from state-owned commercial banks and other joint-stock banks, in order to take the development of medium and small enterprises as basic principle, and guide them to be more mature and stronger gradually.
- Establishing orderly various intermediary organizations which serve for financial industry and financial ecological environment. The principle of intermediaries establishment is not only to expand the number even more to improve quality.
- Developing non-bank financial institutions, and making them and financial institutions complement each other in business.
- ·Developing capital markets, especially the OTC market.

With the development of various financial institutions, clarity of property rights should be priority.

4.6 Introducing foreign capital

Development economist, who have studied the problem of economic take-off in undeveloped areas and advised that introducing foreign capital should be an important measure in these areas, pointed out that the introducing of foreign capital could not only relieve the fund demand in "bottleneck" region, but also bring advanced concepts, management, supervision and experience through the form of direct financing. Northeast China should introduce foreign capital timely, measurably and selectively while improving the financial environment. Foreign capital here can be understood in a broader way:

- Capital from other parts of Chinese mainland.
- Capital from overseas of China.
- Capital from developed areas of China, such as Hong Kong, Macao and Taiwan.

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ICT in Education in India

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Abstract

Technological leapfrogging offers an opportunity for developing countries to catch up with modern ICT resources. In practical terms, leapfrogging is "bypassing some of the processes of accumulation of human capabilities and fixed investment in order to narrow the gaps in productivity and output that separate industrialized and developing countries. This phenomenon is most obvious in India's education sector. The advent of ICT technologies has changed the teaching and learning paradigm in this country. Government and private programs of adopting wireless internet and broadband in schools and teaching and learning technologies like smart classrooms, e-learning, multi-media courseware, in addition to school administration technologies and affordable hardware and software has shown exponential growth. Despite India being the largest educational systems in the world, literacy rates are very low. In this paper we examine the impact of new educational technologies on India.

INTRODUCTION

The rapid diffusion of computers and Internet use has been a fixture of the global landscape over the past decade; nonetheless, rates of technology use still differ markedly across countries. For example, the latest estimates from the International Telecommunications Union (ITU) indicate that only 6 percent of the population in India used the Internet in 2007. In contrast, more than 50 percent of the population in all developed countries used the Internet, with rates of technology use being substantially higher in many European and North American countries. These disparities in technology diffusion may have important economic consequences because technology use may increase knowledge diffusion through improving communication efficiency (e.g. Jovanovic and Rob, 1989), improve political engagement (Norris, 2001), increase productivity (Brynjolfsson and Hitt, 2003, Dedrick 2003), and allow developing countries to "leapfrog" traditional methods of increasing productivity (Steinmueller, 2003).

The importance of ICT diffusion in developing countries to economic advancement has been stressed in the policy arena and previous literature (Wallsten 2005). For developed economies, the literature is fairly well developed, while the implications for developing countries are only now being explored in a systematic fashion. To the extent that the pace of economic growth is dependent on the rate of ICT diffusion, we believe it is important to examine the factors that hinder the uptake of new ICT's in education.

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For more than forty years, innovative educators have been optimistic about computer uses in schools. Their vision for computers have not been realized to nearly the extent thought possible, despite a rapid fall in the price of hardware, the exponential increase in computing power, and the development of the Internet, which has opened a host of new possibilities not conceived a decade ago. The main obstacles in education to incorporating ICT into the teaching-learning process are not obvious. In this paper, we try to understand better where the problems lie and examine the case of a developing country like India.

The outlook towards education is changing throughout the world and especially so in a developing nation like India where instead of being considered an expense it is now seen as an investment for the future. With children's education a key priority in every household today, they believe any call on a thematic investment opportunity identified in this sector will yield long-term benefits. In order to sustaing its approximately 8% growth, India has to invest in education and more so quality education.

India is one of the largest markets in the world for formal school education with an addressable population of about 400-450 million and an annual spending of about $80 billion dollars. Rising middle class income levels will act as a catalyst in increasing the accessibility and quality of education. Forecasts indicate that the number of individuals with an annual average income of over $5000 will increase from 12 million people in 2004, to over 350 million people by 2020.

Individual households spend approximately 9 percent of their income on education, which is second only to food and groceries in an average consumption basket. Average spending on child's education across the country is approximately $350 per year with the highest level of spending occurring in southern India at $450 per year. With the rise in income, households have set very high aspirations for children with 43 percent wanting their kids to get a master's degree and 29 percent a doctorate. Population growth has decreased from 2.1 percent to 1.7 percent which should create greater accessibility for quality education than in the past. The country's labor force will grow at 1.70 – 1.84 percent up to 2015. 13 million people enter the workforce each year in urban India and 23 percent of the global work force addition over the next 5 years is expected to be from India.

Part of the reason for the slow growth of the education sector in India is its overdependence on government funding, a situation which is beginning to change. The focus of the government so far has been to increase access to education till the metric level, instead of on quality or employment opportunities.

A number of new initiatives have been undertaken in the education sector. The entry of new private schools in both the "K to 12" segment and vocational training offer immense potential in terms of growth. The adoption of new technologies by the education sector also offer new opportunities for learning and the acquisition of valuable and transferable skill sets for the development of human capital and to increase the management and accountability of the education sector. A key problem with the education sector is the issue of efficiency, effective teaching and accountability.

The reasons for failure of the education sector till date were long outstanding neglect, insufficient public financing and accountability. Of all the children who enroll in schools, over 50 percent drop out by

class VII and 70 percent by class X. The country has recently begun investing in education. Public spending on schools has increased over the last few years and the government now proposes to triple its current spending on education from its current 3.5 percent of GDP.

The XIth Five Year Plan is in fact a "National Education Plan". Proposed outlays on education would be up from 7.68 percent of the Central Gross Budgetary Support in the Xth Plan to over 19 percent in the XIth Plan. Total spending by the GOI on the education sector is set to exceed $40 billion in fiscal 2008. Incorporated into the plan is the belief that Private Public Partnerships (PPP) should be encouraged to enhance the critical priority sectors of education, infrastructure and facilities in schools and teachers' training institutions and examinations reforms.

The sector offers immense potential considering India's poor literacy rate of 67% (as of 2004-05) and with the employable population set to account for close to 60-65 percent of the total population over the next 10-15 years. The market in India for education could be one of the largest markets in Asia with a population of over 1.13 billion. With the government planning to spend around 5 percent of GDP in the next 5 years on education, the market could be any where worth $ 65-100 billion according to some industry reports.

ICT IN EDUCATION – A REVIEW

Most analysis of ICT in the educational sector focuses upon the impact it has had on pupil teaching/learning. However, direct changes in the way teaching and learning are organized should be only part of the effect ICT has in the organization of the education sector. We analyze the role of ICT in education in three parts:

- Changes in the management of the educational sector associated with ICT.
- Changes in the work process in education associated with ICT.
- Changes in the training of educational personnel and of students associated with ICT.

As in business, ICT has contributed greatly to networking among schools and universities and among individuals in schools and universities. This has been especially true in the developed countries, and is now spreading to developing countries. For example, *Enlaces*—the Chilean government's educational ICT system— has made a priority of connecting rural schools to the Internet and thereby integrating them more tightly into the larger educational system, and hooking them up to the outside world. Many school districts and almost all universities now communicate internally and externally largely through e-mail.

