

On The Priority of Intellectual Property Rights, Especially in Biotechnology

The ease of software piracy, and of down-loading copy-righted material from the web have raised substantially the visibility of the problem of intellectual property—that is the question of whether, for what reasons, and to what extent, good new ideas should be treated as private property. Napster may have made the problem visible, but the revolution in genomics has raised the stakes of solving the problem for almost all of us, and especially for that portion of man-kind unlikely to benefit directly from, indeed potentially to be harmed by, the enforcement of intellectual property rights.

Here I want to advance an argument for giving intellectual property rights which are untrumpable by any other sort of considerations from human welfare. The notion that there are basic human or natural rights, which cannot be overridden no matter what the welfare-consequences of do so, is a familiar one. But no one supposes that intellectual property rights, or indeed any property rights, are among this privileged set. Moreover, that considerations from human welfare should underwrite such status for any human right is perhaps more surprising. After it all, it is to limit the writ of welfare-considerations that untrumpable rights are invoked.

The argument brings together some fundamental considerations from economics and a utilitarian approach to decisions about what social institutions we should adopt. I will often employ the term ‘welfarist’ instead of utilitarian hereafter, in order to emphasize that the normative standard for institution-design I invoke is one which chooses institutions on the basis of their consequences for human welfare, recognizing that human welfare is itself a vexed notion, that the principle is ambiguous as between total, average, median, or other quantities of welfare, and that one of the chief objections to utilitarianism is that consequences are difficult to determine. Below I touch on each of these issues as they bear on the problem of intellectual property rights. The most important reason for adopting a welfarist basis for institution design in the present connection is that utilitarianism is *prima facie* inimical to the priority of rights over welfare. Its founder, Bentham is famous for the quip that “rights are nonsense, and prescriptive rights nonsense upon stilts.” Thus, a welfarist argument for the prescriptive status of intellectual property rights, would be a particularly surprising one and a strong reason to entrench a property right to one’s ideas, independent of general arguments in political philosophy about whether there are natural rights or not.

This paper employs examples drawn heavily from discoveries and inventions in the life sciences, especially ones made by employees of “Big Pharma”, the six or seven largest multinational pharmaceutical companies spending the largest amounts of money

on research, development and clinical trials. It also frames conclusions about institutional design that are of special relevance to these corporations and their international markets. The reasons are illustrated in widely publicized conflicting interests of the holders of patent rights in antiretrovirals from the developed world, i.e. “Big Pharma” and the welfare interests of persons infected with HIV in Brazil, The Republic of South Africa, or elsewhere in the developing world. Imagine the potential conflict raised by the discovery of a cure for or vaccine for malaria, or somatic genetic resistance to major illnesses of the third world due to impure water supplies? Imagine the temptations even in developed nations to expropriate gene-chip technology when it provides a cheap, easily replicated, instantaneous tool for diagnosing each individuals’ “inborn errors of metabolism”, and perhaps even synthesizing the required bioactive molecules *in situ*. The short term saving to national health systems of expropriating such technology are potentially budget-balancing by themselves. The prospects of ever increasing biochemical and especially genomic innovations in health care are accelerating very rapidly, practically ensuring that the choice faced by countries such as Brazil and the Republic of South Africa about whether to honor intellectual property rights of multinational pharmaceutical corporations for example, will recur again and again in the future, with ramifying consequences even for those without any direct stake in the immediate matter.

1. The economics of good ideas

Good ideas present the most serious problem in developmental economics, or the economics of growth, and therefore in the economics of improving people’s welfare as well. It is so big a problem that it is often treated by developmental economists as if the problem doesn’t exist, or is none of their business. And these economists may in a way be right to do so.

Once land, labor and current capital are fixed, diminishing marginal productivity will always limit total output of whatever it is that people want and need. Diminishing marginal productivity must always eventually set in. As Malthus noticed, holding land and capital constant, population increase by itself must ensure ever increasing immiseration owing to the increasing supply of and diminishing marginal productivity of labor. But of course Malthus did not reckon with technological change, i.e. with the provision of ideas about how to increase the efficiency of land, labor and capital inputs in producing output. Good ideas are not just the most important variable for increasing production over time; in the long run they are the only variables. Once resources are fixed, increases in the productivity of land (physical capital), labor (human capital) and capital (capital), both separately and together are due to good new ideas. Even narrowly

construed, the rate of return on technological investment alone appears to be huge.¹ Moreover, the supply of good ideas is indefinitely large.²

Quite independent of the theoretical claim about decreasing marginal productivity of all other factors of production, the history of technology makes it patently obvious that good ideas are the chief source of welfare-improvements in the history of the world, and at an accelerating rate since 1900. Consider the implications of Moore's law, that memory capacity of microchips doubles every 18 months through human ingenuity. The computer power available for air-freight delivery anywhere in the world in less than five days for less than \$ 1000 would have cut the time of completion of the Manhattan Project which built the first atomic bombs by a year or more and cut perhaps a billion dollars in 1945 money (50 billion dollars in 2000 money) from the cost.³ Consider the improvement in human welfare consequent to the invention of so simple an innovation as mosquito netting, or consequent to the invention of an efficient mechanical process for fabricating it cheaply and in large quantities. All these outcomes are the direct consequence not of opening up new territory or extracting more of the same raw materials, or increases in labor inputs resulting from population growth. They are all due to new ideas, and new ideas that build on other new ideas. Electromagnetism, the incandescent light bulb, the vacuum tube, the cathode ray tube, the transistor, the integrated circuit, the microchip, the liquid crystal diode, each is an unanticipated new idea that required its predecessor but also greatly enhanced its predecessor's impact on production.

The sequence of unanticipated innovations from Faraday's discovery to the laptop illustrates the fact that good ideas are quintessentially unpredictable. A famous jazz musician answered the question, "Where is jazz going" by replying, "If I knew, I would

¹ See Griliches, Zvi, "Hybrid corn: an exploration in the economy of technological change" *Econometrica*, 25 (1957): 501-522, for an influential early exploration of how great is the excess of benefits over costs that is produced by good ideas.

