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Sofware Patents and the Information Economy

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SOFTWARE PATENTS AND THE INFORMATION ECONOMY†

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I. INFORMATION

Modern economists universally acknowledge that information is an essential component of productivity. Moreover, as they begin to focus more and more on the nature of information, their conception of information widens considerably.

According to a widely cited estimate of Marc Uri Porat,[1] in 1967 (almost three decades ago), 25.1 per cent of the U.S. Gross National Product originated with the production, processing, and distribution of information goods and services sold on the market.[2] In addition, the purely informational requirements of planning, coordinating, and managing the rest of the economy consumed another 21.1 per cent.[3] In other words, workers whose tasks were predominately informational accounted for almost one-half of the total U.S. labor income at the time.[4] Since then, the information economy certainly has grown by leaps and bounds.

The reaction of the American Express Corporation in 1982, when it was first included in the Dow Jones Industrial Index, symbolized this trend toward an increasing role for information. The company issued a statement that read, "[O]ur product is information .... [I]nformation that charges airline tickets, hotel rooms, dining out, the newest fashions and even figures mailing costs for a travel magazine; information that

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1. MARC U. PORAT, U.S. DEP'T OF COMMERCE, OT SPECIAL PUB. 77–12(1), THE INFORMATION ECONOMY: DEFINITION AND MEASUREMENT 1–8 (1977).

2. *Id.*

3. *Id.*

4. *Id.*

grows money funds, buys and sells equities and manages mergers; information that pays life insurance annuities . . . ."[5]

Not surprisingly, many have come to see the main tendency of modern capitalist economies as an evolution toward information economies. Yet, we should be careful in letting ourselves be carried away by our enthusiasm for the role of information. To begin with, some researchers find Porat's estimate a bit excessive. The bulk of the estimates for the size of the information sector in the advanced capitalist countries runs from around 25 per cent to 40 per cent of the total economy.[6]

In addition, some of the apparent growth of the information sector is an illusion that is due to changes in the structure of the economy. Virtually all work involves the processing of information, but we only tend to take notice of the informational aspects of work when it becomes a specialized occupation.

In effect, much of the new information economy merely represents an increasing specialization in which the abstract content of information processing becomes a measurable activity separated from the work associated with it. Jagdish Bhagwati has made much of this specialization in his analysis of services.[7] He writes of the "continuous process during which services splinter off from goods and goods, in turn, splinter off from services."[8]

For example, today, instead of employing a carpenter to build a house, we first employ an architect to design it. Architects are part of the information sector, but carpenters have never been treated that way, even when they routinely perform design work in the course of building houses.

Ernesto Galarza offered some insight into the informational processing associated with agricultural field work, a class of labor thought to be among the most unskilled known to modern society:

Field labor was a blur in which the details of field harvesting and the skills it required went unrecognized. To pick a ripe honeydew requires a trained eye for the bloom of tinted cream, a sensitive touch for the waxy feeling of the rind, and a discriminating nose for the faint

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5. Dan Schiller, *How to Think About Information*, in THE POLITICAL ECONOMY OF INFORMATION 27, 27 (Vincent Mosco et al. eds., The University of Wisconsin Press 1988) (quoting advertisement by American Express).

6. Meheroo Jussawalla, *Information Economies and the Development of Pacific Countries*, in THE COST OF THINKING: INFORMATION ECONOMIES OF TEN PACIFIC COUNTRIES 15, 23–24 (Meheroo Jussawalla et al. eds., Ablex 1988).

7. Jagdish N. Bhagwati, *Splintering and Disembodiment of Services and Developing Nations*, 7 WORLD ECON. 133, 134 (1984).

8. *Id.*

aroma of ripeness. In the asparagus fields, the expertness of the Filipino cutters was obvious to all but those who hired them.[9]

More important, much of the supposedly vital information is of little value. Consider Kenneth Arrow's suggestion that "[t]he meaning of information is precisely a reduction in uncertainty."[10] According to this perspective, some that are normally counted as information producing activities, say market research, should actually be excluded. Such information may, at best, charitably be called "local information." It may reduce uncertainty for the firm that benefits from the information, but it may create more uncertainty for other agents.

Other so-called informational activities are probably even counterproductive. For example, Porat's estimate of the information sector mistakenly includes advertising and marketing activities as information producing.

Rather than providing information, professionals design much advertising to do nothing more than delude and confuse people in order to get an edge on competitors without serving consumers' needs in any way. True, some advertising is constructive, but surely most is merely combative, having nothing to do with conveying information.[11] In fact, we could do better treating such activities as disinformation.

