Some Economics of Trade Secret Law

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D espite the practical importance of trade secrets to the business community, the law of trade secrets is a neglected orphan in economic analysis.[1] This paper sketches an approach to the economics of trade secret law that connects it more closely both to other areas of intellectual property and to broader issues in the positive economic theory of the common law.[2]

What Is a Trade Secret?

A trade secret is an item of information—commonly a customer list, business plan, or manufacturing process—that has commercial value and that the firm possessing the information wants to conceal from its competitors in order to prevent them from duplicating it. It is questionably described as "property" in a recent Supreme Court decision that upheld a conviction for fraud under a statute (the federal mail-fraud statute) that has been interpreted to require that the fraud deprive the victim of something tangible—something like property but unlike the right to honest service.[3] A trade secret is not property in the usual sense—the sense it bears in the law of real and personal

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[1] An exception is Edmund W. Kitch (1980).
[2] By "common law" we mean law made primarily by judges. Although there is federal as well as state common law, trade-secret law is a part of the latter rather than the former. It is no longer a pure common law area, because a number of states have adopted the Uniform Trade Secret Act; but like other uniform laws, notably the Uniform Commercial Code, the Uniform Trade Secret Act is for the most part codification rather than repudiation of the common law.

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property or even in such areas of intellectual property law as copyright—because it is not something that the possessor has the exclusive right to use or enjoy. If through accident the secret leaks out, or if a competitor unmasks it by reverse engineering, the law gives no remedy. The law does give a remedy if the secret is lost through a breach of contract—say by a former employee who had promised not to disclose what he learned on the job—or through a tort, like trespass. But the violation is not of a property right to the secret but of a common law right defined without regard to trade secrets or to information in general.

Hence there is in a sense no law of trade secrets, though one can discern the emergence of one in a case like E.I. du Pont deNemours & Co. v. Christopher.[4] A competitor of du Pont hired a pilot to photograph a plant that du Pont was building. The goal was to uncover secrets of du Pont's manufacturing process. Although the court found no trespass by the overflying aircraft, it held that the competitor had violated du Pont's common law rights. Given the court's finding that there was no trespass, the "rights" invaded could only have been rights to the trade secrets themselves, rather than the right to prevent trespass, conversion, breach of contract, or other conventional common law wrongs.

There is another way in which our statement that there is no law of trade secrets is too bold. Even though in general a legally actionable violation of a trade secret requires the commission of an independent common law wrong, when it comes to assessing damages or awarding some other remedy the court will take account of the trade secret's commercial value.

The common law of trade secrets raises three principal questions, which are the focus of this paper. The first is why the law does not protect trade secrets as such, or, what is nearly the same question, why it does not protect against the loss of trade secrets by accident or by reverse engineering. The second question is why anyone would elect not to patent his trade secret, and the third and closely related question is why the law permits the election. The conclusion that emerges from our attempt to answer these questions is that, as in a number of other areas of common law, the common law approach to trade secrets appears to make good—even subtle—economic sense.

Choosing Between Patent and Trade Secret Protection

The second and third questions can be discussed more briefly than the first, so we begin with them. Judges and lawyers have sometimes thought that because trade secret law provides less protection to the inventor than patent

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[3]Carpenter v. United States, 108 S. Ct. 316 (1987). The statute is 18 U.S.C. §1341; see also §1343 (wire fraud).
[4]431 F.2d 1012 (5th Cir. 1970).

law does, no rational person with a patentable invention would fail to seek a patent; and therefore trade secret law must protect a class of lesser inventions.[5] This reasoning is incorrect. Consider three cases. In the first, the inventor has a patentable invention that he believes will take as long or almost as long as the term of a patent for anyone else to invent, but the invention has only modest economic value. In the second case, the inventor again has a patentable invention, but in this case one that he believes will take much longer than the term of a patent for anyone else to invent. In the third case he has a nonpatentable invention but believes that reinventing it would take so long that he can obtain a substantial return by keeping the invention secret.