Schools and school districts hardly use ICT to manage the quality of output, to raise teacher productivity, or to reduce costs through analyzing spending. Beginning in the 1970s US school districts regularly used computers to store student and personnel data. With the advent of high-speed personal computers in the 1990s, computers became a permanent fixture in school offices. In many school districts in the U.S., school administrators have access to data from district computers; in many schools, individual teachers are hooked up to central data files either in the school or district office. Educational

administrative offices in most developed countries have ICT, and data collection in the developed world is universally computerized.

Bilateral assistance agencies and international banks put increasing emphasis in the 1980s and 1990s on using ICT to collect educational data and to improve the administration of educational systems in developing countries, particularly through decentralizing educational offices to regions, states, municipalities, and states themselves. As in developed countries, such ICT systems have been used mainly for collecting enrollment data, student attendance, basic information on teachers, and basic information on schools. In other words, ICT mainly helps administrators get a better idea of the size of the educational system, student dropout and repetition, and the number of students per teacher.

In some sense, this can be characterized as measuring the "efficiency" of the educational system and as a first step in improved resource allocation. We could liken this to inventory control in business. Educational administrators need to have basic information on student and teacher flows, probably also of school supplies, and how much the system is spending on various inputs, in order to make the most basic resource allocation decisions. Undoubtedly, ICT has played an important role in improving data collection in educational systems. It has also made these data more widely available to school personnel, parents, and the public at large through central administration web sites, and in some countries through direct access to central or district databases by school personnel.

These rudimentary data collection functions are expanded in some countries and regions by more sophisticated quality control data, namely student evaluation data. France makes available the results of the *baccalaureat* examination, school by school, on the Ministry's Web site. These results are presented in "adjusted" form, corrected for the socioeconomic background of the students in each school. Chile also makes available the results of its national SIMCE assessments at the 4th, 8th, and 10th grade, school by school.

Until 1996, these results were only available to schools; now they are also posted on the Web. States such as Texas and North Carolina are pioneers in using testing in grades 3-8 and a high school exit test to monitor individual school "success or failure" with students from different ethnic groups. Now many states use similar state standards and testing to monitor schools. ICT is crucial to these national and state accountability systems, both in collecting/processing the data and disseminating the results. In all these systems, however, the centralized administration uses ICT to "regulate" the system from above. It collects information from and distributes information to the different "departments" (schools), and uses the information to extract greater effort from the different parts of the system. In many countries, such top-down use of ICT to monitor performance could be extended to collecting and disseminating information on student and teacher absenteeism, student attainment (achievement levels), and other variables, all on a school-by-school basis.

As mentioned above, top-down monitoring is a typical use of ICT in business applications. The education industry is largely public, marked by permanent contracts and wage negotiations that have little to do with measures of productivity. Thus, any effort to measure educational productivity, even of firms

(schools), could be considered as moving in the direction of labor "control," of attempting to take "autonomy" away from teachers.

Such top-down administrative controls are not widely practiced even in developed countries, especially those with more decentralized systems. The single most prevalent form of centralized control is a standardized curriculum and a system of inspection. This system is supply based. It assumes that if the technology (curriculum) is fixed, and teachers are applying the technology (this is controlled by the once per year inspection), student will learn at an expected rate. In practice, supply based management leaves an enormous amount of control of the educational process in the hands of individual, unsupervised, un-evaluated teachers.

In all the cases mentioned attempts to augment centralized control with student evaluations, the central administration uses ICT to regulate schools but leaves to schools (decentralized administrative units) the choice of method to improve performance. How much of a role does ICT play in helping schools do better, either in improving school attendance, student test scores, or student promotion? In France and Chile, for example, the curriculum is centrally controlled, and student evaluations in 3rd and 6th grade in France and in 4th, 8th, and 10th grade in Chile are all tied directly to the standard curriculum. Similarly, in many U.S. states where students are regularly tested and schools judged on the basis of test scores, individual student test scores are made available to schools (in France, the tests are graded by school personnel at each school). With computer capacity available to schools, it would not be difficult to assess student results against components of the curriculum.

In states or countries where students are tested in every grade, it would be possible to assess student progress grade-by-grade (gain scores) in each school—provided that students stayed in a school. Patterns of incorrect answers by students could even be matched to individual teachers, thus helping teachers improve their productivity, at least in terms of test items.

There is evidence of teacher resistance to external accountability using student testing as a measure of school productivity (Benveniste, 2000; DeBray, Parson and Avila, 2002). However, teacher resistance has not impeded the application of external accountability, and there are some studies that indicate its positive effects on student outcomes, particularly in mathematics (Grissmer and Flanagan, 2000; Carnoy and Loeb, 2002).

How much is ICT used at the *school and local district level* to improve productivity? Certainly, good school administrators do use data to improve student performance, but there is very little evidence that ICT is widely used even in countries where schools have ample computer hardware and software to use available information in this way. Educational administrators at the department level are unlikely to use ICT for managing educational output or quality. Nevertheless, under pressure from state-based external accountability demands, some schools are using specially prepared software packages that allow teachers and the school to measure student gains on tests and compare test items missed by individuals and the sum of individuals in a evaluation.

Why is ICT used so much less in educational management decision-making than in private business? One argument could be that it is not being used this way because it would not be useful for increasing productivity, and that teachers, the production managers in education, realize this and resist applying ICT to assessing student learning gains at the classroom and school level. A major use of ICT in business decision-making is gathering data on various aspects of business performance (sales by department or sub-department, for example) and, on the basis of that data, assessing how performance can be improved. In education, data on student performance (test data) is readily available in many schools and school districts, and these data can be related to curricular content to assess whether required or tested curriculum is being applied.

However, many educators have claimed that measuring learning through achievement tests essentially pushes schools to teach the tests, and is detrimental to a broader, more valid conception of learning (see, for example, McNeil, 2000). Constructivist approaches to education argue that understanding arises as learners through prolonged engagement relate new ideas and explanations to their own prior beliefs (OECD, 2001, p. 26). Standardized testing, many argue, fails to measure this understanding; hence, analysis of test data would lead to incorrect educational decisions, often pushing teachers who might be providing 'understanding' of the material to focus on teaching test items.

The other side of this coin is that ICT used for student-centered teaching, in which student engagement, hence greater understanding of the material, may require new kinds of assessment tools. In its recent publication, *Learning to Change: ICT in Schools*, the OECD discusses recent work by Voogt and Odenthal (1999), who "… have proposed a series of *emergent practices* associated with the integration of ICT in education, which imply and invite radical change. They see an emphasis on skill development and on cross-disciplinary activity more in keeping with real life, developed and accredited through formative and summative student assessment by a variety of means, including portfolios. Students will themselves, accept more responsibility for their own learning and its assessment, developing expertise in the process" (OECD, 2001, pp. 28-29). The OECD study further concludes that the potential of ICT will not be realized as long as assessment is primarily in terms of student achievement in single subjects, by means of conventional written tests (OECD, 2001, p. 31).

Yet, this does not explain why ICT has not been more extensively used in translating traditional assessment procedures into more systematic educational improvement. It would seem logical to harness the information processing power of today's desktops to monitor student progress on curriculum-based assessments. With more workers (teachers) per supervisor (school directors and academic supervisors) than in almost any other industry, we should see ICT more extensively utilized to assess student performance gains classroom by classroom. Even if we assume that teachers would resist such external supervision, in the current accountability environment, we should observe ICT being increasingly used by teachers for assessing and improving their own performance in meeting state and national standards. The fact that little of this occurs anywhere suggests that there are major barriers to employing ICT as an administrative tool in schools.

