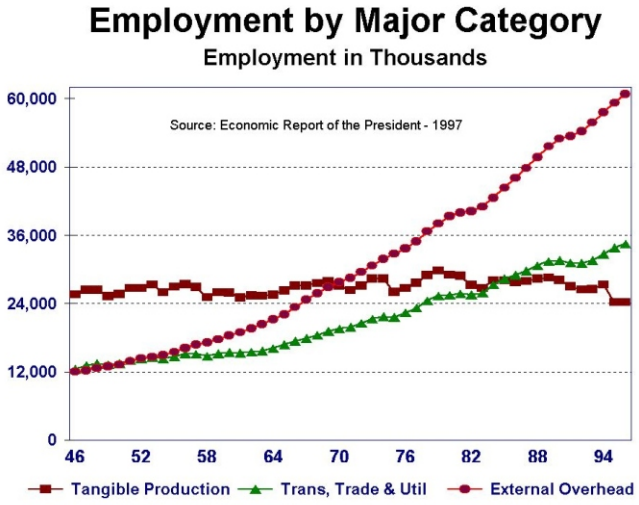
Measurement of the

Industrial Economy

Second Edition



Frederick M. Zimmerman

University of St. Thomas Technology Press

St. Paul, Minnesota

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ISBN 0-9624229-8-3

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Dedicated to

Hans Anthony Zimmerman

Brigitte Aimee Zimmerman

Christina Joanell Zimmerman Ristau

Carita Michelle Zimmerman

Frederic Josef Zimmerman

and especially to my dear wife

Joanell Eleanor Zimmerman

and her seventy foster children

Background

This report is based on the premise that manufacturing, construction, mining and agriculture are essential to the prosperity and social fabric of nations and communities. These industries provide good jobs and create value and wealth which is shared by the general community. Advantageous activities in the producing industries bring economic health to neighborhoods and provide dignity to the people who live there. There is also evidence suggesting that the multiplier effects of investments in the industrial economy are higher than with comparable investments in services and retail trade.

If essential producing industries fall prey to internal disorganization or intense international competition, not only will people in these industries be affected, so will everyone else. The service, entertainment, government and financial economies are all affected if the industrial economy is weak. During this era of intense international competition, it is important for us to effectively measure the status of our industry.

Yet our measurement of the precise inner-workings of the industrial economy lacks insight, accuracy and, often, relevance. Our economic statistics are filled with confusing and counterintuitive data elements that often either disguise the truth or distort it — often because it is not always pleasant to accurately measure the results of our policies. So, while we continue to look good statistically on a few measures, jobs are being lost, communities are shrinking, income distribution is widening, deficits are mounting and an increasing number of essential products are no longer produced in the United States.

Many people; labor leaders, industrialists, factory workers, business journalists, eminent scholars, scientists, engineers and a few dedicated public employees all seem to recognize the inconsistencies between statistics and real world observation. What we have attempted to do is to organize new methods for understanding our industrial economy. We hope the work will prove valuable.

Members of the McKnight Foundation staff heard of these efforts at an early stage. The Foundation was kind enough to provide the University of St. Thomas with an appreciable grant that made the research possible. We are greatly indebted.

The research was conducted by the Graduate Program in Manufacturing Systems and Engineering of the University of St. Thomas. With approximately 350 graduate students enrolled in four master's programs, St. Thomas is one of the larger graduate level manufacturing schools and has received formal engineering accreditation from the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). This department of the University of St. Thomas has had a long and intense interest in Minnesota's industrial economy. Faculty members such as John Povolny, Edward Rzepecki, Robert M. Johnson, Arnold Weimerskirch, Glen Thommes, Ronald Bennett and Fred Zimmerman have all been active with companies, governmental units and labor unions in nurturing manufacturing in our region. Research and articles on manufacturing from this department have been published in *Twin Cities Business Monthly, CityBusiness*, the *Star-Tribune*, the *Pioneer Press*, *The Journal of Applied Manufacturing Systems* and elsewhere. We believe a better understanding of the workings of the industrial economy will benefit both rural Minnesota and the core cities so that more people can be employed.

Acknowledgments

This project was managed by Dr. Frederick M. Zimmerman, Professor of Manufacturing Systems Engineering programs at St. Thomas, but would not have been possible without the supportive assistance of department colleagues including John Povolny, Edward Rzepecki, Robert M. Johnson, Glen Thommes, Ronald Bennett, Dave Braun and Michael Schwartz. Their day-to-day anecdotal testimonials arising from their combined 200 years of industrial experience added much wisdom to the project. Help was also received from Dr. George Allen, retired Senior Vice President for Research and Development at 3M.

Much of the data was enthusiastically collected by three of our graduate students, Elvira Medina from Colombia, Kevin Schmitz of the United States and Giridhar Addagudi from India, all of whom have industrial as well as academic experience in both the US and overseas. Another graduate student, Gaylen Schaubroeck provided valuable assistance in managing and organizing the project. Editing help was provided by Carmen Peota.

We must also express our appreciation to the panel of experts who contributed their assessments of the industries likely to spawn strong industrial employment in the future. Among them were Kieth Gardiner of Lehigh, Raj Suri and Marvin DeVries of Wisconsin, Leon McGinnis of Georgia Tech, Philip Wolfe of Arizona State, Bill Omurtag of Missouri and Robert M. Johnson, John Povolny, John Walker of the University of St. Thomas.

I also appreciate the many constructive and helpful comments I received from my friends and colleagues during my time as a visiting professor at the University of Minnesota Hubert H. Humphrey Institute of Public Affairs. John Adams, Jim Hogg, John Brandl, Lee Munnich and Ed Schuh have all been friends for many years and the manuscript has benefited greatly from their wisdom and experience. Also appreciate the encouragement and special information provided by Art Hill of the University of Minnesota Department of Operations Management who was kind enough to loan me some key books for this report.

A very special thanks is extended to my friend, Dave Beal, Senior Business Columnist for the Pioneer Press, whose wise counsel and excellent suggestions did so much to improve the quality of this work. His several decades of practical experience in covering the nation's business matters added both insight and encouragement for which I am deeply grateful. Also helpful were the suggestions received from Frederic Zimmerman of the Food Science Institute of Stanford University.

Those of us at St. Thomas greatly appreciate the McKnight Foundation's willingness to provide funding for this research based on its interests in rural communities and core cities.

Most of all, I appreciate the contributions of Joanell, my wife of 35 years, who heard of the principal findings of this study, and offered her reflections, more often than I am sure she cares to remember. Our sons and daughters, Frederic, Carita, Christina, Brigitte and Hans, were also helpful in so many ways.

Table of Contents

Introduction — Measuring our Measurements

There is no longer time for routine acceptance of the statistical methods we use to portray our economy. There are too many contradictions and lingering questions — too much at stake and too many livelihoods in jeopardy — too much unemployment in small towns and core cities — too much destitution on the part of people who at one time had hope.

Much of the country appears to be doing well, of course, but even this perception does not reduce the need for better measurement. Even the apparent prosperity raises new questions. Does the prosperity reflect actual advancement or are we living off of our future? Is the prosperity real or is it an imitation? Is it an outgrowth of accomplishment or is it merely the squandering of savings accumulated at other times? Do we really have a well-thought-out program for the future or are we bouncing for one unprogrammatic endeavor to another without really examining what we are doing or how well we are doing it? If we are doing well, are we doing well enough to retain our competitive edge? And, if we are, why are trade deficits increasing? We are doing well in some industries. Where are we doing well and do these industries employ enough people at high enough wages to ensure national prosperity?

This study focuses on the industrial sector for two reasons. We are convinced that a strong industrial sector is absolutely vital to prosperity generally and because we see major transformations that concern us. We are particularly interested in the following eight questions:

1. **Are we investing enough to be cost-competitive with other emerging industrial countries?**
2. **Does it matter which industries are expanding or contracting if the economy is healthy.**
3. **Are the industries that are expanding those which will provide good jobs in the future?**
4. **In which industries is there adequate progress? Which are in jeopardy?**
5. **As inner-city industry gets older and less productive, will there be anything to replace it?**
6. **Are we making productive use of the capital resources we have available?**
7. **Can we remain competitive with such a small fraction of our people in production?**
8. **Are the activities of finance resulting in higher, or lower, investments for the future?**

The purpose of this project is to develop economic indicators that will provide meaningful, reliable information on trends and developments in the industrial sector of the United States and the Upper Midwest in particular. A primary objective is to suggest new analytical tools and measurements that will be useful to public and private sector leaders for the development of policies leading to healthy industries capable of providing long-term, viable employment for our citizens.

Current indicators do not provide meaningful data on the special problems facing our industrial sector during this time of vigorous world-class competition. Time delays, naive assumptions, out-of-date industrial classifications, limited industrial experience on the part of analysts and the long-established convention of portraying

state economic statistics in a favorable light, all compromise the quality of our industrial measurements. Minnesota is not worse than other states in this regard, but it is not better. As are the children of Lake Woebegone, all states are above average if their own statistics are to be the guide.

During the early 1990s in particular, our economy was filled with contradictions. Unemployment was low, but poverty was increasing. Both profit rates and real wages were declining over long periods. The dollar was losing value, but trade deficits ran at record levels. The stock market was up, but companies and units of government were declaring bankruptcy. There were reports of widespread prosperity, and yet we were a society that was going more and more into debt every year.

Some people offered political explanations, pitting one class against another with the hope of appealing to one group or another. Yet in our travels within the industrial sector, we heard workers and managers, labor leaders and industrialists expressing concerns about the same things: employment, solvency, competition, trade barriers, rising costs, health insurance, retirements, downsizing, restructuring and much more. Both the problems and the skepticism are widespread enough to make dogmatic solutions impractical. The more constructive way is to intensify our analysis of what is happening and correct the practical operating problems before us. We are all in this together.

Statistically, our industrial sector has a great capacity to create valuable jobs for our citizens. These are generally, but not always, well-paying jobs. Industrial expansion triggers growth in other sectors -— more so than is the case with expansion in services or trade. The output of the industrial economy generates more export earnings and can help to buffet our society from financial instability. The industrial sector is especially vital to core cities and rural communities. Other segments of the economy have proven to be anemic if the industrial sector is weak.

By 1996, the US economy had retained some of its prior vigor but, again, with record level trade deficits and very high budget deficits. Labor relations became more contentious in some circles as evidenced by the fractious UPS strike. The stock market remained high but with volatility. Some industrial companies had learned to compete effectively in world markets but others withered in the face of intense international competition. The future looked a little better, but still uncertain.

This study proposes some new measurements of our industrial economy that we hope will better serve the long-term needs of our region, particularly the core cities and outstate Minnesota. What is offered here is a proposal -— new ideas for looking at the industrial economy more introspectively. Some of the proposed measurements make use of existing, but rarely used, statistics. Others pose more difficult data collection obstacles. In other cases, the quality of the data at this stage of development is problematic. We will discuss these proposed concepts with the thought that if an approach has potential, the data can be screened further. In total, we are not proposing new data collection systems that are expensive and burdensome. Instead, we are making new inferences from existing, but rarely used data sets.

We began this study by reviewing the measurements used in other countries. Often, we found methods similar to those we employ here. Occasionally, we found exciting new measures that would appear to have potential for application in our country. In total, we used a lot of overseas data for a very important reason. Our nation is competing with other countries every day. This fact requires understanding of other economies and the rationale behind the measurements they use.

This report is not largely a study of economics. It began as a study of industrial systems conducted by a manufacturing engineering department at a university quite known for its rapport with industry and labor. It soon became apparent, however, that the problem we were studying was multidisciplinary. Our nations competitive problems involve manufacturing, education, law, culture, discipline, honesty, internal efficiency, fiduciary responsibility, government, moral conditioning, transportation, and almost every aspect of our society. We cannot lay the blame at the doorsteps of the mere 12 million people involved in manufacturing direct labor. There aren't enough of them. We are all part of the problem and each of us owes our nation and its people better efforts toward a solution.

Solution Driven Information

The distinguished professor of management, Andrew Van de Ven, once noted that unsuccessful companies make decisions on the basis of available information. Successful companies go out and obtain the information they need in order to make good decisions. The distinction is pertinent to the examination of our industrial economy. We have a lot of information but much of it is not useful in solving the competitiveness problems we have before us. To prevail, we must seek and develop the information appropriate to the problems we have before us.

For most purposes, the presently available data displaying general trends in manufacturing employment does not reveal the true health of an industrial economy. It does not, for example, show the strengths and weaknesses of manufacturers, nor does it identify competitive pressures for specific groups within the manufacturing sector. All economic activity, however bizarre, is deemed roughly equivalent if transaction costs are similar. Today's economic statistics posture indifference between tobacco, industrial machinery, gambling and precision instruments. There is no importance rating — no qualitative form of economics. As a result, the information available is not well-suited to assist in the formulation of public policy — either with respect to our emerging social problems or with respect to examining the status of our industrial sector.

There are many ways our current industrial statistics are inadequate. Our long-established custom of capturing employment information by Standard Industrial Classification (SIC) codes describes the basic industry, but normally does not tabulate the activities conducted. Converted plants, warehouses, research laboratories, branch sales offices and corporate headquarters are often listed as manufacturing enterprises when little manufacturing takes place. For example, three prominent manufacturers, Valspar, Horton and Donaldson, no longer do any manufacturing in Minnesota but are listed as Minnesota manufacturers. With the exception of limited pilot production, General Mills no longer manufactures here either. Yet the published statistics indicate that manufacturing employment is increasing. This shallowness disguises the real state of manufacturing in Minnesota and elsewhere.

In many other areas, we lack information about how trends in manufacturing are affecting other industries (industrial linkages). For example, the role suppliers play in end-product market penetration is not appreciated in current U.S. measurements. The input/output characteristics of our economy are neither clearly understood nor are they routinely considered in matters of policy. Tax increment financing may not always have economically positive impacts in part because it is often unrelated to industrial linkages. We should have much better evidence of what supplier capabilities are needed to ensure success among end-product companies and of our economy in general.

In other respects, we completely ignore the international dimension. We are fond of saying that Minnesota is a Mecca for medical device manufacturers just as we used to say we were a leading computer center. In reality, medical device manufacturing is shifting overseas in much the same way the Minnesota computer industry vaporized ten years earlier. We ignore, also, the relative world market positions of our leading firms. Is General Mills really a large food company? It is certainly much larger than Malt'O Meal, but is minuscule when compared to Nestles. If we are going to discuss international competition, we must not be general. Our country will not have a favorable trade balance until specific companies produce high-quality products for world markets. There is no general solution — only specific solutions.

Section I -- Prosperity and its Indicators

The industrial economy is an endeavor of society aimed at providing for the economic and social welfare of its citizens. It is not primarily an activity of government, though some governmental actions may be helpful. If the industrial economy is not healthy, other sectors of the economy inevitably become weaker — perhaps leading to destabilization, chaos, and upheaval of the most unsatisfactory kind. Things never get better for a nation whose industrial economy is weak. They only get worse.

World Economies in Transition

As the acclaimed University of Minnesota professor, Ed Schuh, has observed, the global economy is going through a massive restructuring as we all become more integrated with each other in response to a growth in trade which is much larger than the growth in world output. There will be winners and losers in this restructuring since it is driven primarily by the search for efficiency gains which some of us may not choose to achieve. Lower cost ways of doing things will no doubt be sought in all of our endeavors — in manufacturing, finance government, education and other of our activities. Although the resulting changes may be difficult for many of us, the overall process is a healthy one for its potential to provide gains resulting from new efficiencies along with the possibility of reduced disparity in the world's income and wealth. After all, we are all world citizens as well as citizens of our respective countries so we should look forward with enthusiasm to at least some of the changes that are taking place.

To individuals and to individual countries, the changes may be quite major, however. The factory worker in Chicago, St. Paul, New York or Peoria must now provide a higher benefit to cost ratio than the worker in Singapore, Milano, Sao Paulo or Monterey. In some cases, this will be possible because higher degrees of automation and work organization. In other cases, competing will be difficult because of higher cost structures at the place of employment, even if the wages themselves are not higher. Companies as well as people are involved in this struggle. Managers and staff people are not more immune than people on the production line — nor are people in indirect activities such as accounting, law, finance or government. Each of us is engaged in a worldwide struggle to improve our efficiency and to operate more cost effectively for not much more than the right to continue doing what we have done before. It is not likely to be easy.

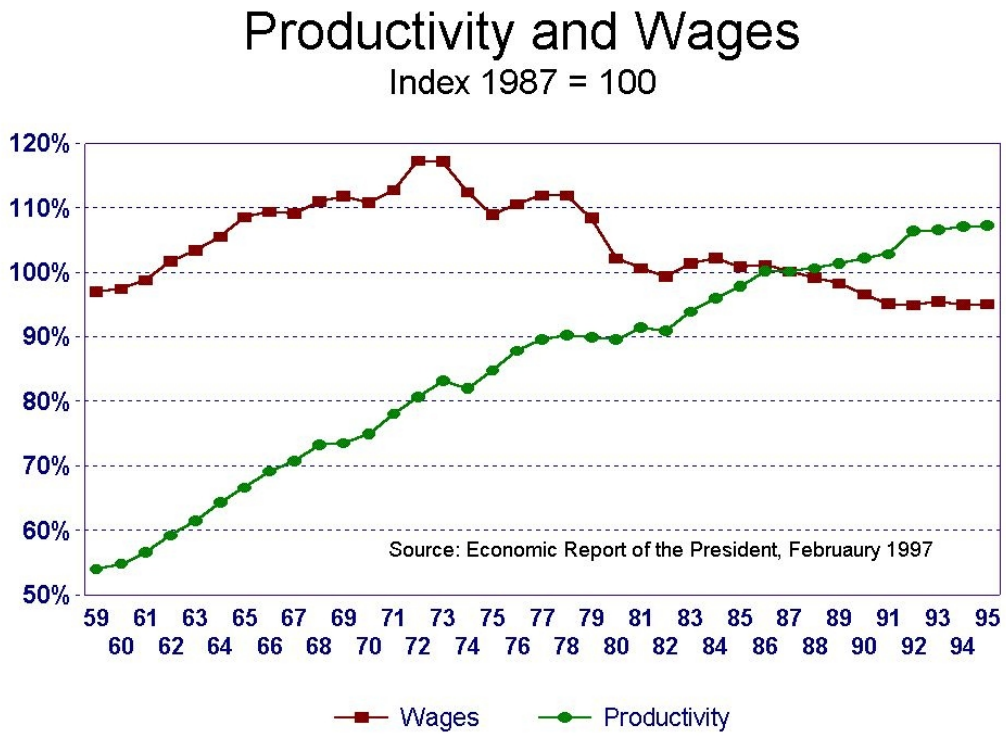
Some of us will no doubt attempt to exclude ourselves from participation in this vast restructuring. We will want to keep our salaries where they are, keep our benefits where they have been and avoid taking on new responsibilities. As appealing as this may seem for us as individuals, our reluctance to participate is unlikely to alter the course of powerful new trends. With the increase we are experiencing in world trade, both manufacturing capacity and technical expertise are proliferating rapidly. More and more of the world's people are aware of the American dream and may aspire to it with even more vehemence than many Americans. So, the issue is not how we can alter the flow of world events but how can we integrate our own personal and company strategies with the unfolding of world events which are the natural consequences of advancements in transportation, technology, communications and science.

Unfortunately, not everyone is equally affected. Improved capabilities on the part of overseas manufacturers may create problems for some workers and companies but may be of great benefit to US consumers. The world renown expert, the quality craft person, the efficient manufacturer may all survive quite well even though adjust— even as productivity has increased. U.S. workers and small business people have been losing ground.

Average weekly earnings (in constant 1982 dollars) in the U.S. private sector declined from $315.38 in 1973 to $255.89 in 1991, a decline of 19 percent. Based on a more recent 1987 index, Figure I -1 shows US wages and productivity have moved in opposite directions since 1973. In fairness, there has been criticism of the methods used to compute real wages citing the fact that the Consumer Price Index overstates inflation and that the cost of fringe benefits has increased. However, there has been at least some inflation and the fact that health care has been rising in cost does not mean workers are better off. As a practical matter, the workers share of ever higher medical costs has been increasing to make the issue one of the most inflammable in labor relations today. Also, the real wage figure represents before-tax income. Higher income taxes, computed at rates not adjusted for inflation, higher social security taxes, and higher state and local taxes have all combined to reduce further the standard of living of American workers, both blue collar and white collar. Collectively, the evidence suggests that the standard of living of American workers declined for two decades.

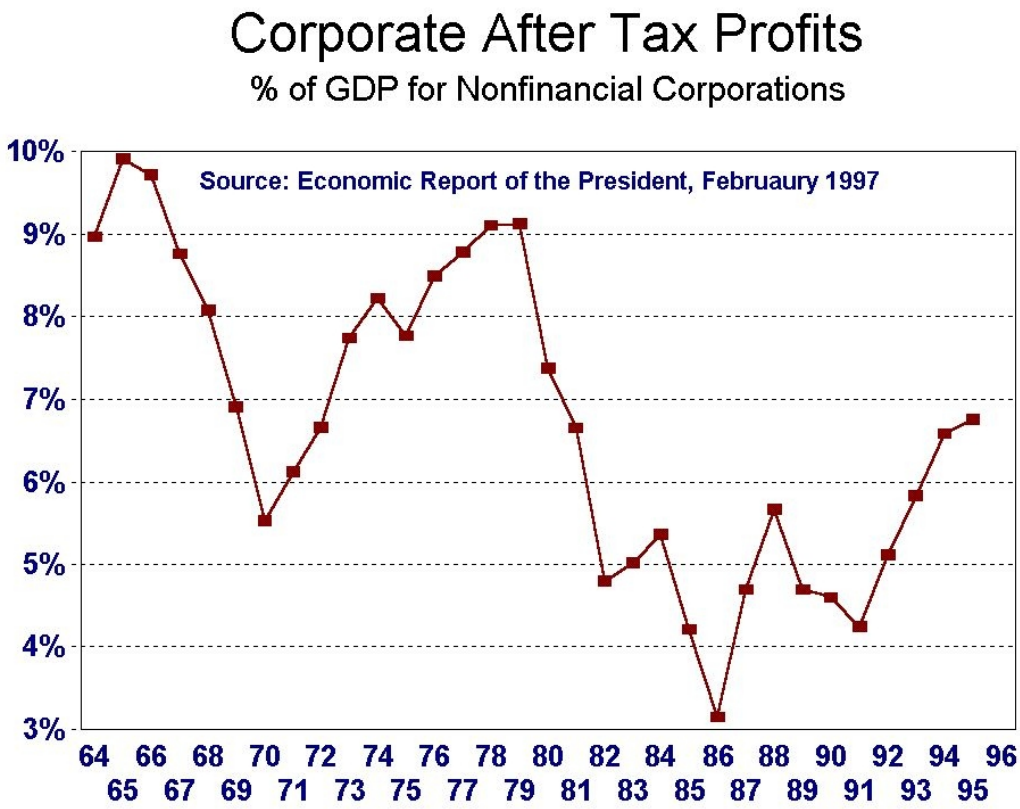
Figure I-1

Meanwhile, during the late 1980s and early 1990s, corporate profits were doing no better. Corporate after-tax profit rates declined from the 8 percent to 10 percent range in the 1960s to the 3 percent to 5 percent range in



the late 1980s and early 1990s (Figure I-2). Some recovery in corporate profit rates did take place in the very robust 1994 to 1997 period and wages ceased to fall in real terms. But, complications were still in evidence. Dividends were greatly increased as a percentage of available profits — presumably to preserve stock prices. Profits retained for reinvestment declined from approximately 4.8 percent of corporate revenue in the 1960s and early 1970s to 1.5 percent in the late 1980s and 1990s with only some recovery during the 1994 to 1997 period. The United States had achieved a unique twist in the distribution of income. Both workers and companies were becoming worse off at the same time.

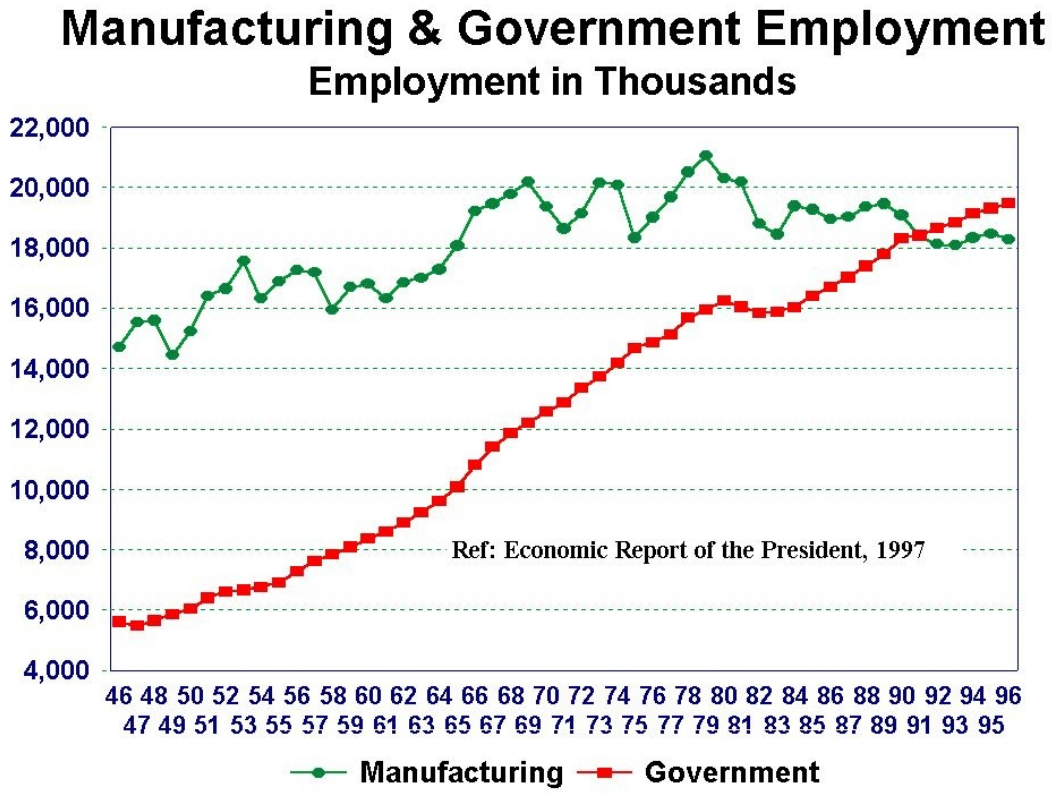
Figure I - 2



Nowhere were the changes more substantial than with small business. Small proprietorships, with their family traditions, shrank in number and in compensation. Non-farm proprietorships, which had accounted for more than 10 percent of national income in the 1950s, yielded only 7.4 percent by the 1990s. Rental income was down even further, from 3.6 percent in the 1950s to an aggregate loss in the late 1980s and early 1990s. Corporate profits fell from 13 percent of the national income in the 1960s to 8 percent in the 1990s. Farm income declined 3 percent to less than 1 percent. By 1991, U.S. national income was made up almost entirely (86 percent) of employee compensation and interest as opposed to the 71 percent it had been three decades earlier. We had driven small producers, proprietorships and farmers into positions that were largely inconsequential to national economic events.

Behind waning disposable personal income, other changes were taking place in the economic landscape of the United States. An increasing share of U.S. earnings were being devoted to the delivery of services, not all of which were voluntarily sought but instead were forced requirements for existing and working in the United States. Higher aggregate expenses for legal services, child care, financial services and insurance all increased the living costs of those people whose incomes were declining. Services grew from 42 percent of disposable personal income in the late 1950s to 51 percent in the 1990s, more than $4,000 more per capita in constant 1987 dollars. As our economy displayed statistical advancement, much of what was being purchased was either involuntarily selected or of minimal long-term benefit.

Figure I - 3



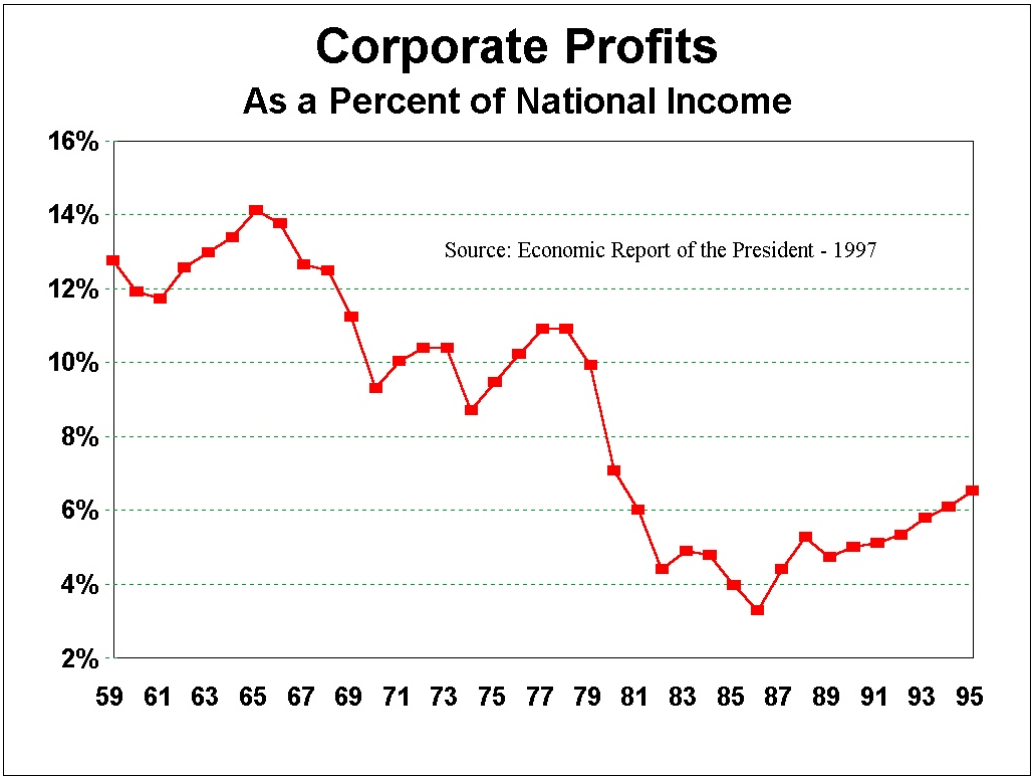
The result of these shifts in national income generation patterns was that our economy became more dependent upon a different set of major employers, the vast majority of whom were not industrial employers. In state after state, the largest employers ceased to be industrial companies and became, instead, units of government, financial companies, hospitals, school districts, retailers (with part-time workers) and public utilities. By 1992, only five industrial companies were numbered among Minnesota's largest 25 employers and none of them were expanding. The year 1991 was a watershed for the United States. For the first time in the history of the nation, civilian government employment exceeded manufacturing employment (Figure I-3).

