

# Connections: Incentives for Innovation

Rapid and pervasive technological innovation has been primarily responsible for the long-term improvements in material well-being that have characterized western industrial societies.

But it has also been responsible for such undesirable consequences as damage to the environment and depletion of some natural resources.

The development of an effective set of policies toward the generation of new technologies—technologies that will meet our social goals—is therefore one of the highest priorities confronting our society.

Technological innovation has, of course, done more than just increase the output of goods with unchanged characteristics. Its effects are not adequately summarized in terms of so many more automobiles, bushels of wheat, or square yards of cotton textiles.

Rather, and more importantly, technological innovation over the past two centuries has dramatically transformed the composition of the economy's output as well as increasing its volume. In doing this it has also transformed our lives.

It would be an unproductive intellectual exercise even to look for 18th-century equivalents (or even the recognizable antecedents) of certain products that we take for granted today—jet airplanes, computers, plastics and synthetic fibers, vast quantities of electric power available at the touch of a switch, television, telephones, antibiotics.

## Technology and Capitalism

Historically, this technological development has been very closely connected with the rise of capitalist institutions and the powerful incentives that these institutions have provided, through the profit motive, for new technologies. The point was forcefully highlighted well over a century ago by even the severest critics of capitalist society, Marx and Engels, in the *Communist Manifesto*, published in 1848:

The bourgeoisie, during its rule of scarce one hundred years, has created more massive and more colossal productive forces than have all preceding generations together. Subjection of Nature's forces to man, machinery, application of chemistry to industry and agriculture, steam-navigation, railways, electric telegraphs, clearing of whole continents for cultivation, canalisation of rivers, whole populations conjured out of the ground—what earlier century had even a presentiment that such productive forces slumbered in the lap of social labour?

Note that Marx and Engels do not attribute this explosion in productivity to the emergence of science, or to a religious ethic, or to some new impulse to human ingenuity. They attribute it specifically to the rise of bourgeois (that is, capitalist) institutions.



In a capitalist market place, the possibilities for profit-making through the introduction of new technologies are vast. Indeed, Marx and Engels take an even stronger position: not only does a capitalist economy offer powerful incentives to innovation; it is also essential for the very survival of the entrepreneur that he innovate as rapidly as possible. As they had pointed out earlier: "The bourgeoisie cannot exist without constantly revolutionizing the instruments of production..."

## Profit Motive

Subsequent history has lent support to this aspect of Marx's analysis of capitalism. The market economy, in which private entrepreneurs actively seek to increase their private profits, has proven to be immensely effective in mobilizing inventive and innovative talent.

At the same time, the market economy has strongly shaped the direction of technological innovation as well as its rapid rate.

Unfortunately, the profit motive has not always worked to advance society's interests. Consequently, the government has supplemented the operation of the market place with public institutions or financial support for specific kinds of activities. These include agricultural experiment stations and a wide range of public subsidies to basic scientific research, from which private profits

are not readily available and for which market incentives alone are therefore insufficient.

Additionally, we have become increasingly concerned in recent years with aspects of the innovative process to which we were surprisingly indifferent in the past. New technologies often inflict certain costs upon their natural and human environment that deserve to be recognized in any social accounting but are not ordinarily part of private profit accounting. These include environmental pollution in a variety of forms and safety and health hazards to workers and consumers.

## New Policies

We urgently need new public policies that will offer incentives for innovation and at the same time protect us against some of the undesirable side effects of technology. Developing such policies will call for political courage and leadership as well as social imagination.

The task of reconciling conflicting group interests and priorities without, at the same time, dulling or even destroying the incentive mechanisms underlying technological innovation, will be an extremely delicate undertaking.

Large issues are at stake. History makes it clear that private business is strongly influenced by market forces

concerning the direction as well as the pace of inventive activity.

Thus, for example, the abundance of forest lands and the cheapness of forest products in colonial America (and later) led to the invention of a vast array of ingenious technologies for exploiting wood. The abundance of good farmland in the American mid-west in the 19th century generated an incredible profusion of machines enabling a single farmer to cultivate a far larger acreage than his European counterpart. And the exhaustion of high quality mineral deposits in the 20th century has already prompted the development of techniques for exploiting low quality ores that were previously neglected.

## Shaping Technology

Our history also shows us that technology is extremely versatile and that it is highly responsive to changes in incentives and rewards. It should not be beyond our ingenuity to use the incentives of the market place to develop new technologies that will deal much more effectively with such current concerns as environment and energy.

It is hardly surprising, for example, that private enterprise developed technologies that fouled the air and treated watercourses as open sewers for the effluents when no cost was imposed upon them for doing so. On the other hand, we can confidently predict that a system of taxes or other charges for industrial activities that pollute the environment will eventually lead to the de-

velopment of new technologies that produce far less pollution. Indeed, in many industries far less polluting technologies are already emerging.

It is a mistake to regard technology as simply constituting part of the problem, although that has undoubtedly sometimes been the case in the past. Technology is an extremely powerful force whose shape and thrust can be influenced to a far greater extent than is generally recognized. But we cannot shape technology if we reject or straitjacket it, as has been increasingly the case with some of the regulatory activities of government in recent years.