Before we leave the subject of advertising, we must mention that advertising clutters up our environment. Besides its ever increasing intrusiveness and overall unpleasantness, it desensitizes us to our surroundings. We can also regard at least some of this junk advertising as disinformation since it obscures valuable clues which might otherwise give us valuable information about our environment.

Finally, when advertisers exercise their considerable sway in the media, they degrade our access to information. For example, our magazines are more enthusiastic about printing pictures displaying the advantages of smoking a particular brand of cigarettes than in discussing the health effects of cigarettes, lest that information displease their source of advertising revenue. We should include this cost as part of the ledger on advertising under the general subheading of disinformation.

9. ERNESTO GALARZA, FARM WORKERS AND AGRI-BUSINESS IN CALIFORNIA, 1947–1960, at 366 (University of Notre Dame Press 1977).

10. Kenneth J. Arrow, *The Economics of Information, in* THE COMPUTER AGE: A TWENTY-YEAR VIEW 306 (M.L. Dertouzos et al. eds., MIT Press 1979).

11. ALFRED MARSHALL, INDUSTRY AND TRADE: A STUDY OF INDUSTRIAL TECHNIQUE AND BUSINESS ORGANIZATION; OF THEIR INFLUENCES ON THE CONDITIONS OF VARIOUS CLASSES AND NATIONS 304–07 (3d ed., MacMillan 1920).

II. INFORMATION AGAIN

Return for a moment to our earlier discussion of resources. Economists say that traditional resources are rivalrous. By that expression, they mean that the more that we restrict other people's use of resources, the more that is left for us. If we are going to farm a piece of land, then we expect to be able to exclude the rest of the world from disrupting our fields or taking our crops without compensating us.

Education may also be rivalrous in the sense that the capacity of educational facilities is limited. When a school is full, accepting a new student requires the displacement of another.

Information is another case altogether. We do not use up information in the same way that we use up food or fuels. On the contrary, excluding others from access to information becomes self-defeating. It does not increase our information. It only spreads ignorance.

In fact, the more that people partake of the supply of information, the greater the total stock of information becomes. In short, information can spawn more and better information. For example, the more a scientist learns about her field, the more she has to share with others. While scientists might compete with each other for the priority of a finding, the discovery of one enriches all.

As a result, the fields of research are very different from agricultural fields. While exclusivity is imperative in the farmer's field, it makes no sense in science. After all, the more information that I gather, the more potential information is available to you.

In conclusion, the concept of scarcity is irrelevant to information. The more we restrict other people's access to information, the less we can utilize for our own use. More to the point, as our economy becomes increasingly dependent on information, our traditional system of property rights applied to information becomes a fetter on our development.

III. PROPERTY RIGHTS IN INFORMATION

We often hear that property rights in information serve a positive purpose. For example, exclusive patents encourage corporations to invest in developing new technologies.

Undoubtedly, patent rights are a significant incentive for corporations, but corporations do not engage in science—people do. As a result, we must reframe the question: How do we organize society so that we develop and use our technological and scientific resources most effectively?

According to this criterion, even economic theory, which is severely biased toward markets, indicates that information should not be treated as private property. Kenneth Arrow, a Nobel Prize winning economist, observed that conventional economic theory holds that goods should sell for their cost of reproduction.[12] In the case of information, even though the original cost of gathering the information may have been substantial, the cost of transmitting this information onto others is minimal.[13]

Arrow added that markets for information are inherently flawed because information is different from other goods.[14] In shopping for clothing, for example, we can browse through the store. We can even try clothes on to see how they look. In the case of information, by contrast, we can possess the product merely by learning about it. Consequently, the owner strives to keep the information as secret as possible to prevent us from shopping for information in an informed manner.[15]

Arrow's logic is indisputable. Unfortunately, theory and reality are moving in two different directions. Information, which libraries and government agencies once distributed freely, is increasingly becoming privatized.[16] In the telling phrase of Vincent Mosco, we are evolving from a paper society to what he calls a "pay-per" society (alluding to the increasingly common practice of selling information).[17]

The United States government has acted as a willing accomplice in this process. For example:

> The role of the Federal Depository Library Program in collecting and circulating government publications is being undermined by the unavailability of those documents. Budgetary constraints have prevented it from acquiring the latest electronic equipment for information delivery .... The government has approved pilot programs in which private contractors manage the electronic filing, processing and dissemination of data that businesses and individuals are required

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12. Arrow, *supra* note 10, at 614–16.

13. Arrow, *supra* note 10, at 614–16.

14. Arrow, *supra* note 10, at 615.

15. Arrow, *supra* note 10, at 615.

16. Herbert I. Schiller and Anita R. Schiller, *Libraries, Public Access to Information, and Commerce, in* THE POLITICAL ECONOMY OF INFORMATION 146, 147–66 (Vincent Mosco et al. eds. 1988); HERBERT I. SCHILLER, INFORMATION AND THE CRISIS ECONOMY 102–03 (1984).