For families, the same trend was repeated over and over. The wages of the family's principal earner were declining so the nominal gap was made up by members of the family taking on additional work. Sometimes another member of the family became an additional wage earner. Sometimes the principal wage earner took on a part time job or more overtime. Sometimes school-aged youth became wage earners. Since new transactions were involved, this additional work activity reflected favorably in the national economic statistics, but these nominal advancements disguised the fact that people were struggling harder to keep pace with their many obligations. It was a trend not without some cost to the social fabric of our nation.

In spite of hard work and productivity gains on the part of America's workers and business people, they have not gained much ground economically. This is true of both workers and corporations — perhaps because the fruits of these activities are not accruing the same way they once were. Lawsuits, mandated costs, hostile take-

overs, and other activities, some of them laudable, have all siphoned money out of the industrial sector of the country at a time when international competition is escalating the need for funds. Governments and other overhead activities have greatly increased their expenditures and hence drawn greater proceeds from the system. Since the 1950s, state, county, local and federal governments have been increasing their expenditures at about twice the rate of the industrial sector. In more recent years, overhead activities have been expanding during times when industries have been shrinking.

Figure I - 4



Many people of course suggest that the transition to a higher service content is a predictable characteristic of an economy in the mature stage of development and we have no argument with that premise. The question is one of degree. How much of a transition to the service economy is usual? What are the boundary conditions? Importantly, is there any possibility of diminishing returns regarding the service sector of the economy.

In his excellent 1990 article, "The Regional Service Economy — A Contemporary Mirage", the economic geographer John S. Adams challenges the notion that the service sector can grow unabated without impacting the competitive position of other segments. He identifies the "big six" service subsectors; banks, insurance, law, health care, government and professional sports and then questions whether each of these is "serving" in the traditional meaning of the word or whether each is merely shifting wealth to its own advantage. In his article, "Why Manufacturing Matters", MIT economist Bennett Harrison makes the conceptual point that "there is not — and perhaps never can be — such a thing as a post industrial economy." Manufacturing, and other forms of tangible production, still matter.

There have been other discussions on individual subsectors of the service economy and other discussions of the general viability of service dominance. The author does not choose to enter the philosophical debate as to whether the service economy is viable, effective or worthy. What is being questioned here is the magnitude of it and how it impacts other industries. How much can we invest in service and how much can we neglect our industry and still provide the standard of living so many of us enjoy?

It must be stated, of course, that many of the services provided are valuable. Education, for instance, is unquestionably an activity which often benefits all of society and, as a society, we have invested heavily in it. We might wonder whether all of the money is well spent — which it probably is not. But, we cannot escape the fact that some of it is. There are certainly some conscientious lawyers, many self-sacrificing doctors, dedicated teachers and many representatives of the service sector who fulfill their roles as citizens in exemplary ways. We would like to avoid the problem that has plagued so much of the nation's political system — the tactic of categorizing whole groups for their contribution, or lack of it. Our belief is that we are not dealing with categorical problems which can be easily solved with sound-bite remedies. The problems are deeper and less aligned with political doctrine. In the main, they are arithmetic problems. How much overhead can we have, what is it doing and who will pay for it? And, what are the variances in quality in both the service sector and in manufacturing?

The task of competing internationally cannot be blithely assigned only to the people directly involved in manufacturing. There are not enough of them to account for the cost differences we are seeing. The competitive position of the United States is a far greater problem involving almost every aspect of our society. The effectiveness of our societal institutions, the efficiency of our government, the capabilities of our education systems, and the way we deploy our resources — especially human resources — all make a difference in how we compete internationally. Industrial measurements systems, if they are to be effective, should go beyond the narrow classification of what is “industrial” to consider at least a few infrastuctural and support system factors that also impact our ability to compete.

Prosperity and Individual Industries

All industries are important to employment, of course. However, some industries are regarded as more valuable by the buying public. More value is generated in some industries than it is in others simply because of market transactions. In many cases, this means more value per employee. Empirically, there is a correlation between value-added activities and wages paid. Not surprisingly, those industries manufacturing higher value-added products or providing higher value-added services tend to pay significantly higher wages than those industries providing lower value-added products. Figure I - 5 shows this relationship for a set of three-digit manufacturing industries, which was derived by combining special information made available for 1990. Note that hourly wages (1990 data) tended to be substantially higher in those industries where the value-added per employee exceeded $80,000 per year.

The fact that some industries create more value than others has ramifications for the way we measure our industrial economy. If we are gradually shifting employment from higher value-added industries to lower value-added industries, which we are, we are altering both the social fabric and the financial underpinnings of our entire nation. Given our progressive tax system, real tax revenue will drop off exponentially if we shift more of our working population to lower value-added industries.

Much of the shift to lower value-added industries has already begun, of course. Our international competitors are not naive. They understand that they can make more money in manufacturing automobiles, aircraft, instruments or highly sophisticated industrial machinery than in commercial printing or snack food. Further, they understand the relative strengths of U.S. firms participating in these industries. We suspect this is one reason why we have much more international competition in industries where U.S. companies are weak or poorly managed than in other industries, such as appliances, where U.S. companies are strong. Often, the manufacturing processes are similar. What is different is the caliber of our industrial presence — the capabilities of the companies involved.

With respect to value-added activities, measurement is important in two ways. First, we have to examine where we are going. Are we progressing to a more prosperous high-technology society or are we regressing to a set of industries incapable of generating enough income to sustain the way of life in the United States as we know it? But measurement is important for another reason. The inherent value of individual industries is not constant. Yesterday's major technological breakthrough may become tomorrow's commodity. Feedback is always essential in dynamic environments.

Some people suggest that industrial nations need not worry about depletion in their industrial ranks because the slack can be taken up by advancement in services that can be exported to other parts of the world, just as manufactured products are exported. Although, it is true that services have become a substantial segment of modern industrial economies, particularly the U.S. economy, we should examine in great detail how material, how rewarding and how voluntary is this trend. There are several problems with the service economy. First, it has natural limitations that serve as great impediments to expansion overseas such as licensing, local conventions, knowledge of the markets, and the high cost of delivering services at a distance. Second, according to the US Department of Commerce and others, the services industries do not produce the same employment multiplier effects as we experience with tangible production. Third, somebody has to pay for these services, and their extensive proliferation can bog down the industrial companies that provide high-paying jobs and good benefits to their employees. In addition, it is not clear that the raw quality of many of our services is suitable for world markets.

The interconnections between social and industrial events is embodied in sociologist Russell Ackoff's observation that no problem exists in complete isolation. The solution to any problem affects every other problem. The United States exists as a gigantic system where economics, politics, industry and sociology all intersect. In our pursuit of single issues and simple solutions, we have often lost sight of these interconnections. Our national dilemmas are filled with system problems, small imperfections that combine to make the overall system function in a manner that is far short of optimal. Whether we look at currency flows, employment statistics, average income statistics, trade statistics or the number of American companies in positions of world prominence, we reach the same conclusion. The United States is at crossroads regarding the long-term standard of living of its citizens. We could continue to do well — but our future is not guaranteed.

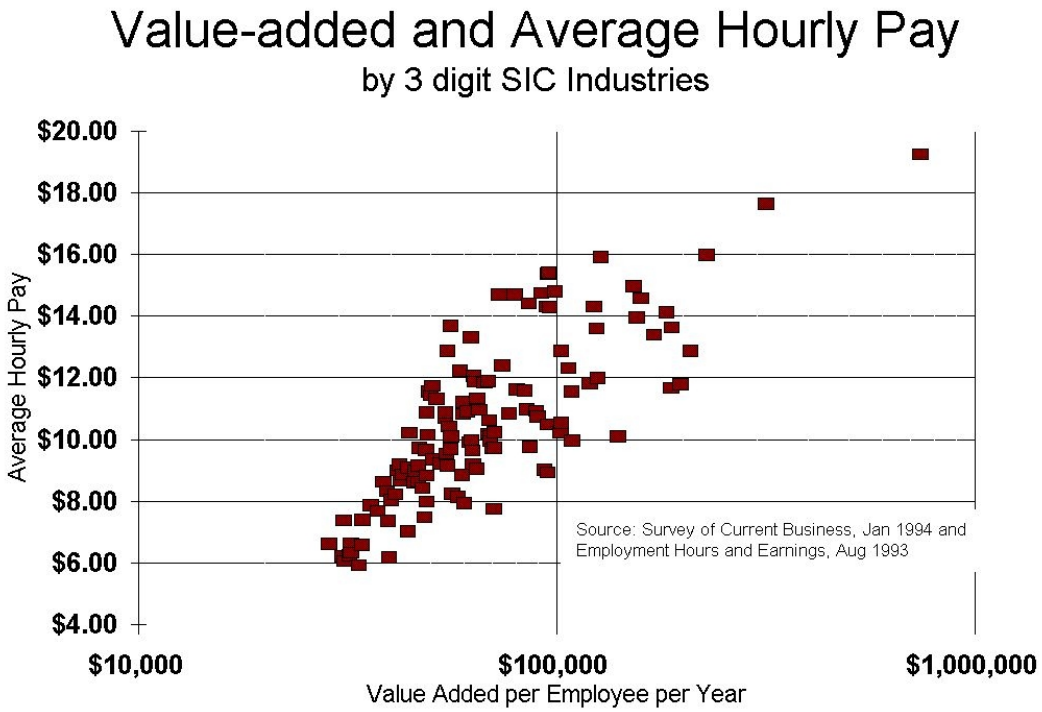
There is much to be gained in analyzing problems with a systems methodology versus the narrow and more specialized analyses we have employed in the past. A systems methodology reveals tradeoffs, how one action affects other actions. But, a change in our analytical methodology is necessary to deal with major systems problems. In addition to intense specialization, broad experience is often necessary — not always the hallmark of specialized researchers. Yet, we do not have to conclude that systems thinking leads only to a series of unhappy compromises. We can, as Mary Parker Follett pointed out 70 years ago, achieve goal integration. We can achieve solutions where major parties are collectively and individually better off than they would have been had a goal-integrated solution not been sought. Improved measurement systems should allow us to gain a better perception of where we are. The United States is a wonderful country and it is because of confidence in our country that we pursue the matter of industrial measurements. The United States does not need to have the problems that it has.

Industrial Specificity

It is usual to look at broad general statistics and conclude that the U.S. economy is doing well. The economy does go up and down, of course, and sometimes it is doing well. These analyses appear soothing, however, because so little detail exists on the really important issues lying beneath the surface of aggregate economic statistics. The United States probably does as good a job as most countries gathering statistics. Certainly, we spend enough money on it and it could be argued that meaningful information is in there some place. All we need to do is to extract it, apply proper analysis and reach conclusions. Yet, we still have these contradictions. Gross Domestic Product continues to advance as we shift our efforts to less meaningful activities. Unemployment drops, but so do real wages. Industrial production and factory orders surge, but factories are unwilling to hire new people. New business formations increase while our trade deficits worsen. These apparent contradictions raise questions as to whether the statistics on our industrial economy are rooted in sufficient specificity.

As Professor Van de Ven implies in some of his excellent writings, there are two ways we might seek meaning in our industrial statistics; working forward from the information we have or overtly finding the new information we need. Both approaches have practical value but, in general, we have tended to work forward from the information we had on hand rather than engage in the investigative information gathering the nation's fiscal

and trade problems warrant. We probably will not be able to redesign the myriad data collection systems we



now have. Yet, there are gaps that we need to understand more completely employing better measurement so that we might better understand crucial relationships.

Figure I - 5

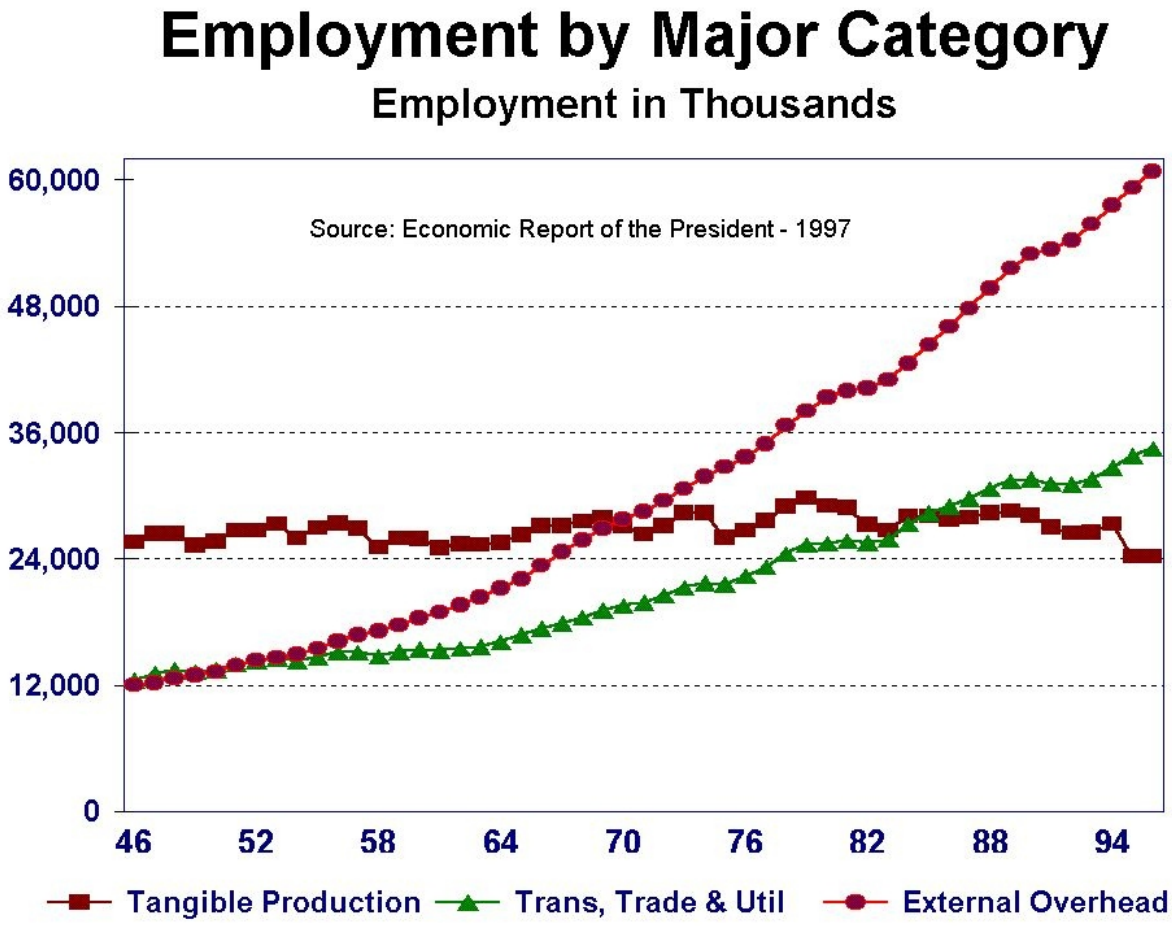
Although it is inconvenient analytically, we might find that much of the new information we need falls outside of the traditional domain of economic measurement. Our national industrial prowess is influenced by technology, work readiness, geography, finance, the effectiveness of our infrastructure and quite likely the moral commitment of all of us who participate. We may also find that some value judgments are helpful in guiding our interpretations.

Using value judgments is anathema to some scholars, of course, but the application of values to industrial problems is commonplace overseas. Quite responsibly, some argue that observers are not entitled to impose their values on the situations being examined. Some of us suggest this rigid interpretation of scientific inquiry results in bland analysis unusable in the solution of worrisome problems. We have mounting debts, huge trade imbalances, shrinking wages, burgeoning social problems and an aggregate economy that demonstrates low probability for long-term equilibrium performance. What should we do about it?

In the real world, it matters a great deal ***what*** we do. In general, we need a better understanding of secondary effects and system impacts, of tradeoffs and consequences, of sector multipliers and investment requirements. Clearly, current measurements of our industrial economy, as they are commonly reported, miss important points. Are people becoming better off? Where is the money going? Is our statistical progress real? Are we moving toward greater prosperity in the future or more poverty? Are investing enough to remain competitive?

There is information on many of these questions but it is not routinely reported or examined. Some present information is misleading. Some is erroneous. Our next step will be to examine measurement systems in place in other countries.

Figure I - 6


Employment by Major Category
Employment in Thousands
Source: Economic Report of the President - 1997
60,000
48,000
36,000
24,000
12,000
0
46
52
58
64
70
76
82
88
94
Tangible Production
Trans, Trade & Util
External Overhead

Section II -- Industrial Measurement Systems in the United States and Overseas

The first two phases of our study involved surveying systems of industrial measurement in the United States and in other industrial and emerging countries. Some of our observations on existing economic indicators used in the United States to track performance of the manufacturing sector were summarized earlier. This section will provide a brief description of a few interesting measurement systems used elsewhere.

Time did not permit us to conduct an in-depth review of industrial measurement systems in all countries. However, we did study literature from several countries in the regions of Southeast Asia, Europe, South America, the Asian Subcontinent, China and Australia/New Zealand. Our review was not as complete as we would like, but it was as extensive as we could make it within the scope of this project. Measurements in the world vary but each country makes unique contributions to industrial measurements. Our research uncovered much commonality with the U.S. and a few intriguing differences.

How the U.S. System of Industrial measurements Differs

In many respects, the measurement systems in place in other industrialized and industrializing countries are similar to those we have in the United States. However, the industrial measurement systems in place in the United States differ from those existing in some other industrial economies of the world in some important, but subtle, ways:

1. Other industrial economies appear to more selective about what activities support long-term industrial growth. Unwilling to allow a laissez-faire economic system to go unmeasured, other countries often focus more directly on the tracking of variables seen as most critical to future economic health. Problems related to industrial development tend to be dealt with qualitatively as well as quantitatively. In Korea, this may mean rigorous attention to the factors relating to an export economy. In Western Europe, attention may be more focused on factors relating to employment. In other areas, other variables are measured and followed with greater attention. Although most of these countries resist compulsive national industrial policies, they do monitor what goes on -- often with more deference to the welfare of society's members than we employ here.

2. Industrial measurement systems in other countries are often more specific with respect to companies. The major political forces within these other industrial societies often have strong ties to industry as well as ties to both management and labor organizations. They give more attention to the condition of individual companies and less to general economic events. In the United States, we may talk about "exports." In Korea, they may talk about Samsung, a large exporting company. The distinction is subtle but important. The fitness of individual companies actively participating in world markets is evaluated routinely in some countries.

3. Rapidly expanding economies have more information on the industrial aspects of their economies. There is more emphasis on manufacturing, construction, mining, agriculture or other productive activities. There is less emphasis on financial activities, service activities or the activities of govern-

ment. The measurements are skewed more toward industrial activities and away from overhead activities. In the United States, we are more inclined to tabulate some activities as economically meaningful — even if they are not.

4. Rapidly expanding industrial economies are more likely to gather information relating to the need for large regional projects that cross industry lines and the lines between government and industry, industry and society, and society and industry. In Minnesota, we are more likely to build an ordinary office building and call it the "World Trade Center." In Taiwan, they are concerned about harbors, railroads and the infrastructure to support exporting.

This combination of intelligent coordination, eminent practicality regarding industrial questions and more people doing useful things has served our international competitors well as they have steadily gained higher market shares over the past 40 years. True, the United States did possess a temporary advantage at the end of WW2 when so much of the world industrial capacity was in ruin. But, we dissipated this temporary advantage by failing to keep many of our industries competitive enough to survive in today's hotly contested world. In 1950, U.S. corporations dominated almost every industry. Instead of investing further to sustain and expand this position, we elected to place our investments in shopping centers, office buildings, gambling establishments and bureaucratic superstructure. All along, however, the statistics we were gathering indicated more progress than we were actually making.

Some Examples of Industrial measurements Elsewhere

As Oscar Morganstern and others have pointed out, it is difficult to make comparisons between the economies of different countries. There are plenty of statistics in the United states and elsewhere so it is difficult to make the case that the data we have is insufficient. However, perceptions differ, methods differ, meanings differ and local conventions differ. Any quantitative data that spans national boundaries should at least be supplemented with actual visits to the countries involved.

Nonetheless, it is interesting to see the creative analytical approaches being taken not only in other economically developed societies but in developing ones as well. In many cases, we have similar information available here in the United States but somehow it does not seem to receive the same level of attention. Most of the information focuses on either employment trends or dollar transactions and there is certainly nothing wrong with either of these. However, in much of the rest of the world, the information goes well beyond these categories to discuss physical units of output, matters of importance to selected industries and a wide assortment of qualitative factors that might potentially impact the society as a whole. Among the more interesting examples were the following:

Singapore compares the effectiveness of their infrastructure in phenomena like the "legal climate" and education to other leading industrial countries such as Switzerland, Germany, Japan and the USA.

The European Community maintains an extensive database of physical characteristics such as kilometers of navigable inland waterways, kilometers of paved roads, electrical consumption per capita and other matters which relate directly to industrial efficiency. In addition, the Community rigorously tracks export intensity, import penetration, environmental considerations, strategies and production processes for wide assortment of European industry.

India measures the value-added portion of the country's exports rather than relying on only exports expressed in currency values. These measurements are consistent with the Indian objective of improving trade performance in those industries capable of generating the most wealth.

> Much of Latin America tracks industry revenue by type of company ownership; state, local or foreign to examine the relative strength of ownership groups operating in different industries along with any changes in investment patterns or levels.
>
> Sweden tracks the reasons for unemployment; reorganization, personal decision, breaking job discipline or other. Special statistics are also collected on the employment situation for recent college graduates by major field of study and former or present homemakers.
>
> Perhaps due to the country's historically high inflation rate, Brazil routinely tracks physical units of output in key industries such as cement, iron ore, steel, automobiles, airplanes and tractors.

The European Community is particularly thorough in the collection of data on its industries. Information on industrial processes is blended in the same documents with information on market demand, supply and competition, industry structure, the leading companies, recent trends, regional distribution, and the relevant regulations. Importantly, European industry is then compared, even handedly, with similar industries in other countries. The European Community has developed a term called the "Vulnerability Index" which lists industries, and inferentially companies, most vulnerable to foreign competition.

While figures such as the above may occasionally be available in the United States, the depth of information does not seem to make it through the interpretive stage. In comparison to the statistics in much smaller and much less developed economies, as well as many developed ones, industrial measurements in the United States seem shallow and uninteresting. They also seem to be quite disconnected from the requirements for an orderly and contented society.

Mostly, however, the more creative of these foreign industrial measurements seem to emerge from a system of logic surrounding national objectives. These objectives, sometimes written and sometimes implicit, seem less concerned with theoretical consistencies and broad generalization in favor of the practical measurement of variables most important to long-term economic development and the welfare of citizens. The concept of *free trade*, which has attracted much of our public policy here in the United States, is more apt to be *fair trade* elsewhere where the emphasis is on being able to sell about as much as you buy. Here, in the US, we express productivity in terms of dollars of revenue per direct labor hour, which is not a very meaningful measurement if there is extensive out-sourcing or if other costs are increasing. In some other countries, productivity may be expressed in terms like metric tonnes of steel per employee or value added per employee.

The United States does have a vast array of industrial statistics which does help us so we should not be too critical. However, there are many innovative measurements employed elsewhere, some of which could be employed here.

Qualitative Economics

The magnitude and seriousness of the problems in any modern industrial economy clearly require a more qualitative form of economic analysis. Quantitative methods are necessary and they provide important insights. But quantitative measurements alone are not generally encompassing enough to deal with the system problems we have before us. As a result, political parties, schools of thought, and governmental methods have made little progress on the pressing problems facing the nation — such as crime and underemployment in cities. The problems seem to get worse every year — or at least, most years. This could be because our underlying industry is not strong enough to support the society as we have built it.

The quality management movement provides a useful framework from which to consider our national economy. Although there are many definitions of quality, they all suggest that high quality implies meeting the expectations of customers. With respect to the economy we have many customers — workers, business people, new entrants, retirees, governmental units, investors, middle-class people, poor people, young people, old people and the disadvantaged. It's unlikely that we will be able to satisfy everybody all of the time though we should be able to develop approaches that could be more broadly perceived as making progress.

Industrial Measurements in Sweden

Sweden's Industrial Export Market Shares in OECD countries

Market shares for highly specialized branches of Swedish industry

Market shares for neutral branches of Swedish industry

Market shares for non-specialized branches of Swedish industry

Relative unit labor costs in the national currency

Relative unit labor costs in the common OECD currency

Relative unit labor costs in the German currency

Swedish and German exports in staple industries

Swedish and German exports in engineering industries

Swedish and German exports in other industries

Gross profit rates in the transport equipment industry

Gross profit rates in the pulp and paper industry

Gross profit rates in the chemical industry

Gross profit rates in the mechanical engineering industry

Gross profit rates in the metal products industry

Gross profit rates in the textile industry

Gross profit rates in the electronics industry

Basic points of a strategy of industrial policy

Gross and net investments by industry

Research and development costs by industry

Energy use for branches of Swedish industry by type of energy used

Productivity by industry

Development time and engineering hours per new product in comparison to other countries

In order to progress, any economy with resource constraints must choose carefully how it allocates its resources. It is as important to avoid doing what does not need to be done as it to do what needs to be done. As unrefined as this concept may seem, there is such a thing as national waste — unnecessary endeavors that squander the nations wealth. Although it will always be tempting to avoid value judgments in the application of economic policies, no judgment is a judgment by itself. Value judgments are often useful. Fortunately, we need not embrace highly doctrinaire theories in order to upgrade the practical application of the nations economic principles. We need only nurture the same sort of utilitarian common sense that gave our new nation its innovative spirit.

Industrial Measurements in India

Detailed statistical and narrative information the types and capacity ranges, applications, production, exports and future outlook of specific industries such as;

- Pumps
- Machine tools
- Compressors
- Engines
- Electric motors
- Vehicles
- Scooters
- Trucks
- Steel

Energy requirements by Industry

Communications requirements by Industry

Transportation requirements by Industry

Tax receipts by Industry

Educational requirements by industry

Science and technology requirements by industry

Occupational injuries by industry

Labor cost by industry

Ref: Reserve Bank of India Bulletin, 1993 and Kotharis Industrial Directory of India, 1994

All of us would prefer to operate within the framework of a smoothly functioning market economy. We do have a well developed market economy but it is not always clear that it is functioning smoothly. Much of the nation's capital has been spent rearranging corporate structures for the temporary benefit of corporate raiders and acquisitive minded CEOs. The jury is not in as to whether these amalgamations create any efficiencies and the divestitures that often follow a few years later would also raise questions. We seem to be able to proceed with investments in sports facilities, gambling casinos and office building while essential investments that support the nation's industrial base lay wanting or snarled in bureaucratic or legal delays in a permitting system is sometimes mutually exclusive of industrial progress. Our legal system siphons off huge "damage" awards from manufacturers well in excess of any gain in selling the product in the first place. A freely functioning market economy is always preferred — if that is what it is.

Some other countries may have done a better job of articulating a more collective view of what initiatives will help a nation progress. Perhaps they are more cynical of what counts as market activity. For instance, few of us would argue that increased smoking should count as an up-tick in economic performance. Drugs and alcohol are largely in the same category. The argument here is not over what should be permitted and what should not. The question is, if we do buy alcohol or drugs, should these transactions be construed as contributing as much to the gross domestic product as when we invest the same amount of money in something needed for the future. One easy way to make the United States look like a growing and prosperous economy under the present framework of economic statistics would be to legalize drugs, track transactions, and count them as ingredients in the gross domestic product. Many industries provides people with the opportunity to make a living but the question remains; is the economy better off because of them? Do they contribute to a higher standard of living for our citizens of the future? Do these activities contribute to the long-term satisfaction of our customers? Some countries are less bashful about making these judgments and then reflecting these judgments in the set of variables they measure and track.

