WAGES, WATER, AND STAGNATION

THE REAL WORTH OF PREVENTION

by Craig S. Marxsen

PRODUCTIVITY GROWTH in the manufacturing sector of the American economy has slowed considerably since 1973. Multifactor productivity measures the annual growth rate in output in the economy, and the annual growth rate of its component sectors that would have occurred if the size of the labor force and capital stock had remained constant. Table 1 shows multifactor productivity for the manufacturing sector as a whole (based on a waited average for the entire manufacturing sector) and for most component industries as calculated by the U.S. Bureau of Labor Statistics ("Monthly Labor Review," July 1995). From 1949 to 1973, multifactor productivity grew at an average rate of 1.8 percent per year. That means that if the capital and labor employed in manufacturing had remained constant, output would have increased 1.8 percent per year solely as a result of the 1.8 percent productivity growth. In contrast from 1973 to 1992, manufacturing multifactor productivity grew at just 0.8 percent per year, a decrease of one percentage point per year.

THE COSTS OF CONTROLS

Why did the rate of increase in the output of the American manufacturing sector slow down after 1973? One plausible explanation is that pollution-control expenditures diverted scarce funds from productivity-enhancing investment. Expenditures to comply with pollution control laws have been disproportionately concentrated in four industries within the manufacturing sector. In 1991, manufacturing output of $1.033 trillion constituted about 18 percent of the $5.725 trillion gross domestic product of the United States. According to the Council on Environmental Quality, the manufacturing sector spent $20.912 billion in 1991 on pollution abatement. That is about 22 percent of the $94.79 million spent on 1991 pollution abatement and control. Spending to comply with environmental regulations also fell heavily on electric utilities, natural gas, mining, state and local governments, and private persons (e.g. motorists).

Table 1 provides estimates by the Office of Technology Assessment of 1991 pollution control spending as a percent of sales for industries in the manufacturing sector. Pollution-control spending averaged 0.8 percent of total sales for the manufacturing sector. However, average expenditures

Table 1

Industry	Productivity 1949-1973	Productivity 1973-1992	Pollution Spending	Slowdown per year
Food	1	0.5	0.42	0.5
Textile	2.1	1.6	0.38	0.5
Lumber	1.4	0.6	0.63	0.8
Furniture	0.7	0.3	0.38	0.4
Paper	1.5	0.1	1.87	1.4
Printing	0.5	-0.8	0.15	1.3
Chemical	2.8	-0.3	1.88	3.1
Petroleum	0.8	-0.4	2.25	1.2
Rubber	1.3	1	0.49	0.3
Leather	0	0.4	0.65	-0.4
Stone	1	0.1	0.93	0.9
Prim Metal	0.4	0	1.68	0.4
Fab Metal	0.9	0.4	0.65	0.5
Machinery	1	2.7	0.29	-1.7
Electric	2.2	2.6	0.49	-0.4
Trans Eqp	1.6	0.2	0.33	1.4
Instruments	1.8	2	0.27	-0.2
Misc.	1.5	0.2	0.26	1.3

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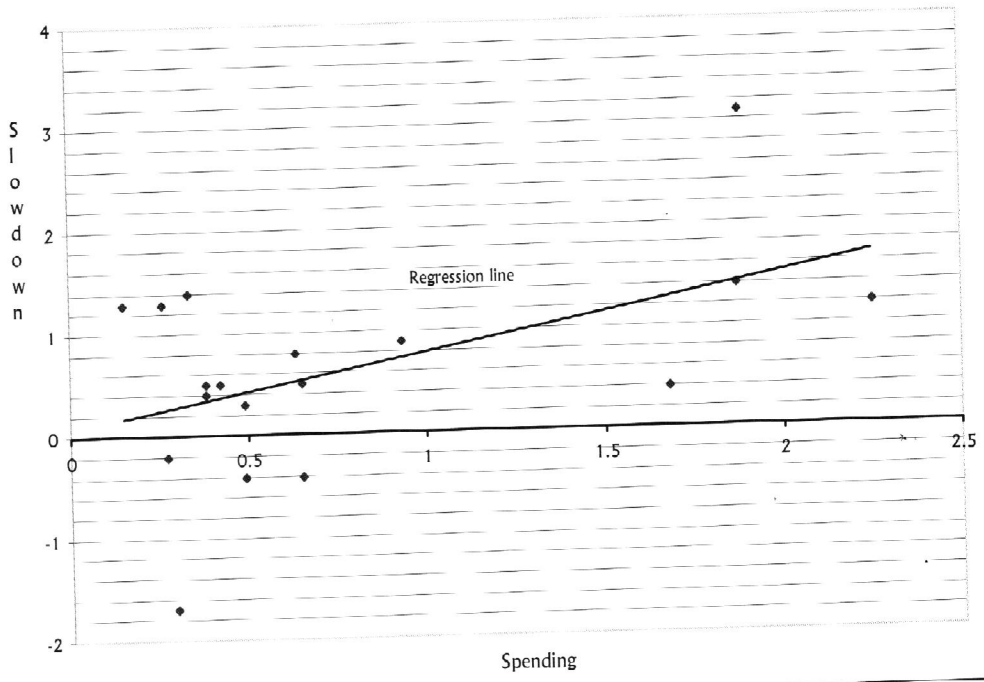
were 1.92 percent of sales for the four industries most heavily affected by EPA regulation: paper, chemicals, petroleum refining and primary metals. And on average, they experienced a productivity growth slowdown of 1.53 percent. The remaining fourteen manufacturing industries spent, on average, only 0.45 percent of their sales revenue on pollution control and their average productivity growth slowdown was only 0.37 percentage points per year. [scatterplot here and lead into regression]

