

**Clifford Barclay Memorial Lecture
Creativity and Knowledge: Managing and Respecting
Intellectual Assets in the 21st Century**

by

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Higher incomes and greater long-run economic growth won't befall us like manna from heaven. Nor will more highly productive businesses, an improved global public health, or a more robust and sustainable environment. Societies are now richer, healthier, and more productive because humanity has successfully fostered creativity and ingenuity, and put to productive use the fruits of that intellectual labour. But what challenges do we now face in managing intellectual assets, as their nature continues to evolve and their importance continues to rise with ever-ongoing changes in technology?

Mr Chairman, distinguished guests, ladies and gentlemen:

It is a great delight, honor, and privilege for me to be here this evening. I am grateful to the Barclay family, who have supported this series of public lectures in memory of Clifford Barclay, for allowing me the opportunity to speak to you this evening. Clifford Barclay was a London financier and entrepreneur, and a great friend to the LSE. London being the world financial centre that it is, saying someone is a London financier immediately says he is world-class, operating at the very top of his profession. Members of the Barclay family, some of whom are here tonight, have continued to support and involve themselves with the School. Their selfless actions in this regard draw on a simple idea, that one principal source for a good society, for all of

us to live in, is to allow people to access high-quality, well-resourced education.

This evening I want to talk to you about creativity and knowledge. Now, any research academic proposing to discuss these topics should carry a health warning that what he's going to say next might be self-serving, self-indulgent, pompous, pretentious nonsense. As an economist, moreover, I am doubly hobbled in that whatever credibility I might have is typically thought confined to concrete measureable quantities: What is the right value of the exchange rate? Will unemployment rise? What will happen to my mortgage payments next year? Will I be able to get a job when I graduate from the LSE if I've only studied social science and developed no useful technical skills?

Yet, the evolving reality of the world out there is now one where serious thinking is needed on the nature of creativity and knowledge in hard-nosed, bottom-line-focused economic application. The world has become one where technology—the creative result of ideas and knowledge—pervades our lives to a degree never before experienced in human history. Modern technology is no longer just confined to the factory floor and the machine shop assembly line. Modern technology is an in-your-face technology.

Fresh ideas for creating and managing modern technologies are called for as these technologies continue to emerge. Sure, these technologies make economies more productive, and they alter the pattern of rewards between workers skilled and unskilled. But they don't do just that. They also subvert the traditional ways whereby societies have created and used new technologies.

This last is my focus this evening. This lecture is about creativity and knowledge put to economic use—which is what technology is, really—and the challenges to continued economic progress that are thereby raised. When we talk about technology advancing, we are talking about creative people putting new knowledge to economic and social application. Creative people produce ideas; call these ideas *intellectual assets*.

1 12,000 years of economic growth

Ten to twelve thousand years ago, humans started to grow crops and rear animals. Humans began to control their own economic destiny, instead of simply hunting and gathering, activities dictated to them by the volatile nature around them but that had been the source of economic wealth for the previous 40,000 years.

Despite this change, however, most of the last 12,000 years of history has remained economically dismal. Up through about 200 years ago the great majority of humans continued to scratch the earth for a miserable sustenance much the same way they'd done the 118 centuries before then.

With the Industrial Revolution of the late 18th century, everything changed. Dramatically. And although there has been ebb and flow, that profound, explosive change has continued.

A century ago, Earth held one billion people. Today, over six billion roam the planet. A century ago, the average human had real income barely one-eighth that of her counterpart today. Today, world income is fifty times what it was a hundred years ago. Moreover, this is not just a measured-incomes only improvement: One hundred years ago, the average human born on earth looked ahead to living a full life under 40 years in length. Today average life expectancy is close to 70 years. One hundred years ago one quarter of all babies died within their first year of life; today less than six percent suffer that terrible fate. One hundred years ago only one in four adults could read and write; today more than 80% can do so. The rate of decline in world poverty nearly tripled, from 0.3% per year in the half-century before 1870, to 0.8% per year after.

What explains this development? Humans didn't suddenly become intrinsically different beings: Mental capacities, human physiologies, and animal biologies evolve, but not that radically that quickly.