The inventor's decision may seem an obvious one in the first case, since the patent will yield greater protection. But it will probably do so at greater cost, which may not pay if as assumed the invention is not of great value. Obtaining patent protection involves significant fixed costs of preparing the patent application. Protecting a trade secret avoids these fixed costs, but adds expenditures to prevent disclosure of the secret. The latter cost should be roughly proportional to the value of the secret to prospective appropriators, and hence should be low when the secret is of modest value. In that situation, trade secret protection may well be cheaper than patent protection, and the difference may exceed the difference in benefits arising from the fact that patent protection is broader and lasts longer. Notice also that the cost of obtaining a patent must be incurred in every case, whereas the cost of establishing trade secret protection is incurred only if the secret turns out to be valuable enough to incite someone to try to steal it.

In the second case (the patentable invention that the inventor believes will take much longer than the term of a patent for anyone else to invent), the inventor's choice is between patenting the invention for stronger protection and keeping it a trade secret, with luck for a longer time. He will choose the latter course of action if he thinks that doing so will give him a greater return. By doing so he will in effect be contending that the social value of the invention is greater than the patent law assumes—and he is offering to demonstrate it through the failure of other inventors to duplicate the invention though legally free to do so. The law of trade secrets assists him in this demonstration by increasing the chance that if someone does duplicate the invention, he will do so by inventing rather than by stealing it.

Admittedly we are oversimplifying. On the one hand, the inventor is more than demonstrating his claim; the existence of the invention will typically lower the cost to others of duplicating it, so that their failure to do so will demonstrate a fortiori that they would not have come up with the invention independently. On the other hand, the existence of the invention lowers the return from duplicating it, and thus lowers the incentive to try to duplicate it. These effects

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[5]Such an analysis is implicit in Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470, 482-90 (1974).

cut in opposite ways insofar as the length of time the trade secret will remain a secret is concerned, and therefore need not affect that time.

The third case—that of the nonpatentable invention expected by its inventor to yield a substantial return if only it can be kept secret—is analytically similar to the second. The case assumes that the government thinks the invention obvious—thinks that someone else will come up with it shortly and therefore that granting the inventor a patent would overreward him; for that is (roughly) what it means to say the invention is unpatentable. The inventor offers to demonstrate the contrary, that it is not an obvious invention, by keeping it a secret. If he is wrong and someone else invents the same thing the next year, this proves the government right; so it is as if the inventor had been denied a patent and the patent laws were exclusive. But if the inventor is right and there is no duplication, then he gets the approximate reward he would have gotten if the invention were patentable—as he should, for he has shown that the government was mistaken in thinking the invention unworthy of patent protection.[6]

This third case need not reflect a disagreement between the inventor and the patent authorities, though we have posed it that way; it may merely reflect the fact that patent law cannot be tailored finely enough to cover every case. Everyone may agree that the invention will be duplicated in five years, but since patent law contains no provision for patents that expire in five years, awarding the inventor a patent will substantially overreward him. The Patent Office correctly refuses the patent—and the inventor correctly uses trade secret protection instead.

To summarize, trade secret law supplements the patent system. Inventors choose trade secret protection when they believe that patent protection is too costly relative to the value of their invention, or that it will give them a reward substantially less than the benefit of their invention (as reflected, in part, in the length of time before any else will invent it), either because the invention is not patentable or because the length (or other conditions) of patent protection is insufficient. By successfully maintaining their trade secret they provide evidence that their belief was correct. In effect the common law has plugged several economic holes in the patent statute. It has not done so costlessly; patenting results in the disclosure of socially valuable information, and trade secret protection does not. But it may be doubted how great this social cost is, for reasons to be considered next.

Our analysis of trade secret law is congruent with the basic economic explanation for patent protection—that it provides a means of internalizing the benefits of innovation. But it may appear to clash with the complementary explanation, Kitch's prospect theory, which views a patent primarily as a device

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[6]As the Court recognized in Kewanee. This was one of the reasons it gave for rejecting the argument that the patent statute preempts (abrogates) the states' common law of trade secrets. 416 U.S. at 487, 491.

for establishing property rights over regions of partially unexplored inventions —analogous to the claim of a prospector over a partially unexplored body of ore. From this standpoint, the public disclosure that is a condition for obtaining a patent is essentially a boundary marker, serving to head off wasteful duplication of inventive efforts by alerting the competition to the existence of a privileged developer.