Multifaceted and Multilevel Measurements

After reviewing industrial measures in other countries and observing the competitive status of U.S. industry, it seems clear that our measurements of the industrial economy should provide multilevel analysis of critical factors directly influencing industrial performance. If we are going to provide a meaningful assessment of how we are doing industrially, we have to accumulate more information by industry and by the firms and on the firms most active in these industries. At the same time, it will be important to monitor the effectiveness of our support organizations and our infrastructure to insure that they are taking the steps to strong industrial performance in the future. To achieve these objectives, we will find it necessary to examine, in more detail, how we use our resources — financial, physical and human.

The information we have collected in this study is composed of five levels of analysis. The five levels of analysis are:

1. **Aggregate measurements — relating to the national economy.**
2. **Industry measurements — relating to particular industries.**
3. **Firm measurements — relating to particular firms or companies.**
4. **Support systems measurements — relating to those activities supporting the industrial economy.**
5. **Infrastructural Measurements — relating to our society in general.**

Table II - 1
Conceptual Outline of Measurement Categories

Measurement Category	Aggregate Level	Industry Level	Firm Level	Support System	Infras-tructure
Employment Distribution	X				
Manufacturing Value-added	X	X			
Expanding & Declining Industries	X	X			
Relative Importance of Industries	X	X			
Production Worker Ratio	X	X	X		
Profit rates	X	X	X		
Retained Earnings	X	X	X		
Export Intensity	X	X	X		
Producer's Equipment Investment	X	X			
Value-Added per Employee		X	X		
Bankable equity			X		
Research & Development Expense		X	X		
Employment Changes	X	X	X		
Savings	X			X	
Non-financial (Industrial) Lending				X	
Profile of New Financings				X	
External overhead Employment	X				X
Overhead and Tangible Production					X
Government & Mfg Employment					X
Unfunded Pension Liabilities					X
Science and Engineering Degrees					X
Interest Rate Spreads				X	
Profits Retained for Reinvestment	X	X	X		

Section III -- Issues and concerns.

Problems with International Data

The purpose of this study was to explore possible new measurements for measuring our industrial economy. This work had to be carried out before a complete set of reliable data was in place. The quality of data from other countries, and other companies operating in other countries, will improve greatly within the next few years of intense international economic activity. At the moment, however, there are significant shortcomings in the completeness and timeliness of data available on international companies stemming from three major problems:

1. Many large foreign corporations are privately owned and allow less access to information.

2. It takes time to consolidate information and input it into the databases, which are readily available here in the United States. For instance, in the Moody's international database much of the information available for foreign companies is six months or a year older than it is for U.S. companies operating in the same industry. Consequently, we were often comparing U.S. performance in 1994 (a very good year) with overseas performance in 1993.

3. Recent changes in currency exchange rates will change these figures fairly appreciably — often in favor of foreign companies. Most of the international data has been adjusted to U.S. dollar equivalents based on the latest rates available in the Moody's international database at the time we did the study (February 1, 1995). Since that time, there has been a fairly appreciable volatility in the value of major currencies.

These three factors probably contribute to a bias in favor of U.S. companies and their relative strength in world industries. If these same measurements are taken over long periods, some of these biases should be eliminated. In the short term, however, it seems safe to suggest that the U.S. position in international industries is no better than it appears in this report and it could be a bit worse. Since the United States is a strong economic power, and tends to look strong in certain industries, we need not be depressed. Nonetheless, the growing prowess of international companies in important industries is impressive.

At the same time, there may be factors that portray international competitors as <u>better</u> than they actually are. Accounting practices are neither universal nor are they universally regulated from one country to another. Some assets on foreign balance sheets might vaporize under more rigorous accounting regulations. Some Asian countries, in particular, may be exposed to some future large write-downs in the value of corporate assets. Other countries have similar and other exposures.

In any case, the process of examining industrial measurements is important to pursue. Further refinement of the information is clearly necessary for thorough analysis; but what is presented here should be useful for general discussion.

How the Data was Collected

Our review of existing industrial measurements involved most of the official statistics on individual countries tempered by analytical articles published in the business and academic press. The aggregate statistics on the U.S. economy were largely taken from a wide variety of sources including the *Economic Report of the President* over several years, the *Survey of Current Business*, the *Statistical Abstract,* the *Monthly Labor Review*, the *National Economic, Social and Environmental Database* and the *National Trade Data Bank*. The international information was obtained regionally from publications such as *EC Industry* and *Business Asia* as well as from official county publications. Our general objective was to utilize existing data whenever we could. We have questions as to the validity of the information collected by several governments so, in that sense, the data situation we see overseas has attributes in common with what we have here. Still, we feel progress in industrial measurement is improved.

Data collection has its own policy dilemmas, of course. The cost of economic data collection in the United States has been roughly estimated at between $2 billion and $20 billion per year — God only knows. So, we were not anxious to come forth with proposals suggesting that these expenditures be increased. Instead, we advocate making better use of data elements that are currently being collected and then matching them with overseas information, industry studies, individual companies and financial reporting systems.

Our sources for much, but not all, of the company information for both U.S. and overseas companies were the *Moody's Company Database* and the *Moody's International Database*. We used data for the major companies in each industry as defined by the primary SIC code. This was not an entirely flawless procedure because many companies, including many large foreign corporations, operate in several major industries. It is quite likely that some of them are primary suppliers in several key industries. However, we did not want to list any company more than once. So, with very few exceptions, we abided by the primary SIC code as it was provided by the Moody's databases.

We then consolidated the various US and international companies by three-digit (SIC Code) industries. We felt that using a three-digit SIC grouping, as opposed to a four-digit grouping, would reduce the ambiguous classification problem and provide a more insightful industry analysis while sacrificing little in specificity.

The company information by three-digit industry was then linked with U.S. government employment and economic statistics for three-digit industries. We were thus able to see where there had been significant losses in U.S. employment and at the same time rapid emergence of foreign competitors.

An appreciable part of the data collection was the visiting of many factories — probably hundreds in all. Firsthand experience with U.S. and foreign factory practices and an ongoing exposure to what production equipment was being purchased, provided us with a useful perspective in interpreting the international and U.S. economic data.

Value-based Economics and Industrial Costs

National economies have things in common with individual companies. If costs are too high, it is difficult to compete. It is therefore necessary for us to look at our total costs, and our cost structure, in order to understand how we might compete more effectively in international trade.

Yet information on our national cost structure is rarely collected — a shortcoming which causes policy dilemmas. The United States has spent lavishly to accumulate statistics on the workings of our economy in the past but these expenditures have reportedly been curtailed in recent administrations. Present statistics do not adequately capture the intricacies of the precious linkages that determine success or failure of our industrial economy. Neither are they sufficiently encompassing with respect to the costs we incur and the relationship between suppliers and end product companies. Credible attempts have been made (Nobel prize - winner Leontief), but we have not paid much attention. The principal logic of input/output economics is straightforward. What is consumed must be produced somewhere. If it is not produced within the domestic economy, it must be imported and paid for. If we do not have exports, our national cash flow is reduced.

Present measurements do not always capture this subtlety. In our value-free approach to analysis, we hesitate to suggest that one industry might be preferred over another when considering long term national prosperity. Yet, some industries provide dependable long-term employment of our citizens in meaningful essential while other industries appear, on the surface, to be less supportive of industrial growth. When computing on basic measurements of industrial progress, such as gross domestic product, one industry is thought to be pretty much the same as another. Tobacco and machine tools, ball bearings and gambling casinos, precision forgings and cheap movies are evaluated equally, as long as they bring in the same money. Solid investment in plants and equipment is not clearly differentiated from speculation. Figure III-1 shows the variation in voluntary fringe benefits per worker for manufacturing industries (2 digit). The variation of $1500 per year to over $10,000 hardly suggests equality.

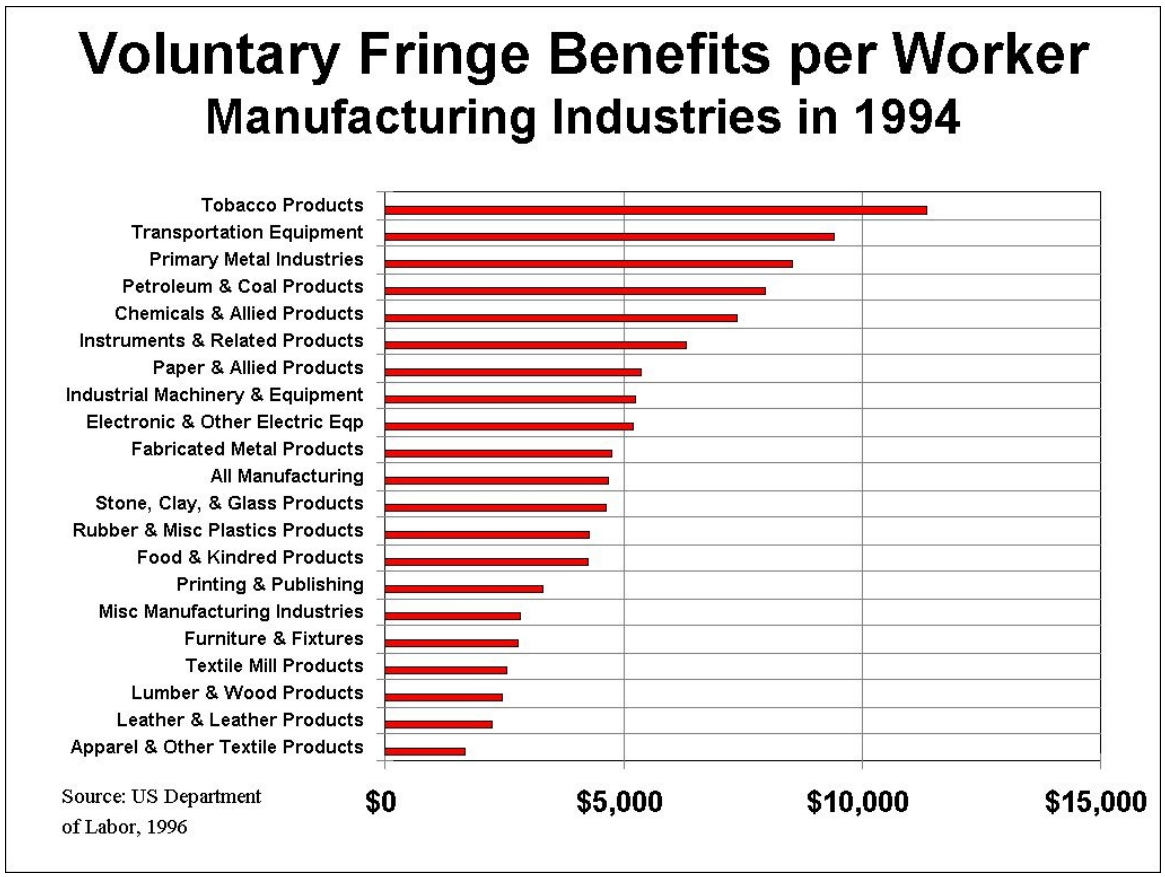


Table III-1

Some will argue, of course, that manufacturing is only a temporary stage in the gradual evolution to an advanced, information-based, economy. This perspective suggests that we should not try to prevent or even resist this increasing tendency of developed economies to gravitate to the service sector. Yet there are enormous ramifications to this perspective for both communities and people. Also, there is the sporting aspect of it all. The reemergence of the U.S. auto industry from 1992 to 1995 provides a heartening refutation of the view that

we cannot compete even if we put our best efforts forward. We are competing very well in some industries, and if we could avoid the naive approaches that make our competitive position incrementally worse, our economy could grow substantially.

It will be helpful to deal with these questions factually. With respect to our competitive position in manufacturing, we can begin by analyzing the principal cost elements.

1. Direct labor
2. Labor Quality
3. Materials
4. Component parts
5. Internal overhead
6. External overhead

We then contrast how American companies compare in each of these individual cost categories to those of other producers overseas. We should do this from the standpoint of both cost and quality.

Direct labor is not more costly in the United States than in other industrialized countries. For the most part, it is much cheaper than it is in Germany, about the same as in Japan, lower than in the Scandinavian countries, a little higher than in Korea and Singapore, and quite a bit higher than it is in Mexico. But with respect to most of our competitors, we are about on par in terms of labor cost. Per hour labor cost is not in and of itself the major reason for the shift to offshore manufacturing. The relocation of industries does not take place primarily because people are paid less in other places. Although labor cost is important, it is not the overriding factor in our nation's inability to compete. In a nation of more than 250 million people, about 16 million are employed in direct labor in manufacturing, construction and mining with a combined payroll of around $500 billion per year out of a gross domestic product approaching seven trillion. This is hardly the group to blame for the worsening trade deficits of the United States.

The source of the nation's trade deficit by trading partner (Table III-1) provides some indication of whether or not high wages are the principal driving factor in our ability to compete. The fact is that in 1993, 84 percent of our non-oil trade deficit was accumulated with trading partners with higher average production wages than what we have here in the United States. Our trade with countries with average production wages in excess of $10 per hour accounted for more than 100 percent of our non-oil trade deficit. Though labor cost may influence industrial location, clearly there are many other factors.

The **quality of direct labor** is more of a problem because our education system in the United States is weak by international standards. The American worker develops his or her competencies not because of our education system but because of the effectiveness of the on-the-job experience. Major U.S. companies can get high-quality labor in such places as Taiwan, Singapore, Mexico, Malaysia, Argentina, Brazil, Puerto Rico or the Czech Republic — in part because U.S. companies are often perceived to be attractive employers and therefore have little difficulty attracting the talent they seek. Highly competent people live in many places throughout the world. When plants are transferred to offshore locations, the quality of labor may actually improve. We should begin to recognize the interconnections between what happens at home, in families, in schools, on the social front and labor quality. These forces add to or detract from our ability to compete.

The third category, **raw materials**, is not generally a problem for US manufacturers. A world market exists for most materials, thus leveling cost differences between nations. The developed status of the U.S. transportation system, and the fact that we are well-provided with raw materials, probably provides us with a small advantage. Access to and cost of materials clearly does <u>not</u> worsen our competitive position.

An important caveat should be added regarding raw materials, however. As the rest of the world industrializes, two new developments will likely take place to alter the presently favorable position the United States currently has in raw materials. First, other developing countries are likely to compete more vigorously to supply their developing industrial bases. Second, countries supplying raw materials may forward integrate into material pro-

cessing to increase the value added obtained from their own natural resources. Both developments seem likely. Even at the present, the United States imports nearly one hundred percent of thirty key production minerals. Minerals and specialty steels may become more expensive for us in the future.

The availability of **component parts** represent more of a potential problem for us in competing in world markets because we are continuing to lose suppliers of key components and processed materials. Because key component parts, such as switches, wires, encoders and instruments, are now manufactured and shipped in from overseas and no longer manufactured here, we now have a disadvantage where we previously had an advantage. There are many examples, especially in some of our main end-product industries such as automotive, aircraft and industrial machinery, of important components now being manufactured mostly outside of the United States. As one example, one country, Singapore, now products about 70 percent of the hard drives used in computers. Korea is a leading supplier of displays for computers — including the newer flat panel displays. One machine tool control, Fanuc from Japan, has a very high percentage of the world market.

The relationships between supplier companies and end-product companies has not received the attention such an important matter deserves. If we are going to build an automobile or a VCR, then we will need component suppliers that provide such things as transmissions and recording heads. And if we are going to manufacture recording heads, then we will need precise machining equipment and other micro components. If we are going to manufacture precise machining equipment, we are going to need accurately ground bearings. Currently, most grinding equipment is Swiss and Japanese. Machining equipment is mostly German and Japanese. Heads are primarily Japanese and most major US bearing manufacturers are only a fraction the size of their Asian and European counterparts. Then we wonder why it is difficult to make VCRs or other products. Access to an efficient cadre of qualified suppliers is a major factor in manufacturing success.

Yet, though direct labor, labor quality, materials and component parts all important aspects of world competitiveness, they are not more formidable than other factors that could adversely affect our future on a grander scale. The most formidable obstacle to the improvement of our nation's competitive position is our glut of overhead. We have high internal overhead unique to the firm plus enormous external overhead that society places on manufacturers.

With respect to **internal overhead**, industrial corporations have already gotten the message and internal overhead costs have begun to decline — except perhaps in executive compensation which has continued to escalate. This downsizing of US corporations has been painful for many people to bear. Millions of middle managers, coordinators, support people and executives have seen their positions eliminated since 1980. It is tragic. However, it would be even more tragic if entire firms are forced to cease operations because they could not compete. This has happened with some of our largest, and at one time, most prestigious companies. Firestone, International Harvester, Kaiser Steel, Penn Central, Allis-Chalmers, Zenith and RCA have all ceased operations in their major businesses. The fact that companies like Boeing, IBM, Ford and Chrysler have had to downsize to remain in business should not surprise us, painful as it is for everyone involved. Some of these same manufacturers have emerged as some of our most successfully competitive organizations.

It is quite plausible, however, that manufacturers will not be able to reduce internally generated costs fast enough to compensate for the costs imposed upon them by official mandates or other passed on expenditures. Well intentioned programs aimed at improving the nation's social or environmental ills often contain costs that some citizens favor but are disinclined to fund from the tax base. Often, these costs are assigned to manufacturers or private employers generally, not always because of any causal link, but because it is politically easier to mandate costs to companies than to pass new taxes. These costs are escalating and become imbedded in the operating expenses of companies that are trying to compete internationally. Many manufacturers have seen mandated costs at least partially cancel the savings from downsizing and severe cost cutting aimed at preserving the firm's competitive position.

Our largest and most significant impediment to competitiveness is our **external overhead** which has continued to grow exponentially as it adds great cost to our industrial system. Over the past 40 years, we have witnessed a falling participation in tangible production as opposed to finance, insurance, real estate, services and government. In 1900, 48 percent of the nonagricultural labor force was engaged in tangible production (manu-

Table III - 1
United States Trade by Trading Partner for 1993

Trading Partner	Average Production Wage	Exports	Imports	Trade Balance
Total Trade		$464,767	$580,511	($115,744)
Oil Trade		$6,095	$50,361	($44,266)
Non-oil Trade		$458,672	$530,150	($71,478)
Germany	$25.70	$18,957	$28,605	($9,648)
Switzerland	$22.63	$6,804	$5,979	$825
Belgium	$21.62	$8,876	$5,177	$3,699
Austria	$20.37	$1,326	$1,411	($85)
Norway	$20.21	$1,212	$1,938	($726)
Netherlands	$19.95	$12,839	$5,451	$7,388
Denmark	$19.11	$1,092	$1,664	($572)
Japan	$19.01	$47,949	$107,268	($59,319)
Luxembourg	$18.49	$561	$253	$308
Sweden	$17.70	$2,353	$4,532	($2,179)
Subtotal of those trading partners with average production wages higher than the United States at $16.73		$101,969	$162,278	($60,309)
Finland	$16.56	$847	$1,609	($762)
Canada	$16.33	$100,177	$110,922	($10,745)
France	$16.23	$13,267	$15,244	($1,977)
Italy	$16.00	$6,456	$13,223	($6,767)
United Kingdom	$12.76	$26,376	$21,736	$4,640
Australia	$12.49	$8,272	$3,294	$4,978
Ireland	$12.16	$2,731	$2,620	$111
Spain	$11.50	$1,445	$2,813	($1,368)
Isreal	$8.82	$4,420	$4,426	($6)
New Zealand	$8.01	$1,247	$1,208	$39
Greece	$6.94	$884	$348	$536
Korea	$5.51	$14,776	$17,123	($2,347)
Singapore	$5.25	$11,676	$12,796	($1,120)
Taiwan	$5.22	$33,960	$25,105	$8,855
Portugal	$4.50	$735	$790	($55)
Hong Kong	$4.29	$9,873	$9,558	$315
Argentina	$3.30	$3,772	$1,206	$2,566
Mexico	$2.61	$41,636	$39,930	$1,706
Brazil	$2.55	$6,045	$7,466	($1,421)
Czech Republic	$1.20	$266	$278	($12)
Colombia	$0.76	$3,229	$3,033	$196
South Africa	$0.46	$2,197	$1,847	$350
Sri Lanka	$0.42	$203	$1,002	($799)
Subtotal for trading partners with known average production wages lower than the United States		$294,490	$297,577	($3,087)
Other Trading Partners		$62,213	$70,295	($8,082)
Source: US Statistical Abstract, 1993 and World Competitiveness Report, 1994				

facturing, construction and mining). If we included the employment in agriculture, which is more difficult to measure, then it is quite probable that two thirds of employed Americans in 1900 were directly engaged in tangible production. Tangible production employment includes sales people, accountants, secretaries, custodians and all people employed by corporations in the producing industries.

Even as late as 1950, the percentage of the nonagricultural labor force engaged in tangible production was still at 41 percent. By 1988, it had dropped to 24 percent; our government has issued a projection that it will be 21 percent by the year 2000 (See Figure I - 6). Meanwhile, employment in finance, insurance, real estate, government and services has mushroomed from 13 million people in 1950 to more than 50 million in 1990. Employment in overhead industries, rose from 22 percent of nonagricultural employment in 1900 to nearly half of it today.

The problem of national overhead goes far beyond government. Many of us are part of it. Finance, insurance and real estate employment has more than tripled since 1950, and some resulting activities such as the S & L crisis have not always been in the best interest of the nation's economy. Service employment has increased nearly five times, while essential services remain unaffordable to many citizens. Education has burgeoned in cost during the same period and has become less effective.

This mushrooming in employment unrelated to production has placed an extreme economic burden on the people and companies engaged in international competition and has raised their costs. Our problem is not that our people and companies do not know how to design and build good products. For the most part, US products are respected for their quality and value. Our ability to compete globally is severely affected by exceptionally high overhead cost.

Some people will suggest that our shifting employment mix is a natural progression resulting form high productivity gains in the goods producing industries and, to some extent, this argument is valid. However, the magnitude of these huge employment shifts are large enough to put us in uncharted territory. During the past 40 years, the number of total job holders per production employee has increased from 2.2 to 4.4. In 1950, the United States had only three quarters the number of people employed in overhead as in tangible production. Now there are over twice as many. This huge burden of 50 million employees paid to conduct activities unrelated to production, transportation, utilities or trade has placed a large burden on society in general, including some conscientious people who are involved in these very occupations. Our very large number of people involved in finance, insurance, real estate, services and government raises the question of how much of it is affordable. Are all of these people doing things that are essential to a healthy, productive society or is our paper clip to welding rod ratio much too high?

High overhead costs are costs that the society must bear. These higher costs impact the competitive position of producing firms and often result in plant closings causing individuals to lose their place of employment, often forever. It is operationally quite challenging for the 26 million people engaged in tangible production to supply all of the food, manufactured goods, buildings, roads and raw materials for the 230 million people who are not engaged in production and still compete effectively in world markets. As the United States struggles to provide more and more goods and services to a society that is producing less and less, deficits have increased. State and federal on-budget and off-budget deficits ballooned to nearly $400 billion in 1993 while the trade deficits remained astronomical in spite of a weakened dollar. In spite of some deficit reductions during the current booming economy, the long term situation may not be sustainable economically.

For our industrial economy to be healthy, major institutions need to improve their effectiveness while reducing costs. Without dramatic improvements in the effectiveness of these major institutions, separately contrived industrial policy initiatives will not meet objectives. Among the institutions of greatest interest are education, law, finance, economics, insurance, manufacturing, corporate governance, transportation, environmental science, energy, government, the media and perhaps most importantly, the family. We cannot address all of these in this report but we may be able to discuss some possible new measures which might more accurately gauge our overall competitive system for its cost effectiveness and for its operational effectiveness.

Improving the Manufacturing Economy of the Future

As with many other socio-technical system problems, questions surface regarding the cause of economic difficulties. Is it the lagging character of production capability? Or is it the increasing burden it must bear? Should production be increased? Or is it necessary to reduce the expenditures of the non-producing part of the system? Manufacturing and other forms of tangible production, along with essential maintenance services, provide the real economic wealth of the nation for all of its people. The future of the economy of the United States is inescapably tied to the efficiency and quality of its tangible production. In the interest of economic stability, a more favorable balance between production and consumption will probably need to be developed if our international competitive position is to be improved — or even sustained. It will be much more difficult for our competitive position to improve if we continue to accentuate the ill-suited and costly overhead which the magazine *The Economist* refers to as "the parasite economy." This 50 percent of our economy will need to improve its effectiveness if we are going to compete meaningfully in international markets. The budget deficit and the national debt pose unpredictable problems for the future — especially since we do so much foreign borrowing.

It is prudent for us to recognize that the United States makes up approximately five percent of the world's population and yet we consume roughly 30 percent of the world's resources. We, one of the wealthiest nations on earth, are borrowing heavily from poorer countries to sustain a standard of living that we do not seem to be able to afford — perhaps because so much of our economy is not oriented to wealth creation. This already huge and rapidly escalating overhead cost structure constitutes a primary obstacle to being competitive in world markets. Accordingly, the monitoring of the cost and effectiveness of this overhead pool should be an objective of appropriate industrial measurement just as concern over factory burden rates has given rise to activity-based-costing initiatives in manufacturing.