Graph 1

Average Annual Percentage Productivity Slowdown vs.
1991 Pollution Control Spending as a Percentage of Sales
(Selected industries)



REGRESSION RESULTS

A regression analysis can be used to estimate the relationship between the productivity growth slowdown and pollution control spending among the eighteen industries. The regression results suggest that pollution control expenditures explain approximately 23 percent of the variance in the productivity growth slowdown across manufacturing industries. For every one percentage point increase in pollution spending, measured as a percent of sales, the slowdown in post-1973 productivity increased by .72 percentage points. The statistical relationship estimated in the regression implies that if pollution control expenditures had been zero, the post-1973 slowdown would have been only .064 percentage points on average rather than the actual 1 percentage point, a more than fifteenfold difference.

The regression predicts that in the absence of pollution control expenditures, manufacturing output would have been 21 percent ($223 billion) larger in 1992. Said differently, manufacturing output was 17 percent less in 1992 than it would have been in the absence of pollution control spending.

CONFIRMING STUDIES

The results of this simple regression are consistent with the more sophisticated work of other scholars. Professor James C. Robinson of the University of California at Berkeley recently studied 455 component industries of the U.S. manufacturing sector. He compared annual productivity growth with annual environmental compliance spending and expenditures to comply with the regulations of the Occupational Safety and Health Administration over the period from 1974 to 1986. In the *Yale Journal of Regulation* (summer, 1995) Robinson concluded that productivity was 11.4 percent lower than it could have been by 1986 as a result of the growth in environmental regulation since 1974. Projecting his twelve year reduction over the nineteen year period from 1973 to 1992 gives virtually the same 17 percent reduction suggested by the regression analysis.

The direct effects of environmental regulation spread indirectly throughout the entire economy, transmitted by changes in wages, prices of intermediate products, and levels of saving and investment. Michael Hazilla of American University and Raymond J. Kopp of Resources for the Future estimated those indirect effects using the Hudson-Jorgenson numerical general equilibrium model. In the *Journal of Political Economy* (November, 1990) Hazilla and Kopp found that all sectors of the economy experienced substantial impacts from environmental regulations even though direct compliance costs are concentrated in just a few sectors. For example, their analysis shows that by 1990, when manufacturing output was, in their model, reduced by 6.33 percent, output of the financial, insurance, and real estate sector was depressed by 4.97 percent, even though virtually no direct compliance spending took place within that sector.

Higher prices for inputs purchased by banks added costs in the financial sector. Indeed, environmental regulations caused real GNP to be 5.87 percent lower by 1990, almost as much as the direct effects on the manufacturing sector alone, according to the model developed by Hazilla and Kopp. Such results suggest that Robinson's 11.4 percent reduction in manufacturing productivity would be accompanied by a drop in real GNP of about 10.6 percent if his results are consistent with those obtained by Hazilla and Kopp.

RIPPLE EFFECTS OF REGULATIONS

But Professor Robinson argues that environmental regulations have been even more costly than Hazilla and Kopp claim. Hazilla and Kopp capture the ripple effects transmitted from one sector to another, but they neglect to report the extent to which productivity enhancing innovation is stifled by the command-and-control regulation characteristic of American environmental policy. Robinson argues that "choice-constraining initiatives" in current policy prevent management from developing new and cheaper methods for delivering goods and services. He believes that "the efficiency impact of regulation on innovation and productivity dominates direct resource misallocation costs in the long run."

Professor Richard B. Stewart of New York University Law School observes in the *Yale Law Journal* (June, 1993) that "since the mid-1980s, environmental regulation has entered a more ambitious stage." He argues that "the dysfunctions of the relatively centralized, legalistic regulatory system in the U.S. have become more pronounced in this ambitious second stage of regulation." For the private nonfarm business sector of the American economy, multifactor productivity growth has averaged just 0.08 percent annually from 1973 to 1994, dropping to virtually zero after 1988. From 1960 to 1973, by contrast, it grew at 2.1 percent per year on average, a rate that doubles the standard of living every thirty-four years.

MEAGER BENEFITS

What benefits has America obtained for its pollution control expenditures? One estimate suggests that the benefits do not offset the costs and thus the means for controlling pollution deserve review. A. Myrick Freeman estimates that the benefits from water pollution control laws alone equaled about $14 billion per year as of the middle 1980s. But even though 96 percent of industrial water pollution sources use "best practicable control technology" to limit effluent, the nation's surface waters have not improved much since the passage of the Clean Water Act because water quality was good before enactment.

The U.S. Geological Survey, the only source for national water quality data, reports that the water quality at almost 90 percent of its monitoring stations exhibited no improvement from 1974 to 1981. And Freeman cites William J. Vaughan and Clifford S. Russell as reporting that use of "best practicable control technology" and secondary treatment standards has resulted in about a one third of one percent increase in the total water suitable for fishing in the United States.

A more complete picture of the benefits would require further analysis. But what is certain is that there is indeed a high correlation between spending on pollution control and lower productivity growth. It suggests that pollution control has enormous costs that must be taken into account least the adverse consequences more than overwhelm benefits.

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