One obvious barrier could be teacher resistance, as discussed above. But there are many ways that ICT could be used in helping teachers assess their individual work, or their collective work with other teachers in their school. Benveniste (2000) shows how external assessment was applied in Uruguay, with teacher union participation, and greater teacher involvement and acceptance at the school level than in Argentina or Chile. If teacher resistance were the main obstacle to ICT as an administrative tool, we should observe much more teacher shaped assessment using ICT. This would be analogous to business applications where labor unions are involved in defining productivity measures and worker evaluation. We rarely observe any use of ICT by teachers even for self assessment.

Rather, the most important barriers appear to be the lack of data analysis skills among administrators and teachers and, until recently, the lack of user-friendly software for analyzing test results at the school level. Few school directors, their staffs, or teachers are trained in using basic ICT tools such as Excel or Edusoft and in applying them to assessing student performance in schools and classrooms even in states that have provided major incentives to schools to do so by pressuring them to approve through both moral and financial rewards and sanctions.

Even these centralized analyses are relatively limited. In those countries and states that implement accountability systems, schools and districts are usually responsible for finding the means to improve student performance, yet have little or no capacity to do so.

In some OECD countries, were there is a tradition of educational research, or collecting extensive data on education, and making these data available to researchers, there is considerable analysis of educational productivity. In the past decade, Chilean researchers, assisted by the Ministry of Education, have also begun doing extensive analysis of Chilean educational data on a regular basis using the power of ICT. Yet, even in these countries, ICT as a management tool has not reached into local school districts and schools. From this analysis, the most obvious policies inside education that could stimulate more use of ICT in educational management would be widespread training of secondary school and university students in using ICT-based management tools and preparing high school students and education majors in college in rudimentary statistical analysis. By making such training part and parcel of a general educational preparation, the younger generation of teachers and educational administrators would be highly trainable in using data to assess their students' and their own work.

INDIAN SCENARIO

Investment in the education sector would be required for India's impressive figures of economic growth to continue. This is one sector the outlook towards which is changing, from being considered an expense it is now taken as an investment for future.

There are about 20 million persons entering the work force each year. It is therefore essential to create the environment that will encourage the individuals to take up self-employment. While loans, fiscal incentives and appropriate policies are necessary; we believe the education sector will play a major role.

Of all the children who enroll in schools, over 50 percent drop out by class VII and 70 percent by class X. Most of them, as also many who complete schooling, then join the unofficial workforce, doing odd jobs on farms, homes or in the millions of small business that abound in both the city and village. In a short period, they pick up rudimentary work skills, learning on the job, and life skills that enable them to cope with an adverse environment. The few or even many years of traditional school education contribute little to prepare them for such work or for the environment.

India is of the opinion that vocational education will be very important going ahead as many traditional occupations face extinction due to industrial production and change in life styles. A host of new technology products are entering the markets and into the lives of people. These offer immense opportunities for self-employment, which calls for vocational training.

Vocational training has not been very successful in the past. Vocationalization of secondary education, introduced in 1988 at the +2 stage, did well initially but later lost stream. At the university level, career oriented courses were introduced in 1994 but have never been popular.

Different ministries have initiated numerous other schemes, but none seem to have really been successful. The major problems are insufficient practical training, irrelevant courses and inadequate training of faculty. Overall, the lack of involvement of practitioners and a lack of market responsiveness seems to be the problem.

Fewer schemes, far greater involvement of industry, responsiveness to market needs and a well-structured programme of faculty training should be the areas to focus on. In order to promote self-employment, the course must include training in entrepreneurship and low cost loans must be made available to all who pass such courses. Courses must begin at the school level and must be made available to school dropouts too.

We believe a massive programme is urgently needed, implemented as a public-private-partnership (PPP) and focusing on the disadvantaged, especially in poorer areas Such an effort can increase productivity, create jobs, and provide substantial benefits to individuals and society.

Some of the main challenges before the Education System in India pertain to:

- Access-While availability of elementary schools within a reasonable distance from habitations is now fairly universal; same cannot yet be said in regard to Secondary Schools and Colleges. Pockets still exist in many remote parts of the country where the nearest Secondary School or College is much too far for everyone to be able to attend. Besides the physical availability of institutions, other barriers to access – e.g. socio-economic, linguistic– academic, physical barriers for the disabled, etc. – also need to be removed.
- Participation & Equity**-** Gross Enrolment Ratios for the elementary, secondary and tertiary stages of education in 2003-04 were 85%, 39% and 9%, respectively. These participation rates are undoubtedly low, and need to be raised very substantially, for India to become a knowledge society / economy. A linked challenge is one of equity. Participation rates in Education are poor largely because students from disadvantaged groups continue to find it

difficult to pursue it. Even when they manage to participate, students suffering from disadvantages of gender, socio-economic status, physical disability, etc. tend to have access to education of considerably lower quality than the others, while the education system needs to provide them access to the best possible education so that they are able to catch up with the rest.

- Quality- The challenge of quality in Indian education has many dimensions, e.g. providing adequate physical facilities and infrastructure, making available adequate teachers of requisite quality, effectiveness of teaching-learning processeș, and attainment levels of students.

Besides the need to improve quality of our educational institutions in general, it is also imperative that an increasing number of them attain world-class standards and are internationally recognized for their quality.

Education in India needs to be more relevant and skill-oriented both in terms of life-skills as well as livelihood skills. In sheer numerical terms, India has the manpower to substantially meet the needs of a world hungry for skilled workers, provided its education system can convert those numbers into a skilled work-force with the needed diversity of skills. Management of Indian education needs to build in greater decentralization, accountability, and professionalism, so that it is able to deliver good quality education to all, and ensure optimal utilization of available resources.

Resources need to be expanded. India's stated national policy since 1968 has been to raise public expenditure on education to the level of 6% of GDP. On the other hand, in 2004-05, outlay of central and state governments for education amounted to only about 3.5 percent of GDP. Thus, the gap in allocations for education is still substantial, and needs to be urgently bridged.

OUTLOOK

Whether in India or in the West, the markets for educational content services provide unlimited opportunities to the few players operating in this segment. We believe India needs a greatly expanded supply of educated and skilled labor to support ambitious growth targets. Education is the best hope for achieving inclusiveness and for spreading development to backward regions and marginalized groups. Nothing would ensure an effective spread of opportunity to all sections of the population more than the availability of good quality education especially in rural areas.

This will be possible only through inclusiveness in the education sector and by spreading development to backward regions and marginalized groups. Right now, in the education sector there is severe competition for the market—a limited number of entrants are allowed. So there is limited competition in the market leading to high prices (and economic rents, part of which has to be paid to the operators of the state control machinery to gain their patronage). Limited competition in the market

implies not just high prices but assures low quality also. The people, given the supply constraints, in desperation put up with high prices and low quality.

Free entry should be allowed in the education business. By doing so there will be no competition for the market, there would be competition in the market. Prices will reflect true costs and the quality would also improve.

In Asia, countries like Japan, which once turned out students that consistently ranked at the top of international tests are now looking for lessons from India. The Japanese bookstores are filled with books like “Extreme Indian Arithmetic Drills” and “The Unknown Secrets of the Indians”. The countries perceive India as the world’s ascendant superpower.

The Indian education space could be one of the largest markets in Asia with a population of over 1.13 billion. With the government planning to spend around 5% of GDP on education in the coming five years the market could be any where worth $ 50-55 billion.

One cannot dispute the fact that for any transformation in the sector all we need is new plans with our old attitudes. Fresh creative thinking and out-of-the-box solutions will only do the trick.