Table III - 2 Employment in the United States

Year	Civilian Empl	Ag Empl	Non-ag Empl	Goods Producing Empl	Mining Empl	Const-ruction Empl	Mfg Empl	Tangible Production Empl	% of Total%	Service Producing Empl	Transp& Utilities Empl	Whole-sale Trade Empl	Retail Trade Empl	Total Trade Empl	Finance Ins Real Estate Empl	Services Empl	Govt Empl	Check Total	Transp Trade Util Empl	% of Total	External Over-head Empl	& of Total
1959	58,833	5,565	53,268	20,411	732	3,004	16,675	25,976	40.19%	32,857	4,011	3,092	8,035	11,127	2,549	7,087	8,083	2,057	15,138	23.42%	17,719	27.42%
1960	59,646	5,458	54,188	20,434	712	2,926	16,796	25,892	39.36%	33,754	4,004	3,153	8,238	11,391	2,628	7,378	8,353	2,280	15,395	23.40%	18,359	27.91%
1961	59,198	5,200	53,998	19,857	672	2,859	16,326	25,057	38.11%	34,141	3,903	3,142	8,195	11,337	2,688	7,619	8,594	1,834	15,240	23.18%	18,901	28.75%
1962	60,493	4,944	55,549	20,451	650	2,948	16,853	25,395	38.07%	35,098	3,906	3,207	8,359	11,566	2,754	7,982	8,890	2,298	15,472	23.20%	19,626	29.42%
1963	61,340	4,687	56,653	20,640	635	3,010	16,995	25,327	37.38%	36,013	3,903	3,258	8,520	11,778	2,830	8,277	9,225	2,352	15,681	23.14%	20,332	30.01%
1964	62,805	4,523	58,282	21,005	634	3,097	17,274	25,528	36.83%	37,277	3,951	3,347	8,812	12,159	2,911	8,660	9,596	2,714	16,110	23.25%	21,167	30.54%
1965	65,126	4,361	60,765	21,926	632	3,232	18,062	26,287	36.98%	38,839	4,036	3,477	9,239	12,716	2,977	9,036	10,074	2,596	16,752	23.57%	22,087	31.07%
1966	67,880	3,979	63,901	23,158	627	3,317	19,214	27,137	37.23%	40,743	4,158	3,608	9,637	13,245	3,058	9,498	10,784	2,140	17,403	23.87%	23,340	32.02%
1967	69,647	3,844	65,803	23,308	613	3,248	19,447	27,152	36.51%	42,495	4,268	3,700	9,906	13,606	3,185	10,045	11,391	1,750	17,874	24.03%	24,621	33.11%
1968	71,714	3,817	67,897	23,737	606	3,350	19,781	27,554	36.29%	44,160	4,318	3,791	10,308	14,099	3,337	10,567	11,839	1,389	18,417	24.26%	25,743	33.91%
1969	73,989	3,606	70,383	24,361	619	3,575	20,167	27,967	35.90%	46,022	4,442	3,919	10,785	14,704	3,512	11,169	12,195	1,081	19,146	24.58%	26,876	34.50%
1970	74,343	3,463	70,880	23,578	623	3,588	19,367	27,041	34.37%	47,302	4,515	4,006	11,034	15,040	3,645	11,548	12,554	242	19,555	24.85%	27,747	35.27%
1971	74,608	3,394	71,214	22,936	609	3,704	18,623	26,330	33.17%	48,278	4,476	4,014	11,338	15,352	3,772	11,797	12,881	(257)	19,828	24.98%	28,450	35.85%
1972	77,160	3,484	73,676	23,668	628	3,889	19,151	27,152	33.05%	50,008	4,541	4,127	11,822	15,949	3,908	12,276	13,334	111	20,490	24.94%	29,518	35.93%
1973	80,260	3,470	76,790	24,893	642	4,097	20,154	28,363	33.34%	51,897	4,656	4,291	12,315	16,606	4,046	12,857	13,732	439	21,262	25.00%	30,635	36.01%
1974	81,779	3,515	78,264	24,794	697	4,020	20,077	28,309	32.62%	53,470	4,725	4,447	12,539	16,986	4,148	13,441	14,170	(141)	21,711	25.01%	31,759	36.59%
1975	80,353	3,408	76,945	22,600	752	3,525	18,323	26,008	30.30%	54,345	4,542	4,430	12,630	17,060	4,165	13,892	14,686	(2,436)	21,602	25.16%	32,743	38.14%
1976	82,713	3,331	79,382	23,352	779	3,576	18,997	26,683	30.06%	56,030	4,582	4,562	13,193	17,755	4,271	14,551	14,871	(1,367)	22,337	25.17%	33,693	37.96%
1977	85,752	3,283	82,469	24,345	812	3,851	19,682	27,628	30.02%	58,124	4,713	4,723	13,792	18,515	4,467	15,302	15,127	(726)	23,228	25.24%	34,896	37.92%
1978	90,084	3,387	86,697	25,585	851	4,229	20,505	28,972	30.16%	61,112	4,923	4,985	14,556	19,541	4,724	16,252	15,672	(238)	24,464	25.47%	36,648	38.16%
1979	93,171	3,347	89,824	26,461	958	4,463	21,040	29,808	30.16%	63,363	5,136	5,221	14,972	20,193	4,975	17,112	15,947	(484)	25,329	25.63%	38,034	38.49%
1980	93,779	3,364	90,415	25,668	1,027	4,356	20,285	29,032	29.24%	64,747	5,146	5,292	15,018	20,310	5,160	17,890	16,241	(2,113)	25,456	25.63%	39,291	39.57%
1981	94,526	3,368	91,158	25,497	1,139	4,188	20,170	28,865	28.75%	65,661	5,165	5,376	15,172	20,548	5,298	18,619	16,031	(2,402)	25,713	25.61%	39,948	39.79%
1982	92,968	3,401	89,567	23,814	1,128	3,905	18,781	27,215	27.34%	65,753	5,082	5,296	15,161	20,457	5,341	19,036	15,837	(4,120)	25,539	25.66%	40,214	40.41%
1983	93,583	3,383	90,200	23,334	952	3,948	18,434	26,717	26.50%	66,866	4,954	5,286	15,595	20,881	5,468	19,694	15,869	(3,466)	25,835	25.62%	41,031	40.69%
1984	97,817	3,321	94,496	24,727	966	4,383	19,378	28,048	26.71%	69,769	5,159	5,574	16,526	22,100	5,689	20,797	16,024	(1,351)	27,259	25.96%	42,510	40.48%
1985	100,697	3,179	97,518	24,860	927	4,673	19,260	28,039	26.17%	72,658	5,238	5,736	17,336	23,072	5,955	21,999	16,394	(1,859)	28,310	26.42%	44,348	41.39%
1986	102,688	3,163	99,525	24,558	777	4,816	18,965	27,721	25.29%	74,967	5,255	5,774	17,909	23,683	6,283	23,053	16,693	(1,328)	28,938	26.40%	46,029	42.00%
1987	105,407	3,208	102,199	24,708	717	4,967	19,024	27,916	24.83%	77,491	5,372	5,865	18,462	24,327	6,547	24,235	17,010	(392)	29,699	26.41%	47,792	42.50%
1988	108,705	3,169	105,536	25,173	713	5,110	19,350	28,342	24.65%	80,363	5,527	6,055	19,077	25,132	6,649	25,669	17,386	(438)	30,659	26.67%	49,704	43.23%
1989	111,529	3,199	108,330	25,322	693	5,187	19,442	28,521	24.31%	83,008	5,644	6,221	19,549	25,770	6,695	27,120	17,779	(715)	31,414	26.77%	51,594	43.97%
1990	113,159	3,186	109,973	24,958	711	5,136	19,111	28,144	23.87%	85,015	5,826	6,205	19,683	25,888	6,739	28,240	18,322	(2,119)	31,714	26.90%	53,301	45.20%
1991	112,207	3,233	108,974	23,820	697	4,696	18,427	27,053	23.15%	85,154	5,823	6,072	19,340	25,412	6,707	28,778	18,434	(3,756)	31,235	26.72%	53,919	46.13%
1992	111,726	3,207	108,519	23,142	631	4,471	18,040	26,349	22.41%	85,377	5,709	6,045	19,346	25,391	6,571	29,053	18,653	(3,512)	31,100	26.45%	54,277	46.15%
1993	113,245	3,074	110,171	22,974	599	4,573	17,802	26,048	22.01%	87,197	5,710	6,114	19,734	25,848	6,605	30,193	18,841	(2,673)	31,558	26.45%	55,639	46.64%
1994	117,581	3,409	114,172	23,908	601	4,986	18,321	27,317	22.20%	90,265	5,993	6,162	20,507	26,669	6,896	31,579	19,128	(2,517)	32,662	26.54%	57,603	46.81%
1995	120,643	3,440	117,203	24,206	580	5,198	18,468	27,646	22.13%	92,997	6,165	6,412	21,173	27,585	6,830	33,107	19,310	(3,417)	33,750	27.02%	59,247	47.44%

Table III - 3 Non-agricultural Civilian Employment Since 1900 and Projected

Year	Total Non-ag Civilian Employment	Mining Employment	Construction Employment	Manufacturignng Employment	Tangible Production Employment	Percent of Total	Transportation & Utilities Employment	Trade Employment	Transp, Trade & Utilities Employment	Percent of Total	Finance, Insurance & Real Estate Employment	Services Employment	Government Employment	External Overhead Employment	Percent of Non-ag Total Empl
1900	15,178	637	1,147	5,468	7,252	47.78%	2,282	2,502	4,784	31.52%	308	1,740	1,094	3,142	20.70%
1910	21,697	1,068	1,342	7,828	10,238	47.19%	3,366	3,570	6,936	31.97%	483	2,410	1,630	4,523	20.85%
1920	27,434	1,180	850	10,702	12,732	46.41%	4,317	4,012	8,329	30.36%	902	3,100	2,371	6,373	23.23%
1930	29,424	1,009	1,372	9,562	11,943	40.59%	3,685	5,797	9,482	32.23%	1,475	3,376	3,148	7,999	27.19%
1940	32,376	925	1,294	10,985	13,204	40.78%	3,038	6,750	9,788	30.23%	1,502	3,681	4,202	9,385	28.99%
1950	45,222	901	2,333	15,241	18,475	40.85%	4,034	9,386	13,420	29.68%	1,919	5,382	6,026	13,327	29.47%
1960	54,188	712	2,926	16,796	20,434	37.71%	4,004	11,391	15,395	28.41%	2,628	7,378	8,353	18,359	33.88%
1970	70,880	623	3,588	19,367	23,578	33.26%	4,515	15,040	19,555	27.59%	3,646	11,548	12,554	27,747	39.14%
1980	90,415	1,027	4,356	20,285	25,668	28.39%	5,146	20,310	25,456	28.15%	5,160	17,890	16,241	38,291	43.45%
1990	109,973	711	5,136	19,111	24,958	22.70%	5,826	25,888	31,714	28.83%	6,739	28,240	18,322	53,301	48.45%
1995	117,203	580	5,158	18,468	27,646	22.13%	6,165	27,585	32,750	27.02%	6,830	33,107	19,310	59,247	47.44%
2000 Projection	122,056	705	5,885	19,090	25,680	21.04%	6,097	29,811	35,908	29.42%	7,762	33,717	18,989	60,468	49.54%

Source: US Statistical Abstract, 1995 and U.S. Department of Labor, Employment, hours, and earnings: 1909-94, United States Bureau of Labor Statistics, Sept 1994, Economic Report of the President, 1997.

Section IV
Alternative Industrial Performance Measurements

In this section, we are proposing a multilevel system of industrial measurements which are not identical for each level but have some correspondence. The five levels of analysis are

1. **Aggregate Measurements** — measures of the national economy.
2. **Industry measurements** — measures of a particular industry.
3. **Firm Measurements** — measures of a particular firm or company.
4. **Support systems Measurements** — measures relating to those activities supporting the industrial economy.
5. **Infrastructural Measurements** — measure relating to our society in general.

We were tempted to add a sixth level of analysis — energy and the environment. As noted in earlier sections, these matters get considerable attention overseas and it would be reasonable to structure a separate measures in response to these important issues. However, the topics of energy and the environment are so vast that the author did not think justice could be done within the score of this report. Perhaps appropriate measures can be added in the future in ways similar to the systems in place in India.

Aggregate Measurements

The United States has a very considerable warehouse of measurements used to gauge the aggregate economy. However, this warehouse of measurements has not always provided a clear picture of how we are doing internationally. Most of the industry oriented material included in reports such as *Economic Report of the President* are indices showing changes in price levels or output levels. Numbers of people employed or unemployed are covered but there is not much indication of whether all this employment is helping to build a stronger competitive base or whether we are losing ground in international markets. Measurements such as where people are employed or whether or not they are engaged in activities profitable enough to permit the paying of things like health insurance, have often been addressed casually or not at all in our mainstream statistics. The purpose of this section is not necessarily to deny the worthiness of some of the measurements we already have, but to suggest a few new measurements which might be better fitted to today's international economy. Admittedly, these measures stem from the premise that not all activity is equally useful in the practical task of meeting stiff global competition.

A-1 Percentage of Employment in Tangible Production

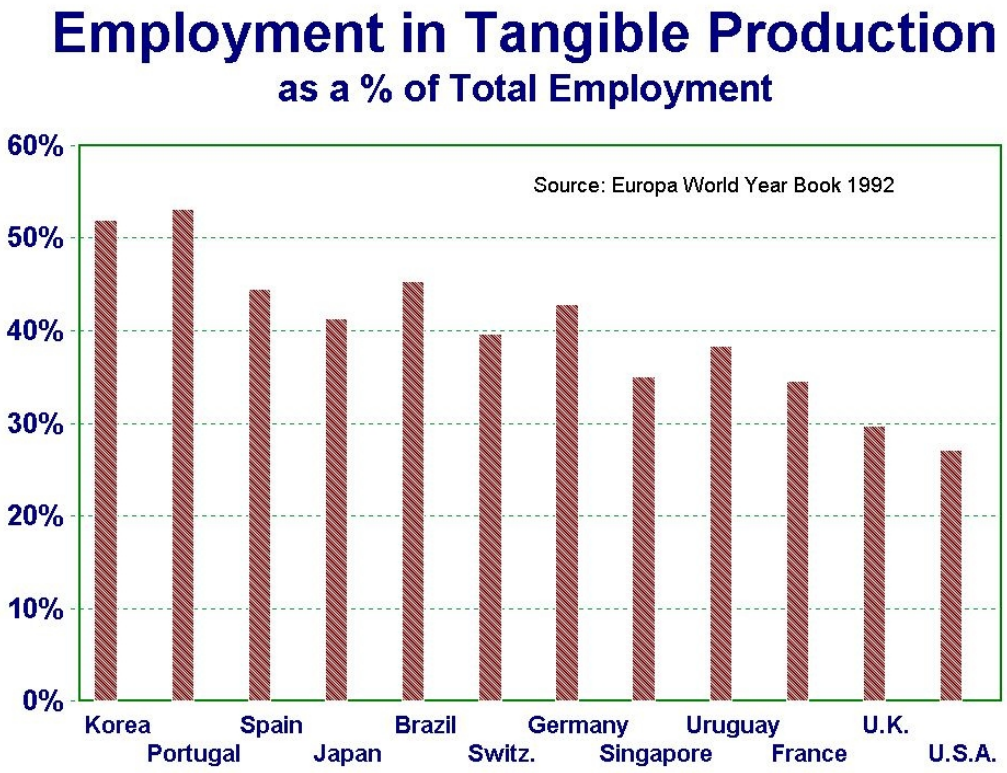
Description Employment in Manufacturing, Construction, Mining and Agriculture as a % of Total Employment

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: The purpose of this measure is to identify the fraction of the nation's employment devoted to manufacturing, construction, mining and agriculture (described here as tangibly production) in comparison to the employment profiles of other industrialized countries. Although the service economy is to be respected, the fraction of our employment devoted to productive activity is understandably a partial determinant of industrial output.

The measurement does not imply that production-oriented employment is preferable to other categories of employment. It merely seeks to clarify how the employment profile of the US compares to that of other countries. It should be used with caution because it can be impacted by productivity improvements and the amount of employment in agriculture.



A-2 Percentage of Employment in Manufacturing

Description: Employment in manufacturing as a % of total employment

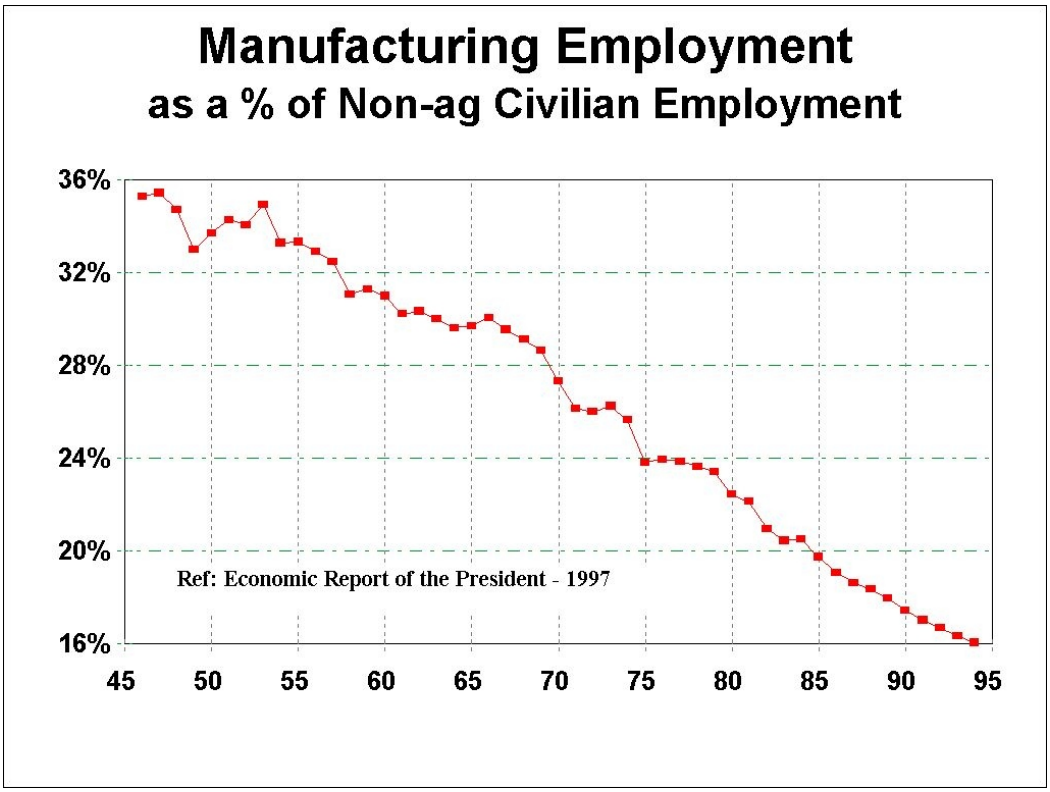
Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: This measurement tracks the percentage of the nation's full-time employment specifically devoted to manufacturing. The manufacturing sector is a powerful generator of jobs in other sectors. However, the measure has to be used carefully because it does not take into consideration productivity improvements that might be taking place in manufacturing.

Still, productivity improvements in the services and government have generally not kept pace with the productivity improvements in manufacturing. It is worthwhile to follow this measure because if employment in manufacturing and other forms of tangible production continues to diminish as fraction of the nation's total employment, the nation may be gradually reducing its productivity and thereby creating an economy which could become susceptible to long term trade and budget deficits.

In any case, the continued slippage in the manufacturing employment percentage from 34 percent in the late 1940s to 15 percent today is a very substantial change. We have little experience with an economy of this sort.



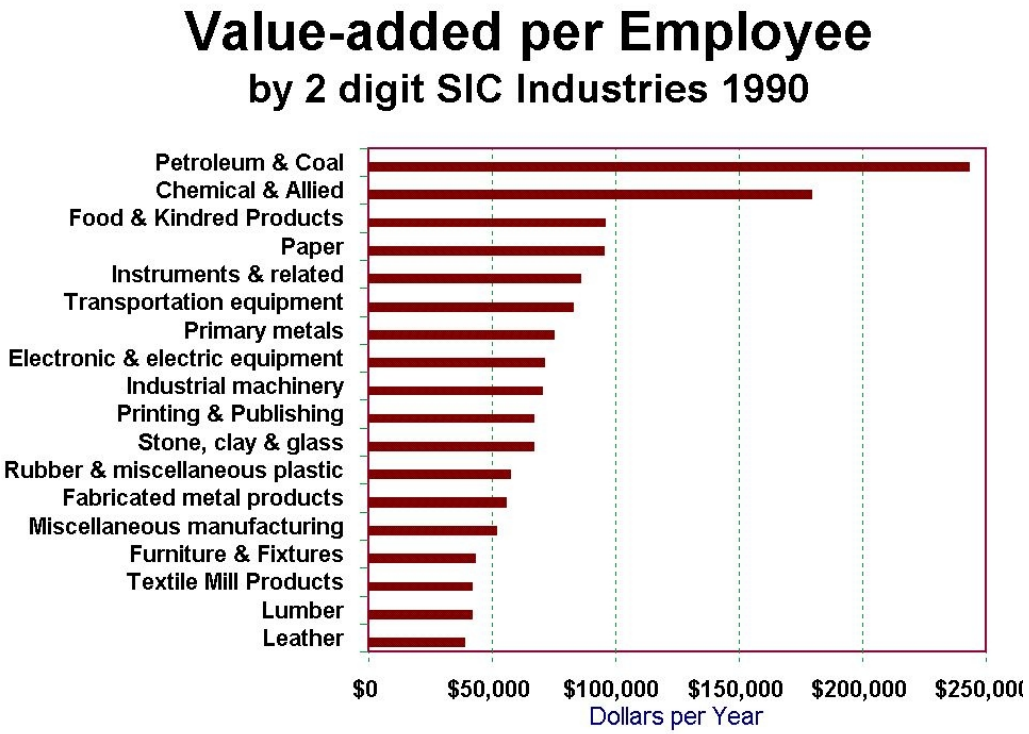
A-3 Manufacturing Value-added per Employee per Year

Description: Manufacturing revenue less cost of material & out-of-pocket expenses per employee

Frequency of reporting: Quarterly, Annually

Unit of Measure: U.S. Dollars

Rationale: Neither revenue, profits nor employment are sufficient indicators of actual manufacturing activity. A company, or a nation, can have high revenues, and in some cases temporarily high profits, by importing component parts or whole assemblies or even whole products and then shipping products to customers. Manufacturing operations of this nature, described by *Business Week* as the "hollow corporation", show revenue when components are merely shipped from one stage to another even though not much value is created. Or, the products may of lower quality and thus not be of very much value on world markets. Long term prosperity is highly dependent upon value-added for its relationship to hourly pay (Figure I-4, Page 7). If much of our expansion is in the low value-added industries, which it is, then we can expect lower overall wages in the future. We might also expect lower tax revenues and lower levels of savings and investment.



A-4 Expanding/Declining Industry Importance Rating

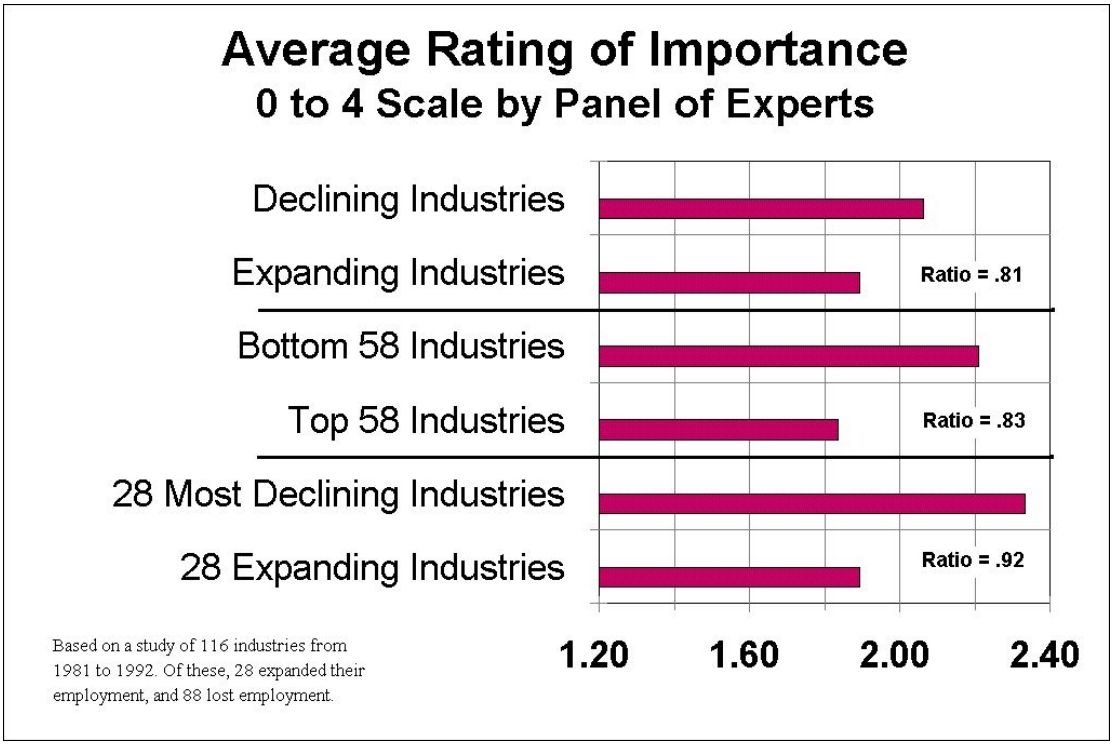
Description: Importance rating of expanding industries divided by importance rating of declining industries (in terms of employment).

Frequency of reporting: Quarterly, Annually

Unit of Measure: Percent

Rationale: The Expanding/Declining Industry Importance Rating measure is based on the premise that some industries are more important to the long term economic health of the community than other industries. Tobacco and industrial machinery are not equally important. While this assumption should be discussed and challenged, we should remember that most of our international competitors do have industries that are regarded as more meaningful.

This report pertains only to 116 industries with 3 digit SIC codes in the 200 to 399 range (industrial companies) for the period 1988 to 1992. The key rating, or importance rating as it used here, for each industry was determined by surveying established experts in manufacturing from leading industrial universities such as Lehigh, Wisconsin, Missouri and others. The measure itself is simply the ratio of the importance rating of industries with expanding employment divided by the importance rating of industries with declining employment. A ratio greater than 1.0 indicates that our employment is shifting to more important industries. A ratio under 1.0 indicates we are shifting employment to less important industries. The intent is to provide a measure as to whether employment growth is taking place in those industries most essential for the future.



A-5 Key Industry Asset growth

Description: Asset growth among industries with an importance rating 3.0

Frequency of reporting: Monthly, Quarterly, Annually

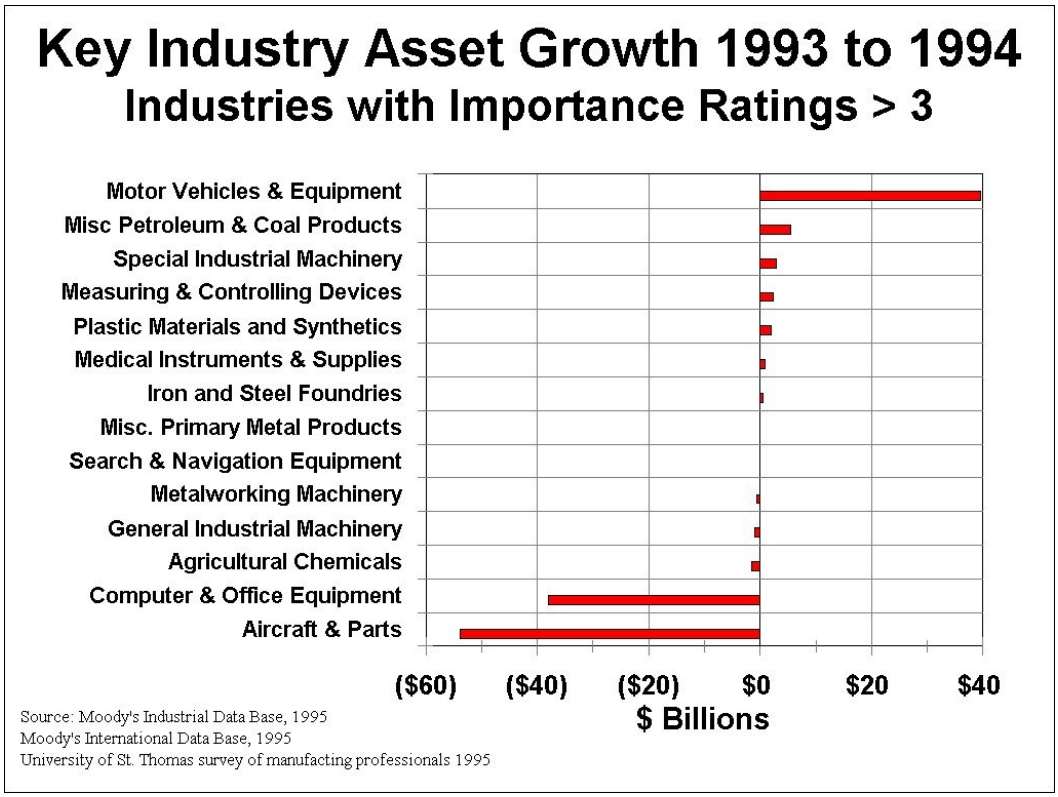
Unit of Measure: Percent

Rationale: Admittedly, the term "key industry" is a subjective term. The intent here is not to suggest that one industry is intrinsically better than another but merely to examine how those industries are doing which were identified as having the most favorable long term impact on high value-added employment as rated by our panel of experts. Other panels might favor other industries, of course.

Those industries with an importance ratings greater than 2.99 on a 0 to 4 scale constitute roughly one third of the industries. Since these industries were selected as the most important for long term industrial growth, we should have an ongoing assessment of the degree of asset growth within these industries.

While asset growth among high key industries provides useful information for the nation, it also provides a basis for making comparisons to the asset growth taking place in other industrialized and industrializing countries.

Not enough time has passed for this measure to be fully developed. At this stage, we are merely offering some exploratory measurements.



A-6 Key Industry Revenue

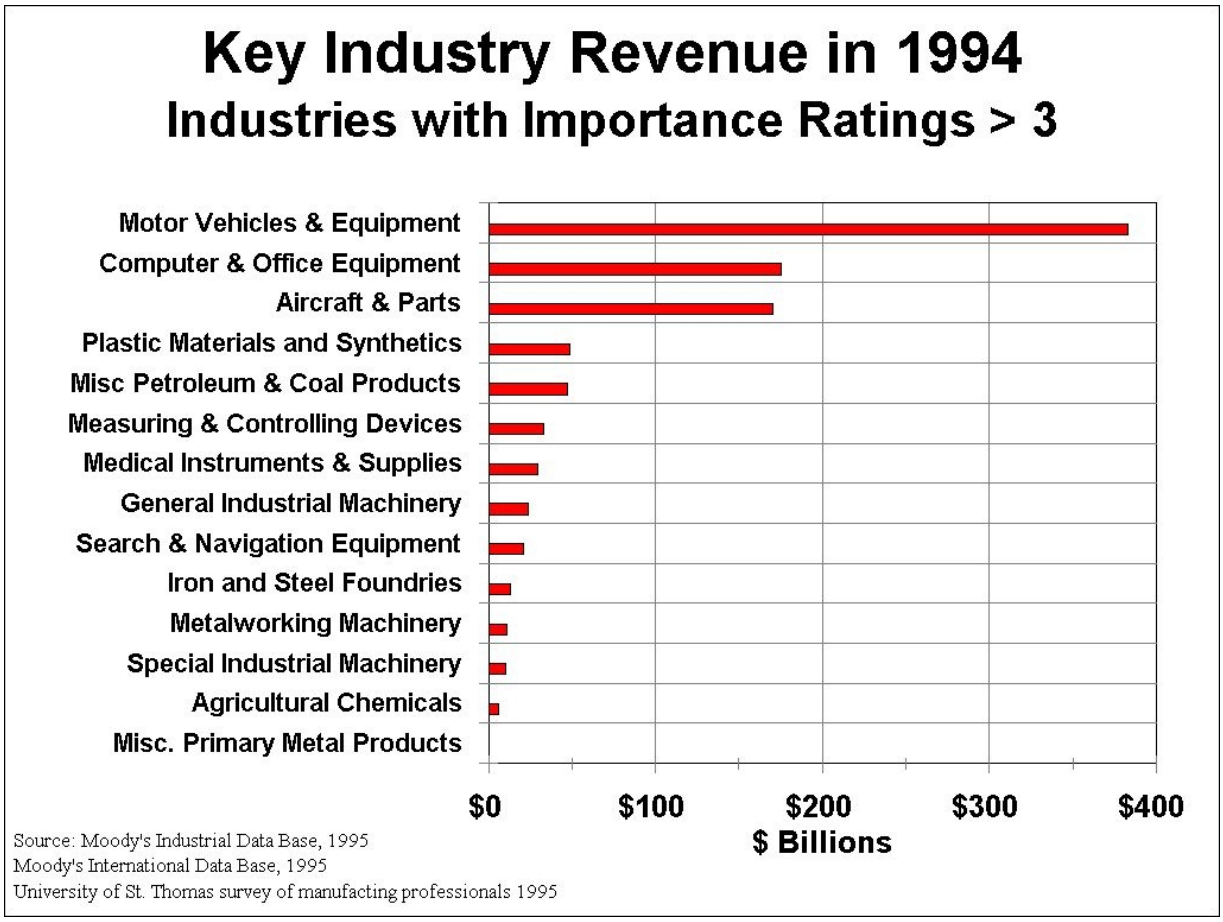
Description: Revenue among industries with an importance rating 3.0

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: Those industries with an importance ratings greater than 2.99 on a 0 to 4 scale constitute roughly one third of the industries. These industries were selected as the most important for long term industrial growth by our panel of experts. With further refinement of this measure, we would like to develop an ongoing assessment of the degree of revenue growth within these industries.