² Indeed, this fact about good ideas, is part of an argument for intellectual property rights which must appeal strongly to proponents of Locke's account of chattel property. The "Lockian proviso" that property is morally permissible when one mixes one's labor with it, and "leaves as good and as much" for others is arguably more easily satisfied by good ideas than anything else. After all, good new ideas can only be acquired by mixing one's mental labor with them, and acquisition of one good new idea comes as close as anything can come to leaving enough and as good for others. A utilitarian will be unimpressed with this argument for intellectual property.

³ Which is not to say that the Manhattan project produced a net increase in human welfare. See the brief discussion of the welfare cost of good ideas in footnote 13 below.

be there already!” As philosophers have regretfully reported, there is no logic of discovery, nor for that matter a psychology, sociology, still less an economic theory that identifies the causal variables responsible for the appearance of good ideas. Accordingly, developmental economists traditionally described technological change as an “exogenous shock”, the cause of the “residual” left-over component of the data about economic growth which they cannot explain.⁴ Endogenous growth theory—the account of how an economy grows and what institutional arrangements may abet or hinder such growth thus seems just to ignore the factor economists recognize as the ultimate and sole source of all economic growth: at most endogenous growth theory introduces forces familiar to economists (e.g., imperfect competition, human capital, levels of R and D investment by government and firms, international trade barriers, von Neumann/Morgenstern uncertainty) that treat good ideas as a desired outcome—a component of the “objective function”, while going on to the more tractable and academically impressive task of deriving general equilibrium results for model economies adorned by these institutional forces.⁵

Of course it’s no criticism of economic theory that it can’t make the appearance of good ideas an explanatory variable; no one can, with the possible exception of some future neuroscientist. And not even the neuroscientist can make the provision of good ideas a matter of prediction. That’s the point about the jazz musician, and one recognized by philosophers since Popper, who used it to argue that a predictively powerful social science is impossible.⁶ Besides Popper’s (“logical” and controversial) argument for the unpredictability of an innovation, there is the fact that good ideas interact “strategically”, not parametrically, and there is no stable equilibrium towards which the production of such ideas moves. Like a move in a strategic game without a Nash equilibrium, one good idea (e.g. Coulomb’s law, circa 1840) generates a cascade of interacting improvements

⁴ Following Solow, R., “Technical change and the aggregate production function”, Review of Economic Statistics, 30 (1957): 214-231.

⁵ See Romer, Paul, “Endogenous technical change”, Journal of Political Economy, 98 (1990): 71-102, and any issue of the Journal of Developmental Economics. This program of research in development economics substantiates the analysis of the centrality of general equilibrium analysis throughout theorizing in many branches of economics I have advanced repeatedly (see for example, Rosenberg, Economics—Mathematical Politics or Science of Diminishing Returns, Chicago, University of Chicago Press, 1992, which has been widely decried by economists as exaggerated).

⁶ Popper, K., The Poverty of Historicism, Routledge, London, 1957, pp. vii-viii.

that if any thing increase the unpredictability of subsequent good ideas (from coulomb's law to the microprocessor in 120 years). The complete unpredictability of which, when and where good ideas will be produced means that there is hardly any way to assure their provision by a centrally planned, coordinated or controlled means.⁷

The failure of central planning—whether private or public—to provide efficiently or even at all for good new ideas is a direct consequence of their inherent unpredictability. It is rarely possible to identify and still less to solve a specific intellectual problem merely by throwing money at it from a central source, and it is never possible to do so efficiently. Only the individual person closest to the research frontier has both the relevant information and the incentive to recognize an opportunity to solve a problem and when and how to do so. The central planner is never identical with that individual. Maximizing the provision of good ideas requires maximally decentralizing the decision-making power about investing in their production. One thing that economists since Hayek have of course emphasized is that the *only* institution capable of proving relevant information to those who can make the best use of it is the price system of a free-market economy. A price system is an information- transmission device and one that most efficiently harnesses individual self-interest to provision of good ideas and other things that people really want instead of what planners with the best will in the world think they want.

A free-market price system optimally provides the information required at the most decentralized level required to produce new ideas. But the free market is not sufficient to insure optimal provision, owing to features which good ideas share with that other source of market-failure—the public good. Even more than public goods, good ideas can be optimally consumed by one person without depriving any one else of the benefits of consuming the good idea. In economist's parlance, once a good idea has been produced the marginal cost of another copy of a good idea is either zero or the price of a stone tablet, a piece of parchment, paper, or a floppy disk. The upshot is of course that as with public goods, a perfectly competitive market will not provide the optimum level of good ideas.

In the case of public goods, the welfare economist's solution to the problem of provision is central planning and government coercion. Since this wont work for good

⁷ This is not to deny that, they can be generically fostered, as by the US National Institutes of Health or National Science Foundation. But even the success of these institutions is a testimony to the importance of maximal decentralizing research decisions to the individual laboratory researcher.

ideas, the solution has been to privatize good ideas, make them intellectual property and provide their originators with patent right. The analysis is straightforward. A market economy without patent rights will not provide the optimum level of welfare it is capable of providing its participants. Seeking to invent and/or discover new labor-saving or welfare increasing ideas about how to organize or reorganize matter takes effort, time, and resources, incurs opportunity costs, and it is risky: there is no assurance of success. For many inventions and discoveries, no one has an incentive to undertake the efforts without the assurance of returns; every one has the incentive however to watch others and simply copy any idea others develop that will enhance their welfare. If you expend resources to invent something, say crop-rotation for example, others can freely copy if it is observed to work, they will free-ride on your efforts. No rational agent wants to take needless risks or be a sucker, so among economically rational agents, there will be a sub-optimal supply of new ideas. But the problem is worse. In a competitive economy without intellectual property rights, some new inventions and discoveries may give their discoverers great advantages if they can keep the innovations secret and so restrict their use. If everyone knows this, many will seek the solution to some problems, in the hopes of securing a competitive advantage over others. What happens when one among these many discovers the solution? To reveal the solution to all is to surrender the competitive advantage. If the secret is successfully kept, the others will continue to invest in seeking a solution, thus wasting the economy's scarce resources. The discoverer cannot sell the discovery to those who could make use of it to their own advantage and that of the other economic agents, thus wasting more of the economy's resources. Moreover, it will usually cost the discoverer something to keep the secret, and of course at least some agents will employ resources to engage in industrial espionage to uncover good ideas that others were keeping secret. Result: still more waste of productive resources, and economic inefficiency, which in a market economy makes at least some people, and sometimes even all people, worse off than they would be.