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Off-Track Betting and the New York State Economy

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ABSTRACT

The creation of Off-Track Betting (OTB) in the state of New York led to a reallocation of parimutual betting revenues between the state and race tracks to include local governments and cities. Coate and Ross (1974, 1978) concluded that with the changes in track attendance patterns, as bettors moved from racetrack attendance to OTB facilities, and the change in revenues flows between track operators, state authorities and local government, that state tax revenues from parimutuel betting and track operators revenues declined. The issue of revenue splits has continued to plague the relationship between state and local government and OTB operations - as demonstrated most recently by New York City's recent threats to shut down OTB facilities throughout the city which was just narrowly averted by a tenuous political compromise. This paper analyzes OTB, its effects and impacts on state and local government revenues, and the future of parimutuel betting in New York State.

1. INTRODUCTION

New York was the first state in the country to institute a system of off-track betting (OTB) in 1970. While part of the rationale for establishing OTB was to reduce illegal gambling in the state, it was also considered a means to increase revenue streams to the state as well as to local communities from gambling. Thirty-eight years later, New York City threatened to shut down all of its OTB locations due to high operational costs and the limited revenue streams returned to the city treasury. A complete shutdown was averted only when the state stepped in to assume control over city OTB facilities during the summer of 2008.

This is not the first time that NYC has had problems with its OTB operations. For the fiscal year ending 2007, NYC OTB operations closed with a net revenue of $-3.38 million on a net total handle of $1.03 billion (New York State Gaming and Wagering Board, 2008, p. 46). Thirteen years earlier, NYC OTB had found itself in a similar situation with a $7 million dollar loss on $742 million in total handle (Flint, 1994). During the 1980s, OTB brought in average net revenues of $65 million annually for NYC (The Economist, 2008). Overall, revenues to the state since 1971 have increased from $592 thousand to $30.9 million (parimutuel tax and breakage, regulatory fees, and uncashed tickets) in 2007 (New York State Gaming and Wagering Board, 2008, p. 48).

Horse racing and parimutuel gambling in New York state is overseen by the New York State Racing and Wagering Board including oversight for horse racing and harness tracks as well as off track betting facilities. There are six separate OTB corporations in the state, that include the Capital, Catskill, Nassau County, New York City, Suffolk County, and Western districts. While NYC opened the first OTB facilities in the state in 1970, it was soon joined by the Capital district, and the rest followed within a few years.

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Over time, OTB operations and facilities expanded and now include intrastate and interstate betting, simulcasting, teletheaters, and telephone betting. As gambling in general has become more accessible not only across New York state but regionally and nationally, off track betting operations have had to modernize various facets and facilities of their operations to compete including allowing a full array of various restaurant and bar services and amenities to be offered at some facilities (Buchtal, 2004; Vallen, 1993;.CHRAQ, 1993). OTB facilities may also be set-up in restaurants as well (Frumkin, 2000).

The public and popular view of horse-racing and OTB in particular is that of an industry in decline with an aging clientele facing a multitude of competitive pressures from the increasing availability of alternatives. While there certainly is some truth to this viewpoint, nationwide from 1996 to 2003, total wagers at off track betting facilities across the 38 states that allow it, increased 53%, from $8.7 billion to $13.3 billion (Buchtal, 2004).

The underlying question for this paper is what is the viability of OTB in New York State and NYC. Economic analysts thirty-four years ago (see Coate and Ross, 1974) pointed out the various conflicts between state and local government as well as the racing industry that would arise from OTB especially as the result of split of the takeout rate between three different entities. Changes in these rates along with surcharges imposed on OTB corporations to support the racing industry have only exacerbated the problem, especially as it concerns NYC. The next section of this paper provides a review of the some of the literature on OTB, horse racing and parimutuel wagering. Following that is a statistical and econometric analysis of OTB operations. The conclusions of this study are presented in final section of this paper.

2. OTB AND NYS

The establishment of OTB in the state presented a number of issues for a government enterprise. While the notion of a government entity operating a parimutuel wagering operation may have controversial at the time, other state governments later approved various forms of off track betting and other forms of legalized gambling, and many of these states also run lotteries as well. One underlying rationale for establishing these operations, especially in the late sixties and early seventies was to redirect the flow of funds from gambling away from organized crime and illegal activity to a legal arenas. These activities were also viewed as another source of funding for state and local government entities. Pescatrice (1979; 1980A; 1980B) suggests that off track betting and other gambling or parimutuel wagering opportunities can be effective sources of additional government revenues.

Coate and Ross (1974; 1978) directly addressed some of the major issues that OTB presented for New York State and also for the racing industry. The takeout rate from total wagering handle on parimutuel wagering in New York State tracks was established at 17 percent, with the state receiving 10 percent, and the track keeping 7 percent. For OTB, the takeout rate remained at 17 percent, but the split was not conducted three ways, with the horse racing industry (tracks) receiving between 1 to 2 percent

depending upon the type of wagering instrument, tracks receiving 3 to 5 percent againg depending on the type of wagering instrument, and the local government OTB corporation receiving 10 percent. The split on takeout creates one major potential source of conflict. Their analysis indicates that OTB resulted in a loss of revenue to both the state and the local race tracks, but an increase in revenues to NYC (Coate and Ross, 1974). The decline in track revenues arose from declining track attendance, which according to Coate and Ross (1978) occurred as some race patrons switched from track attendance to placing their bets at OTB facilities.

In their analysis of the impact of transportation costs on parimutuel wagering demand, Ali and Thalheimer (1997) find that consumers are sensitive to both travel costs and time costs. Their study looks in particular at New Jersey horse and harness racing tracks that also include simulcasting, but not OTB. They suggest that both attendance and revenue streams could be increased by reducing the costs per visit by several strategies including the number of racing days, reallocating the existing number of racing days to different locations, increasing the number of wagering sites or strategically relocating sites. In a later paper, Ali and Thalheimer (2002) develop an expanded multi-product demand model for wagering finding a number of interrelationships between wagering products and underlying demand characteristics including breed of racing, source (live or simulcast), and geographic location.

Stein and Mizzi (2003) examine the role of new or exotic wagers in the parimutuel markets. In particular they look at the continuing issue or problems associated with attracting new patrons as well as keeping existing clientele given the ever increasing availability of alternative opportunities to gamble, such as casinos. Race tracks have moved into offering ever more exotic instruments such as the twin trifecta, in which bettors have to select the top three horses in order in two specified races to win, or three exactas, the first two horses in three races in a row. Their analysis assesses expected payoffs from what is termed a grand slam, which involves selecting an exacta, trifecta, and a superfecta across three selected races. One of the goals of their analysis is to provide a means to evaluate the trade-offs of new wagering instruments in attracting and retaining customers given the potential carryover of portions of the betting pool, and the ability of bettors to win. They suggest that tracks face the problem that if it is too easy to win, parimutuel associations will not attract enough customers, while if it is too difficult to win, bettors will lose interest before the carryover pool grows large enough to make it profitable. Studies such as those by Gramm and Douglas (2006), find that simulcasting of races which also takes into account current trends in parimutuel wagering markets, has increased market efficiency.

Other studies such as those by Ray (1991) indicate that parimutuel racing may help to induce local or regional economic growth. Walker and Jackson (2007) on the other hand do not find strong evidence that the establishment of gambling facilities leads to economic growth.

Overall, it appears that OTB and other opportunities for gambling has reduced on-track attendance, and thus may have some effects on the race track and harness track industry. This has led over time to states such as New York making adjustments to the distribution of handle takeout, and imposing new taxes or fees on off track betting and simulcast facilities to redistribute to track and harness operators.