Revenue by industry provides a graphic illustration or the relative size of different industries within the United States but it also provides a basis for making comparisons to the revenue growth taking place in other industrialized and industrializing countries. As can be seen from the graph below, the actual size of these industries varies greatly. Some US industries such as motor vehicles, computers and aircraft are very large. Others such as special industrial machinery are quite small but they are still important as industrial building blocks.



A-7 Production Worker Rate

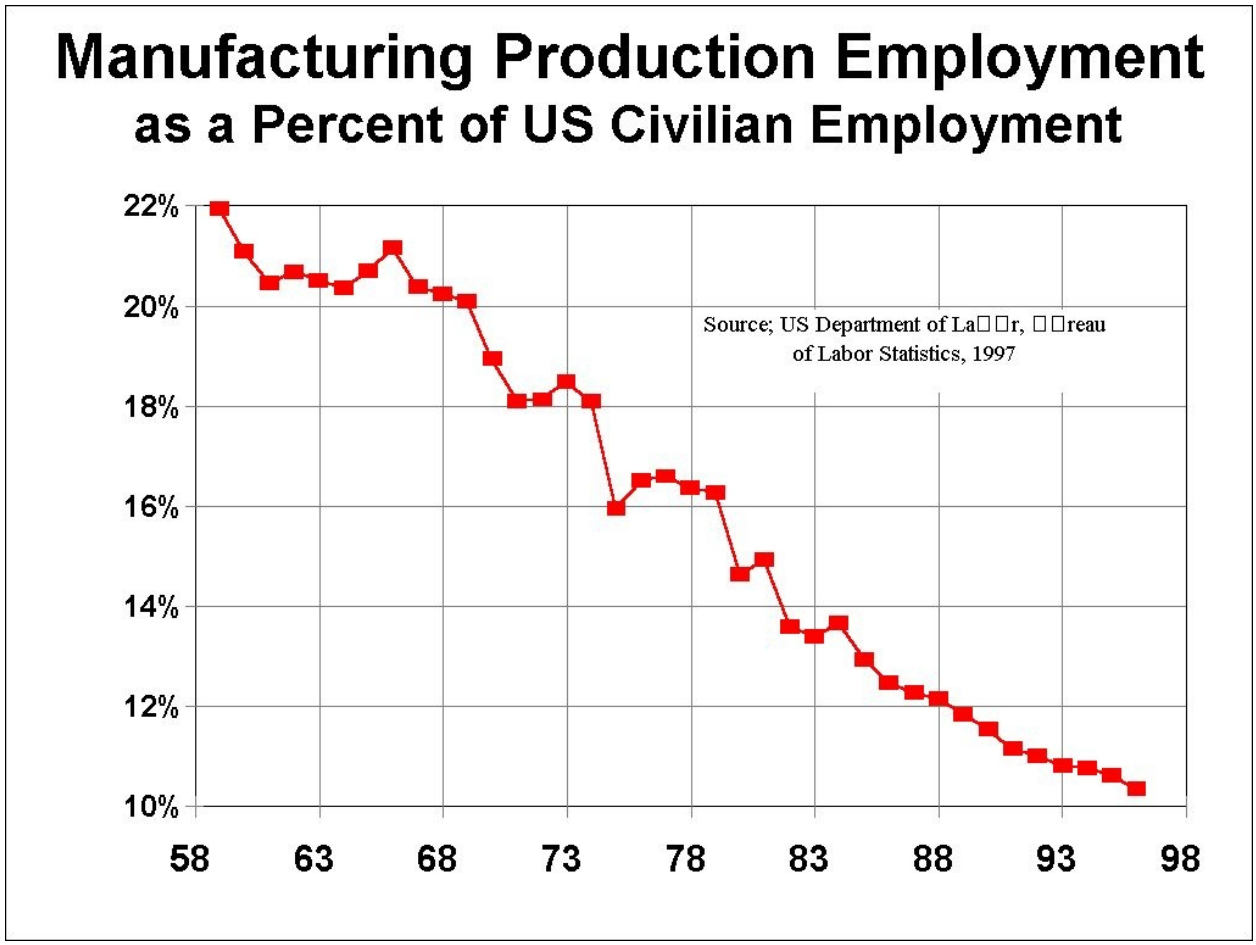
Description: Manufacturing production workers as % of total US employment

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: Under the current system for classifying employment, all people working in a particular industry, independent of their position, are classified as employed in that sector of the economy. All sales people, accountants, secretaries, executives and production workers employed by companies in the manufacturing SIC Codes constitute the number of manufacturing jobs as the number is commonly reported. In many cases, most of the products are imported and little manufacturing actually takes place and the companies might be better described as wholesalers. We have no objection at all to the jobs not on the factory floor being classified as manufacturing jobs, but we should also examine how much real production employment exists because, as costs have risen, many companies have subcontracted their manufacturing to other companies — in some cases overseas. While we can understand the cost pressures behind these decisions, we should still monitor what is happening with actual manufacturing employment because there may be considerably less of it than what current statistics indicate.

The graph below indicates the percentage of non-farm employment made up of production workers in manufacturing.



A-8 Profit rate

Description: After-tax profit as a % of the gross product of non-financial corporations.

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: Profits and the financial viability of companies are both strong determinants of our ability to compete. In spite of relative general prosperity in recent years, some very large industrial employers are operating marginally or at a loss. We do have some profitable industries but, in total, profits are significantly lower than they were in the 1960s and 1970s although 1994 did show some modest improvement.

Still, the long term decline in corporate profits of non-financial corporations from around eight percent of their gross product in the 1960s to under five percent in the early 1990 was a substantial decline — especially when considering the higher dividend payout rates that occurred at the same time. Although profit rates rebounded during the robust economy of the mid 1990s, profitability still lags that experienced during prior robust periods. Long term changes in profit rates impacts tax revenues, reinvestment levels and savings as well as consumer spending.

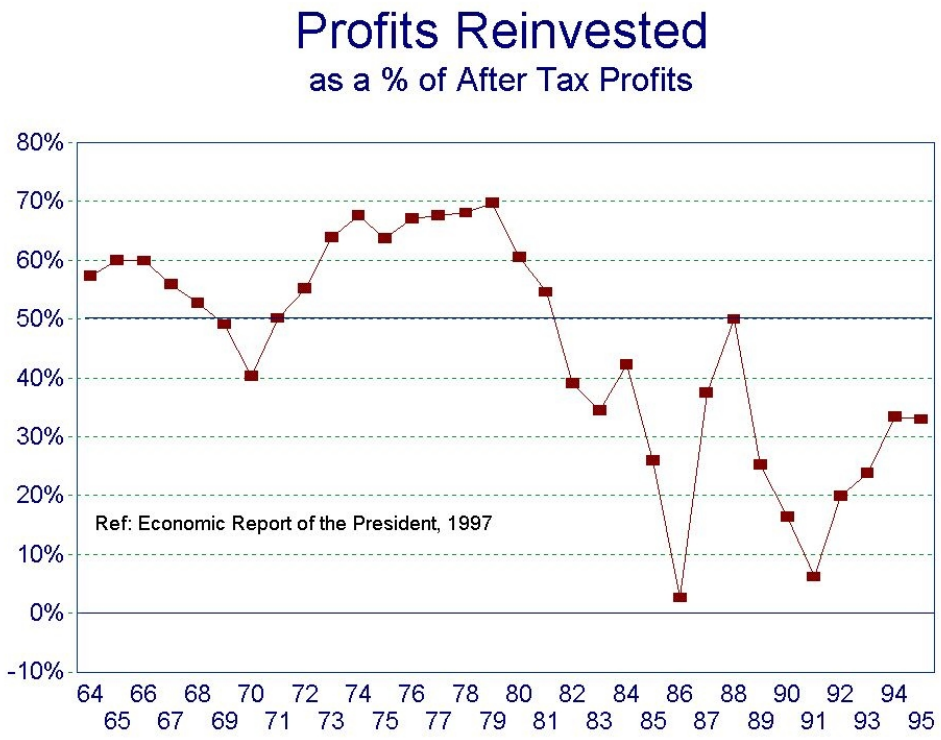
A-9 Profits Reinvested

Description: Profits reinvested as a % of net after-tax earnings

Frequency of reporting: Quarterly, Annually

Unit of Measure: Percent

Rationale: The purpose of this measure is to gauge the corporate reinvestment as a percentage of profits. A nation's economy may generate high profits but if these profits are mostly being paid out in dividends, instead of being reinvested in the business, we are essentially transferring money from investment to other uses — perhaps consumption. Although the United States has retained a bit more of its corporate earnings in recent years, the dividend payout ratio rose to high levels during the mid and late 1980s thus diminishing contributions to retained earnings (profits reinvested). Approximately 60 percent of net after-tax profits were retained for reinvestment during the 1960s and 1970s. By the 1980s, the more typical figure was around 30 percent. Given the fact that net profit margins also declined during this period, the absolute level of profit dollars retained for reinvestment declined substantially.



A-10 Profits Reinvested as a Percent of Corporate Revenue

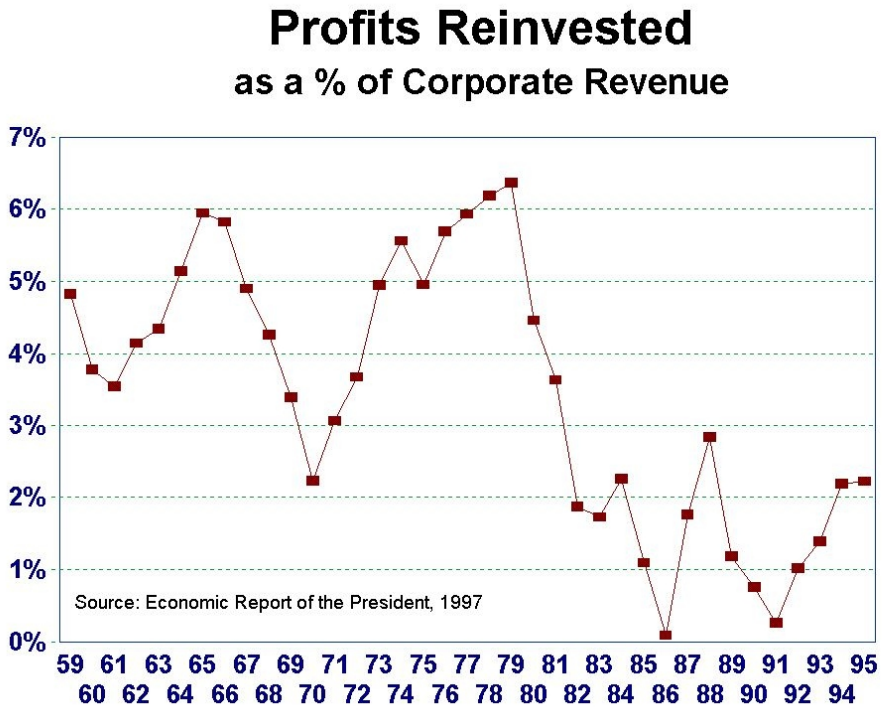
Description: The percent of corporate revenue retained for reinvestment after the payment of dividends

Frequency of reporting: Quarterly, Annually

Unit of Measure: Percent

Rationale: The percentage of corporate revenue retained for investment in plant, equipment and new product development is of crucial importance to long term growth with respect to our participation in a global economy. This measure will prove to be even more valuable at the industry level and as an indicator of the global competitiveness of individual firms. In the aggregate, it indicates what portion of our total corporate revenue is set aside for investment for the future.

During the mid 1960s and late 1970s, because of the combination of high profit rates and low dividend payouts, US corporations typically re-invested about 5 percent of their revenue versus 1.5 percent of revenue in the 1990s. The pressure to sustain short term stock prices may be a contributor to this decline or there may be other reasons. Whatever the principal reason, this reduction in the money available for reinvestment is likely to impact our competitive position in the years ahead.



A-11 Profits Reinvested per Employee

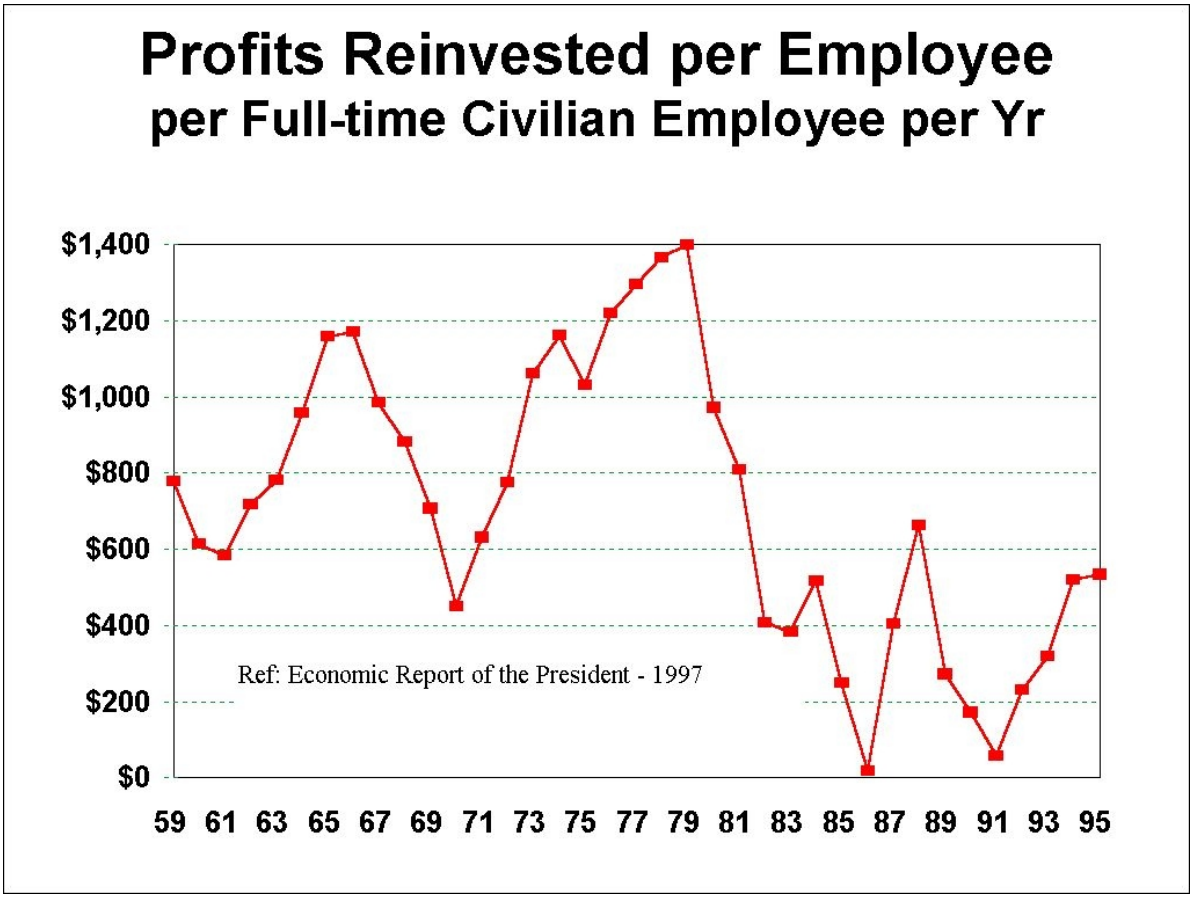
Description: Profits reinvested per full-time civilian employee for the year

Frequency of reporting: Quarterly, Annually

Unit of Measure: U.S. Dollars

Rationale:

Profits Reinvested per Employee per Year is a measure designed to provide insight on the relationship between reinvestment and the number of full time employees. To be most effective, the measure should be discounted for inflation — which it was in this analysis. Note that contributions to retained earnings (during the current year) declined from about $1200 per employee in the late 1970s to around $500 today. This very appreciable change could impact US competitiveness in the future.



A-12 Manufacturing Plant and Equipment Purchased per Employee

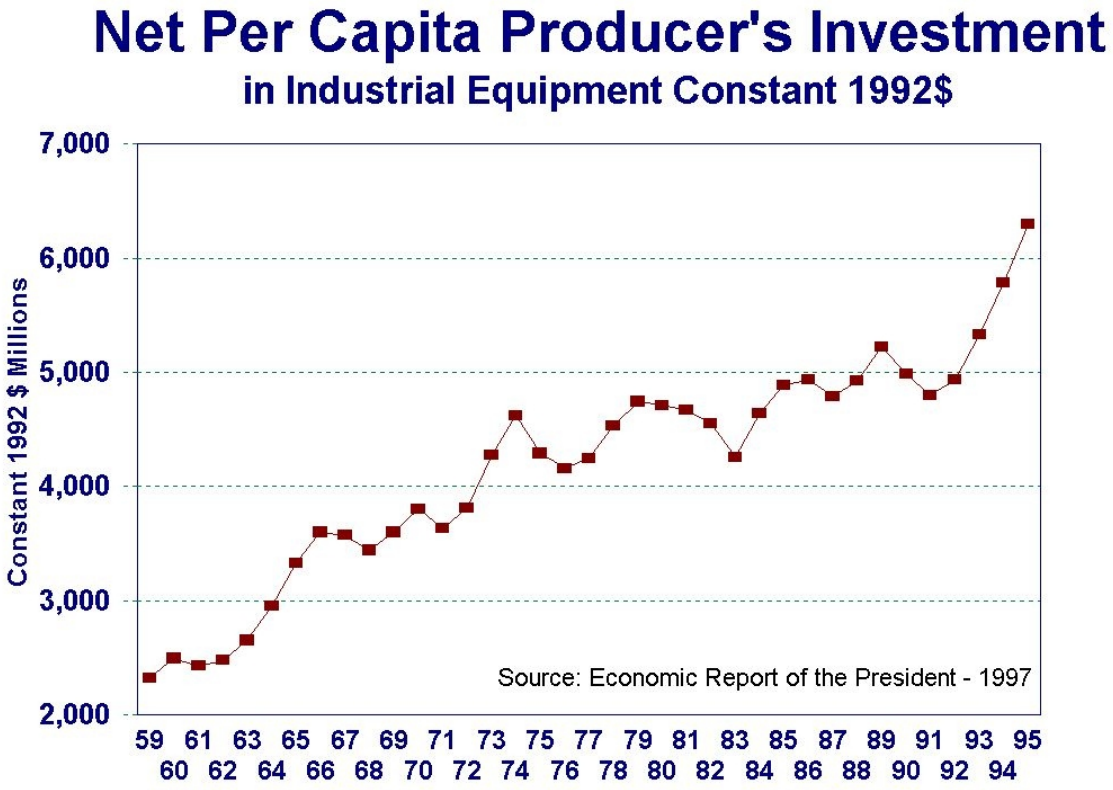
Description: Manufacturing plant and equipment purchased per full-time employee

Frequency of reporting: Quarterly, Annually

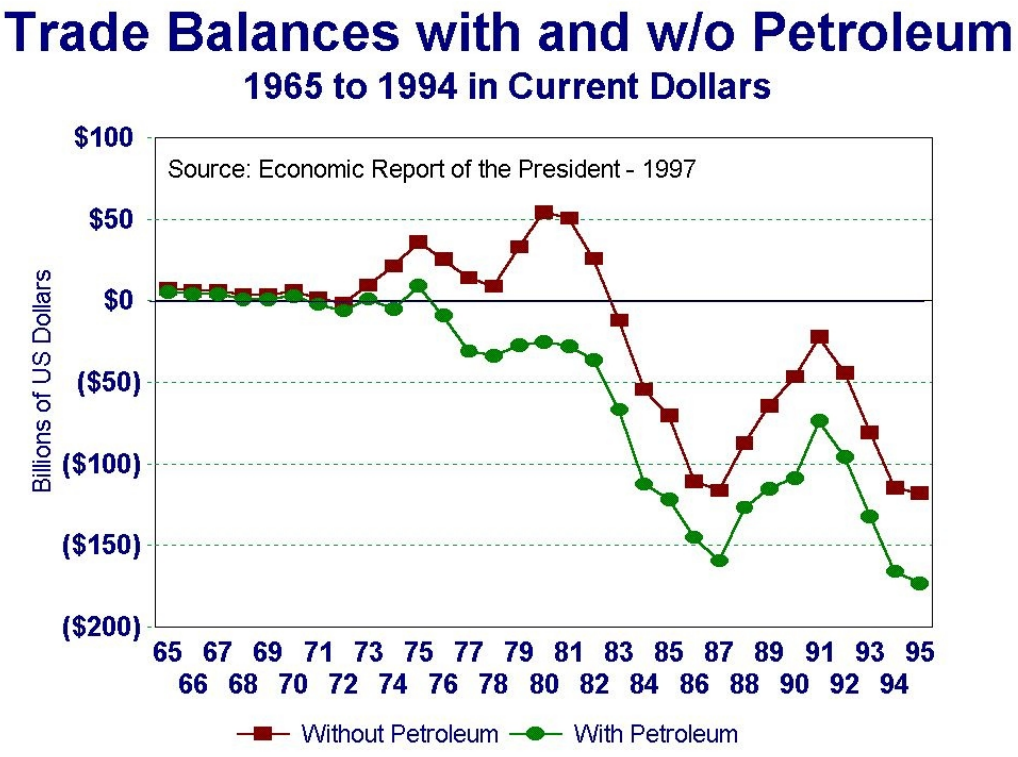
Unit of Measure: U.S. Dollars

Rationale: Some industries are doing a very nice job of keeping their industrial facilities well-equipped and up to date. Others are not. There have been critical times during the history of the United States when our performance lagged badly followed by periods of massive imports into this country. It declined during the first energy crisis and was followed be a period of massive importing. It declined again after automobiles were initially downsized in the early 1980s followed by a period when foreign producers began to permeate the market for higher priced products. For any nation to remain competitive in world markets, the investment in plant and up-to-date equipment has to be sustained at high levels compared to industrial competitors.

Investment in producer's equipment always fluctuates because of business conditions, interest rates and other factors. This trend suggests that with the growth in our economy in recent years, investment in producer's equipment is increasing — which is a good sign. However, we also have much production equipment that is being depreciated so we



need to invest heavily to remain abreast. Also, we have to make sure our investments in producer's equipment does not slow if the economy becomes less robust.



A-13 Trade Balance

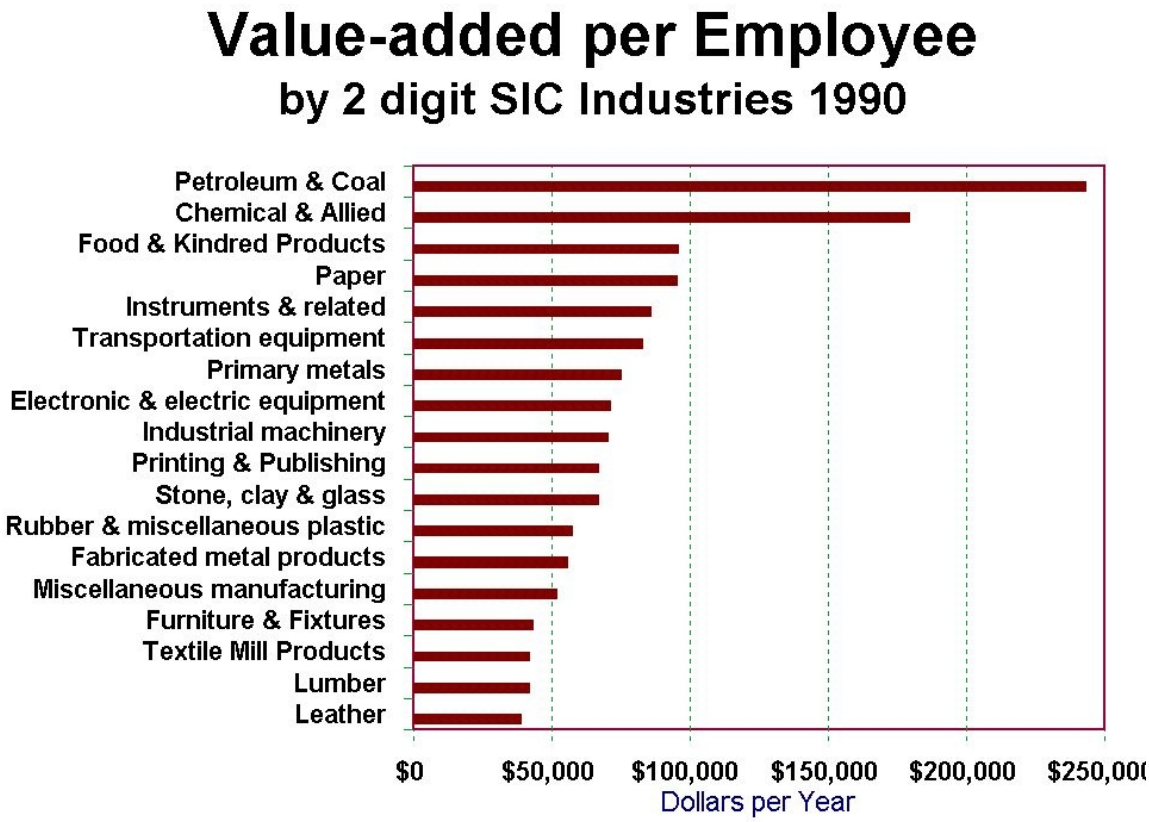
Description: Exports minus imports

Frequency of reporting: Monthly, Quarterly, Annually

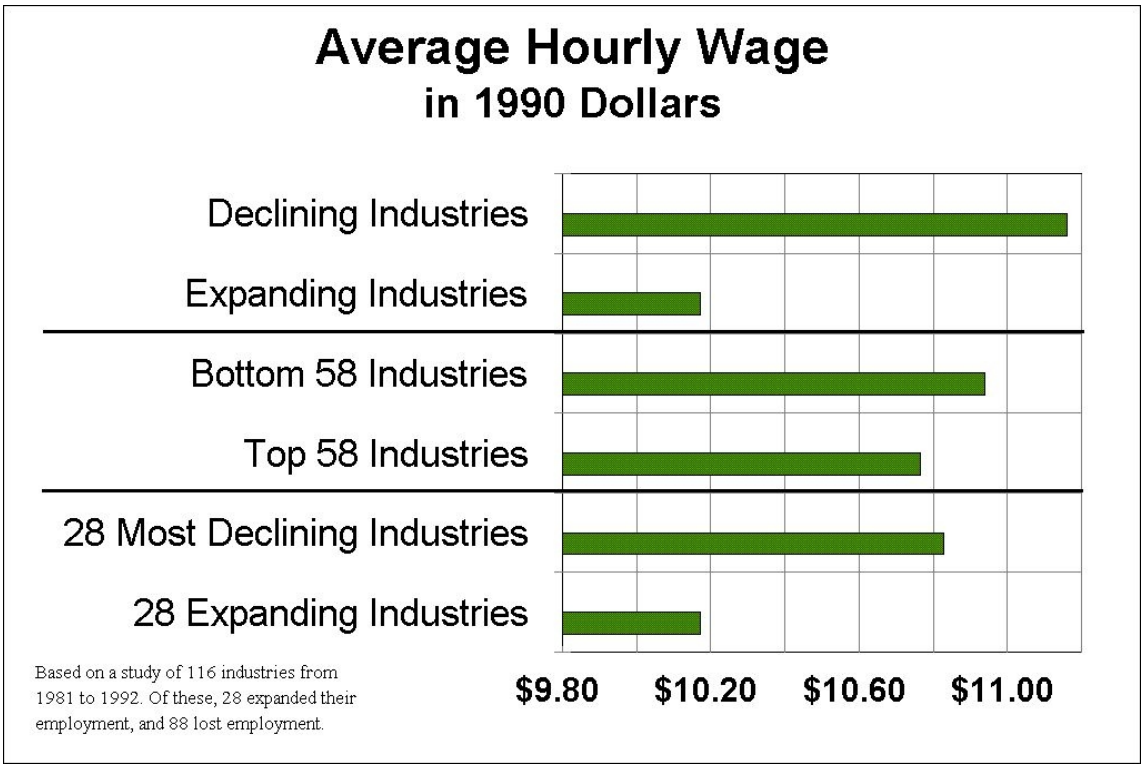
Unit of Measure: U.S. Dollars

Rationale: The trade balance of the United States is routinely reported. However, it is useful to follow the historical trends of US exports and imports both with and without petroleum. The trade deficit is definitely worsening even though the deficit on petroleum has been reduced since the late 1970s. What is most alarming is the huge deficits in non-petroleum trade which has worsened by about $130 billion during the past 20 years.

What is especially interesting about the widening US trade deficit is that it has been taking place when the US dollar has been losing its value. Some theories suggest that when a nation's goods and services are less costly in world markets, exports increase and imports decrease yet that does not seem to be happening with the United States at this time. There are some technical (engineering) reasons why both trade deficits and currency values might move in the same direction. The shrinking base of US suppliers may mean that certain components are simply no longer produced in the United States because the product and manufacturing tech-



nologies are elsewhere. This may result in the not obvious possibility that dollar devaluations may mean significantly higher costs to US manufacturers and therefor are not of much help in reducing trade deficits.