17. Vincent Mosco, *Introduction: Information in the Pay-per Society, in* THE POLITICAL ECONOMY OF INFORMATION 3, 3–26 (Vincent Mosco et al. eds. 1988).

to submit to government agencies .... In sum, the national information supply is an endangered resource.[18]

To make matters worse, the government, after paying for the fixed costs of gathering information, often permits private agents to treat this information as private property.[19]

Finally, the government is continually expanding its concept of so-called intellectual property rights. Presently, the United States Patent Office is granting patents on genetic material and even mathematical procedures that are developed at or in conjunction with universities that receive substantial public funds. In the process, it is contaminating the scientific process. Researchers, who once worked with great diligence to win recognition for their peers, now shroud their research in secrecy in the hopes of striking it rich.

IV. PATENTS IN COMPUTER SOFTWARE

The computer software industries illustrate wonderfully how treating information as private property causes unbelievable waste. Today, software companies are taking pains to undermine each others' efficiency through complex strategies of copyright and patent litigation. As a result, the legal costs of producing software are soaring. The Wall Street Journal reported on the case of Paul Emmerich, President of CadTrak Corporation, a six-person company in San Mateo, California.[20] This company takes in almost $5 million a year in licensing fees for a method he invented for moving a cursor around on a graphics screen.[21] "Mr. Emmerich scans computer ads and treks through trade shows, hunting for unwitting violators. After four days at the giant Comdex show in Las Vegas last fall, he says, he 'picked up 10 or 12 new infringers that he could sue.' "[22]

The firms that CadTrak sues do not knowingly copy CadTrak's discovery. They come upon it independently. Still, one might try to stretch the usual case for patents by arguing that patents somehow have encouraged people, such as Mr. Emmerich, to innovate. This defense does not hold water in the case of Berkeley Limited Partnership, which settled a suit with IBM in February 1989 after accusing IBM of patent infringe-

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18. Schiller, INFORMATION AND THE CRISIS ECONOMY, *supra* note 16, at 84.
19. Schiller, INFORMATION AND THE CRISIS ECONOMY, *supra* note 16, at 84.
20. William M. Bulkeley, *Will Software Patents Cramp Creativity?: Growing Threat of Litigation Worries Firms*, WALL ST. J., Mar. 14, 1989, at B1.
21. *Id.*
22. *Id.*

ment.[23] As its name might suggest, Berkeley Limited Partnership has its roots in the world of finance rather than software. This firm began with the purchase of a patent at a bankruptcy sale by a Washington, D.C. lawyer. Berkeley claims that its patent covers some basic software operations that are found in almost every personal computer and word processing program.[24]

The use of the courts to extract rents can cripple the production of innovative software. Jeffrey Tarter, editor of SoftLetter (a Cambridge, Massachusetts newsletter) said that such lawsuits can overwhelm a small software developer "if it's a matter of challenging seven or eight patents every time you do software and fighting with lawyers."[25]

Software companies contend that most of the glaring deficiencies of the software industry are inevitable, claiming that, without the lure of profit made possible by protecting the vendors' intellectual property, the programs would never be written in the first place. Others that are familiar with the software industry insist that the corporate culture is incompatible with the sort of creativity that good programming requires.

In fact, the majority of the major software houses either began as or became software brokers rather than software creators. For example, even Microsoft began as a tiny company which supplied a growing core of computer hobbyists with the BASIC language.[26] Its fortunes soared when it won a contract to supply IBM with the DOS operating system; however, Microsoft did not originate DOS. Instead, it purchased the software from Seattle Computer, an even tinier software house, for a mere $50,000 in 1980.[27] Within five years, Microsoft's revenues for system software reached $75 million.[28] Seattle Computer won some relief later when it successfully sued Microsoft and was awarded $925,000,[29] but this amount is a pittance compared to Microsoft's now legendary fortunes.

The fortunes of Micropro illustrate the conflict between the corporate culture and successful programming. Micropro was an early software success story. It marketed Wordstar, the dominant word processing program at the time.[30]

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23. *Id.*
24. *Id.*
25. *Id.*
26. Peggy Watt, *Microsoft Keeps MS-DOS Rights*, COMPUTERWORLD, Dec. 22, 1986, at 58; Peggy Watt, *MS-DOS Creator Tim Patterson Earns Place in Industry Annals*, COMPUTERWORLD, Apr. 7, 1986, at 54, 56.
27. *Id.*
28. *Id.*
29. *Id.*
30. John B. Judis, *Technotrends*, IN THESE TIMES (Chicago), Sept. 3–9, 1986, at 16–17.