3. PRELIMINARY STATISTICAL AND ECONOMETRIC ANALYSIS

In many states, including New York, there has been the elimination of restrictions on various forms of gaming that includes various forms of casino gambling, and establishing and expanding state lotteries. Race and harness track operators, facing greater levels of competition have pushed as well to be allowed to engage in new gaming areas. Since its inception, total OTB revenues in nominal terms have grown from $118 million in 1971 with only one OTB regional corporation to $1.94 billion in 2007 with six OTB regional corporations. While this represents a 16 fold increase in revenues, in real terms OTB revenues hit their peak in 1979 and have slowly declined since (see Tables 1 and 2).

Year	Capital	Catskill	Nassau	NYC	Suffolk	Western	All Regions
1971.00	NA	NA	NA	118.59	NA	NA	118.59
1972.00	2.32	NA	NA	450.32	NA	NA	452.63
1973.00	11.41	NA	NA	691.28	NA	NA	702.69
1974.00	15.10	NA	NA	786.71	NA	13.44	815.25
1975.00	19.80	NA	NA	773.55	30.37	55.24	906.86
1980.00	102.67	73.98	142.57	879.64	117.25	146.49	1462.60
1985.00	157.72	106.08	155.09	871.87	140.67	143.30	1574.73
1990.00	234.81	115.88	214.67	961.47	197.05	199.84	1923.71
1995.00	214.68	130.49	220.13	854.46	177.06	184.05	1780.87
2000.00	222.47	139.03	252.04	1013.18	174.30	174.04	1975.06
2001.00	229.44	144.74	258.21	1014.63	186.82	176.32	2010.15
2002.00	225.38	144.62	264.30	1030.29	205.25	171.89	2041.72
2003.00	220.87	143.27	261.87	1025.07	211.48	159.91	2022.45
2004.00	212.24	143.12	299.36	1036.09	205.29	149.54	2045.63
2005.00	213.06	146.52	311.11	1046.42	199.05	145.40	2061.57
2006.00	209.92	143.03	307.67	1060.98	195.18	140.23	2057.02
2007.00	201.84	131.81	293.52	1030.20	188.16	139.44	1984.96

Table 1: Nominal OTB Handle in millions

Across the same time span, the overall population of the state grew from 18.3 million people to 19.29 million people (Table 2). This growth was by no means uniform, as certain parts of the state, particularly Western and Northern New York actually saw population declines, while NYC and the surrounding counties experienced increases. Over this same period, while nominal income shows an increase from $5169 to $46,664, or what appears to be a nine fold increase, in real terms, state per capita income increased by approximately 43 percent (Table 2). While a complete series for the time period on state tax revenues was not available, from 1992 to 2007, real sales and gross receipts tax revenues increased by approximately 20 percent (Table 3).

Year	Capital	Catskill	Nassau	NYC	Suffolk	Western	All Regions
1971	NA	NA	NA	607.36	NA	NA	607.36
1972	11.49	NA	NA	2233.25	NA	NA	2244.74
1973	53.27	NA	NA	3226.34	NA	NA	3279.61
1974	63.48	NA	NA	3307.54	NA	56.51	3427.52
1975	76.26	NA	107.49	2979.80	116.98	212.79	3493.32
1979	262.03	190.96	385.52	2387.57	311.79	381.45	3919.33
1980	258.40	186.20	358.81	2213.85	295.10	368.69	3681.04
1985	303.92	204.42	298.84	1680.05	271.06	276.14	3034.43
1990	372.61	183.89	340.66	1525.74	312.69	317.12	3052.71
1995	292.10	177.56	299.52	1162.62	240.92	250.43	2423.13
2000	267.88	167.41	303.48	1219.99	209.88	209.56	2378.22
2001	268.70	169.51	302.39	1188.27	218.79	206.49	2354.16
2002	259.81	166.71	304.67	1187.65	236.60	198.14	2353.58
2003	248.88	161.44	295.09	1155.09	238.30	180.19	2279.00
2004	232.94	157.08	328.56	1137.18	225.32	164.13	2245.22
2005	226.22	155.57	330.32	1111.03	211.34	154.38	2188.85
2006	215.92	147.12	316.46	1091.28	200.75	144.23	2115.76
2007	201.83	131.80	293.52	1030.17	188.15	139.43	1984.92

Table 2: Real OTB Handle in millions

The exact level of takeout and breakage from parimutuel handle varies on the basis of type of wager. Additionally, over the last thirty-seven years, New York State has levied additional fees to support the racing and harness industry. OTB takeout and breakage now averages approximately 20.5 percent of total net handle, with OTB corporations retaining approximately 50 percent of takeout, the tracks taking approximately 40 percent, the state taking approximately 7.5 percent, and 2.5 percent going to the Thoroughbred and Harness Breeders funds. In 2007 two OTB corporations operated at losses, NYC and Suffolk County.

The data used in this study come from several sources, including the New York State Racing and Wagering Authority which issues a public report annually on OTB and simulcast wagering including information on total racing handle, takeout, and payments to tracks and New York State authorities for the six OTB corporations. CPI , New York State population , per capita income, and data on state tax revenues come from databases maintained by the Bureau of Labor Statistics, the Bureau of Economic Analysis, and the St. Louis Federal Reserve.

Year	Per Capita Income	Real Per Capita (2007dollars)	Population (1000s)
1971	5169	26474	18357.982
1975	6972	26857	18003.485
1980	11015	27722	17566.754
1985	16877	32521	17791.672
1990	23523	37328	18002.855
1995	27082	36849	18150.928
2000	34901	42025	18996.571
2001	35640	41739	19076.61
2002	35416	40826	19132.542
2003	36107	40687	19207.652
2004	38423	42172	19258.479
2005	40942	43470	19262.545
2006	43898	45152	19281.988
2007	46664	46663	19297.729

Table 3: Per Capita and Real Per Capita Income and Population

Year	Tax Revenues (1000s)	Tax Revenue (2007 dollars)
1992	10658851	15751068
1993	11309933	16231192
1994	11595814	16220449
1995	11774157	16020477
1996	11913517	15747640
1997	12139863	15680294
1998	12422939	15801475
1999	12819740	15956247
2000	13307079	16023364
2001	13094014	15334881
2002	13120783	15124888
2003	15145453	17066621
2004	16478965	18086807
2005	17331254	18401274
2006	19212180	19760827
2007	19505685	19505246

Table 4: New York State Sales and Gross Receipts Taxes

Various analysts such as Coate and Ross (1974; 1978) and more recently Ali and Thalheimer (1997; 2002) have successfully used time series models and techniques to examine wagering markets. Ali and Thalheimer, for example, estimate an aggregate demand function (using a Hicksian demand function) for on track horse racing and harness wagering using time series data of the form: $h = h(p_w, p_x, y)$. The demand for wagering h, is a function of the p_w, the price of wagering, p_x, the price of other goods, and income, y. The price of wagering is not directly observable and so the takeout rate is generally used as proxy.

A complete series on takeout rates was not readily available for this study, thus limiting an analysis of wagering demand through OTB. Instead, OTB wagering is examined using a time series model for the six pooled regional corporations using an autoregressive structure. In particular, the following equation is estimated in log form:

(1) Net OTB Handle = f(constant, Net OTB Handle$_{t-1}$, population, per capita income, trend).