Rather, we should seek ways of increasing the rewards for technological innovations of the kind that we regard as socially desirable. Prizes, patent grants, and favorable tax treatment are some of the mechanisms devised in the past to encourage innovation.

By strengthening such incentives and developing new ones, we can assure that technology will, in the future, be more consistently arrayed on the side of the solutions rather than on the side of the problems.

## Chronicle Letters

### Oneness

Dear Editor:

With all the boycotts, demonstrations, public unrest, private scandal and social immoralities facing our cities, I still have a deep regard for home. Home for me starts with self, reaches out to my community, and further extends that self throughout the universe.

Taking notice of the poor communities in our cities across the nation, there is a lot of potential. There are a lot of people in the poor community, classified as weak and poor who are some of the strongest persons or individuals, potentially. I am saying that these persons are very intelligent.

Mind you now, I must give you the definition for intelligent. It means having or showing the ability to learn, quick to learn. There are other meanings but we want to look at this one.

According to history, we find when books and other information of value were hidden from us, we found a way to consume that knowledge.

There has also been the image of God pinned on the cross (given to us) that had and still has some of us worshipping God as an image. In the Book Christians and Jews, it says, "Thou shalt not make unto thee any graven image, or any likeness of anything that is in heaven above, or that is in the earth beneath, or that is the water under the earth."

Today TV teaches our children and us. There is also the radio. In addition, we copy other socie-

ties and give devotion to many other causes except the poor people's cause. What does this have to do with self? Just this.

To look at how well we have learned these things, then we can see more clearly the greatness of our potential. To take these thoughts and energies, turn them toward things we need to better education, get jobs for our

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### SALT II

Is the ratifying of the Strategic Arms Limitation Talks (SALT II) valid? Was SALT I effective? Is detente the only means of national defense?

It is common knowledge that the U.S.S.R. outnumbers American sea power by a 3:1 ratio and that America is attempting to offset that with the creation of the Trident nuclear submarine, a multi-warhead nuclear sub with a potential kill radius twice

the distance of any other weapon known to man, (6,000 miles instead of 3,000).

Under the current SALT treaties, America and Russia have continued to stockpile numerous weapons many times the killing power of previous arms.

SALT I was effective in limiting the numerical potential of strategic arms

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Wyatt Davis  
Manager, University Plaza Office

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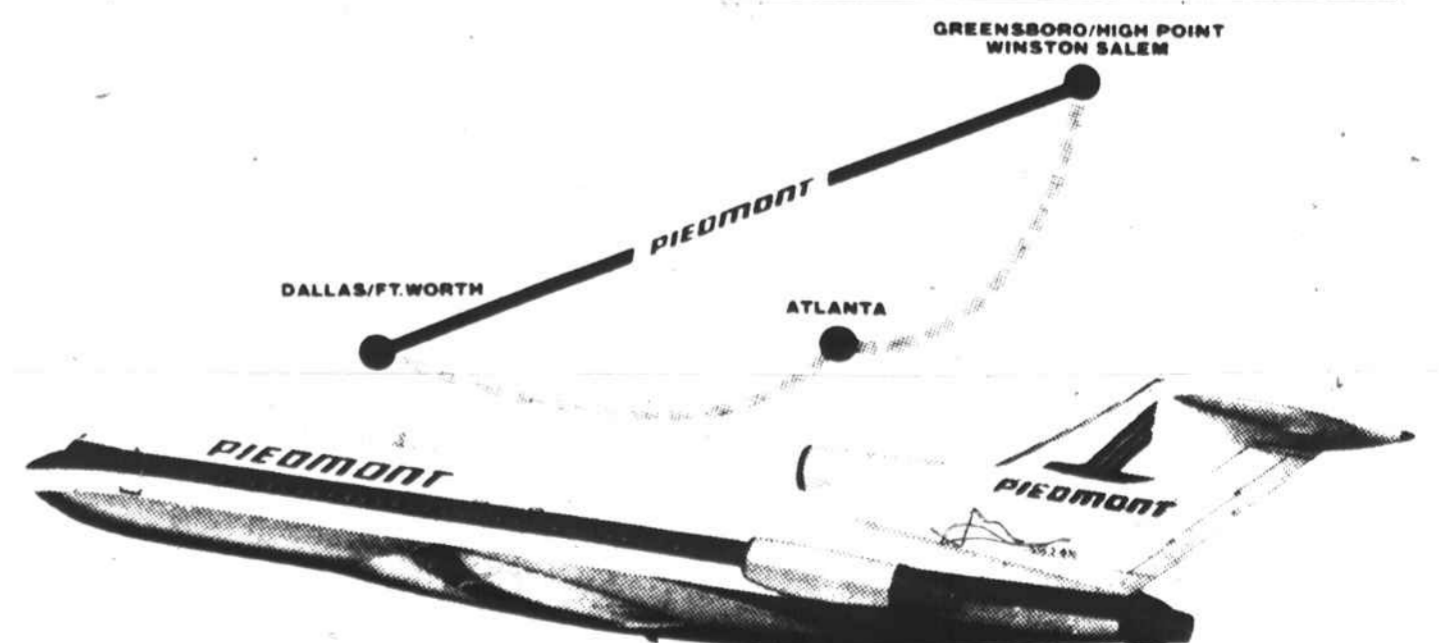
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