There is, of course, no public disclosure of a trade secret, so if we want to maximize disclosure (while preserving incentives to invent) it may seem that we should force the possessor of a trade secret to choose between patenting the invention and losing all legal protection of it. This could be done by a rule that federal patent law preempts state trade secret law, or more precisely bars the use of state common law remedies by possessors of trade secrets. Yet that rule has been rejected, as we have seen.

In fact its rejection seems consistent with the prospect theory, as well as with the reward theory. The key to this conclusion is to realize that an inventor is not barred from obtaining a patent merely because someone else has made, but has secreted, the invention.[7] Therefore the endeavors of the second inventor do not have the futility of endeavors to make an invention that the inventor will not be allowed to use because a competitor patented it a day earlier. It is true that if the first inventor, the one who is keeping his invention a secret (which means, by the way, that *he* cannot patent it once the one-year grace period in which an inventor may use his invention without applying for a patent has expired[8]), were forced to disclose the invention, the second inventor would save resources. To that extent trade secret law encourages a duplication of effort that patent law discourages. But this is just to say that information is privately as well as socially valuable, so that people will expend resources to obtain, if necessary by duplicating, information possessed by others. Our point is only that trade secret law does not let an inventor play dog in the manger, for if he takes the trade secret path and thus (after a year) forfeits his right to seek a patent, he cannot prevent a subsequent inventor from patenting the invention and knocking the first inventor out of the market.

A further round of analysis, moreover, suggests that trade secret law may actually discourage duplication of inventive effort, relative to patent law. The cause of excessive effort by those seeking patent protection is that the first to invent will receive the entire reward of invention, even if he beat the second inventor by only a day, in which event the first inventor's incremental contribution to social welfare will be much smaller than the value of the invention. The excessive effort resulting from this divergence between private and social benefits is most wasteful when the cost of making the invention is falling rapidly over time; for then, from a social (but not private) standpoint, it should be

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[7] 35 U.S.C. §102(g).
[8] 35 U.S.C. §102(b); Metallizing Engineering Co. v. Kenyon Bearing & Auto Parts Co., 153 F.2d 516 (2d Cir. 1946) (L. Hand, J.).

made later rather than sooner. Unlike patent protection, trade secret protection pushes toward the correct social outcome in this case, though whether it attains it is unknown. The faster the cost of making an invention is falling, the less valuable the invention will be as a trade secret, since the falling cost will increase the likelihood that it will soon be invented independently. Hence in a regime of trade secret law, unlike one of patent law, an invention whose cost is falling more rapidly will (other things being equal) be made later than one whose cost is falling less rapidly, and this is as it should be.

Why is Trade Secret Protection Limited?

We turn back to the first question, why trade secret law is for the most part confined to protecting against conduct that is independently wrongful—that is, that violates some independent common law principle. The owner of ordinary physical property does not lose his property right if he loses the property; there is no legal principle of "finders keepers," although finders may have some rights and property can be lost by abandonment. The owner of a patent does not lose his property rights because someone else is clever enough to figure out his secret by reverse engineering his product without consulting the files of the Patent Office, where the invention will be described for all who wish to read. Why does the law deny these rights to the lawful possessor of a trade secret?

There are two possible answers, or classes of answer. The first focuses more than the second on the economic character of a trade secret as information, and the second focuses more than the first on the economic characteristics of the various methods of "stealing" a trade secret.