The equation was estimated in first difference form in order to eliminate problems associated with non-stationarity found in some of the data, with a cross section trend variable included for each of the six regions. The results of the analysis are found in Table 5.

Variable	Coefficient	t-statistic
Constant	0.0217	(1.33)
Handle (-1)	0.1931**	(7.03)
Population	-0.9008	(-1.21)
Per capita income	0.6692**	(2.55)
$Capital_{trend}$	-0.0013	(-1.58)
$Catskill_{trend}$	-0.0016*	(-2.03)
$Nassau_{trend}$	-0.0001	(-1.56)
NYC_{trend}	-0.0020**	(-2.39)
$Suffolk_{trend}$	-0.0017*	(-2.08)
$Western_{trend}$	-0.0022**	(-2.63)
Adj R^2	0.325	
F	11.31**	

Table 5: Dependent variable - Net OTB Handle

The coefficient estimates are consistent with those of previous studies. While there is a positive association OTB handle with income, betting at OTB facilities throughout the state has trended downward. During the period ending in 2007, two regional corporations reported net losses, NYC and Suffolk county. Net revenues from the six regions including the portion of takeout and breakage to the state, the reserve for uncashed tickets, and regulatory fees totaled approximately $30 million, an almost insignificant amount when compared to the $19 billion in sales and gross receipts taxes collected in 2007.

4. CONCLUSIONS

While nationally wagering on horse and harness racing appears to have increased, in New York, in real terms, wagering as shown through OTB data has actually declined across the state. Preliminary time series analysis of the data indicates that this trend is continuing. In terms of the financial viability of OTB across the state, already regions such as NYC and Suffolk County are suffering losses on their OTB operations. While NYC has encountered this situation in the past, and despite new agreements with the state regarding the NYC OTB operation, its financial health in the city and even the whole state is in question.

While data availability limited the scope of this current study more work still needs to be conducted in this area. The gaming industry has grown over the last forty years, and the expansion of off track betting and simulcasting has been an important part of this growth across the country, and will continue to be in the future.

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An Assessment of US Air Quality Policy: Past, Present and Future*

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ABSTRACT

It is accepted in current literature that market-based pollution reduction methods are more effective that conventional command and control policies. This paper examines the current trends in air quality levels in the US and the projected effects of the EPA's Clean Air Interstate Rule (CAIR) to develop a benefit-cost model to analyze the potential effectiveness of the cap and trade programs developed in this program. The model adopts a marginal benefit of pollution abatement from the literature and uses actual and projected market-based prices for annual SO2 and seasonal NOx allowances. The results show that the benefits of pollution reduction in both markets far exceed the costs.

INTRODUCTION

This paper will present a brief cost-benefit study on the efficiency of the proposed CAIR cap-and-trade air quality programs. There has been a significant amount of ex post analysis on Title IV of the Clean Air Act Amendments (CAAA) of 1990 presenting empirical data that states the benefits of reducing SO2 emissions from EGUs across the country far outweigh the costs. Citing Title IV as an example, it has been accepted in the literature that cap-and-trade programs relating to air pollution reduction are more environmentally and economically effective than alternative "command-and-control" programs. The following section will discuss both the environmental and economic benefits of using a cap-and-trade program, describe the current state of benefit-cost models as they relate to air quality policy, and present a concise, up-to-date model that forecasts the market efficiency and net benefits of CAIR programs with respect to SO2 and seasonal NOx emissions reductions.

ENVIRONMENTAL EFFECTIVENESS

The environmental effectiveness studies that have been done have largely focused on the success of the Title IV acid rain trading program. These results can be generalized to predict the results of similar programs for pollutants other than SO2. Ellerman (2003a) argues the acid rain trading program's environmental effectiveness is due to four features: (1) a large reduction in emissions was actualized relatively quickly after implementation; (2) the use of allowance banking significantly accelerated emission

* This paper is a relevant excerpt from a larger, more comprehensive paper produced during a summer research internship within the Andrew Young School of Policy Studies at Georgia State University.

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reduction; (3) no exemptions or exceptions from the program's requirements were granted; and (4) the pollutant-ridden "hot spots" that opponents of cap-and-trade programs cite as a result of allowance trading have not yet appeared.

Since the main air pollution reduction policies involving a cap-and-trade program implemented are designed almost identical to the ARP, these policies should achieve similar results. Ellerman's first three environmentally effective features should transfer to other programs in at least some magnitude. There were fears that a lone national market for SO2 would result in an increase in pollutant concentrations in the Northeast from EGUs in the Midwest where it is more costly to reduce emissions. These fears, however, have proved to be ungrounded as the entire eastern seaboard has received benefits due to the patterns of trading coupled with a national decrease in emissions (Burtraw et al. 2003). Ellerman (2003b) also points out that sources in the Midwest provided about 80% of the emissions reduction achieved in the acid rain program. This pattern is also expected to be seen as a result of the CAIR reduction programs which, by title, are devoted to reducing the pollution that traverses state borders.

ECONOMIC EFFECTIVENESS

In the early nineties, when the acid rain program was promulgated, there were very few estimates of the economic benefits of air pollutant reduction, namely SO_2. Burtraw et al. (2003) claims that the only economist who presented an opinion the issue in 1990 estimated the benefits and costs of the acid rain program to be approximately equal. It is now well known that the benefits of SO_2 reduction far outweigh the costs. This is, in part, due to the increasing valuation of health and ecological benefits from pollution reduction as pollutant monitoring and analysis technology has improved as well as the lower than expected aggregate abatement costs provided by allowance trading.

Burtraw et al. (1998) compares the estimated costs of command-and-control legislation proposals for SO_2 reduction in the eighties to the realized costs of the cap-and-trade ARP. The Sikorski/Waxman bill proposal in 1983 had a range of estimated costs from $7.9 to $11.5 billion dollars per year (1995 $). Another bill proposal, H.R. 4567 in 1986, targeted similar environmental improvements at an estimated rate of $7.5 billion per year. Burtraw et al. (1998) compile a list of eight studies that estimate long-run (2010) costs of the ARP between $.9 billion to $3.7 billion, with the more recent studies (circa 1998) being lower and probably more accurate as they are structured on actual rather than entirely projected data. According to Burtraw et al. (1998), the fact that the price of *ex post* realized allowances are much lower than the *ex ante* estimates of marginal abatement costs demonstrates that the market-based allowance trading system is responsible for reducing the costs of lowering SO_2 emissions.

BENEFITS ESTIMATES

In the literature, benefits gained from a reduction in pollution are estimated in a variety of ways. Health benefits are the predominant monetary benefit in most studies. Some estimates also assign values for ecological damages including agriculture, visibility, and materials (Banzhaf et. al 1996).

Ostro et al. (1998) describe four distinct components when measuring health benefits: (1) the quantitative relationship between ambient concentrations and the concentration-response functions; (2) the size and identification of susceptible populations; (3) the projected change between current and target air pollutant concentrations; and (4) the economic value of the reduction in health effects incidence. The fourth component differs substantially throughout the air quality literature. Concentration-response, or dose-response, functions assess the "what-if" scenario with respect to an increase in pollution and the accompanying pollution-related health incidents. Ostro et al. (1998) disaggregate health effects related to particulate matter pollution into categories of premature mortality, adult chronic bronchitis, respiratory hospital admission, cardiac hospital admission, emergency room visits, child acute bronchitis, restricted activity days, asthma symptom days, and acute respiratory symptom days—each with a particular range of dollar values. Banzhaf et al. (1996) disaggregate monetary health, as well as agricultural, effects by damages done by each of the six criteria pollutants in a study on electricity generation in the Midwest. Muller et al. (2007) annualize monetary damages by the effects of six different pollutants in the following categories: mortality, morbidity, agriculture, timber, visibility, materials, and recreation. Ultimately, every benefits analysis contains different benefit criteria and a different range of monetary benefits, so, as would be predicted, the aggregate benefits of reducing pollution differs substantially across the literature.