The absence of intellectual property rights among economically rational agents results in serious under-investment in ideas it is hard to keep secret and serious over-investment in ideas it is easy to keep secret. The introduction of patent rights in such an economy is a welfare-increasing solution to this problem. It is not a solution that optimizes the efficiency of the market, it is merely one that increases its efficiency. It is not an optimal solution for two reasons: most obviously because a patent right is a monopoly, and there is a standard economist's argument to show that monopolies result in welfare losses-the so-called "dead weight loss" which perfect competition avoids. Less obviously, the monopoly is never quite equal to the level which optimizes the

rewards to innovation, since it is always less than the total surplus in the whole economy created by the innovation. Patent rights are a so-called “second best” solution because without them the welfare loss to the economy is greater than with them—fewer good new ideas and too much investment in duplicate research, hiding, and stealing results of research. Moreover, the monopoly “rents” which the patent holder secures are an incentive to others to “invent around” the original patent, finding a different way “to skin the same cat”, and thus secure a portion of these rents, while increasing competition without depriving the original innovator of the patent right. Nevertheless, as with any monopoly the granting of patent rights still results in some loss by comparison to the optimum allocation of resources in the economy.

An alternative to patent rights that more closely approached the welfare optimum allocation of resources to invention and discovery in the economy would be preferable. But there have long been reasons to think none is available. Accordingly we adopt the second best solution. A patent is an exchange. The discoverer makes the idea public so that every one who can improve their productive efficiency by using the idea can easily learn of its existence, thus reducing the amount of resources wasted in duplicating ideas kept secret, making industrial espionage pointless and saving money the innovator would have had to spend to keep the good idea secret. In return the innovator is allowed the exclusive right to sell the innovation for a period of time, after which the right expires and any one can use the idea without payment. The exclusive right to sell is the monopoly, and the amount of time it can be exercised must be long enough to repay the costs of research, especially for ideas it is easy to copy and hard to keep secret, and the amount of time must be short enough so as to prevent the monopolist from destroying more of the consumers’ surplus than is necessary to motivate research for good ideas.⁸

Some recent work in economic theory suggests that there is an alternative to granting patent rights which is at least as good and may be better from the point of view of welfare economics.⁹ A system of government rewards for innovation in which

⁸ It is quite possible that in the case of Big Pharma at present all of these variables are set at too generous a level. That is, the number of years usually accorded their patent protections is too great, and the return on their investments is probably well above the level required to induce them. For a discussion, now perhaps somewhat dated, of the optimal life of a patent, see Nordhaus, W., Invention, Growth and Welfare, Cambridge Ma., MIT Press, 1969.

⁹ See Shavell, S., and van Ypersele, T., “Rewards versus Intellectual Property Rights”, Harvard Economics Dept Working Papers, 2000.

payments depend on demand for the products produced by employing the innovation will avoid the dead weight loss resulting from the limited time monopoly accorded to the new idea's owner. It may also avoid the under-investment problem that results from granting the monopoly as well. Under this system, the incentive to invest in producing new ideas is the government's payment of a reward. The innovation is sold to competitors at marginal cost so there is no deadweight loss and the incentive to innovate may be closer to optimum if the reward is set equal to the market surplus. It can be shown that a system of governmental rewards to innovators will be superior to a patent system if the government knows enough about the market demand for goods produced using the idea, and if the level of incentives required to get people to invest heavily enough in the invention and discovery of new ideas is not too great. It is relatively easy to see that despite the soundness of the "theoretical result" that a system of rewards for new ideas is preferable from the point of view of welfare efficiency, practical difficulties and the great distance of the real world from the economist's idealizations limit the attractiveness of this proposal. In connection with the problem to be addressed of whether we abrogate intellectual property rights in the interests of large increases in short term welfare, the alternative of a reward system is largely irrelevant.

There is to begin with the very large scale of governmental involvement which always raises transaction-costs and introduces rent seeking behavior (a.k.a. corruption) on the part of bureaucrats, and those who can influence their conduct. The second problem is the requirement that the government secure accurate information about the level of demand for all the products employing an innovation that is to be rewarded in order to determine the level of reward to the innovator. The potential for misrepresenting demand, improperly increasing demand, added to the costs of measuring demand, will be large. Opportunities to manipulate the market in order to secure higher rewards will be particularly tempting when the product embodying the good idea is cheap to produce—e.g. a pill or a piece of software—and can be purchased heavily by the agents of the idea's owner to secure a reward which may exceed the good's production cost. Notice that a patent scheme places the burden of determining demand on the owner of the good idea, and the burden of rewarding it on purchasers, who have incentives to measure or predict supply and demand accurately. Of course there are some transaction costs of a patent system (the patent office and the patent courts) and opportunities to improperly influence its distributions of income. But a patent system's greater reliance on individuals to pursue their own interests directly, instead of through an intervening government, is generally more efficient than alternatives. As noted, the most efficient system for recording and responding to information about consumer's demands and producers costs is a market

price system. Patent protection relies on such a system more directly if not more fully than does governmental reward.