The first approach finds an analogy to the trade secret problem in the distinction in international law between lawful and unlawful espionage, a distinction founded in turn on the cooperative nature of information production. To ferret out another nation's secrets by patient collation of its published statistics and its newspaper articles or by photography from a spy satellite or by the diligence of one's military attachés stationed in the nation's capital illustrates lawful espionage. The unlawful kind is illustrated by bribery of government employees, by extortion, by kidnapping, and by burglary—in other words, by common law offenses. No doubt the legal difference is due in part simply to the greater cost of preventing espionage of the first kind, and there is an obvious and nearly exact parallel in the choice made in trade secret "law" of what tactics of espial to forbid. But that will not explain the tolerance of international law for the military attaché's nosing about. The explanation must be reciprocity. We allow other nations to station military attachés in our country as a condition of their allowing us to station our military attachés in their countries. But why are the net gains positive, rather than the losses exactly equal to the gains? The answer, we suggest, is that a nation desiring to deter its adversaries must be able to communicate a credible, if inexact, notion

of its strength. It does this by opening itself (in part) to the first-hand scrutiny of its adversaries' trained professionals. This is a more credible mode of demonstrating strength than bragging about it. A nation that refused to allow foreign military attachés would be communicating weakness.

The qualification "in part" should be stressed. No nation wants to reveal all its secrets, lest this invite countermeasures by potential enemies. The attaché system allows it to keep some secrets.

Corresponding to the considerations of reciprocity that lead all nations to agree to provide some but not all information to their competitors are considerations of reciprocity in the law of trade secrets that arise from the fact that every producer of information is also a consumer of information—the basic input into the production of information is information. Every producer of information desires, ex ante (or behind the "veil of ignorance"), access to his competitors' information as well as protection of his own (Landes and Posner, 1989). The law strikes a balance between these inconsistent desires by prohibiting only the most costly means of unmasking commercial secrets. They are costly in major part because of the defensive maneuvers they incite. For example, if the law refuses to enforce contracts in which employees promise not to spill the employers' trade secrets, employers may be led to reorganize their businesses in inefficient forms—perhaps by splitting up tasks among more employees so that each knows less, or by bringing in family members (even though they may be less competent) as employees, counting on them to be loyal out of altruism or because the family setting often enables effective, informal retaliation against the disloyal; for members of a family are in an ongoing relationship, unlike the employer and an unrelated former employee.

Where on the contrary the social costs of enforcing secrecy through the legal system would be high, the benefits of shared information are likely to exceed the net benefits of legal protection. There are gains when manufacturers are permitted to reverse engineer each other's products—the manufacturers learn things they can put to use in their own design of new products. Withholding legal protection is not all social loss, therefore, and in addition it economizes on what would be high costs of legal protection. In the case of reverse engineering, then, the social cost-benefit calculus appears to favor denial of legal protection.

The second approach picks up where the first left off, with a careful focus on the differential costs and benefits of different ways of appropriating, and preventing the appropriation of, trade secrets. Here a simple model will be helpful. We assume that a firm can lose its trade secret either through theft or other common law wrong on the one hand, or through accidental disclosure or reverse engineering on the other; we denote the loss in either case by L. The probability that the loss will occur through a common law wrong we denote by p, and is lower the greater the legal protection and the greater the firm's own expenditures (x) on preventing the loss. The probability of loss through accidental disclosure or reverse engineering we denote by q, and the firm's

expenditures on preventing this by y. The firm wants to minimize the sum of (1) its expected loss from losing its trade secret and (2) the costs of preventing the loss. Let this sum be L^*. Assuming for simplicity that the firm sells a single unit of output of a given cost (that is independent of the costs of protecting the firm's trade secrets) at a given price, then $L^* = [p(x)(1 - q(y)) + q(y)(1 - p(x)) + q(y)p(x)]L + x + y$. It is easily shown that to minimize L^* (assuming diminishing marginal effects of x and y), the firm will choose an x and a y such that $p_x(1 - q)L + 1 = 0$ and $q_y(1 - p)L + 1 = 0$. Thus the greater the value of the trade secret, and the more productive the expenditures on preventing its being lost whether through theft or other common law wrong on the one hand or through accident or reverse engineering on the other, the more the firm will spend on protecting its trade secret.