METHODS

This paper aims to build upon prevalent knowledge and analyze the effectiveness of current air quality policy in the U.S. in order to predict an estimate of the efficiency of the CAIR program which is scheduled for implementation in 2009 and 2010. The focus of this model centers on two pollutants, SO_2 and NO_x, and their effects. Banzhaf et al. (2004) provide the results of a simulation model designed to estimate efficient emission fees for SO_2 and NO_x in the national electricity sector. The model presented in that study provides satisfactory values for marginal benefits of both SO_2 and NO_x abatement—that is, the social dollar value of one less ton of a pollutant in the air. These values—$\$3{,}000/ton_{SO2}$ and $\$900/ton_{NOx}$—are adopted for this paper's model. Burtraw et al. (2001) and Burtraw et al. (1998) confirm the NO_x estimation of Banzhaf et al. (2004) in four separate models with NO_x reduction benefits ranging from $647 to $755.

Additionally, most of the air quality benefit-cost studies use an estimate of program implementation, monitoring, and new technology installation costs to calculate the aggregate costs of a program or policy. Alternatively, this paper will apply actual and EPA-projected market-based allowance prices at different

levels of abatement as an aggregate marginal cost. Burtraw (1998) explains that allowance prices in a given year should reflect marginal abatement costs in that year and provides this example: "Imagine instead that allowance prices were less than a firm's marginal costs. Then the firm could decrease its compliance activities and purchase allowances in the market as an alternative means of compliance, earning positive net revenues."

This model focuses on the market efficiency of annual SO_2 abatement and ozone season NO_x abatement. This paper does not address the annual ozone NO_x reduction program because that program is the first of its kind and has no current data available for analysis. The annual ozone program does, however, limit the projections of market prices for the seasonal ozone program since the two programs overlap, while restricting emissions of the same pollutant, during five months of the year. This model, therefore, can only estimate the projected allowance prices by the trend in known data and the expected future level of abatement.

Using the allowance price data, this model is designed to approximate a marginal cost curve at different levels of pollution abatement. The allowance price data is regressed exponentially to form a marginal cost curve. For SO_2, the derived curve held the equation: $y = 144.54e^{0.0000003872x}$, where $y =$ annual SO_2 allowance price and $x =$ tons of SO_2 abatement. For NO_x, the derived curve held the equation: $y = 447.17e^{0.000002833x}$, where $y =$ seasonal NO_x allowance price and $x =$ tons of NO_x abatement. The marginal benefit curves are simply horizontal lines at the particular dollar value per ton of pollutant abated.

Table 1[1]:

Annual SO2 Emissions (tons)	**2008**	**2010**	**2015**	**2020**
Actual (Projected Emissions with CAIR)	8,893,322	6,100,000	5,000,000	4,300,000
Projected Emissions without CAIR	10,034,310	9,700,000	8,900,000	8,600,000
Abatement Level	1,140,988	3,600,000	3,900,000	4,300,000

Seasonal NOx Emissions (tons)	**2007**	**2009**	**2015**	**2020**
Actual (Projected Emissions with CAIR)	1,196,402	1,050,000	960,000	970,000
Projected Emissions without CAIR	1,267,520	1,200,000	1,210,000	1,220,000
Abatement Level	71,118	150,000	250,000	250,000

Allowance Prices	**2008**	**2010**	**2015**	**2020**
SO2	$300	$533	$671	$868
Adjusted for Inflation ($ 1999)	$231	$517	$651	$842
	2007	**2009**		
NOx	$710	$888		
Adjusted for Inflation ($ 1999)	$547	$684		

Marginal Benefits	**SO2**	**NOx**
	$3,000	$900

Discussion and Analysis[2]

Figure 1 illustrates the marginal benefits and costs of SO_2 abatement per annum under current conditions and projections with CAIR. This is an atemporal analysis, despite the yearly labels. The yearly labels simply signify the level of abatement projected for that year under CAIR. As is expected, the level of abatement increases with each phase of CAIR. In 2008, the marginal costs of SO_2 abatement are $231/ton at a level of 1.14 million tons. The net benefits reach $3.3 billion and the benefit-to-cost ratio is 36.4. In 2010, the marginal costs of SO_2 abatement are projected to increase to $517/ton at a level of 3.6 million tons. The net benefits are projected to reach $9.9 billion with a benefit-to-cost ratio of 11.5. In 2015, the marginal costs of SO_2 abatement are projected to rise even further to $651/ton at 3.9 million tons of abatement. The net benefits are projected to rise to $10.6 billion with a benefit-to-cost ratio of 10.6. In 2020, the marginal costs of SO_2 abatement are estimated at $842/ton at a level of 4.3 million tons. The annual net benefits are projected to settle at $11.6 billion and the benefit-to-cost ratio is calculated to be 9.7.

A^*_{SO2} represents the efficient level of SO_2 abatement (7.833 million tons) based on this model—where marginal costs equal marginal benefits. Achieving this level of abatement is not practical under CAIR considering it requires almost total abatement of 2020 emissions levels. It is important to note, however, that this model defines a level of abatement comprising over 91% of total 2020 SO_2 emissions as economically efficient with a benefit-cost ratio greater than 5.

Figure 1:

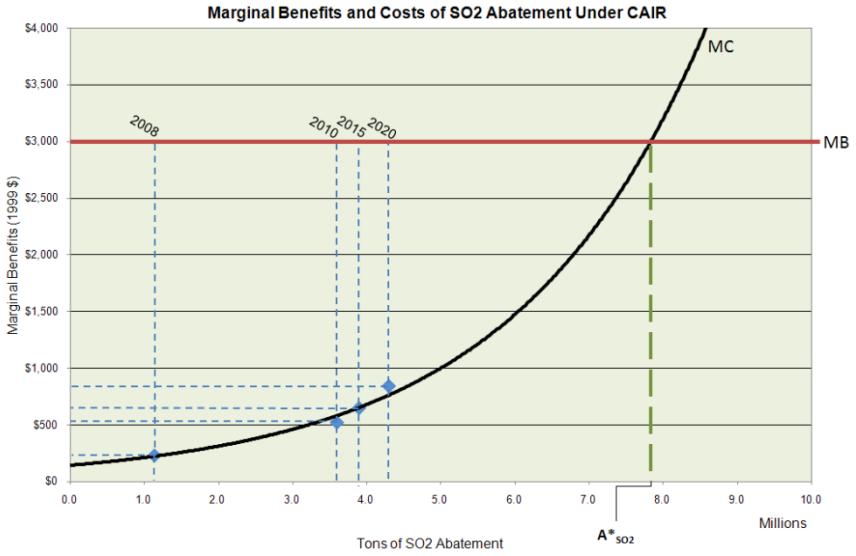

Table 2[3]:

Net Benefits of SO2 Abatement
(millions of 1999 $)

	Total Benefits	Total Costs	Net Benefits	B/C Ratio
2008	3,420.0	93.9	3,326.1	36.4
2010	10,800.0	936.6	9,863.4	11.5
2015	11,700.0	1,099.2	10,600.8	10.6
2020	12,900.0	1,336.3	11,563.7	9.7
A*	23,499.0	4,434.2	19,064.8	5.3

Figure 2, similarly, represents the marginal benefits and costs of seasonal NO_x abatement per annum under CAIR. Using the allowance pricing data from 2007 and 2009 as well as the projected levels of abatement, the marginal cost curve in this model is drawn to illustrate the economic efficiency of CAIR's cap-and-trade program. In 2007, the marginal cost of seasonal NO_x abatement was $547/ton at a level of .071 million tons of abatement. The net benefits reached $62.9 million with a benefit-to-cost ratio of 56.6. In 2009, the marginal cost of abatement is estimated at $684/ton at a level of .15 million tons. According to the model, the net benefits should reach $130 million with a benefit-to-cost ratio of 26.8.