The reward scheme and the patent scheme share several salient features which make them pretty much equivalent for present purposes. They both accord ownership to the inventor of the good idea and pay for its exploitation. But we are interested here in the question of whether there are circumstances that make it permissible or obligatory to forgo such payments; it does not matter by whom. Second, both the patent system and the reward system reflect national and not international institutions. Just as one nation's patent laws do not have force in other countries, one nation's reward system cannot compensate for a good idea's uses in other countries. In both cases there is a serious problem of securing enforcement and uniformity across developed, developing and underdeveloped countries with differing national health care needs and limited resources, which may be unwilling to subscribe to a patent agreement.

In what follows I will focus on a patent system as the closest to a practicable solution to the problem of assuring the continued flow of good new ideas. But my claims will apply almost equally to a reward system, should that be more optimal.¹⁰

2. The political philosophy of good ideas

For reasons given above, let us employ welfarism as a normative basis for institutional design, and in what follows I shall employ it. A welfarist argument is one that underwrites a certain policy, institution or outcome on the grounds that it enhances human welfare more fully than available alternatives. At the outset I noted several features which make welfarism is a highly controversial political philosophy. Most

¹⁰Some have and will respond to this analysis by decrying the “commodification” of good ideas it reflects and pointing out that over the historical past, it has not been necessary to incentivize people to produce good ideas. The best ideas, pure science for example, are produced in an environment of strongly institutionalized communism (as Robert K. Merton noted three generations ago, Merton, RK. “The Normative Structure of Science” in Storer, N.W. (1973) The Sociology of Science. Chicago: U of Chicago Press. p267-278). In reply it should be noted that, first, over the last 400 years the social institution of science has incentivized and rewarded those who provide good ideas with fame, prestige, security, and in many case financial reward. Second, many important good ideas were produced in response to the provision of money prizes—e.g. the method of determining longitude at sea, and third, that the costs of providing good new ideas, as well as the benefits they provide have become so much greater in recent years, especially in health care, that commodification is a small price to pay for assuring their continued and ever-increasing rate of provision.

important of them is its denial that some individual human rights are so morally important—basic civil liberties, due process, fairness--that they can never be sacrificed for improvements in welfare, no matter how large. But we can set this problem for welfarism aside here on the reasonable ground that intellectual property is not one of these human rights thought to be untrumpable by considerations of welfare. After all, the right to chattel property is certainly not one that is untrumpable by welfare considerations. Most theories of natural rights recognize that the state may sometimes permissibly expropriate chattel property on payment of compensation.¹¹ The same must presumably be true of intellectual property.

We may therefore raise the question of what conditions will permit or require welfarism to abrogate intellectual property rights. The answer may seem obvious. For example, honoring the patent rights of “Big Pharma” in the antiretroviral AIDS drugs cannot make for greater enhancement in human welfare than abrogating those rights and making such medicines widely available in the developing world. Surely welfarism must sanction the disregard by third world nations of patent protections available in the developed world?

From the point of view of the committed welfarist, who weighs all moral choices in the light of how the alternatives will effect human welfare, the answer to the question of permissible abrogation is far from obvious. The confident affirmative answer to the question can only be based on arbitrarily narrowing the time-frame within which we calculate human welfare. It is indeed obvious that that in the immediate and near term human welfare is better served by abridging patent rights in antiretroviral drugs. Once we lengthen our horizon, however, the question becomes much more complicated, and it does so against a number of different dimensions.

The source of the problem is that (a) once a product’s patent rights are abrogated in order to meet the needs of those who cannot pay monopoly prices for it, disincentive effects on investment in innovation set in; (b) these effects will be long lasting or even permanent, and most important, (c) it is in the nature of scientific innovation that they are both completely unpredictable, and more consequential in their welfare-enhancing effects than any other human activity. Consequently, the medium term and long term cost of

¹¹ Cf. Richard Epstein, Takings, Cambridge, Harvard University Press, 1985, especially pp. 331-352.

abrogating patent rights is both impossible to quantify or measure in any detail but very probably must be huge.¹²

Points a) and b) require little argument. c) both requires some further explanation and argument. But once its ramifications are clear, welfarist arguments against abrogation of intellectual property rights become evident.

(a) Once innovators anticipate that their property may be expropriated when relatively large short-term welfare needs require it, innovators will shift their investments and investigation to those innovations of interest only to the smaller numbers of wealthy people in the developed world who can afford to pay monopoly prices for the innovations. In the case of Big Pharma this means a focus on diseases exclusively of the rich: baldness, impotence, wrinkles, etc. (b) Experience with hyperinflation, an inconsistent legal environment, governmental expropriation, price-controls, and other sudden departures from settled expectations, always have a persistently chilling effect on participants in a market. They know that even after one of these sudden departures has been terminated, it may occur again. Once the genie is out of the bottle, it is hard to get him back in.

Combining even a slight tendency for (a) and (b) to obtain with the truth of (c) is what makes the abrogation of patent rights so grave a matter. (c) is in part the claim that no other factors are more responsible for improvements in human welfare than intellectual innovation—good ideas, that these ideas are unpredictable in emergence and huge in their welfare-effects. Once we grant the overwhelming importance of intellectual innovations to improvements in welfare, the ramifications of any step that discourages investment in them becomes manifest.

Welfarism is a form of “consequentialism” in moral decision making: it holds that the morally best course of action is the one that maximizes future welfare or minimizes future “ill-fare”. As noted above, one classic objection to consequentialism theories such as Welfarism is the evident fact that we cannot see very far into the future and so it is difficult to tote up the costs and benefits of alternative courses of action and choose the welfare maximizing one. Accordingly, Welfarism is attacked as a policy which cannot be implemented with any confidence. But when it comes to weighing costs and benefits for human welfare of significant disincentives to intellectual innovation, this objection has little force. Indeed, we can be confident that the very reverse of its conclusion must be the

¹² This may be expressed as an expected value calculation: even if the probability of some good idea’s appearance is low, the product of a low probability and a huge money or welfare pay-off must itself be very large.

case. No matter how little we can foresee even the near-term consequences the long-term benefits of commodifying good ideas must exceed the costs.¹³ The question welfarism must face is the far from obvious one of how to balance short-term welfare benefits over longer-term costs.