Rob Barnaby, a programmer, claims that he wrote most of the code for Wordstar while working for another company, IMSAI.[31] Barnaby's program was a masterful *tour de force*, packing a full blown word processor into a tiny 64k CP/M machine. According to John Judis, "when Barnaby, repelled by Micropro International's corporate culture, quit, the firm's team of programmers were unable to master and improve Barnaby's code."[32] With the emergence of the IBM, Micropro merely ported Wordstar over from the 8 bit CP/M world rather than rewriting it to take advantage of the more powerful 16 bit environment. Today, Wordstar is all but forgotten.[33]

V. COMPUTER SOFTWARE AS A PUBLIC GOOD

Micropro did not owe its once comfortable fortunes only to the expertise of a single programmer. Once it became the standard word processor, it benefited handsomely from a wide community of users who made significant contributions to its product.

Wordstar had what were called patches, openings into the program which allowed users to write their own code to perform specialized tasks. Many of these patches were eventually incorporated into the program itself. More modern programs allow users to write macros (mini-programs) to make the product more effective, but macros tap only a limited part of the program's potential.

Ideally, software developers would provide access to the original code that makes up the program, allowing users more opportunity to improve the program. Of course, software developers want to maintain as much secrecy as possible to protect their profits.

Software vendors impose other costs on the economy in order to protect the value of their commodity. For example, they routinely hide their code so that potential competitors cannot take advantage of their programs. This tactic may help purveyors of software collect rents, but it cripples the potential usefulness of some programs.

The software industry restricts the potential usefulness of its products in an even more blatant respect. Economists understand that a monopolist will profit by distorting the array of quality and variety of their product even though such behavior reduces social welfare relative to the imaginary ideal of perfect competition.[34] Software marketers are

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31. *Id.*
32. *Id.*
33. *Id.*
34. *See* David Besanko et al., *Monopoly and Quality Distortion: Effects and Remedies,* 102 Q. J. ECON. 743 (1987); Eric Maskin & John Riley, *Monopoly with Incomplete Informa-*

no exceptions. In order to create an artificial range of quality, they actually spend money to disable some features of their product.

Similar behavior among computer hardware manufacturers is rarer, although IBM did go to the expense of installing special circuitry to make their infamous PC-Junior unable to match the performance of its PC line.[35] Earlier, the developers of the original PC line chose the 8088 chip rather than the more powerful 8086 because the corporate headquarters would never allow the computer to be built with the 8086—a possible threat to the existing IBM line of computers.[36]

Admittedly, software is expensive to develop. The development costs of a business application program for a microcomputer run at about the same as many commercial phonograph recordings. Software prices generally exceed the prices of phonograph records by a significant amount, sometimes by thousands of dollars. Once produced, however, software code costs virtually nothing to duplicate.

Software companies sometimes justify their high prices by the alleged costs imposed by piracy, although high prices make piracy a more tempting alternative to the outright purchase of programs. Although the software sellers regard pirates as mere criminals, software pirates also provide valuable services to the industry.

To begin with, pirates perform a great service for the developers by introducing the program to a wider audience. Currently, many software companies willingly incur significant costs to send sample disks gratis to acquaint potential customers with their products. Many alleged pirates save firms such expenses by "sampling" programs to see if they are worth purchasing later. The vast majority of these supposedly "stolen" copies remain unused after the pirate spends a couple of hours trying them out.

One can even go beyond Arrow's suggestion that informational goods be free to suggesting that piracy of computer software is such a productive activity that subsidizing pirates might even be justified. Certainly, piracy can improve software performance. For example, many of the users who contributed patches to Wordstar were pirates. In many cases, their contributed patches added more to the value of the company than the payment for the product would have brought. In this sense, piracy can significantly add to the value of a program for the customers who legally purchase it.

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tion, 15 RAND J. ECON. 171 (1984); Lawrence J. White, *Market Structure and Product Varieties*, 67 AM. ECON. REV. 179 (1977).

35. JAMES CHPOSKY & TED LEONSIS, BLUE MAGIC: THE PEOPLE, POWER, AND POLITICS BEHIND THE IBM PERSONAL COMPUTER 23-24 (1988).

36. *Id.*

A decade or so ago, many software houses took great pains to thwart pirates through copy protection, creating an artificial cost of transmitting information. The intent was to make software more unlike public goods. Ironically, copy protection made the program even more expensive because of the extra programming involved in copy protection.

To make matters worse, copy protection usually involved major inconveniences for purchasers of the program. A groundswell of consumer resistance built up. Once consumers balked at purchasing programs with copy protection, this method of ensuring that software companies could collect rents fell into disuse.