Figure 2:

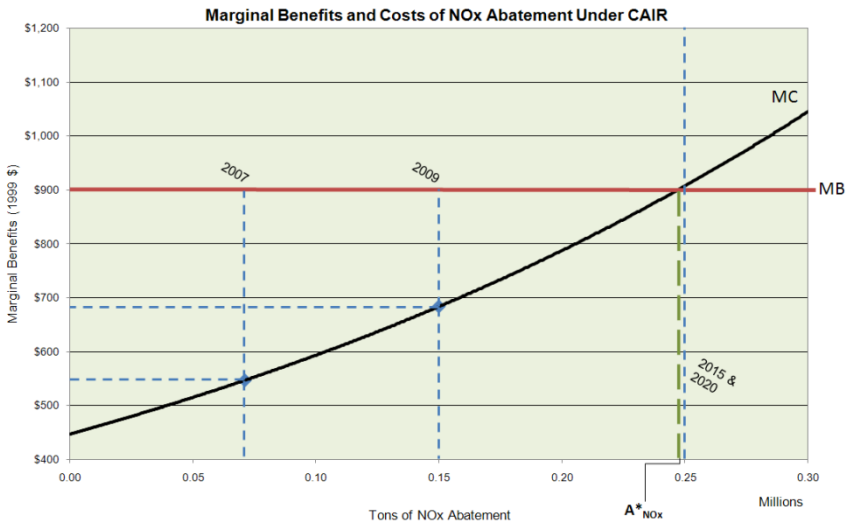

Table 3:

Net Benefits of NOx Abatement
(millions of 1999 $)

	Total Benefits	Total Costs	Net Benefits	B/C Ratio
2007	64.0	1.1	62.9	56.6
2009	135.0	5.0	130.0	26.8
A*	222.3	13.6	208.7	16.3

A^*_{NOx} represents the efficient level of seasonal NO_x abatement (247,000 tons) in this model. Even at this level of abatement, the benefit-cost ratio is 16.3. This signifies a substantial social benefit with respect to costs of achieving the abatement level. Under CAIR, projected abatement levels for 2015 and 2020 fall at about 250,000 tons of seasonal NO_x. Since there is an additional annual NO_x allowance trading program under CAIR, reasonable price forecasts for seasonal NO_x could not be used to improve the accuracy of the model. At an abatement level of 250,000 tons, however, the CAIR program falls within 3,000 tons of perfect economic efficiency. Perhaps in assigning phase II caps for the seasonal NO_x emissions requirements, the EPA's air quality model developed similar results as this model and the cap was set in attempt to achieve economic efficiency through CAIR's market based allowance trading program.

Table 4:

Study	Benefits Estimate (billion dollars)	Comments
Burtraw el al. (1998)	$29.8	Projected Annual Benefits of Title IV in 2010
Muller et al. (2007)	$31.0	Estimate of SO2 and NOx Abatement in 2000
Ostro (1998)	$32.0	Achieving Particulate Matter (2.5) NAAQS from 1994-1996 baseline concentrations
Chesnut (1995)	$35.3	Projected Annual Benefits of Title IV in 2010
EPA (1999)	$110.0	Projected Annual Benefits of Title IV in 2010
Chesnut (2005)	$122.0	Projected Annual Benefits of Title IV in 2010 including benefits to southern Canada and several local benefit studies

In the literature, studies show total annual benefits of SO_2 and NO_x reductions projected to reach roughly $30-35 billion relative to levels of pollution that would be present absent air quality programs from 1990 onward. Two studies, EPA (1999) and Chesnut (2005), projected the total annual benefits of the acid rain program well over $100 billion. The model presented in this paper estimates benefits of CAIR in its initial years of implementation (2009 and 2010) around $10.9 billion without an estimate for annual NO_x reduction. In 2020, the model estimates annual benefits of CAIR around $13.1 billion, again without an estimate for annual NO_x reduction. The EPA projects CAIR to result in $85-100 billion in health benefits and $2 billion in visibility benefits by 2015. Judging by this estimate and the benefits estimates of the acid rain program, it is apparent that the model in this paper is a great underestimate of potential benefits of CAIR.

The low-limit nature of this model provides a useful point of economic analysis. In this study, it is shown that the economic benefits of reducing air pollutants are much larger than the costs of pollutant abatement. With undervalued benefits, the actual benefit-cost ratio is most likely an improvement from the results presented in this model.

FINAL REMARKS

The economic and environmental success of the ARP of Title IV has set the foundation for air quality policy both in the US and worldwide. Critics of cap-and-trade programs for environmental improvements have been silenced by the efficiency of markets—a great victory for economists—as market based programs begin to conquer the world of pollution policy.

This paper is intended to be used as potential framework for future benefit-cost analyses related to market-based air quality policy. With firms actually assigning a dollar value to a ton of pollution abatement, the guesswork on the cost side of analysis is minimized resulting in higher accuracy and better future projections of costs. The benefits of pollution reduction remain vague in the literature. Ambient air quality infiltrates sectors of society in millions of ways that are not, or cannot, be valued and this ambiguity lends uncertainty toward scholarly results. It appears that the literature has begun to narrow the range of health benefits, but skepticism persists.

Ultimately, this paper allows for the understanding, discussion and analysis of air quality policy in the US. The economics of environmental regulation will continue to become a point of interest for those concerned about the human impact on the natural resources. Given that policy provides the opportunity to curb the negative externalities on the environment, it is imperative that research and analysis in this area continues as there is no alternative for clean air.

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ENDNOTES

1.

- The 2008 and 2007 projected emissions without CAIR data for both SO2 and NOx, respectively, were interpolated using a third order polynomial regression of the 2010, 2015 and 2020 EPA estimates as well as actual 2003 baseline levels.

- The 2009/2010, 2015 and 2020 actual (projected emissions with CAIR) data, the 2009/2010 projected emissions without CAIR data, and the actual 2007 seasonal NOx emissions data were gather from the EPA.
- The actual 2008 annual SO2 emissions level was obtained by extrapolating a third order polynomial regression of actual EPA emissions data from 1980 to 2007.
- The 2007/2008 allowance prices are based on Evolution Markets' actual spot-trade pricing. The 2009/2010, 2015 and 2020 data are EPA forecasts. All values are inflation-adjusted to 1999 dollars.
- The marginal benefits are adopted from the Banzhaf et al. (2003) study. These values are in 1999 dollars.

2. It should be noted that all dollar values used in this section of the paper have been adjusted for inflation to 1999 dollars using the BLS inflation calculator.
3. Total costs were calculated by taking the definite integral of the MC function with a lower limit of zero and an upper limit of the level of abatement in the specified year. Hence, total costs are defined as the total dollar value spent by firms on emission allowances.

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