Instead, what this is due to is the accumulation of knowledge: economically substantive but physically intangible, and therefore quick to evolve and grow, building layer upon layer of itself. Scientific and engineering understanding of the physical forces and materials al-

lowed humans to manipulate the physical environment around them, substituting hydraulic and electrical power for animal and human energy; replacing fragile materials with durable, high-quality iron and steel; raising agricultural productivity so that food surpluses could be generated using an ever-smaller workforce on the farm, that the labour released could then find gainful employment in the manufacturing and mining industries and still be fed and clothed.

This relation between technological development and economic progress is broad-based and describes not just what happened over time but across economies today. The Figure, from the 2001 United Nations Human Development Report, shows how across countries, the index of human development (on the vertical axis)—a summary measure combining per capita income, educational attainment, and life expectancy—is tightly related to technology achievement (on the horizontal axis).¹ The relation is not perfect and it's not linear, but it is remarkably tight.

While the Figure is striking, its principal conclusion should come as no great surprise. If we allow our collective memory and imagination to roam more freely—confined neither to the current profile of economic development around the world nor to just a linear history—we quickly run up impressive lists of ideas that have become significant drivers of economic and social progress: animal husbandry; mechanization and the steam engine; waterworks; the organization of life in cities; moveable type and the printing press; anaesthetic; penicillin and modern antibiotics; the birth control pill; the concept of education itself. We can imagine how life might have been like before

¹ Technology achievement combines four elements: (i) technology creation, i.e., taking into account number of patents granted per capita and total royalties and license fees; (ii) diffusion of recent innovations, e.g., number of Internet hosts per capita and the share of high- and medium-technology exports in total goods exports; (iii) diffusion of older innovations, e.g., electricity consumption per capita, number of telephones per capita; and (iv) human skills, i.e., mean years of schooling in the population (aged 15 and above) and the science enrolment ratio in tertiary education.

and after each of these but it makes little sense to seek to quantify their impact.

Kenneth Arrow, the Stanford University economist and 1972 economics Nobelist, used to relate to me the conundrum that hypothetical financial supporters of 17th-century scientific research might have confronted if before them they had two grant applications: The first, proposing to study the properties of different woods and metals in constructing the hulls of ocean-going ships; the second, proposing to analyze the properties of the square root of -1 . The first showed obvious and immediate benefits to society: With more robust shipping, fewer lives would be lost at sea, ocean-going trade volumes would grow, ever more of the natural resources of the world would come within our grasp.

The second? Imagine you were the one writing the referee evaluation report. Where do you begin?! Not to nitpick or anything, but this research proposal seeks to study something that doesn't even exist! (Rene Descartes referred to such numbers, in a derogatory way, as *imaginary*.) Of course, if you had perfect foresight, you would have seen how that imaginary unit, the square root of -1 , would simplify and make intuitive the formulas in Einstein's theories of special and general relativity; how it would become an integral part of quantum mechanics (since that theory is constructed on infinite-dimensional Hilbert spaces over \mathbb{C} , the field of complex numbers); how it would enter Maxwell's theory of electromagnetism, and thus be used by every electrical engineer, radar operator, signal analyst, and telecommunications specialist in the coming four hundred years, and more practically, be embedded in every electrical gadget, personal computer, Internet device, and mobile telephone that we use today. Over the course of World War II high-speed, reliable telecommunications, via electromagnetism, saved many more lives than did robust ocean-going vessels with especially strong wooden hulls.

Two features are central, if only implicit so far, in this telling of the story. Let me make them explicit now: First, economic growth draws at its most fundamental level from interaction with knowledge and ideas. The Graphic shows how, from the creativity, skills, and education in a society's population, knowledge is added to through

discovery, innovation, and invention. This accumulation of ideas is technical progress that then wends its way through an intermediating economic system to provide, in ever more productive ways, high-quality goods and services to the population.

The second critical feature concerns the nature of that intermediating economic system, whereby ideas and knowledge are brought into productive use. Douglass North, the economic historian and 1993 Nobelist, has described how it is because societies have figured out ways to reward innovators and agents of creativity that explains the modern ongoing explosion of ideas and knowledge in economic progress.