3. How long is the long term?

The question of whether we should forgo property rights in good ideas in order to enhance human welfare, or in order to avoid reducing it is question about how to trade off the short, medium, and long term effects on human welfare. Let us agree that in the short run, in the immediately foreseeable future, abrogating Big Pharma's property rights in the design of antiretroviral anti-AIDS drugs will result in a net increase in human welfare: the lives of millions of people—including many infants and young children in the third world--will be saved, the economies of these countries will remain viable, their health-care systems will not collapse under the burden of the AIDS epidemic. And the only "down-side" will be a reduction in the income of the much better off residents of the developed world who own shares in "Big Pharma", are employed by it, or otherwise directly benefit from doing business with it. Indeed, we can anticipate some short term benefits to the developed world from the third world's abrogation of first world patent rights: The flow back of cheaper antiretroviral through a grey market will lower the cost of these drugs for all who need them, rich or poor, and so thereby also increase short term welfare in the developed world.

But what of the medium term and the long term? Well, as Keynes famously noted, in the long run, we are all dead, so we can disregard the long-term costs and benefits that will emerge from abrogation. This leaves the medium term. How long is that? One generation, two, three? It is clear that in several important areas of national and international policy debate, the near term is a matter of several, and perhaps even many generations. Consider in particular the debates about environmental and ecological

¹³ Welfare reducing innovations, from poison gas to nuclear weapons to biotoxins may be held up as counterexamples to this claim. "Good ideas"--like nuclear power--with unintended and unforeseen welfare reducing consequences-- may be even more serious counterexamples. It is, however, clear that a system of property rights in innovations is the one most likely to induce the provision of new ideas that will help solve problems like nuclear waste. Innovations designed to reduce human welfare are another matter, and their rate of provision is probably independent of any property scheme for ideas or chattels. Most patent laws make such innovations unpatentable in any case through their provisions excluding innovations that threaten public order or morality.

issues: how to dispose of nuclear waste material, closing the hole in the ozone layer, protecting rain-forests, global warming, pesticide use, protection of endangered species, exhaustion of water, petroleum, and other scarce resources. In each of these cases the relevant time frame varies from centuries to millennia. In each case, it is recognized that the short term cost/benefit calculation favors the exercise of (largely property) rights by living people that impose costs (externalities) to be paid by future generations who will not be able to exercise the rights. Nevertheless, the medium term costs, measured in consequences up to 25 generations (500 years) into the future in the case of nuclear waste storage for example, are agreed by most participants in the debate to swamp the short term benefits.¹⁴

To illustrate the problem of the short term versus the near term in the case of intellectual property rights, assume that the population of the world will reach some fixed upper limit within the next half century and then remain there. Assume also that the total quantity of arable land, refinable mineral and non-mineral reserves, etc. will remain fixed thereafter. Attach a convenient number to the total level of welfare of this generation: say, 100 units of welfare, distributed probably unequally across the 10 billion people. Now assume the unequal proportions remain constant while the total welfare increases in each subsequent (20 year) generation by 10 % (i.e. .5 % per annum) as a result of the continual provision of patented good ideas and their implementation. At the end of six generations, the index number for total welfare in the population would reach 161.05 units; at the end of 13 generations, the index number will reach 311.68. Suppose, however, that there is a disease rampant in generation 1 and patent rights in some pharmaceutical needed to treat the disease are abrogated, for that generation only, resulting in a 20 % increase in welfare in generation 2, owing to increased survival, good health and the benefits they confer on children, and a decline from 10 % to 9 % in per generation welfare increases (.5 to .45 % per annum) thereafter owing to the chilling effect on intellectual innovation resulting from the abrogation of patent rights in generation 1. These assumptions are liberal in regards the benefits of abrogation in generation 1, and may be quite conservative as regards the costs of abrogation in subsequent generations. The result of the 20 % increase in welfare at generation 2 and the 9 % increase in welfare for every generation thereafter, would after 13 generations equal 311.68 units, just slightly less than preserving intellectual property rights in generation 2

¹⁴ In making recommendations for the storage of nuclear waste in the USA, the National Academy of Science adopted a planning horizon of 10,000 years (500 generations).

and not enhancing the welfare of those who need but cannot purchase the intellectual property rights in question.

It may be that the numbers assigned to these variables are quite unrealistic. Indeed, as noted above, it is a perennial criticism of welfarism that human welfare does not admit of cardinally measurable units in either dollars, euros or utiles of happiness. Doubtless, this is correct. But even if the numbers attached are notional, provided welfare varies directly with the size of world output, holding its proportions and welfare-inequalities constant, there will always be some generation, after which all future generations level of welfare will be lower than they would have been otherwise, if we abrogate intellectual property rights. And after this generation the amount of welfare forgone will increase from generation to generation time without end. Even if the immediate advantage to abrogating intellectual property rights is a doubling of welfare and the subsequent cost is a 1/10 of 1 % decrease in the provision of new ideas, at some point in the future the welfare trade-off will turn against abrogation. It is true that welfare has no cardinal values, and does not even vary linearly with money. But it is equally true that money can purchase lower infant mortality, longer life span, fewer hospitalizations, more human flourishing generally, and most other component of welfare. This is why *per capita* income is an imperfect but useful measure of welfare. The problems raised by the assumption that welfare is measurable are common to all welfare-enhancing policies, and not one that undermines the present point about the medium term consequences of abrogating intellectual property rights.

Of course one could postpone the generation at which the costs of abrogating intellectual property rights exceeds the benefits of preserving them by “discounting” the welfare of future generations. One could hold that the welfare of a generation as yet unborn should not be a variable in any cost/benefit calculation, or if it is, it should be reduced by some constant or variable factor, in the way that future income is “discounted” to determine its present value. But there is no ground in Welfarism, or any other acceptable normative basis for policy decision, for discounting future lives.¹⁵ We may well not have an interest in future people (including perhaps our future selves). More likely each of us may well have an interest in our descendants that decreases as the proportion of our genes they share declines, but this is a morally irrelevant consideration. When it comes to political philosophy, blood is no thicker than water.