A-14 Value added per Dollar spent on Salaries and Wages

Description: Dollars of value added per dollar spent on wages and salaries

Frequency of reporting: Quarterly, Annually

Unit of Measure: U.S. Dollars

Rationale: Value-added per dollar spent on salaries should provide some indication of trends in the balance between value created and wages paid. Industries vary greatly in their capacity to pay comfortable wages. Some industries, such as instruments or petroleum refining, generate high levels of both revenue and added value per unit of wages. Others, such as textile manufacturing, are far lower. There is also a high correlation between value-added activity and wages (page 7).

Some industries do not generate enough value to pay consistently high wages to their workers. In some very capital intensive industries, such as chemicals, petroleum, food and paper, the value generated has to be high to pay for the capital. In other instances, non-labor and non-material costs have crowded out more usual industrial expenditures to make the industry noncompetitive. Since non-labor and non-material costs are increasing, the question that emerges is; precisely what does make an industry uncompetitive?

A-15 Average Hourly Wage - Expanding versus Declining Industries

Description: Average hourly wage of expanding versus declining industries

Frequency of reporting: Quarterly, Annually

Unit of Measure: U.S. Dollars

Rationale: Individual industries are expanding and declining all of the time. Some people suggest that the decline of individual industries is not a problem because some other industry emerges to employ more people. This hypothesis has to be tested. Decline is taking place in some industries — without doubt. The question is, are replacement industries emerging? In addition, if they are emerging, what kind of wages do they pay?

The information below was gathered on 116 3-digit industries in the industrial SIC code sequence (2000 to 3999). There are many pitfalls in an analysis of this sort — in part because new companies often pay less than more established companies. Still, it is an analysis that should be made. We should keep track of whether we are progressing toward higher levels of prosperity or shrinking back. So far, there is some evidence that expanding industries pay less than declining industries.

Industry Level Measurements

I-1 Asset Strength of U.S. Firms

Description: Percentage of assets of world's top ten firms held by US firms in top ten

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: The percentage of the assets held by U.S. firms of the top ten firms (in terms of assets) in the world, describes the relative asset strength of U.S. firms operating in each 3-digit industry. For some industries, such as guided missiles and farm machinery, US producers enjoy worldwide prominence. In others, such as electrical industrial apparatus and metal forgings, US producers are not very significant among the list of larger companies.

This information has to be used with considerable caution because the data were retrieved from US created databases which may not include many of the world's private companies — especially those private companies based overseas. The measurement is intended as a beginning.

I-2 Revenue Strength of U.S. Firms

Description: Percentage of revenue of world's top ten firms held by US firms in top ten

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: The percentage of the revenue achieved by U.S. firms of the top ten firms (in terms of revenue) in the world, describes the relative revenue strength of U.S. firms operating in each 3 digit industry. For some industries, such as industrial organic chemicals and farm equipment, US producers enjoy worldwide prominence. In others, such as shipbuilding (which is an industry that triggers other industrial activity), US producers are not very significant among the list of larger companies.

This information has to be used with discretion because the data were retrieved from US created databases which may not include many of the world's private companies — especially those based overseas. The measurement is also intended as a beginning.

I-3 Debt Upgrade to Downgrade Ratio

Description: Debt upgrade to downgrade ratio

Unit of Measure: (by Moody's and Standard and Poors)

Frequency of reporting: Monthly, Quarterly, Annually

Rationale: By examining the number of debt upgrades (by Moody's and Standard and Poors) for each industry we can gain a better perspective of whether our financial strength in each of these industries is increasing or shrinking. It would be a great benefit if this figure could somehow be adjusted for the dollar value of debt outstanding. Its very clear from the study of individual cases that some crucially important U.S. industrial companies are becoming more financially marginal each year. A few are becoming financially stronger and continuing to grow. The subtleties of these changes have largely been excluded from our statistical material on the U.S. economy.

The graph below summarizes the debt upgrade and downgrade performance for all US whose ratings were changed in a given year. Ultimately, we hope to obtain information by specific industry.

Still, it is apparent that during the past eight years, there has generally been more downgrades than upgrades, though things have improved recently because business has been quite good since 1994.

I-4 Bankable equity - Industry

Description: Stockholders equity less intangibles and less 50% of inventory

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: U.S. Dollars

Rationale: The term bankable equity was invented for the purpose of this study and is intended to shed some light on the general value and liquidity of a company's balance sheet. It is derived by subtracting from a company's total stockholders equity those assets that would normally not serve as a base for borrowing money. Arithmetically, Bankable equity, as the term is used here, is equal to Stockholder's Equity minus Intangible Assets (such as Goodwill) minus fifty percent of the book value of the inventory. It is exceedingly rare for banks to loan money on intangible assets and, normally, banks will not lend money on more than 50% of inven-

tory value and even these loans are frequently tied to other transactions. Bankable equity is intended as a rough approximation of the future borrowing ability of corporations.

US bankable equity is reasonably consolidated in a few industries such as computers, petroleum, electrical components and drugs. There are many changes, however, in part because of the wave of mergers, consolidations and divestitures sweeping the nation. It will be interesting to follow this measurement over time.

I-5 Bankable equity Rate - Industry

Description: Bankable equity as a percent of stockholders equity

Frequency of reporting: Quarterly, Annually

Unit of Measure: Percent

Rationale: The term bankable equity is derived by subtracting from a company's total stockholders equity those assets that are not normally a base for borrowing money. Arithmetically, Bankable equity, as the term is used here, is equal to Stockholder's Equity minus Intangible Assets (such as Goodwill) minus fifty percent of the book vale of the inventory. Bankable equity is intended as a rough approximation of the future borrowing ability of corporations. The measure Bankable equity as a Percent of Stockholders Equity provides some indication of whether the stated stockholder's equity, as stated by the companies with primary SIC codes within the industry, is reasonably free of intangible assets and excess inventory.

The relationship between bankable equity and stated stockholder equity is important because of the vast number of mergers and acquisitions being consummated in the United States. Quite frequently, these transactions involve purchase prices that are well above the net book value (assets minus liabilities) of the companies being acquired. The difference, usually expressed as “goodwill”, is then listed as an intangible asset of the acquiring company's balance sheet. Accounting standards require goodwill to be amortized and written off against future profits so it is not an enduring asset.

I-6 Employment Change - Industry

Description: Employment for current period less employment for prior period

Frequency of reporting: Quarterly, Annually

Unit of Measure: Employees

Rationale: Although it is true that a company or an industry can improve both revenue by introducing productivity improvements with the same base of employees, employment trends within industries may provide some indication of an improving or deteriorating competitive position or of massive productivity changes. In general, it does not appear that the industries with the greatest investments in automation are the ones losing employment. Employment losses appear to be more concentrated in those industries that are not keeping pace.

This measure should be used with other complimentary measures for the same industry.

I-7 Production Worker Rate

Description: Production workers as % of total workers - industry

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: Under the current system for classifying employment, all people working in a particular industry, independent of their position, are classified as employed in that sector of the economy. For instance, all sales people, accountants, secretaries and executives employed by companies in the manufacturing SIC Codes constitute the number of manufacturing jobs as it is commonly reported. In reality, in some cases, most of the products are imported and little manufacturing actually takes place.

The number of production workers is also reported by the US Department of Labor but seems not to be as commonly discussed. Yet, the number is of interest for, as costs have risen, many companies have subcontracted their manufacturing to other companies overseas.

The differences from one industry to another are actually of less interest than how these percentages change over time. However, recent changes

in the way employees are treated and categorized, coupled with differing levels of capital intensity, may make interpretation of this measurement less useful unless it is coupled with other measurements.

I-8 Profit rate

Description: After-tax profit as a % of revenue by industry

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: The year 1994 marked a dramatic turnaround in profits versus two years earlier as US corporations experienced their best overall year since 1979. Nonetheless, there were still wide variations from industry to industry and, for some crucially important industries, ongoing profit rates are probably insufficient to sustain the investments needed to remain competitive in world markets. One of the alarming attributes of the U.S. industrial economy in recent years that in spite of relative general prosperity, some very large industrial employers are operating marginally or at a loss. The high profit rates in instruments and aircraft are impressive but profit rates in machinery tend to be low.

I-9 Retained Earnings as a % of Revenue

Description: Retained earnings as a % of revenue by industry

Frequency of reporting: Quarterly, Annually

Unit of Measure: Percent

Rationale: The purpose of this measure is designed to gauge the long term retained earnings (as stated in the Stockholder Equity section of the Balance Sheet) as a percentage of annual revenue. A nation's economy may have generated high profits but if these profits were mostly paid out in dividends, there may not be sufficient reserves to remain competitive during periods of economic stress. Some key companies in some industries have attempted to support stock prices with high dividend payouts while others have retained a much larger fraction of earnings for reinvestment.

Drugs, sawmills, measuring devices and medical instruments are all industries with high retained earnings when compared to revenues. Other industries have lower levels of retained profits — either because they paid out large dividends, were only marginally profitable, or both.

I-10 Retained Earnings per Employee by Industry

Description: Retained earnings per employee by industry

Frequency of reporting: Quarterly, Annually

Unit of Measure: U.S. Dollars as recorded in the stockholder equity section of the balance sheet.

Rationale:

Retained Earnings (as stated in the Stockholder Equity section of the Balance Sheet) per Employee per Year is a measure designed to track long-term trends in profits reinvested in the business on a per-employee basis. The amount of reinvestment that has already taken place (and thus recorded on the company balance sheets) varies greatly from industry to industry. Some industries like drugs, paper, plastic materials and aircraft have retained substantial amounts of profits for reinvestment (on a per employee basis) while others have retained much less.The range is from about $10,000 to over $135,000. The concern here is that some industries may not be reinvesting amounts sufficient to retain employment at present levels.

This measure complements other measures. The aircraft and parts industry, for instance, has medium levels of retained earnings as a percent of revenue but ranks quite high in retained earnings per employee.

I-11 Voluntary Fringe Benefits by Industry

Description: Voluntary Fringe Benefits per Employee by Industry

Frequency of reporting: Annually

Unit of Measure: Dollars per employee per year

Rationale:

Fringe benefits vary enormously between industries -- even within manufacturing. These differences should be of interest to policy makers and other public officials who often lament such phenomena as the lack of availability of health insurance to many people within our society. Although the rapidly escalating costs of medical care have no doubt caused some companies to reduce the fraction of the insurance premiums paid by the employer, a more practical explanation is that industrial shifts in employment are responsible for much of the trend. If employment is reduced in transportation equipment, primary metals and the process industries while we simultaneously add employment in printing and publishing, the health insurance problem will become more acute.

Attention to the industry specific nature of social-related problems is overdue.

I-12 Profits Reinvested in the Business — Longitudinal View

Description: Profits Reinvested in the business — longitudinal view

Frequency of reporting: Quarterly, Annually

Unit of Measure: U.S. Dollars

Rationale: Some companies are doing a very nice job of reinvesting profits to keep their industrial facilities well-equipped and up to date in bad times as well as good. Others have continued to pay high dividends to support their stock price even during periods of large losses. This practice of paying dividends out of equity, instead of profits, was especially prevalent during the early 1990s but was also by some companies in the 1980s. The practice of paying dividends out of surplus is not new and has served as the prelude to the decline of some of the nation's largest employers of the past such as Studebaker, which lasted for 114 years as a manufacturer of wagons and motor vehicles -- sometimes with up to 33,500 employees..

The objective with this measurement is to track reinvestment over time. The sample here is for 23 companies tracked from 1989 to 1994. Larger samples will be gathered later.

The substantial erosion of equity due to artificially high dividends has occurred in the 1990s and was particularly influenced by several of the nation's largest firms including General Motors, Westinghouse and IBM.

I-13 Trade Balance by Industry

Description: Industry exports minus industry imports

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: U.S. Dollars

Rationale: Although total exports and imports are important at the aggregate level, there is also much to be gained by examining trade balance by industry. In reality, the current trend in the U.S. trade balance would look even less favorable than it does except for the fact that the price of oil has declined and we have achieved some reduction in the use of oil through our conservation efforts. In many high value-added industries, we have suffered a worsening in our trade balance.

There is not a one-to-one correspondence between the commodity code used to categorize imports and exports and the SIC codes used to tabulate the activities of industries. However, some approximations can be made which pretty clearly show which industries are suffering the largest trade imbalances and where we have the greatest strength. Of concern is the rapidly worsening situation in areas where we formerly did well such as computers, telecommunications and miscellaneous manufacturing.

I-14 Average Hourly Wage by Industry

Description: Average hourly wage per full-time employee by major industry

Frequency of reporting: Annually

Unit of Measure: U.S. Dollars

Rationale: Average wages vary greatly from industry to industry to the degree where which industries are expanding or contracting should be of major interest to future levels of prosperity and tax revenues. Again, as stated before in the report, some of the more significant job erosions are taking place in the higher paid industries — even within the industrial sector of our economy. The problem of stagnating wages cannot simply be reduced to have and have-not distributions between classes within the economy as a whole. The problem of stagnating wages also results from a gradual shift in employment from higher value-added industries, with higher wages, to lower value-added industries that always have paid lower wages. Similar observations can made regarding fringe benefits covering medical care. We cannot expect to lose high value-added employment in crucial world-competitive industries and not experience a decline in the number of people covered by health insurance. US industries, as well as industries in other countries throughout the world, vary greatly in what they pay workers because the industries differ greatly in the value of what it is that they do.

I-15 Employment Changes by Industry

Description: Employment changes from 1988 to 1993 by major industry

Frequency of reporting: Quarterly, Annually

Unit of Measure: Employees

Rationale: The purpose of this measure is to indicate whether the employment base is being sustained or shrinking in each major industry.

Employment trends within individual industries are important not only because of substantial differences in pay and tax revenues but because of the spillover impact certain key industries have in fostering or adding to the competitiveness of other industries. During the past fifteen years we have been losing jobs in aircraft, instruments and other more technical industries while we have been adding a few jobs in commercial printing, wines and brandies, cookies, crackers, office furniture, burial vaults and greeting cards. Unfortunately, it is difficult to build a modern jetliner for export from this latter list.

I-16 Value added per Employee

Description: Dollars of value added per employee

Frequency of reporting: Quarterly, Annually

Unit of Measure: U.S. Dollars

Rationale: Industries vary greatly in their capacity to pay comfortable wages as a consequence of variations in value-added. Some industries, such as instruments or petroleum refining, generate high levels of both revenue and added value per unit of wages. Others, such as textile manufacturing, are far lower. The is also a high correlation between value-added activity and wages. Some industries do not generate enough value to pay consistently high wages to their workers.

In the sample described below, declining industries generated about 7% more value added than expanding industries (1990 data).

Firm Level Measurements

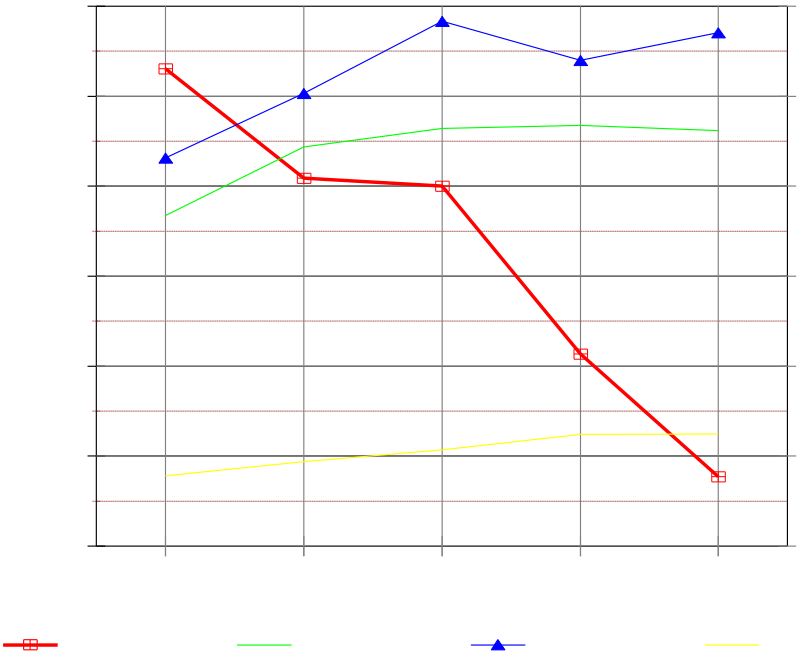
F-1 Export Intensity

Description: Percent of revenue from exports

Frequency of reporting: Quarterly, Annually

Unit of Measure: Percent

Rationale: Export Intensity is a term widely used in Europe which describes the percentage of revenue coming from exports. It will be interesting to follow export intensity at the level of the firm as an indicator of the global competitiveness. At this writing, we are encountering some difficulty in finding sufficient information on exports by individual firms here in the United States. We will keep working on it.



To be developed

F-2 Bankable equity - Firm

Description: Stockholders equity less intangibles and less 50% of inventory

Frequency of reporting: Quarterly, Annually

Unit of Measure: U.S. Dollars

Rationale: The term bankable equity is derived by subtracting from a company's total stockholders equity those assets that would normally not serve as a borrowing base for borrowing money. Arithmetically, Bankable equity, as the term is used here, is equal to Stockholder's Equity minus Intangible Assets (such as Goodwill) minus fifty percent of the stated book value of the inventory. Bankable equity is intended as a rough approximation of the future borrowing ability of corporations.

In the example provided below, some large companies like Emerson Electric, Ford, Motorola and 3M have substantial bankable equity. However, some other large corporations like Baxter International and Bethlehem Steel have negative bankable equity. The range is enormous.

F-3 Bankable equity Rate - Firm

Description: Bankable equity as a percent of stockholders equity

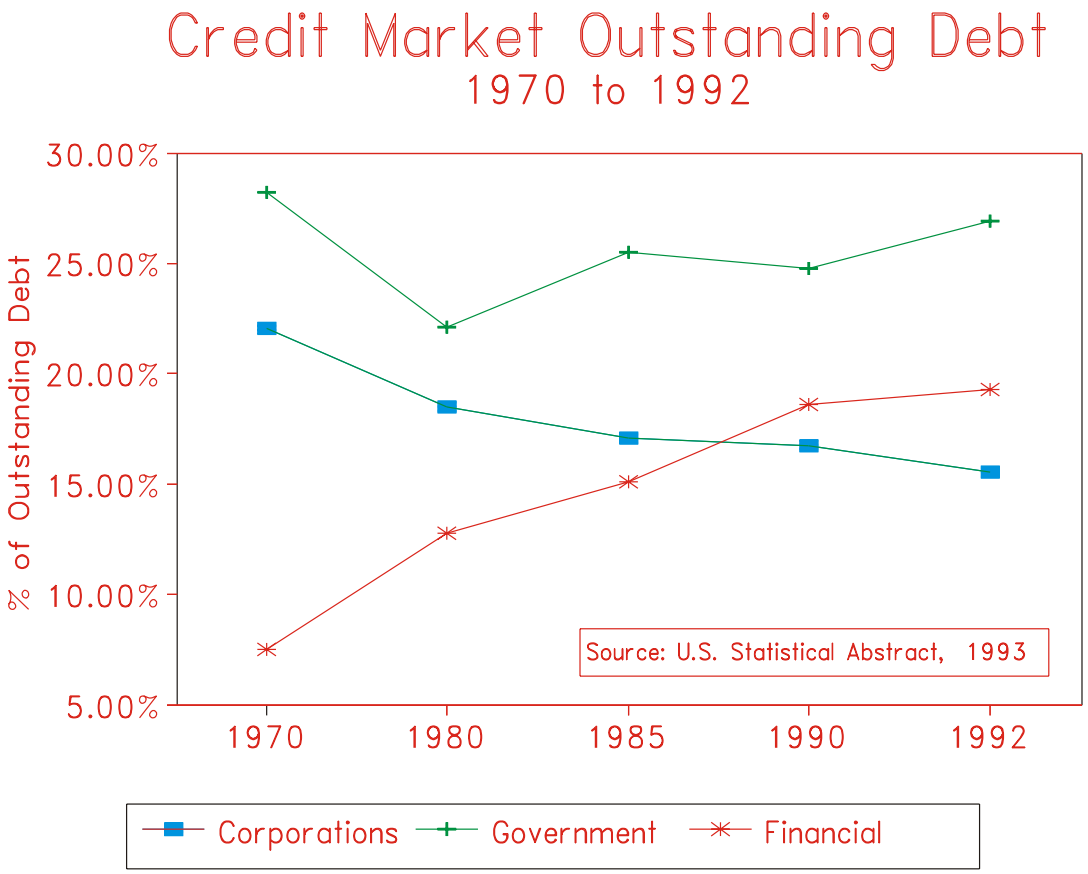
Frequency of reporting: Quarterly, Annually

Unit of Measure: Percent

Rationale: The measure Bankable equity as a Percent of Stockholders Equity provides some indication of whether the stockholder's equity within the industry is reasonably free of intangible assets and excess inventory. It might be construed to be a sort of reality check on the balance sheet.

In the example below, Shell Oil and Rubbermaid both have balance sheets which are reasonably free of intangible assets and excess inventory. On the other hand, Quaker Oats and Cooper Industries have negative bankable equity.

It is important to recognize that intangible assets almost always have to be amortized against future profits, thus deflating future earnings. Inventory, too, must ultimately be expensed. Very little inventory lasts forever — though some companies have recorded it as if it did.



F-4 Percent Change in Production Worker Employment

Description: Production workers change in employment by industry

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: Under the current system for classifying employment, all people working in a particular industry, independent of their position, are classified as employed in that sector of the economy. For instance, all sales people, accountants, secretaries and executives employed by companies in the manufacturing SIC Codes constitute the number of manufacturing jobs. In reality, in many cases, most of the products are imported and little manufacturing actually takes place. We have no objection at all to the jobs not on the factory floor being classified as manufacturing jobs. However, we should also examine how much real production employment exists. In many cases, some large firms now classified as manufacturers would be better described as wholesalers for as costs have risen, they have subcontracted their manufacturing to other companies overseas. While we can understand the cost pressures behind these decisions,

we should still monitor what is happening what is happening with actual manufacturing employment because we suspect we have considerably less of it than what current statistics indicate.

The graph below indicates the percentage change in production worker employment by industry. The changes are influenced by productivity changes and also by the caliber of companies operating in each major industry.

F-5 Profit rate

Description: After-tax profit as a percent of revenue

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: Profits provide the financial viability of companies but profits also represent a primary source of funds for reinvestment to support future employment. Profits are important to the long-term health of the industrial economy at the national level, at the industry level, and again at the firm level. One of the alarming attributes of the U.S. Industrial Economy in recent years that in spite of relative general prosperity, some very large industrial employers are operating marginally or at a loss. The data in the graph below is for 1994.

This measurement also has to be used with caution because of the accounting changes required by Financial Accounting Standard 106 which required companies to take charges against earnings to account for future retiree benefit liabilities — a practice not always required of governments. Many of these charges were taken during the 1992 to 1993 period.

F-6 Net Long Term Reinvested Profits (Earnings minus Dividends)

Description: Net after-tax earnings minus dividends (five year period)

Frequency of reporting: Annually

Unit of Measure: Dollars

Rationale: The purpose of this measure is to compare corporate reinvestment (in the business) in relation to profits over a period of five years for specific companies. A specific company may generate profits but if these profits are mostly being paid out in dividends, we are reducing the money available for reinvestment. Some companies have attempted to support stock prices with high dividend payouts. Others simply did not earn very much. Still others have retained a much larger fraction of earnings for reinvestment.

Hewlett-Packard, Boeing, Motorola and 3M all have reinvested roughly a billion dollars per year in their companies. General Motors and IBM have been divesting equity. The data compiled here is for 23 companies.

F-7 Retained Earnings per Employee

Description: Retained earnings (from the stockholders equity section of the balance sheet) divided by the number of people employed by the company

Frequency of reporting: Quarterly, Annually

Unit of Measure: U.S. Dollars

Rationale: Retained Earnings per Employee indicates the amount of corporate reinvestment that has taken place in relation to the number of company employees. Some companies, such as Medtronic and Kellogg have reinvested large amounts in corporate profits in relation to their employment base. Others, such as Cooper Industries and Westinghouse have not been as effective as financial stewards from the perspective of the employee. The case might be made that the resources necessary to remain competitive are eroding for some of the most well known US companies.

Note that Chrysler reinvested almost $30,000 per employee over the five year period — yet Chrysler management is under pressure from dissident stockholders to increase dividend payouts. Cincinnati Milacron, at one time one of the largest machine tool companies in the world, invested about $4,000. Westinghouse and Cooper Industries both have negative retained earnings.

To be most effective as an indicator studied over time, this measure should be discounted for inflation.

F-8 Long Term Profit Trends

Description: Historical profits in selected industries

Frequency of reporting: Annually

Unit of Measure: U.S. Dollars

Rationale: Industries vary greatly in their capacity to survive the pressures of international competition. Some companies in some industries survive well and pay comfortable wages. Other industries seem to have a problems fielding a team of active conditioned participants to meet the challenges of world trade. As recently as 1976, approximately 96 percent of the machine tools sold in the United States were built here. However, in the past twenty years, the US machine tool industry has not been as aggressive in providing high quality production equipment at reasonable cost. As a result, profits have been in decline for several years.

Some caution is warranted with these figures because of the role Financial Accounting Standard 106 has had in reported company profitability.

F-9 Multinational Patents Filed

Description: Number of patents filed in more than one country by firm.

Frequency of reporting: Annually

Unit of Measure: Number of Patents per Year

Rationale: U.S. technology has bolstered the US economy for over a century. While U.S. technology is still important and still respected, there is evidence that other countries are outstripping the United States in key innovations.

There are some problems with this measurement in part because many Asian companies are such large companies. Still, the comparison is interesting.

Since 1989, real research and development spending has been cut by many U.S. companies — including GE, IBM and Eastman Kodak.

Support System Measurements

S-1 Savings Rate

Description: Savings as a % of income

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: Personal and business saving is the ultimate source of investment for both the public and private sectors. The two comparisons we should make are how much are we saving in comparison to the past and how much do we save in comparison to other countries. In both comparisons, the US savings rate is low.

S-2 Interest Rate Spread

Description: The prime interest rate charged to the highest rated industrial customers minus the interest rate paid on 90 day certificates of deposit

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: Within the framework of reasonable competition, the interest rates paid on personal savings should reflect the market rate paid by borrowers. However, in recent years, the interest rate paid by prime industrial customers has remained fairly high even though the rates paid to borrowers has remained comparatively low. The spread has been increasing from about 1.5 percent twenty years ago to about 2.5 percent today. The abnormally high spread has greatly increased the profitability of financial institutions but it does represent a cost of doing business to industrial companies.

S-3 Industrial Lending Rate

Description: Percentage of total borrowings made by industrial companies

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: In the years long past, most loans were made to individual, corporations (or companies) and units of government. Since the 1970s, credit markets have been supplying increasingly higher percentages of loanable funds to other financial institutions. Now we have a much larger percentage of loans being made to other financial institutions than to companies. Instead of investing these monies in solid, proactive steps to improve our industrial base for the future, these monies are often used instead for mergers, acquisitions and corporate restructurings — many of which add very little to US industrial strength.

S-4 Initial Public Offerings Compared to New Issue Municipal Bonds

Description: Dollar value of IPOs compared to new issue municipal bonds

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Dollars

Rationale: The flow of money is one indicator of where we put the priorities in our economy. By comparing the sales of newly issued municipal bonds and initial public stock offerings for companies, we can gain some insights as to whether we are nurturing enough new corporate activity to sustain the industrial segment of the US economy in the future.

S-5 Science and Engineering Degrees Awarded

Description: Bachelors degrees granted in science, mathematics and engineering in comparison to those in other countries

Frequency of reporting: Annually

Unit of Measure: Number of degrees awarded per year

Rationale: The United states has excellent technology at the moment but technology is progressing rapidly throughout the world. At the moment, about five time as many science and engineering degrees are awarded in Southeast Asia as in the United States and many of the US degrees are awarded to foreign students.

Infrastructure Measurements

G-1 External overhead Employment Percentage

Description: Employment in finance, insurance, real estate, services and government as a % of total employment

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: This particular measurement compares employment in finance, insurance, real estate, services and government as a % of total employment in comparison to a few competing countries.

The fraction of the employed population involved in the external overhead function of an economy can be a factor in determining industrial vitality because of the costs involved in assembling and maintaining the segment. But, it is also worth measuring because of the impediments that can be created for productive activity with a society too laden with intermediaries.

G-2 Overhead to Tangible Production Employment Ratio

Description: External overhead employment (finance, insurance, real estate, services and government) as a % of employment in tangible production

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale:

The Overhead to Tangible Production Employment Ratio shows the relationship between US employment in finance, insurance, real estate, services and government to US employment in tangible production in comparison to competing countries. Roughly, what it says here is that for every 100 people employed in tangible production in the United States, approximately 162 are employed in finance, insurance, real estate services and government. In Germany, this ratio is 82 and in Korea, it is 39. Japan is at about 70 and Singapore is at 90.