Consider the effect of a law that prohibits theft or other common law wrong (theft for short) but not loss through accident or through reverse engineering. Such indeed is American trade secret law, and if enforced should reduce firm's expenditures in preventing losses (x) compared to a world without any legal protection of trade secrets. Since the threat of legal sanctions will deter at least some potential thieves, the probability of losing the secret through a common law wrong (p) will be lower, and the assumption of diminishing marginal effect suggests that the lower p is the less productive units of x will be. In theory, public and private expenditures on preventing theft could be complements rather than substitutes. But this is unlikely. Even if there is no law against theft of trade secrets,[9] there is plenty a firm can do to reduce the probability of such thefts (screening employees more carefully, installing more effective security systems, and so forth); it will do less if the threat of legal sanctions deters.

There is a second and subtler reason why a firm's expenditures in preventing losses (x) will (probably) be lower than in a world where trade secret law also protects against loss through accident or reverse engineering: the probability of loss by these methods (q) will be higher than in such a world. If, as implied by a high q, the trade secret is likely to be lost regardless of expenditures on preventing theft, the productivity of those expenditures is reduced.

Consider now the effects on y (expenditures on reducing the probability of the loss of a trade secret through accident or reverse engineering) of trade secret law; as before, we assume that the law protects against theft but not against accidental loss or reverse engineering. It is apparent that y will be higher than if the law protected against accidental loss and reverse engineering as well as against theft. First, there is no substitution of public for private expenditures so far as preventing loss by accident or reverse engineering is concerned; just as firm expenditures on preventing theft would be higher if the

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[9] It may seem inconceivable that there would be no law against theft; but the law could forbid breaking and entering without punishing separately the theft of the trade secret that the burglar took.

law did not protect against theft, so y is higher because the law does not protect against accidental loss or reverse engineering. Second, with theft unlawful and therefore less frequent, the gains from preventing loss by accident or reverse engineering are greater. Because the trade secret is not likely to be lost anyway —that is, by theft—expenditures on preventing its loss by accident or by reverse engineering are likely to be productive.

The welfare effects of trade secret law as we have modeled it are complicated. One component of L^*, namely L, is a private but not necessarily a social cost, because competitors could make productive use of the information embodied in the trade secret; consumers would benefit from this use; their gain would offset some of the loss to the inventor of the secret. Hence, lowering L^* is not an unequivocal social good. Moreover, L^* may not be lower than in a world in which the legal protection of trade secrets is broader, because the refusal to provide legal protection against loss through accident or reverse engineering will evoke expenditures (y)—which are part of L^*—designed to lower q, the probability of such a loss.

Abstracting from the issue of the difference between private and social cost in L^*, we may be able to resolve the remaining issues by comparing the costs to the trade secret's owner of preventing the loss of a trade secret through accident or reverse engineering with the costs that competitors would have to incur to avoid obtaining a trade secret through such lawful means. The costs are lower to the owner. This is clearer in the case of accidental loss than in the case of reverse engineering, since it would be highly costly for competitors to sift through all the information they received in order to determine whether some of it might be information accidentally "mislaid" by the owner of a trade secret. This is one of those cases where the cost of care is so much lower to the potential victim (the owner of the trade secret) than to the potential injurer (the competitor in our case) that a rule of no liability is more efficient than a liability rule. In the theft case, in contrast, not only would self-protection by potential victims involve heavy expenditures, but the cost to the potential injurer of committing an intentional tort, that is, the cost of *not* investing resources designed to effect a transfer of wealth, is negative (Landes and Posner, 1987, ch. 6). From this standpoint *du Pont* is a sensible decision. Denial of legal protection might induce firms in du Pont's position to invest heavily on roofing over construction sites; and the competitor expended real resources on hiring an airplane and pilot to steal du Pont's trade secret. Holding the defendant liable induces him not to spend real resources on the airplane and pilot and eliminates du Pont's incentive to spend excessively on roofing.