¹⁵ Notwithstanding the huge problems this generates. See Parfit, D., Reasons and Persons, Oxford, Oxford University Press, 1984, part IV.

To see why, suppose you are placed behind a veil of ignorance, so that you do not know in which generation you will find yourself when the veil is lifted. As a self-interested agent would you choose a policy which (subject to maximin qualifications) trades increased welfare in some generation n for permanent decrease in the improvement of welfare in an indefinitely large, not to say infinite number, of generations thereafter? Well, you might do so under one condition. Behind the veil of ignorance you might choose the one-generation improvement at n in exchange for a permanent reduction in the rate of improvement thereafter, if (and it is a big ‘if’) generation n ’s level of welfare is below some minimum, the one-time improvement in its level of welfare raises its welfare above the minimum, at the cost of reducing the rate of increase in the future, but the level of welfare of future generations is always above that minimum. Then behind the veil of ignorance, not knowing whether we were to find ourselves in generation n or a later generation, we would choose policies which has this effect. And this is a conclusion to which Welfarism must accommodate itself.

It is probably the case that in the past, perhaps before the industrial revolution, the general level of welfare throughout the world was below this minimum, and would thus have made abrogation of intellectual property rights in exchange of short term welfare improvements morally permissible. But even if the feasible levels of production and distribution of welfare-enhancing goods and services were once below the minimum level in question, it is highly debatable that they are now below that level. What is not debatable is that current inequalities in distribution of these welfare-creating goods and services condemn many actual people to a level of welfare below the minimum in question. So, from a welfarist point of view, the question becomes that of choosing among those policies which will bring the largest numbers of people currently alive up to at least this minimum, at the cost of the smallest reduction in the rate of welfare growth for generations thereafter.

Ironically, the crucial premise of the argument that the greatest *increase* in immediate welfare will be brought about by abrogating the intellectual property of “Big Pharma” is at the same time the crucial premise in the argument that doing so will bring about the greatest long term *reduction* in the rate of welfare growth. For the only reason to think that expropriating good ideas will have the greatest positive effect on short term welfare is to admit that innovations, inventions and discoveries are the most powerful engines of medium-term welfare- improvement. To bring current people above the minimum permissible level of welfare there are many policies from which we might choose—schemes of redistribution, education, public service, industrialization, civil rights and liberties, education for women, pollution abatement, etc., each of which can raise the

same number of people or even the very same individuals above the welfare minimum that abrogating intellectual property rights can bring up. None of them can have medium term costs as great as those to be borne consequent to a reduction in the provision of good ideas.

“Yes but people are dying now who might be saved by these drugs which they cannot afford.” This plea voices a compelling reason to do something now to mitigate the health care crises in the third world. But from the point of view of a moral theory which values present lives and future ones all equally, and given the facts about the welfare impact of good new ideas, this compelling plea is not a morally compelling reason to abrogate intellectual property rights. It is a reason to abrogate or at least tax private property rights over moveable chattels, which can be bought and sold in something approximating a competitive market and whose proceeds can be used to purchase innovative ideas—such as antiretroviral drugs—at their current monopoly prices. For the provision of new ideas is, as a sheer brute empirical fact of the matter, a far stronger engine of welfare improvement than is the protection of private chattel property from taxation or expropriation. Only if the well-known disincentive effects on other productive activities resulting from limitations on wealth and income also result in a reduction of incentives to innovate, will the welfare costs of abrogation of intellectual property rights be on a par with the costs of abrogating or otherwise limiting wealth and income.

4. Does Welfarism permit patenting gene sequences?

I have argued that welfare-effects and the economics of innovation together mandate that intellectual property rights be protected more strongly than other property rights. The argument has not thus far distinguished between inventions and discoveries, an assimilation enshrined in the US constitution for example, which holds that patent rights include ownership of new discoveries about nature as well as the invention of artifacts and techniques that exploit nature. By contrast European Union intellectual property law does not recognize an ownership right in basic scientific discoveries. Accordingly, the US and the European Union have differed in their willingness to provide patent protection for the discovery of polynucleotide sequences that constitute human and non-human genes of commercial value. It is worth exploring whether and how intellectual property rights’ welfare-enhancing effects enable us to adjudicate this difference between US policy and European Union policy. Is there some feature of scientific discovery in general or of some types of discoveries in particular that unsuits them for ownership from the perspective of welfarism? The attempt to patent discoveries

about naturally occurring gene-sequences makes this a pressing practical problem. Moreover, it will turn out that gene-sequence discoveries are the point at which the patentable/unpatentable discovery line may be best drawn.

Consider the variety of gene-related patents that have been issued by either constituency. Four principle types of discoveries/inventions have secured or been proposed for some sort of patent protection: pharmaceutical products produced from recombinant DNA technology (Genetech's Humulin, and Protropin, for example), test-kits for diagnosis of diseases or susceptibilities associated with gene-sequences (Incytes' BRCA-1 and BRCA-2 test kits), the technique for employing a particular DNA sequence in gene-replacement therapy (whether somatic or germ-line), and finally the chromosomal location of the gene and the sequence of its bases (perhaps together with its promoters and repressor sequences, its introns, and copy-numbers). We need to ask whether a limited monopoly in each of these different kinds of innovations are equally likely to have a welfare-enhancing effect through increases in productivity in medicine, agriculture or other form of biotechnology. That is, we need to consider whether the returns to the innovator-owner will be exceeded by the benefits of the innovation to those who would otherwise not be able to use it. But we need also consider the incentive effects on other innovators produced by the "economic rents" secured by successful patent holders. The larger these rents, the more incentive others have to invest in as yet unpatented intellectual property. Laissez faire economists famously recommend that the best governmental response to a monopoly is no response: the rents made by the monopolist will simply attract others into the market, thus destroying the monopoly. Where there are severe barriers to entry, this recommendation leaves something to be desired. But scientific invention and discovery cannot be so characterized. Such barriers as obtain are not daunting to even modest businesses and under-endowed universities. Indeed it is well known that one of the most significant incentive effects of a patent is the fact that it gives incentives to others to "invent around" the patent to produce the same or a substitute product. A successful invention around a patent will reduce the time during which the original innovator can secure rents, even as the original patent held retains its validity. Thus, an effective competitor reduces the social cost of the original monopoly, and provides wide-spread benefits, both of which need to be set off against the social cost of the original monopoly. The possibility of "inventing around" a patent is the intellectual property-equivalent of the Laissez faire economists' "free-entry".