It is difficult to collect information of this nature because definitions vary from country to country. This data was taken from the Europa World Year Book for 1992. Again, it should be used with other measures.

G-3 Government To Manufacturing Employment

Description: Civilian government employment as a percentage of manufacturing employment

Frequency of reporting: Monthly, Quarterly, Annually

Unit of Measure: Percent

Rationale: Much of government employment is good, but the sheer quantity of it should produce concern. Much of manufacturing employment is good, but perhaps not all of it. The purpose of following both government and manufacturing employment together is to follow the relative growth in each sector over long periods of time. While many government activities are quite worthwhile, somebody does have to pay for them— a task that is becoming increasingly difficult. Historically, the U.S. economy has operated best when there are at least two and a half times as many people in manufacturing as there is in government. Since 1991, we have had more people employed in government than in manufacturing.

The graph below shows civilian government employment and US manufacturing employment.

G-4 Stock Market Value by Industry

Description: Market value (stock market) by industry

Frequency of reporting: Quarterly, Annually

Unit of Measure: U.S. Dollars

Rationale: The stock market has greatly increased in value during the past twelve years. The question is, has the value indicated by the market been in industries likely to provide a strong employment base for the future? Much of the market's current value is in entertainment, finance, communications or retailing. Major industries employing hundreds of thousands of workers, such as chemicals, automotive, aerospace and paper account for a relatively small share of US equity market value. One might wonder if stock market value is a truly meaningful measure of future economic presence or whether it is more related to merger and acquisition potential.

G-5 Unfunded Pension and Benefit Liabilities - Public and Private

Description: Unfunded pension liabilities for public and private employees

Frequency of reporting: Quarterly, Annually

Unit of Measure: U.S. Dollars

Rationale: Individuals have been promised retirement benefits by many governments as well as companies and some of these have been adequately funded by explicit cash contributions which have been made each year. In some cases, the promises have been made but the funding has not been set aside. In other cases, previously set aside funding has become involved in financial restructuring in ways that involve considerable risk. The situation of unfunded retirement obligations is even less clear regarding government employees than it is even in the private sector because of the presence of so many special retirement programs, often involving cash payments out of operating funds. In some cases, special early retirement programs have tapped into retirement funds more than what should be permitted on the basis of actuarial risk. Though there are regulations in place to monitor and govern these matters, these are enormous obligations for the future which we should still routinely measure.

Unfortunately, we have not yet been able to find sufficient information on the magnitude of this situation. Yet there is some historical evidence that economies with weakening production, excessive debts, volatile financial markets and erratic currencies tend to have problems paying for pensions that have been promised.

To be developed

G-6 Union Membership by Economic Sector Served

Description: Percent of union membership by economic sector served

Frequency of reporting: Annually

Unit of Measure: Percent

Rationale: The percentage of union members belonging to unions typically associated with industrial sectors such as construction, manufacturing, transportation, etc. has been declining while membership in public employee unions has been increasing. .

This is not perfect information because many unions serve many segments and because not all unions are officially affiliated with the AFL-CIO which gathers most of the statistics. In particular, the information presented here excludes members of the National Education Association which is one of the largest unions in the country.

Nonetheless, there does appear to be a substantial trend away form membership in industrial unions to membership in public employees unions — potentially changing the face of organized labor.

Section V
Observations

The industrial economy of the United States is delicate. We are strong in a few industries, weak in others and in precarious positions in others. Overall, there are certainly some bright spots such as aerospace, farm machinery and medical devices. However, even in these industries, overseas capability is advancing. Unfortunately for the United States, foreign competitors are showing strength in some of the very industries that have had the best long term histories of providing good wages and benefits to workers in the United States.

The observations of this study can be broadly divided into four categories:

1. **Observations related to measurement.**
2. **Observations related to the US industrial economy overall.**
3. **Observations related to industries.**
4. **Observations related to support structures.**

The word "observations" is used here instead of "findings" because of the vastness of the topic being considered. Clearly there are many measurements of the industrial economy and certainly there is a great deal written about it. It is out of respect for other work in this field, and appreciation for the specialties of economics, policy and statistics that the author introduces Section V. The author's perspective is that of a manufacturing engineering professor who has been visiting factories for many years. Whatever observations the author has should surely be compared with other contributions in the fields of economics, sociology, public affairs, business administration and other fields related to the central topic of this research.

Nonetheless, it seems clear that we need to say something. The huge financial and social risks resulting from prolonged trade imbalances and industrial employment declines on the part of the United States are serious matters meriting our attention and study. The successful management of long term trade imbalances, coupled with fiscal imbalances, has not been achieved by other countries in the past — let alone on the scale which we are experiencing currently. It is not within the domain of manufacturing engineering to predict our ability to muddle through. However, many of us feel that improvements might be possible if the inner-workings of our industrial economy could be more broadly understood.

Observations Related to Measurement.

In general, we have great amounts of data from both private and public sources. However, much of the more interesting information, often the privately collected information, is not commonly reported in publicly released summaries assessing progress in the industrial economy. In particular, there could be more synergy involving not only government collected figures but information on technology, corporate finance, sociology and other areas of study. The following observations relate to the specific attributes of our most common industrial measurement systems.

Measurements are insufficiently global.

During this era of intense worldwide competition, it makes little sense to examine US industry with comparisons confined to our own borders. Other nations are progressing rapidly and few figures are meaningful in the long term if they are not set within the framework of international competition. ADC Telecommunications, for instance, is one of Minnesota's larger and more successful companies. Yet, there are at least seventeen larger foreign companies with the same primary SIC code (primary activities in the same industry). H. B. Fuller is another excellent Minnesota company but there are at least 28 foreign corporations with more stockholder's equity with primary activities in the same industry. With tariffs declining and worldwide marketing affiliations increasing, it will become increasingly necessary for us to appraise both our efforts and the juxtaposition of US firms within an international setting.

Much can be gained by comparing our infrastructure as well. We are in good shape with respect to highways. We are not in such good shape with respect to railroads, shipping, education and the efficiency of our governments or our courts. It was interesting to note that quite a bit of effort on the part of countries like Singapore is directed toward getting a better understanding of how that country compares on infrastructural matters as well as pure industrial matters.

Popular reporting of measurements is too general.

Aggregate figures on matters as important as the industrial base of the nation need to be dealt with specifically and in detail. How we are progressing in overall manufacturing employment may be far less meaningful than how we are faring in the high value-added industries that account for so much of the nation's payroll. From 1988 to 1993, the number of people employed by US manufacturing companies declined by about 1.2 million. Yet the industry losing the most employment, aircraft & parts, had an average hourly wage approximately 50 percent greater than the national average. The second most declining industry, search & navigation equipment, had an average hourly wage about 30 percent higher. We are not suggesting that it may not be in our best interest to allow certain industries to shrink while others expand. Nonetheless, greater specificity is needed in our general discussion of the industrial economy so we can more accurately assess the direction the nation is headed.

Interpretation of industrial measurements should be interdisciplinary.

In an interesting report on manufacturing productivity, McKinsey & Company, Inc. examined variables like the average diameter of blast furnaces and the technologies employed in the relative productivity of German, Japanese and US steel makers. German reporting systems place great emphasis on the work readiness of potential employees. Taiwan measurements are heavily integrated with assessments of the transportation infrastructure. Singapore tracks the responsiveness of its regulatory system. Variables involving technology, finance, employment trends, trade positions, market positions, and work force readiness all impact the competitive position of the United States. It will be helpful to develop analyses that cross disciplinary lines and span segments of our society in order to accurately assess where we are going and where we need to improve to compete internationally.

Longer term interpretation is needed.

The average life of a manufacturing plant is long — probably around seventy years — so it should not surprise us that the observable changes that take place from quarter to quarter or from year to year are only part of the story. The situation is confused further because of cyclical volatility in most markets. Yet, within these shorter time periods, powerful changes are taking place. Some plants are being updated. Some are not. Some companies are bringing forth innovative new products. Others are not. Some key companies in key industries are well run. Others are not operating in the interest of shareholders, workers, the community or anyone else.

While it will continue to be useful to monitor industrial changes at short intervals, more insightful and in-depth analysis is needed over longer time periods. We've lost 400,000 workers from the steel industry during the past

40 years. Some of this shrinkage was no doubt an outgrowth of needed productivity improvements. But meanwhile, steel imports grew to $11 billion per year. In this industry, as in many others, the problems cannot be isolated to a single cause but rest, instead, at the door of many of our institutions along with the management of what was, at one time, our largest industry. Yet, it was evident to keen observers of the industry at the time, including both domestic and foreign competitors, that the pace of US adaptation in this important global industry was not commensurate with what was needed to remain competitive. Whether the problems were due to aloof, ineffective management, recalcitrant labor groups, corporate directors lacking foresight, naive regulation or a burdensome, awkward infrastructure, the results are clear. Steel now accounts for five percent of our trade deficit.

We've lost nearly a quarter of a million workers from the electronics industry since 1988 and over an eighth of a million workers in aircraft — in two industries supposedly harbingers for the future. Other industries have similar trends. We should know more about what is happening in technology, cost, skill requirements, support systems and regulation over longer periods to better provide for the future.

Company and industry performance is linked to aggregate performance.

It is amusing to think of Westinghouse taking over CBS because the event typifies some of the managerial responses long associated with troubled, or declining, companies. The response often seem to be, "if we cannot manage what we have, we had better manage something else" (Zimmerman, 1991). Westinghouse is a company with $10.6 billion of assets but negative bankable equity of $211 million in addition to an unfunded pension liability of $1.3 billion in 1993. It operates in an industry where 9 of the 10 largest companies are headquartered outside of the United States. Earlier, we had lost another prominent manufacturer of electrical generation equipment with the bankruptcy of Allis-Chalmers in 1987 — another case of unprogrammatic diversification this time resulting in the destruction of the largest employer in the state of Wisconsin. The West Allis plant, which at one time employed over 20,000 workers, has now been leveled for a K-Mart.

The US has lost 19.5 percent of its work force in five years in the electrical generation equipment industry — an industry where we still hold a modest, but shrinking, trade surplus. Though other US manufacturers operate in the same industry, the strength of the US is related to the strength of the individual firms operating in that industry.

It is difficult to imagine how we might improve our performance on world trade if there is an insufficient supply of well-run companies capable of effectively competing internationally. Similarly, our aggregate performance is an amalgamation of industrial performances made up, in turn, of company performances. In a manner similar to Benjamin Franklin's famous poem about the loss of a horseshoe nail, the kingdom is in jeopardy if individual company performance is not up to world class standards.

The interconnections between individual companies operating in key strategic industries is not lost on our international competitors who continually target large US industries populated by companies that are uncompetitive by modern world standards. This great attention paid to the caliber of US companies operating in individual industries may explain why we have so much competition in some industries and so little in others when the manufacturing processes are quite similar — for instance large home appliances (where we have little competition) and small home appliances (where we have much competition. Maytag, GE, Raytheon and Whirlpool as a group were far more formidable than Zenith, RCA and Admiral.

Here, as elsewhere, prudence is in order. Recognizing the importance of companies is one thing. The fostering of non-market-oriented industrial policies to prop up sagging firms is quite another and some of our international competitors have also made that mistake. Still, we should do a better job of examining the capabilities of our key industrial companies as a factor in our overall competitiveness.

Observations Related to the US Industrial Economy Overall.

In addition to the specific matter of the caliber of our measurements, there are some attributes of our national industrial economy worthy of discussion. While the United States is a strong country, the rate of industrial transformation is substantial and some features of our economy should be reconsidered.

Aggregate performance is less impressive when industry performance is considered.

We have several industries where US firms clearly dominate technologically, financially and in market presence. Among them are aircraft, navigation systems, abrasives, soap, medical instruments and paper. These industries are dominated by well-run, technically astute companies with strong balance sheets. There are other industries where US companies have largely disappeared from the list of prominent firms. Among these are shipbuilding, steel, concrete and miscellaneous textiles. In between, there are many industries where the US has one or two major international participants — sometimes doing well — sometimes not so well. We have held on pretty well in motor vehicles, appliances and chemicals but there is intense international pressure in each of these industries and several of the larger US firms have been investing less and paying dividends out of existing equity. General Motors, for instance, which is the largest industrial enterprise in the United States, has seen ins stockholder equity shrink from $34 billion to $12 billion. GM's bankable equity remains negative.

The US mega-corporation IBM is still the world's largest computer company but its equity has also declined with substantial losses concurrent with the payment of dividends. Meanwhile, new companies, some US and some overseas, are surfacing in this highly competitive industry. There are now 262 companies listed in the Moody's domestic and international databases that list the computer industry as their primary industry. Some of these, like fast rising Acer of Taiwan, are expanding rapidly. Other large foreign companies listing primary industries other than computers include such companies as Samsung of Korea and Siemens of Germany. Given the fact that many of the components on the computers being sold are now imported from overseas, the US position as the world's leading exporter of computing equipment is likely to remain under pressure. The US trade balance in computers and office equipment has declined from a surplus of $267 million in 1990 to a deficit of $12.6 billion in 1993. Given the fact that one of the world’s emerging software centers is now Bangelore, India, it will be interesting to follow this industry in the years ahead.

The aggregate US economy is still impressive because it is so big. But, beneath that bigness, there is worry about many of our larger industries and, subsequently, the suppliers supporting these industries. Motor vehicles, which has received so much attention, is actually one of our more competitive industries. We have three world class producers with good products and relatively high market shares. But they are also companies with thin profit margins and they are under pressure from Wall Street to increase dividends. Nonetheless, we are less fortunate in some other industries.

The excellent year of 1994 does not constitute a trend.

For profits, employment and general prosperity, 1994 was probably the best year the United States has had since 1979. Still, it is a year when we managed to accumulate a trade deficit of $166 billion along with huge governmental budget deficits. Now there is likely to be, and perhaps should be, further budget reductions impacting some of the industries where the US has historically been most competitive; aerospace, aircraft, and farm machinery. The author is not lobbying against any budget cuts. However, as we look forward to the years ahead, we may see a softening in several of the markets where US producers have historically done well, including motor vehicles which has been a growing market for several years. At this writing, car sales for 1995 are off 3.4 percent.

If the economy does soften, the industrial positions of the US and its competitors will have to be reappraised. We are not alone in having problems. Germany's high cost, Korea's leveraged position and Japan's fragile balance sheets could all pose problems for the world economy in the future. The point here is that one immediate

outcome of a slower world economy might be further cutbacks in some of the industries where we have performed well in international markets and with companies that have provided the most to their employees in the past.

Financial market performance may not be an indicator of future industrial prowess.

Although the performance of the US stock market has been exhilarating in recent years, it is not entirely clear that the cash coming into the market will necessarily support industrial activity. Even in 1993, approximately 40 percent of company market value as listed in *Business Week's Top 1000 List* was from financial services, health care, telecommunications, or leisure time industries. About 18 percent was form the traditional manufacturing industries such as autos, aircraft, containers, paper and computers. We recognize, of course, that market values tend to be a reflection of profit making potential — but not always. Traditional manufacturing companies showing little inclination to merge, acquire or affiliate may sell at lower multiples than companies in the entertainment and media businesses.

Market values are important in sustaining industry. However, after a decade and a half of usually disappointing hostile takeovers, lower profit rates and higher dividend payout ratios at the expense of reinvestment, we are not sure that stock market values, accumulated during a long downward trend in interest rates, are axiomatically good indicators of what lies ahead industrially. There may be better predictors.

Corporate reinvestment is weak.

After-tax profits have declined from around 8 percent in the 1960s to around 5 percent today. Meanwhile, dividend payout ratios have escalated from 40 percent to 70 percent., Thus we are reinvesting 1.5 percent of corporate revenue versus approximately three times that rate three decades earlier. This corresponds to $320 per full time employee per year versus $1400 per employee in 1979 (in 1987$). In fairness, heavy depreciation may also provide cash for expansion and upgrading but profits minus dividends are clearly negative with some companies and not very positive with others. Though there are some excellently equipped US factories, manufacturing equipment averages several years older than in Germany or Japan. Plant and equipment investment has been rising. However, in the specific matter of the net installed base of production machinery and equipment, our stocks have been growing only modestly in recent years.

Our trade imbalance is more frightening if oil imports are left out.

Our trade balance is serious enough but it is more frightening if we examine it by category. the US trade deficit on oil declined from about $70 billion in 1980 to around $50 billion in 1994. Meanwhile, during the same period, the non-oil trade balance worsened from a $50 billion surplus to a $100 billion deficit. The trade deficit on basic manufactures (paper, steel, tires, tools, etc.) mushroomed to over $30 billion last year. For miscellaneous manufactures, such as precision instruments, apparel, watches, photographic equipment and toys, the trade deficit is $60 billion. The most alarming of these trends is the escalating trade deficit in the high value-added industries where US workers have enjoyed higher standards of living than in most other industries.

The long established economic principle of comparative advantage needs a more widely established and universally accepted interpretation. Whose advantage is it and how does it affect us — specifically? The principle may be fully valid. But, what does it mean within the various scenarios that face us?

Wages are correlated to value added.

Although the case is clearly mixed, it does appear that many higher paying industries are losing jobs. However, a more meaningful connection can be made with respect to value being generated in our various industries and the wages that they pay. Not surprisingly, those industries generating the most value per hour pay the most per hour. The difference between low and high paying industries is around $12 per hour in 1990 dollars. This phenomena is a natural outgrowth of market conditions and not a result of political factors or bargaining strength.

The fact is that the world is simply more willing to pay more money (per hour of work) for a pacemaker, a precision instrument or a 767 jetliner than it is for a lower quality apparel or commercial printing or other products that require less skill and technology. The rest of the world knows this and our competitors understandably incorporate this thought in their planning, their training and the building of their infrastructure. Not everyone is successful but the linkage between value added and hourly pay is widely understood overseas. Indeed, most of Europe's tax structure is based on the value-added principle.

Much has been written about stagnating wages in the United States and, at the aggregate level, the stagnation appears to be real. But what might be happening is a simple shift from higher value-added industries to lower value-added ones. The matter deserves considerable attention for its enormous ramifications to tax revenues, retirements, purchasing power, health care and a variety of other issues.

Comfort regarding the US economy implies comfort with deficits.

How we interpret the US economy is a function of how we feel about deficits. If we are comfortable with deficits, then we clearly have a nice situation in the United States. Most of us have enough to spend. Costs are generally low and much of our infrastructure is in place. However, if we are uncomfortable with deficits, then we should work harder to provide a quality interpretation of what is happening to us. Will the correction of the deficits affect us economically? Will avoiding them bring catastrophe? Does having a robust economy within the framework of huge deficits represent progress?

One feature of industrial measurement is the accounting system we employ to measure the economy. As it is commonly reported, it is essentially a single entry system without an offsetting balance sheet. But, if debt is higher at the end of the year than at the beginning of the year at the same time when real investment has been relatively low, it would appear that we have been losing money in the operation of our economy.

Observations Related to Industries.

Although the United States has generally healthy industries, the variability is substantial. There some specific aspects of certain industries worthy of special mention.

The disparity in the performance of our industries is substantial.

Both the paper industry and the textile mill industry have about 630,000 employees in the United States but the similarities end there. The paper industry generates about $95,000 per year in value added for each employee (1990 figures) and pays an average of $13.42 per hour (1993). Seven of the world's ten largest paper mill companies are headquartered in the US and six of these are consistently profitable. The industry has around $33 billion of bankable equity or about 9 percent of the US total for industrial companies. Research and development expenses are high, patents are high and the entire industry is one where the US competitive position is strongest.

In contrast, the textile mill industry generates about $42,000 of value added per employee per year and pays an average of $8.89 per hour or 34 percent less than the paper industry. Of the 204 companies listed with primary SIC codes in this industry, 47 are US companies controlling 45 percent of the listed assets — primarily because of extraordinary US strength in two segments, knitting and carpets. But bankable equity is only $3 billion or 9 percent as much as the paper industry which has the same number of employees. Profit rates average around two to three percent in the textile mill industry except, again, in knitting and carpets. Overall, this industry is in a weak competitive position.

The degree to which our industries differ in technological prowess, financial strength, wages paid, taxes paid, and managerial responsiveness is enormous — enough so that averages or aggregate figures cease to have clear meaning without in-depth understanding of the subsets.

The variation between companies is greater than it is between industries.

As a natural outgrowth of the phenomena of regression, the variation between companies is, of course, even greater than it is between industries. Companies such as 3M, Medtronic and Merck are well managed companies with strong technologies and solid financial positions. Other companies are not as strong. The principal question, however, is how much less strong are they?

In Minnesota, Industrial companies have a combined total of $12.7 billion of bankable equity of which 3M has $5.4 billion or 42 percent. 3M usually ranks among the highest of US companies in patents issued and a very high fraction (maybe three quarters) of Minnesota's foundation giving stems from 3M related foundations. The company is as an active participant in international business where it routinely gets half of it sales and it generates over 40 percent of Minnesota's industrial profits — seventeen times as much as Ceridian Corporation which (as Control Data) was at one time one of Minnesota's largest employers. 3M's bankable equity is nine times that of Medtronic (another excellent company), five times that of Honeywell (also fine) and 155 times that of Ceridian. Clearly there is an enormous range in these companies with respect to their ability to participate meaningfully in international competition. Minnesota is fortunate to have companies such as 3M, Medtronic, Honeywell, ADC, HB Fuller, Pentair, Tennant, Polaris, Artco and MTS all in one state. By comparison, the bankable equity for all industrial corporations headquartered in Wisconsin is about equal to that of 3M. Iowa's industrial bankable equity is little more than that of Honeywell.

Yet, as a nation, we also have many problem situations. Companies such as Bell & Howell (Illinois), Black & Decker (Maryland), Rexnord (Wisconsin), Navistar (Illinois), Northrop Grumman (California and New York), Owens Corning Fiberglass (Ohio), Anchor Glass (Florida) and Uniroyal Chemical (Connecticut) are all companies with over half a billion in sales that have contributed heavily to US industrial expansion in the past. Currently, they are companies with weak balance sheets and low profit margins — often the result of reckless diversification. Since 1994 was an excellent year, most companies did fairly well. However, if the economy were to weaken, especially for a period of three or four years, several major US employers would be in great jeopardy.

Only a few of the expanding industries are technologically based.

There is technology in everything, of course, so we should not suggest that industries such as snack food, public building furniture, burial vaults and greeting cards have no technology because they certainly do. But, the question is do these industries have as defensible technological positions as might be the case aircraft and flight control systems. In some cases, our expanding industries do relay very heavily of technology as is the case with drugs, medical devices and agricultural chemicals. Whether this incremental need for technology will keep pace with the employment losses we seem to be experiencing in aircraft, navigation equipment, computers, electronic components, steel making, shipbuilding and measuring & controlling devices remains to be seen. Collectively, we have lost 607,000 jobs in these industries since 1988 even though the vast downturns in steel making and shipbuilding occurred earlier. Meanwhile, we added 55,000 jobs in medical devices and drugs.

There are some theoretical advantages to low-tech industries stemming from transportation costs and other factors so no one is suggesting that these industries are not important. The question is the relationships between technology, value-added and pay. From 1988 to 1993, we added 50,000 jobs in the meat products industry at $8.49 per hour (average for the industry in 1993). We added 6,000 in the toy industry at $8.80 and 17,000 jobs in miscellaneous food at $9.51. Dairy products were better. We added 43,000 jobs at $11.66 per hour — still a long way from compensating for the 142,000 jobs we lost in aircraft at $17.24 per hour.

Conventional arguments often suggest that changes such as those mentioned above are natural. Industries rise and fall. Something emerges to replace those that are declining. Perhaps. However, there seems to be some evidence that the replacement is taking place all right but in other economic regions. Brazil is now a credible producer of aircraft. Malaysia is a key producer of computer components. Taiwan is now manufacturing some outstanding machine tools and Korea has developed as one of the world's most technologically advanced producers of flat panel displays. With the rapid growth of scientists and engineers in other countries, we might wonder if the technological basis of US prosperity will continue in quite the same way it has in the past.

Table V-1 provides a rough summary of the percentage of industry assets held by US companies. Keep in mind, the Moody's database is largely a US database so we would expect the percentage of US assets to be high. Still, the table does illustrate the disparity in US presence from industry to industry.

US innovation and entrepreneurship is still respected.

Fortunately, there is much that is good about the United States — especially when we are compared to other countries. The renown European management school, IMD in Lausanne, Switzerland, recently completed *The World Competitiveness Report 1994* which ranked 41 nations for their effectiveness in competing internationally. The researchers examined each country on 381 variables divided into eight categories:

1. Domestic Economic Strength
2. Internationalization
3. Science and Technology
4. Management
5. Finance
6. Infrastructure
7. People
8. Government

The United States finished first overall followed by Singapore, Japan, Hong Kong, Germany and Switzerland. The final tally did not square precisely with the *Executive Opinion Survey* that was a part of the report which placed the USA in tenth position. Nonetheless, the report did describe may observable US strengths. Among these were agriculture, basic research, the ability to attract talent from overseas, entrepreneurship, foreign investment overseas, scientists & engineers, total value added and the availability of finance. The US ranked close to the top of the list in other advantages such as the use of information technology, willingness to delegate, worker motivation and living standards. Clearly, the US is a nation with many advantages and many strengths. We have much to be thankful for.

Observations Related to Support Structures.

No discussion of US competitiveness could be undertaken without alluding to the caliber of the support structures — services, government, finance, etc.. The quality and efficiency of the nation's infrastructural activities is a major question worthy of far more attention that the few cursory comments made here. However, some remarks are in order.

Relative to other industrial countries, the US has low industrial employment.

Currently, the United States has about 26 million people employed in tangible production — 18 million in manufacturing, 3 million in agriculture, 4.5 million in construction and .6 million in mining. That is a lot of people but not so many by world standards.

The United States has about 27 percent of its employment in tangible production (manufacturing, construction, mining and agriculture). It is true that much of this employment is highly productive — especially in agriculture but also in other industries. However, the fraction is still small — exceedingly small by world standards. Much smaller Japan has 75 percent as many people employed in manufacturing as we do. Brazil has over half as many. Emerging countries such as Indonesia have vast pools of human talent rapidly moving into manufacturing. China, of course, has a theoretical potential of having a hundred million people employed in manufacturing and so does India.

It is common for popular articles appearing in some newspapers and periodicals to suggest that the productivity difference between the US and less developed countries is so vast that we need not worry about the number of people employed in these industries. However, this assertion needs to be tested. As a practical matter, the engineering and scientific talent is very rich in some developing countries — most of which have highly developed education systems, much higher savings rates and high rates of current investment. Given the fact that much of the world's production equipment is now manufacturing in other countries, there is not good reason to believe that overseas plants will be less automated and less efficient than US plants. As a practical matter, some of the plants coming on stream in more rapidly developing parts of the world are, in fact, among the world's most automated. Meanwhile, machinery and equipment in the United States is fairly old and often not very revolutionary — although this varies greatly from industry to industry and company to company.

If the developing world remains primitive in its manufacturing processes, the US will be more secure in the retention of its competitive edge. If, however, these emerging nations take full advantage of their higher savings rates, superior secondary education systems and their proximity to advanced manufacturing technology, it could be quite difficult for us. We should remember that many of the plants coming on stream in places like Indonesia, Malaysia and China are in fact plants funded by the Japanese who are not exactly amateurs with respect to manufacturing technology. It is within this framework that we might consider the number of people we have in tangible production and the investments we are making to retain their productivity.

Relative to other industrial countries, the US has high overhead employment.

On the other hand, we are replete with overhead. In 1991, the US had 43.5 million people employed in community, social and personal services as compared to 8 million in Germany, 7 million in France and under 3 million in Korea. The US had 8 million people employed in finance, insurance and real estate versus 2 million in Germany and 1 million in Korea. For every 100 people employed in tangible production, Germany has 82 people employed in finance, insurance, real estate, services and government. Korea has 39, Singapore has 90 and Japan has 70. The United States has 162. This large staff of people engaged in tasks not directly related to production is a cost factor, and perhaps the most pressing cost factor, in competing in international markets. In terms of dollars, there is not a sharp distinction between overhead costs and other costs. They are all costs and somebody has to pay for them. There is an increasing question as to whether these costs are affordable.

Some matters can be argued philosophically or politically. This one can be argued arithmetically. In order for the United States to have an employment profile similar to that of our major competitors, we would have to shift about 19 million jobs. If we had 17 million fewer people in overhead, two million fewer people in trade and 19 million more people in production, we would be more like other countries.

Social factors probably impact industry more than we have recognized.

In addition to the ratings on matters such as economic strength, internationalization, finance and science, the World Competitiveness Report by IMD had some interesting assessments of social factors relating to world competitiveness and in these areas the United States did not fare as well. The US ranked below the 25th percentile among the 41 countries on the following items:

Item	Rank	Percentile Rank
Lobbying by Special Interest Groups	32	24%
National Debt	32	24%
International Experience	34	20%
Attitude of the Young People	35	17%
Tourism	35	17%
Management Long Term Orientation	36	15%
Aids	39	7%
Managerial Constraints	40	5%
Product Liability	40	5%
Self Sufficiency in Natural Resources	40	5%
Alcohol & Drug Abuse	41	2%
Environmental Infrastructure	41	2%
Justice & Security	41	2%

Many practitioners in world industry see a connection between social factors and the vibrance of industry and the success of individual companies. Often these connections are bi-directional. Good people build good companies and good companies build good communities. Perhaps that is one reason why the above factors were considered in *The Competitiveness Report* when it was compiled in Europe. Can we sustain our position as a world economic power with the social problems we have before us? It is hard to predict.