The analysis of theft is more complicated in the trade secret area than in the ordinary tort or criminal area, however. In the former but not the latter setting the "thief" brings about a social gain—approximated by the reduction in cost or improvement in quality that is brought about by greater competition as a result of breaking the trade-secret owner's information monopoly—as well as a social cost measured by the resources expended on effecting and opposing

an involuntary transfer of wealth. Yet this gain is at least partially offset by the reduction in the incentive to invent. If the two effects are treated as perfectly offsetting, the character of the trade secret as information drops out of the picture and we can apply without reservation the standard analysis of an intentional tort or crime.

The analysis of reverse engineering is more complex than that of accidental loss, because in many although not all cases a competitor will know full well when he is engaged in reverse engineering, and he could be prohibited from doing so; it is not at all clear that the owner of the trade secret is in a better position to prevent the loss of the secret, as seems to be the case with accidental loss. Moreover, there is a cost in not prohibiting reverse engineering; the owner of the trade secret may incur costs in design or production in order to make his product more difficult to reverse engineer.

There are nevertheless two arguments against liability for reverse engineering. The first is that if a competitor duplicates someone's trade secret it may be difficult to prove that he did it by reverse engineering rather than by independent research; and administrative costs are an important constraint on the scope of legal liability. The second argument is that reverse engineering will often generate knowledge about the product being reverse engineered that will make it possible to improve on it. Here the analogy to our espionage case and to the case of incremental creativity in copyright is close.[10] Ex ante the members of an industry might agree to allow reverse engineering of each other's products, knowing that all would have a net expected gain since reverse engineering frequently results in product improvements. Recognition of this point in the semiconductor industry has given rise to a distinction, codified in a recent statute,[11] between piracy and acceptable reverse engineering—the latter involving substantial investment and innovation (Raskind, 1985). The fact that reverse engineering is costly, moreover, automatically cuts down on the amount of free-riding on the first inventor.

Theft and reverse engineering are substitute methods of appropriating a trade secret. For reasons just explained, we want competitors to substitute in favor of reverse engineering, and a law that penalizes theft of trade secrets but not reverse engineering creates an incentive for them to do so. A law that penalized both forms of appropriating trade secrets would be closely analogous to copyright law, which penalizes copying. It would probably be weaker than patent law, because it would still allow for independent invention, as patent law does not; but it would go further than copyright law does, because copyright law allows the copying of ideas and forbids only the copying of expression. A law that forbade without limitation of term the copying of productive ideas would impose greater costs; whether there would be offsetting benefits is

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[10]See the earlier discussion of how the law prohibits only the most costly means of unmasking commercial secrets, costly because of the defensive measures they incite.

[11]Semiconductor Chip Protection Act of 1984, 17 U.S.C. §§901 et seq. See also § 906.

unknown. Such a law possibly although not probably would be on balance stronger than patent law, since it would be unlimited in term and would not require public disclosure, although it would not bar independent discovery. Use of trade secret law to create such superpatents would pose obvious problems of conflict with patent law, which being federal is in our constitutional system supreme over state law.

Notice that in both the copyright and trade secret cases an alternative to allowing extensive copying is to rely on voluntary transactions. An author who wanted to use a plot line in another author's novel could negotiate a license from him, and firms that wished to reverse engineer each other's products could enter into cross-licenses permitting this; these would be like R&D joint ventures. Transaction costs might well be high, however, and one effect would be to make theft of trade secrets a more attractive substitute for contract than it is under current law.

This discussion raises the broader question whether, to return to the beginning of this paper, trade secrets should be treated as property and comprehensively protected. Such treatment would be tantamount to a perpetual patent law without public disclosure, and would be inconsistent not only with federal patent law but also with Kitch's prospect theory, which ascribes efficiency advantages both to the limited patent term and to the requirement of public disclosure. The current structure of trade secret law may be the best compromise among the competing economic considerations. No stronger conclusion is possible. Yet, tentative and speculative as our analysis is, it does suggest that the law of trade secrets may have surprising efficiency properties that would reward further research in this neglected but important field of common law. For example, many nations—notably Japan, Germany, and the United Kingdom—have much weaker trade secret law than we, and it would be interesting to investigate the adaptations that result. If our analysis is sound, those adaptations can be expected to generate higher information costs compared to the corresponding practices of American firms.

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