In consequence, where "inventing around" is unfeasible, the welfare effect of the patent monopoly is reduced, and may be reduced to the point of unjustifiability, just as high barriers to entry make the laissez faire solution to the conventional monopoly

unacceptably passive. But scientific discoveries differ from inventions in exactly this feature: that the more basic the scientific discovery, the less room there is to “invent around it”, that is to create innovations which do not rely directly on the discovery itself. It is thus easy to see why from a welfarist perspective Newton’s laws or the laws of the Special and General Theory of Relativity ought not to be patented. In general, it seems reasonable to hold that the more basic the scientific discovery, the smaller the prospect of “inventing around” it, that is the smaller the chance that useful scientific effects the discovery enables one to exploit can also be attained by alternative means exploiting different natural processes. Effects which require, for example, completely unshieldable forces that are transmitted at infinite speed through all mediums, including vacuums, must rely on Newton’s laws, as only gravity fills the bill. There is no way to discover around gravity. By contrast, effects like the build up of electrical potential in batteries that require, for example, proton donors, can rely on any of a dozen or so acids it is within the chemists’ power to synthesize. In general, the more basic the process, the less prospect of discovering other processes that have the same or similar effects, i.e. the less the chance of discovering around it. Patenting physical discoveries (e.g. Glenn Seaborg’s attempts to patent the transuranium elements) should therefore be more difficult from a welfarist perspective than patenting chemical ones (e.g. Firestone’s patent for vulcanizing rubber).

As we move to the biological realm alternative ways of inventing around discoveries are even more widespread than in chemistry. Welfarism would certainly agree with the US Supreme Court¹⁶ that the first humanly designed organism capable of digesting oil spills is patentable, for there are many ways to design an organism which is capable of doing so. In fact we know that since natural selection is a mechanism that operates on random variations by environmental filtration, physically different structures which are equally adaptive, i.e. equally fit, will be equally likely to proliferate in the biological realm. Since the same need—e.g. predator avoidance—can be met in several different ways—eg. flight, camouflage, tasting bad—natural selection can not discriminate between alternative structures that meet the same needs equally well. In consequence, there will almost always be two or more physical processes that realize or implement the same biological process. It will thus almost always be possible to

¹⁶ *Diamond v. Chakrabarty*, 447 U.S. 303. It is worth noting that US law, and Supreme Court rulings do preclude the patenting of scientific laws [see *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127 (1948)]. A principled distinction between unpatentable laws, and patentable discoveries needs to be drawn if this approach is to be sustainable.

“discover around” a useful biological idea: find out one of the other ways nature accomplishes the same biological effect.

There seems to be only one exception to this rule: gene sequences! When it comes to heredity, it appears that nature has found only one way to skin the cat. There is but one solution to the design problem of hereditary transmission and biosynthetic control: the DNA polynucleotide. It is a remarkable fact that in the face of every other “design problem” of roughly the same generality as the problem of insuring high fidelity hereditary transmission, natural selection has found multiple solutions. This should be no great surprise, owing to the fact that natural selection is selection for effects which meet adaptational needs. Except in the sole case of high fidelity hereditary transmission. Here DNA has won out as the very best and ultimately the only solution to this problem at least here on Earth. Even where alternative means of hereditary transmission are used by some viruses, the alternative is RNA and it works only by the stratagem of reverse transcription into DNA for copying.¹⁷

But there is no way to discover around the DNA sequence of a gene, or for that matter, its annotation—location, determination of its gene products, promoters, introns, exons, copy numbers, and other features. There is thus no incentive in a lucrative gene-sequence patent to other innovators to seek alternative sequences with the same lucrative features. If this is so, then discovering and annotating gene-sequences are more like discovering Newton’s laws than they are like all other biological discoveries. And if welfarism discourages the patenting of basic scientific discoveries around which no further discovery is possible, it will discourage the patenting of gene-sequences and their annotations. This may be viewed as a surprising result in view of welfarism’s implications for the untrumpability of intellectual property rights, especially in pharmaceuticals. But of course it is perfectly consistent to hold that where intellectual property rights are granted they should be inviolable, while holding that for some designated class of innovations no such rights should be granted, provided a principled distinction can be drawn between the designated class and those ideas which are patentable.

¹⁷ I ignore here the redundancy of the genetic code, which allows multiple chemical sequences to express the same gene, on the ground that the nucleotide sequence for the crucial allosteric and active sites of a gene product, such redundancy is much reduced, if it exists at all. Accordingly, even allowing for the redundancy of the code in general does not open the door to significant discovery around a gene-sequence.

The prospect of inventing or discovering around provides such a distinction between innovations with palpably different welfare consequences.¹⁸

As noted at the beginning of this section, there are at least four different innovations that are likely to emerge from genomic research. And welfarism appears to militate against according intellectual property rights to only one among them, albeit the most basic of them. All the others—genetic testing, the synthesis of particular proteins, the procedures of genetic therapy, all allow for a myriad of alternative means to the same end, can be discovered and invented around, and so are fair game for the assertion of untrumpable intellectual property rights.