Financial institutions may work against competitiveness.

The US system of free markets is clearly an advantage that is respected in other countries. However, in recent years, with the rising incidence of leveraged buyouts and domination of the markets by institutional traders, there may be a question as to whether these markets are exactly the same as they were. The current struggle of Chrysler Corporation is a case in point. It is perfectly valid for shareholders to pressure companies for higher dividends but we should keep in mind the fact that corporate re-investments from profits are running well behind the levels of twenty years ago. Chrysler is involved in a highly competitive industry which requires constant reinvestment to remain abreast in both product development and production efficiency. The quarter-to quarter pressure for dividends and stock price levels may actually be working to the long term disadvantage of workers, shareholders, suppliers and everyone else. The track record of the many takeovers and buyouts that have taken place is not an impressive one. It is ironic that one of the most renown corporate raiders, Boone Pickens, is now in so much trouble with Mesa Petroleum that he himself may not survive.

The proper functioning of a free market is central to US prosperity. Perhaps the markets are free and perhaps they are functioning properly. However, it seems far less likely that the pirating, raiding and daily transactions

would be as influential in Europe as they are now in the United States. It does not seem improper to at least raise the question as to whether market activity, as it is now being practiced, is entirely consistent with our long term best interests or with the most fundamental tenets of the free enterprise system.

This problem does not have to be dealt with philosophically. The fact is that some of our largest and most important enterprises such as General Motors, Westinghouse and IBM have paying out dividends well in excess of profits thereby depleting capital available for reinvestment in their companies.

Also of concern is the relative preference for government debt instruments as opposed to industrial company debt instruments. The full backing of the United States government is one thing when the government is solvent enough to provide a reserve. But, when the government is spending hundreds of $ billions more than it takes in each year, how much of a reserve can it provide? Yet, tax laws actively favor government investments over private investments even when a critical review of our economy would suggest that investments in the private sector would be useful in the restoration of balance.

Observation Summary

The forces impacting the industrial economy are clearly multidisciplinary and multifaceted. Maybe we are doing well — maybe not so well — but in order to figure it out we will need to study more issues. There appears to be some evidence that we may have a larger problem than is apparent in some of the officially released statistics.

Probably our industrial economy will need considerable nurturing and improved understanding on the part of policy makers in order for it to remain competitive in world markets. Yet, many of us are nervous about the national industrial policies because we are not sure they would be either timely or helpful once they made it through the political process. Fortunately, public subsidies are not needed. Many of the shortcomings of US industry can primarily be improved through subtraction — the systematic termination of obstacles and unneeded activities..

Subtraction as a potential remedy is a direct outgrowth of our industrial cost structure. The high costs hampering our industrial competitiveness are not primarily either high labor costs or high material costs. Our principal international competitors have equal or higher costs in each of these two categories. The high costs of the United States result from a host of other activities which impact our competitive position negatively. The US competitive position could be enhanced if the costs associated with indirect segments be reduced. This dilemma underscores one of the tragic flaws of gross domestic product form of measurement which relies so much on cost as a measure of useful activity. The assumption is that transactions have value merely because they cost something. The assumption is valid in freely functioning markets but it may not be valid when such a large fraction of transactions are controlled by governmental policy, imperfect courts, informal cartels or nefarious special interests of all sorts. Compared to other countries, US markets still work well in many instances but they are not perfect in all respects and these imperfections give rise to erroneous measurements if they are based on costs which are not market determined.

Table V-1

US and Non-US Corporate Assets in the Moody's Databases

SIC Code	Description	Number of Companies Listed	Total Assets Listed ($ Billions)	Assets held by US Companies ($ Billions)	% of Assets held by US Companies
204	Grain mill products	55	37.0	21.7	58.4%
208	Beverages	15	248.6	67.0	26.9%
209	Miscellaneous food	124	58.1	7.7	13.2%
229	Miscellaneous textiles	69	25.4	2.8	11.0%
262	Paper mills	76	147.2	71.5	48.6%
267	Misc converted paper prod	60	43.7	19.6	44.8%
281	Inorganic chemicals	80	133.6	44.5	33.3%
282	Plastic materials	103	161.8	58.4	36.1%
283	Drugs	347	377.8	137.9	36.5%
284	Soaps, cleaners & toilet goods	74	95.0	57.3	60.2%
301	Tires & inner tubes	29	40.9	11.3	27.7%
324	Cement, hydraulic	68	74.4	3.7	5.0%
321	Flat glass	16	50.8	5.9	11.6%
327	Concrete, gypsum & plaster prod	66	62.1	3.0	4.9%
331	Blast furnace & basic steel	170	359.5	35.4	9.9%
335	Nonferrous rolling & drawing	58	69.0	17.0	24.6%
344	Fabricated structural metal prod	34	18.2	2.2	11.9%
346	Metal forgings & stampings	37	13.1	2.2	16.5%
352	Farm & garden machinery	32	37.7	33.3	88.3%
353	Construction & related mach	80	141.8	28.8	20.3%
356	General Industrial machinery	110	90.2	22.9	25.4%
357	Computer & office equipment	262	285.2	166.3	58.3%
366	Communications equipment	194	115.0	31.2	27.1%
367	Electric components & access	264	154.7	58.8	38.0%
371	Motor vehicles	162	927.7	502.8	54.2%
372	Aircraft & parts	70	376.1	305.4	81.2%
373	Ship & boat building	29	66.0	.5	.8%
376	Guided missiles & space vehicles	13	26.1	24.3	93.1%
381	Search & navigation equipment	35	32.2	18.1	56.2%
382	Measuring & controlling devices	253	57.6	32.2	55.9%
384	Medical instruments & supplies	235	44.7	30.9	69.2%

Section VI
Impact on Industrial Policy.

None of us wishes to advocate the kind of broad reaching industrial policies that places public sector bureaucracies in charge of the country's industry. Such experiments have been tried before with poor results. Yet, it does not axiomatically follow that because government has done its job poorly that the private sector is free of defects. The fact is, there is widespread mediocrity in both camps — much to our long-term regret. If we are to make meaningful progress on the competitive challenges before us, we are going to have to utilize the best aspects of both systems — whatever those may be. If there is one thing that is clear from a study of industrial measurements, it is that both government and the private sector need to perform better. If we continue as we are, our future is exposed to the following questions:

1. Are we investing enough to be cost-competitive with other emerging industrial countries?

Probably not. Our investments are large in dollar terms but, compared to other industrialized and emerging nations, we are not investing enough to be cost competitive in the future. Our investments in private industry lag our investments in the public sector and only a fraction of our private investment is actually aimed at improving the competitiveness of traditional industries. Our real investments in producer's equipment is quite modest and reinvestment of undistributed profits has fallen appreciably over the past fifteen years. While some companies are investing adequately to remain competitive, many other companies, and some whole industries are withering on the vine.

2. Does it matter which industries are expanding or contracting if the economy is healthy?

The economy is living on enormous amounts of borrowed money, much of it provided by foreigners, so we cannot look upon today's prosperity as an outcome of a scientific test. The financial necessity to return to more responsible spending patterns will probably be imposed by external conditions rather than a willful desire to improve by those in charge.

Without the stimulation of astronomical borrowing, it will be more apparent that some industries pay off far better for society than some other industries. The correlation between value-added per employee and hourly pay is very pronounced. Higher value-added industries pay more, have better benefits, build better plants, buy better equipment, utilize more skilled services and pay higher taxes. Unfortunately, some of these are the industries where we are losing both employment and our status as a world-class industrial supplier.

3. Are the industries that are expanding those which will provide good jobs in the future?

No. We are adding a few jobs in industries like commercial printing and snack food but we are gradually losing the high value-added jobs in industries such as instruments, forgings, and machine tools. A few of these employment losses were due to efficiency improvements and automation but, for the most part, the most significant employment losses have been occurring where investment is low and where automation is not world-class.

The efficiency improvements that do exist were often triggered by viable first-class competition in other countries. Our track record of instituting efficiency improvements in advance of hazardous competition is not very good. In industry after industry, especially in the higher value-added industries, the principal industrial growth is occurring outside of the United States. Then we wonder why essential goods and services are not quite as affordable as they once were and why there is a crisis in essential services like health care.

4. In which industries is there adequate progress and which are in jeopardy?

There are some good signs and some highly competitive US industries such as aircraft, paper, chemicals and aerospace. Unfortunately, even here the number of world-class US suppliers has been reduced in number. Even though we still have one or two major competitors in some important industries, we used to be much stronger. (See Section V)

5. As inner-city industry gets older and less productive, will there be anything to replace it?

Probably not. There is insufficient willingness to alter the repelling forces which have driven industry to new locations — sometimes to rural settings, sometimes to other states and sometimes overseas. Taxes and other operating costs remain high. Schools are usually poor. Infrastructure is crumbling. Crime is widespread. The pool of qualified employees is limited and residents often raise obstacles to industrial expansion. All of this is happening when world markets demand the highest possible product quality at the lowest possible cost. Yet, there are instances where companies and the community have worked together to improve things for both camps. Things could be much better for the core cities.

6. Are we making productive use of the huge capital resources we have available?

No. We are dissipating crucial resources on activities unrelated to the future well-being of our citizens. Financial institutions channel huge sum of money into ill-advised corporate takeovers which create no wealth and divert monies away from what would make our country more competitive. Government allows many of its employees to retire in their mid-fifties but then finds it difficult to keep the nation's infrastructure intact. School districts lament the unavailability of money but then continue the unusual practice of allowing its work force to work eight months out of a year at a time when the reduced quality of US schools has become widely recognized in international circles. In real estate, our idea of investment has become the office building, or the casino, or the museum to re-interest people in a declining city — but very rarely a first class factory. Even the stock market reflects the disinterest in production with much of the nation's equity capital focused on companies involved in entertainment — more low-quality movies for our children to watch on television while children in industrializing countries study differential equations in high school.

7. Can we remain competitive with such a small fraction of our people in production?

It is hard to see how. Over the past thirty years, we have become a nation dripping in overhead — both public and private. Large segments of our economy are engaged in activities unrelated to production and some of them induce drag to the rest of the system. We count these activities as contributors to the Gross Domestic Product because they cost something but in reality our economy would be far more productive if we could somehow reduce their involvement. We have a higher fraction of our employed population in finance, insurance, real estate services and government than any nation studied here — substantially higher than Western Europe and a multiple of what exists in some Asian countries. The sheer personnel count is exacerbated by the fact that many of these people are highly paid and scheduled to retire early with good benefits — often provided at public

expense. The sheer quantity of early retirements alters the critical ration of retired people per employed worker. Our present methods of accounting for these huge future liabilities are inconsistent with recent accounting standards in the private sec-engineered in some way.

8. Are the activities of finance resulting in higher investments for the future?

There is little question that the flow of money has changed over the past twenty-five years. Less money is going to companies and more money is going to units of government and to financial institutions. Often, these moneys are used for activities that are either neutral or harmful to long run wealth creation. We are putting five times as much new money into newly issued municipal bonds as we are into initial public stock offerings for companies. As we continue to fund mergers, acquisitions and hostile takeovers, the fraction of loaned funds going to companies has declined from 22% to 16% since 1970 while the fraction going to other financial institutions has increased from 7% to 19%. Although the US market system is clearly one of the nation's strengths, it may be time to more clearly differentiate between true investment and speculation.

Strengths, Weaknesses, Opportunities and Threats

It is not the intention of this paper to suggest prescriptive changes in public policies to address the problems mentioned above. Rather, the case that is being made suggests that we should at least measure accurately where we are. Measurement of where we are, by itself, is an understandable first step in preparing for the future.

The United States has collected a great deal of information in the past sixty years and it is probably accurate to say that the most important information is there some place. However, the information that we have is not always used introspectively. It is often used to make a case that progress has been made to satisfy the public relations needs of particular groups. In other cases, the people interpreting the statistics have limited industrial backgrounds so the opportunity is missed to glean, from the available information, the precious inferences that would be helpful in improving the lot of the nation. In other cases, the variables being measured are decades old and are outmoded by modern processes. For a variety of reasons, our nation deserves better measurement of its industrial progress. We should be able to field measurement systems which provide us with ongoing assessments of our strengths, weaknesses, opportunities and threats.

Strengths

The United States has many strengths; a huge internal market, adequate transportation, an aging but impressive engineering staff, plentiful natural resources and a few good companies. Although we have not always integrated these strengths in the most effective way, neither has anyone else. In total, the United States has been an excellent country.

With respect to our strengths, however, our principal question should be; are we getting stronger or weaker? We definitely have strengths but the nagging question emerges as to whether these strengths are as pervasive and as encompassing as they once were. In industry after industry, some slippage is evident.

Yet, in some respects, the US has paid some future bills. We are probably ahead of much (though not all) of the developing world in integrating the needs of industry and the very important need to preserve the environment. We may be in the enviable position where some of the environmental regulations can be made more scientific to improve both their effectiveness and their cost-effectiveness. Whereas some of our competitors are even more advanced in environmental preservation, many of our fast-rising competitors have a very long way to go. We are already recycling our scrap and we have redesigned many of our industrial processes to reduce adverse environmental effects. This situation is a major strength — especially when compared to some developing nations.

Another strength is the raw size of the United States and the general size and breadth of our economy — a point well noted in the IMD study. More than any other country, we tend to have viable activities in almost

every major industry. Given the fact that our huge market is somewhat naturally isolated in terms of transportation cost, we should be able to continue to reap advantages from both our geography and our industrial diversity.

A third strength has historically been our established system of research universities and their proclivity to integrate theoretical concepts with day-to-day problems that need to be solved. While this proclivity is not always as purposeful as it might be, it is at least impressive by world standards at this time. Our graduate level education system, as opposed to our K-12 system, is seriously regarded enough to be considered a major strength.

One of our most apparent strengths of all has been the well-run US corporation — not that they all are. Though we do have many companies that are unlikely to persevere as world-class competitors, we do have some good ones. Companies like 3M, DuPont, Andersen Corporation, Ford, Merck, Deere, Kimberly-Clark, Rubbermaid and others are clearly first class companies by world standards. We should be glad we have them and they provide an excellent building base for the future. Given the major strengths our nation has, we should not be operating with unfathomable trade deficits and fiscal policies that threaten to plunge the entire country into social and industrial chaos.

Weaknesses

The reason why we are in the delicate situation that we are in is of course related to our weaknesses. In spite of some colossal strengths, these could be outweighed by some glaring weaknesses in our industrial situation. Our primary/secondary education system is recognized as unduly weak in comparison to those of our competitors. Our financial system has often been self-serving and not very effective. Our government is too big and spawns other inefficiencies. There is even some question as to whether the moral fiber of our population is up to the task of preserving the prosperity of the nation.

Within the industrial realm, we have weaknesses as well. In many industries, the most viable of the US competitors are weak and ineffective by world standards. Research and development functions are lackadaisical. Manufacturing plants and processes are high-cost and out-of-date. Management is often preoccupied with unproductive amalgamations and is often too costly given its effectiveness. Sales forces are not geared to the international marketplace and the quality of the products being delivered is unremarkable given the selling price.

The surprising thing about our industrial weaknesses is not so much that we have them, for all nations have them, but that we resist the need to integrate company specific strengths and weaknesses into our system of national measurements. In this respect, we are somewhat unique. Other nations, large and small, emerging and established, tend to view the economic welfare of an entire nation as inexorably linked to the performance of individual corporations. Our high regard for the long term virtues of competition, which are considerable, has allowed us to treat casually the need to track the performance of key companies. Yet, the weaknesses of some US companies operating in some crucially important industries should be of concern to us.

Of major concern is the emerging weaknesses we are experiencing is certain industries that have historically provided high-wage employment in the past. Wages were high because the value added was high. Not surprisingly, these are some of the very industries that have been targeted by effective international competitors. However, these competitors have been selective. In general, international competitors have attacked those industries where US companies had large market shares but were ineffective operationally, having either lower quality products or high costs or both.

In some cases, such as home appliances, aerospace, chemicals, the caliber of our leading companies is clearly first rate. Costs are low, quality is high, investment is substantial and relationships with employees, vendors and customers is excellent. In other cases, these large companies are only part of a fleeting past possessing neither first rate manufacturing capabilities nor product characteristics. Financial resources are modest and occasionally much worse. Often the victims of ill-timed and poorly thought-out diversification schemes, the resources of these once noble companies have been dissipated by ineffective company leaders who do not grasp either the subtleties or the importance of world-class competition. Among the companies that have fallen (or are fal-

ling) prey to ineffective management are such well-known names as Zenith, Warner-Sweazy, Allis-Chalmers, RCA, Bendix, Bausch & Lomb, Bridgeport (machine tools), US Steel, Bethlehem Steel, LTV, Bendix, Lone Star Cement and Westinghouse.

The range of presence of US companies in world markets is astounding. We are healthiest in the aerospace industries where US companies dominate technologically and in manufacturing efficiency. We are weak, and becoming weaker, in consumer electronics and some of the more traditional industrial technologies such as machine tools, optics and instruments. Unfortunately, these are some of the very industries that spur future industrial development in other industries.

Opportunities

Our major opportunity is to make some minor refinements in our industrial system so the investments we make will be more supportive of long term industrial growth and employment. Dramatic changes in our industrial system are not necessary. But, we could, with proper observation, attend to some of the specific operational deficiencies we have before us. Our financial systems often do not support industrial growth. They support faddish projects and market speculation — not investment. Our bankruptcy laws favor entrenched and ineffective management — exactly the opposite of what happens in some places. Our system of corporate governance is more narrowly drawn than it is with our major industrial competitors which often place communities, suppliers and workers at higher levels of consideration. Our education systems could be improved by simply having a work year that is similar to what exists in other industries and in other countries. The huge societal cost of an opportunistic system of justice could be reduced by placing a few reasonable limits on punitive liabilities. In terms of basic features, our systems do not need major changes — only well thought out reasonable refinements.

With respect to industry, we also have significant gaps. Our future industrial success will depend a great deal upon the effectiveness of our suppliers, innovations in the design of our products, the overall costs (not just labor costs) of our manufacturing organizations and our rapport with customers world wide. It will be difficult to retain our domination in aerospace if we lose our edge in precision instruments. We are unlikely to continue as a key supplier of polymer based products if we the world-class skills in chemistry are located elsewhere. Even the edge we have in aircraft could be compromised if other countries are investing more in metallurgy, metal forming technologies, forging technologies and precision machining. The chief opportunity we have before us is to look at our industry as an integrated whole.

Not all of our suppliers need to be domestic. However, when we lose our ability as a world-class producer utilizing particular manufacturing processes, the pattern that unfolds is very predictable. Foreign competitors first offer lower priced products of low or medium quality. We remain confident that we are still the best. But then the competing products improve. Economies of scale, achieved through higher levels of production in more mechanized plants, are coupled with other technical advancements to improve the quality of competing products as costs are reduced. This is precisely the pattern that has been set in television sets, machine tools, instruments, optics, some electronic components and most other consumer electronics. Up and down the value chain, individual elements of our cost were a little higher and our quality not quite as good. If these trends continue long enough, it will be the US products that enjoy the reputation of high cost and medium quality on world markets.

Fortunately, much of our cost in the United States is not inherent in our industrial structure. Legal costs, finance costs, governmental costs and service costs are the most rapidly increasing elements of industrial cost at this time. Labor and material costs have increased slowly while these other costs have increased exponentially. A chief opportunity we have is to improve the cost effectiveness of the nations infrastructure as the quickest way for us to become more competitive in world markets. The costs of both direct labor and materials have been worked over from one end to another to squeeze out efficiencies — a fact noted with interest by organized labor. If we want to improve our competitive position from this point forward, other elements of cost are going to have to be brought into line. The purpose of this report is not to advocate particular remedial programs. What is being advocated is a system of measurement that will at least estimate where the costs really are.

Threats

The United States could face a series of serious economic threats from several directions — perhaps at once. Will the emerging industrial prowess of Asia appreciably alter the locus of the worlds prosperity? Is much of our physical plant too old to function admissibly in world markets? Do we have enough world-class component suppliers to remain competitive in important end-product industries? Could the nations tenuous finances accidentally bring about financial, political and social chaos? Will sheer population numbers and market size become factors in the location of world industry?

The biggest threat of all is that we will do nothing. After all, we can continue for quite a few years with the gradual erosion we have been experiencing since 1972. We may even have some pretty good years as we did in 1994. With luck, we should even be able to employ the set of existing measurements that are so shallow and so general that we appear to be progressing. However, if we are prudent, we will want to take some appropriately deeper measurements along the way.

Measurement as an Alternative to Industrial Policy

Paul Krugman and others have quite appropriately raised objections to a formal industrial policy for the United States. We respect these reservations for some practical reasons. The nature of industry is changing rapidly. New industries are emerging while others gradually convert from high value-added to commodity status. By the time any industrial policy made it through Congress and garnered the support of whatever executive administration is in power, it would almost certainly be the wrong one.

What is needed to compete effectively in the rapidly changing world of intense international competition is adaptation. The systematic withdrawal of resources and the removal of costly impediments can improve effectiveness in much the same way that simplification of a machine can improve the machine's efficiency. Our present system has much entropy so we should not have to spend more money. The systematic withdrawal of resources is a strategy that has been helpful to troubled companies (Zimmerman, 1986) and it might work quite well in helping the US economy to perform better.

Yet, we have a variety of industrial policies in place already. It is just that they are not labeled that nor are they necessarily supportive of industry. When we permit underfinanced corporate takeovers of important industrial companies in way that leave these companies laden with huge debts, that is an industrial policy. Two financiers, one of whom was later arrested on drug charges, engineered the buyout of one of the largest and perhaps the most solvent airline in the United States, a company with 50,000 employees, with a 2 percent down payment — less than what would be required for a car or a boat. A few years later, this previously strong airline no longer owned most of its fleet, was still heavily in debt, and was saved from bankruptcy only because of massive concessions from its unions and an unprecedented quarter of a billion dollar infusion of money from its home state. The irony of this case is that before the takeover, this particular airline was probably as well suited to face the challenges of deregulation and win as any airline in the country. The permitting of events such as this is industrial policy.

When we permit product liability suits to be filed long after the useful life of the product and for amounts unrelated to the initial selling price of the product, that is an industrial policy. Such actions tarnish the responsibility for good product design that should exist.

At the moment, US governmental policies are providing vast subsidies and special privileges to many segments of our economy. Our ill-defined definition of capital gains provides a strong subsidy for speculation as opposed to substantive investments. Municipal bonds are tax exempt but corporate bonds are not. Most of the community sponsored industrial revenue bonds have provided funding for things that were not “industrial”. Outright gifts and subsidies have often been granted to poorly run firms on the brink of bankruptcy while more honest, well-run, taxpaying firms fended for themselves. We already have industrial policies — explicitly or implicitly. The question is; are they the right ones? Measurement can help focus our efforts.

In the preface to the exceptionally well-done report on European industry, *EC Panorama*, Martin Bangemann, Vice President of the Commission of the European Communities succinctly described the approach being taken be the EC:

> The primary objective of the European Community's Industrial Policy is to increase the international competitiveness of European firms.To achieve this we must not rely on copying our competitors, for this would only lead to dependence on them. We must rather build on the economic strengths which undoubtedly exist in the community. Above all, these include demanding standards and a skilled work force. Even more important, however, is a business environment geared towards competition so that there can be fair competition between European firms. Government intervention and maintenance subsidies prevent the necessary structural change and so intensify structural crisis....European industrial policy must accelerate structural change and promote the widespread use of new technologies...Wherever government action is necessary, it must be taken with the specific objective of increasing productivity and offering incentives for technological innovation. The "European Way" is based just as much on the belief in the free play of market forces as on government responsibility for maintaining and increasing international competitiveness.

Section VII
Strategic Industrial Measurement

The problems we have in the measurement of our industrial economy do not rest only with the numbers themselves. More qualified interpretation is also needed. The problems facing US production are complicated and involve technical considerations as well as managerial and financial considerations. Our situation requires a more encompassing view of the industrial economy — how it works, how companies work together, what are the latest trends in production technologies and do we have them and how the industrial economy impacts a labyrinth of social problems. Our measurements should help us develop a more strategic approach to economics — not at all more central planning but a clearer picture of where it is we are going.

A strategic approach to industrial measurement is neither complicated nor doctrinaire. It simply means measuring those variables that are most important to the long-term health of the economy and the welfare of its citizens. In order to sustain long term industrial growth and best provide for our citizens, high value-added activities represent our best hope. However, we will not be alone in this endeavor and we will need to execute with precision if we hope to compete internationally. There will not be room for very much waste — in the private sector or in government, in education or anywhere else.

A strategic approach to rebuilding our industry will involve focus and constant measurement to ensure we are moving in the right direction. It will not do for us to concentrate our efforts on casinos, shopping malls, office buildings and sports facilities if we are expecting to remain an industrial power. It will be necessary for us to spend more of our energies on projects related to the high-value activities capable of paying good wages. We can begin by measuring how we are doing in these crucially important endeavors. Better measurement and higher quality interpretation can lead to appreciation and perhaps ultimately to improved policies.

Our nation does not cultivate an appreciation for tangible production. Very few textbooks on economics show pictures of anything being done or even discuss production in meaningful terms. Economic activity is portrayed with aggregate level, unspecific, charts and graphs and vague generalities about how the economy might work. But the direct connections between tangible production, meaningful work, and individual and community responsibility and prosperity are rarely made.

Yet, for individual people and communities, all of economics is essentially local. Its fine for us to say that we no longer have a comparative advantage in producing pumps or compressors, for instance, but a particular town in our region depends upon compressors. If the factory there remains poorly equipped and under the tutelage of poor management, the fact is that the people in this town will no longer have employment. The town, situated in a rural area and already buffeted by the declining number of people employed in agriculture, will be in great jeopardy. Now that the plant is part of a vast leveraged buyout involving a larger conglomerate, rumors are circulating that the plant might be shut down and the compressors purchased from overseas suppliers at lower cost.

Our measurement of the industrial economy has to employ the capability to analyze what is happening here. Might the plant close because we lack the technical expertise to manufacture compressors in the United States? Absolutely not. The town we are describing and its community are not in jeopardy because we lack the exper-

tise of manufacturing compressors in the United States, it is in jeopardy because we have allowed the plant to decline relative to other producers in other locations and because we have a system of corporate ownership in the United States that is not very encompassing. Neither is it always capable.

There is no reason at all why we cannot produce high quality low-cost compressors in the United States and especially in a low-cost productive community such as the one we have been describing. We could do it. We could equip the plant, train the people, and instill a reason for caring that could perpetuate a successful endeavor long into the future.

The economists utilization of the term "comparative advantage" could benefit from historical analysis. Who would have predicted, at the end of World War II, that impoverished Japan, without any oil and a devastated production capability, would become the economic power that it is today? Now Japan is threatened by newer upstarts such as Korea, Singapore, and most importantly India and China. Who would have predicted that the country of Malaysia, which was largely a rubber plantation fifty years ago, would be the electronics power it is today? The concept of comparative advantage is a viable concept but what is the time frame under which it operates? And, what changes it?

The systematic inquiry into the nature of comparative advantage change should be a major goal of better measurement. Occasionally U.S. industry has been accused of being short-term in its orientation in contrast to the more long-term perspectives utilized in Europe and Asia. The information gathered in this study might confirm that observation. However, our short-term orientation may well have its genesis in the peculiarities of our financial sector as much as it might be related to the predisposition of industrialists. The terms we employ and the way we are taught indicates something about the way we think about our industrial sector. Terms like "rust belt", "smokestack", "harvest", "cash-cow", "dog", and above all "shareholder value" indicates something about the way we see industrial enterprise. We tend not to see industry's encompassing nature or its impact upon our way of life or ways in which factories become elements of our social fabric.

But what are we going to if our industry fails? What are we going to do nationally and what are we going to do, in particular, in cities and towns where industrial presence is waning? What is going to happen with the people who would have worked in industry but can no longer find employment. These problems are too important to be simply dismissed as usual economic phenomena. There is more to it. There is more to it for our country and for individuals. All economics is essentially local.

Competitive advantage is a national attribute that is created through the employment of effective policies and by the nurturing of key end-product companies and their base of suppliers. Fortunately, in our case, our competitive advantage in many industries can be improved partly by subtraction. Over time, our complex legal system, our opportunistic finance segment and our vast government have imposed many obstacles to effective participation in international competition. The impedance is real but, to date, we have not measured its impact.

As the United Sates moves into the twenty-first century, we have the opportunity to decide what kind of country we want to be. Do we want to have continued well-paid employment in our rural communities and our core cities? If so, we had better measure how we are doing in progressing toward this objective. And, what strategies are we employing to get there? What sacrifices are we prepared to make to meet our objectives? What preparations? What tradeoffs? What skills do we need and does our society nurture them? What expectations of our infrastructure are logical outcomes of both our objectives and our strategy? It seems quite unlikely that we will be able to reverse hundreds of billions of dollars of trade and fiscal benefits without modifying our behavior.

Or do we want to continue to let things unfold as they might? Some of us might not be affected at all. We can continue to build up deficits for those who follow us for several more years — though probably not forever. The purpose of this report is not to propose new policies but to merely begin the process of improving our industrial economy by better measurement of what we do.

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