Alex Rosenberg
Philosophy
Duke University

Appendix: The political economy of intellectual property

Regardless of how iron clad is the moral argument for why we should all respect intellectual property rights, the fact is that at some point the temptation to abrogate these rights in the interests of a nation's citizens must become overwhelming to a government which its citizens choose. For governments famously are prepared to sacrifice long-term benefits, especially other peoples' long term benefits, in order to secure election and reelection, if not to avoid unconstitutional and even violent overthrow. Developing nations with endemic problems of disease and without an infrastructure capable of producing marketable new ideas or much else the developed world is prepared to pay for, have an ever increasing temptation to free-ride on the discovery and invention of good new ideas, especially in health care, generated in the developed world.

It is therefore in the interests of Big Pharma to put incentives in place among developing nations to respect their intellectual property rights. This is a problem rather more restricted to Big Pharma than it is one facing other multinational businesses whose chief asset is intellectual property, for two reasons: first other forms of intellectual property, software for instance, cannot be employed without substantial expenditures on hard-ware. Since it is easier to restrict access to hard ware, the temptation to free ride by

¹⁸ The parallel with an activist attitude towards monopolies is evident. Where we can distinguish between markets that allow for free or at least low cost entry, monopolies may be allowed on the grounds that their success results in their own termination, to the benefit of all consumers. Where barriers to entry are high, abrogation of the monopoly is called for on welfarist grounds.

pirating soft-ware is somewhat easier to police than chemical formulae. Furthermore, it is unlikely that first world opponents of globalization, international capitalism, and the World Trade Organization, are likely to attack companies engaged in monopolistic pricing of their rap music videos. On the other hand, Big Pharma must deal with the fact that not only are its assets in good ideas subject to expropriation in the developing world, but its business practices may come under scrutiny if not restriction, in Big Pharma's home markets, through the action of first world advocates for third world health development.

Protecting their intellectual property requires Big Pharma to design and support institutional arrangements that give potential free-riders an interest in preserving patent rights. This is also an interest of all those in the developed world who will benefit from the discovery of treatments for diseases they share with inhabitants of the third world or who benefit from improvements in the quality of life in the third world. Bear in mind that these improvements will be both huge and completely unpredictable, to the degree that they hinge on the provision of good new ideas. As we have seen, centralized international solutions to the problem of providing good new ideas unfeasible. The provision of particular good new ideas cannot be centrally planned,.

There is another desideratum which may be harnessed by Big Pharma to secure acquiescence in property rights for the good ideas it wants to keep. Even while retaining their property rights in good ideas, Big Pharma is not likely to focus on the disease of the developing world. If their research produces treatments for these diseases, it will be the result of serendipity. It is in the nature of the case that many treatments result from serendipity. So even without focusing on diseases of the third world, Big Pharma may produce such results. On the other hand, it would motivate respect for Big Pharma's patent rights in wrinkle creams, if such respect were tied to support for research into diseases of the poor, instead of the rich.

The solution is not going to be found in paying taxes to governments-national or super-national-- to subsidize research in diseases of the developing world. Over the long run internationally subsidized not-for-profit research institutes of the sort that brought us the Green Revolution won't solve this problem. Recall, new ideas are unpredictable. The search for them must be maximally decentralized and must harness individual initiative and information. And consider recent history. Although the funding system of the US National Institutes of Health, the National Science foundation, the Howard Hughes Medical Foundation, the (UK) Wellcome Trust, and similar public and private agencies have a strong record of identifying and fostering innovation in basic science, the scientists they supported did not make much of a contribution to pharmaceutical

development until governmental policy (in the form of the Dole-Bayh act in the US) held out the prospect of monetary reward for doing so. More significantly, the history of scientific innovation in the Soviet Union, especially in the life sciences and high tech sector should be an object lesson in the failure of governmental policy and central planning to produce good new ideas. Over its last 20 years, the Soviet Union could not even copy good ideas, let alone produce them.¹⁹

So, to begin with, members of Big Pharma need to impose a tax on their own earnings with which to fund an international venture-capital institution—Third World Pharma-- to invest in new research and development efforts in the developing world. These efforts must take the shape of private companies in which shareholding employee scientist have serious incentives to focus on good ideas that are useful in the developing countries where they are working. These firms would retain intellectual property rights in their discoveries and inventions. The participating scientists would have to have strong stake-holder or share holder incentives to focus on those problems that promise to combine near term solubility and wide-spread welfare pay-offs for the regions in which these scientists work. And the nations within which these firms operate will have to have an aggregate (but not a disaggregated) stake in the returns to intellectual property of these firms' discoveries. It is this stake in the returns to intellectual property which give developing nations an incentive to respect the intellectual property of Big Pharma, and this constitutes the reward to it for its investment in "Third World Pharma".

The governments of individual third world nations would secure rights to direct the investment decisions of this venture-capital institution, in return for enforcing intellectual property rights in their jurisdictions. But decisions about what areas to invest in would be made by Third World Pharma operating as a for-profit venture capital style business. Returns to the fund would be determined by market demand for products produced as a result of its investments. Its beneficial owners—third world nations-- would therefore have an incentive to make sound "business decisions" about investment, and block attempts by coalitions of members to hijack the fund into making investments which do not have prospects for optimal returns. Individual consortia of scientists in developing nations would make proposals to Third World Pharma for support in exchange for equity interests in the intellectual property they produce, and the scientist's consortia will themselves secure income only from the property rights in discoveries and inventions they produce. In order to ensure that these consortia focus their research on

¹⁹ Note that among its policies was a reward-payment system something like the one discussed above, which apparently did not elicit a sufficient supply of such innovations.

problems endemic to the developing world, and do not simply compete to seek cures for diseases of the rich, their incomes will have to be limited only to revenue from sales in their home markets, or regional markets—nations with the same health concerns. This will focus research on innovations that are affordable and in real demand in developing countries. Thus, all participants would have strong incentives to devote resources to producing and exploiting intellectual property with direct useable benefits for third world health.