What modern technologies are now, however, short-circuit this intermediating reward system. Items of knowledge are no longer being puzzled over and used only by boffins in a manufacturing lab, encoding the knowledge into slabs of heavy metal for the public at large to use. Instead, items of knowledge are being brought forward for direct consumption by the mass population. Think of computer software and videogames; creative output digitized and disseminated over the Internet; think of DNA gene sequencing and designer pharmaceuticals, finetuned to specific individuals. It is this vanishing leverage point that we now need to examine.

2 Property rights and incentives

Hernando de Soto, an unorthodox Peruvian economist, whose writings and policy recommendations have had immense impact on economic development policy discussion, has observed that 90% of the population in developing countries operates outside formal economic systems. As a result the corresponding economic assets see no legal entitlement: those resources cannot be leveraged, traded, or taxed, even if (according to de Soto's estimates) they amount to USD 9.3 trillion. Without transparent and legally-binding entitlement, collateralizing those assets is difficult. Borrowing, and thus productive investment, cannot be systematically undertaken. Absent clear and legal ownership, these resources cannot be exchanged, so that cre-

ating wealth—moving assets from less to more productive uses—is impossible.

This notion—assigning transparent and formal property rights over productive resources to driven, purposeful individuals thereby generating outcomes good for society overall—that de Soto has forcefully argued and put into practice in Peru, El Salvador, Honduras, Ghana, and potentially in Haiti, Egypt, Mexico, and the Philippines has been described by world leaders as “one of the most significant economic insights of our time.”

But the notion is perhaps more orthodox and conventional than we should admit. This idea is, after all, a prediction of the so-called Fundamental Theorems of Welfare Economics—Adam Smith’s Invisible Hand—that ascribe efficient economic performance to societies that permit free and voluntary exchange of goods and services, after appropriate allocation and enforcement of property rights on society’s resources.

The story goes like this. Strong property rights legally identify an owner. They transform mere assets out there into property specific to particular individuals. In doing this, those property rights sharpen the incentive to develop and put to productive use the resources owned, for the benefits from such improvement accrue then fully to the owner and to no one else. Society gains as well through the provision of worthwhile goods and services. Society will not over-consume the resource as the owner will disallow usage beyond where he finds it worthwhile, relative to the price that society is willing to compensate him. If not for the property rights vested in that owner and the consequent protective behavior that they induce, society would fritter away the productive asset. For the same reason but run in reverse, society will not under-consume the resource either, in that when society’s valuation exceeds what the owner demands in payment, the owner will simply provide more. If he doesn’t, yet others will who have property rights over similar or related goods and services.

This is an extremely orthodox, neoclassical economic story—the kind that we teach to students in universities worldwide. Strong property rights and voluntary exchange, through markets or other-

wise, lead to socially optimal outcomes. Such arrangements, almost magically, align the self-serving behavior of individual property owners with the good of society at large, and through the endogenous unfolding of exchanges occurring voluntarily, reveal the value to society of different goods and services, and of the inputs that go into making them. This proposition is not just a creed of conservative, right-wing apologists for the capitalist system. It is an insight that serves well for a simple reason: It works.

Now, since economically worthwhile ideas are productive assets, the seductive and easy parallel conclusion is that intellectual property rights or IPRs—property rights over ideas—should lead similarly to good social outcomes. The stronger the better.

Michael Eisner of Disney Corporation and Jack Valenti of the Motion Picture Association of America have argued, using reasoning close to what I have just given, that strong intellectual property rights are absolutely fundamental to the efficient workings of economies.

This conclusion, unfortunately, is wrong.

To understand why, we need to dig a little bit into the nature of ideas and knowledge.

Ideas are nonrival and infinitely expansible. First, their use by someone does not detract from the usefulness in their nature to yet others. Second, trading ideas is not an exchange where ideas are handed over for something else; instead, trading ideas simply creates copies of the idea, each exact copy of the idea as much of an original as the original idea itself. In these characteristics, ideas have an intrinsic nature to them that distinguishes them from all other ordinary economic commodities.

Ordinary commodities are rival. Once someone has eaten an apple, that apple not only cannot satisfy anyone else's hunger, the apple is physically no more. Ordinary commodities don't carry infinite expansibility. Apples exchange for, say, oranges by being physically handed over: One party to the trade gives the other party seven apples, perhaps, in return for eight oranges; he then goes home bereft of apples but with pockets full of oranges. Apples do not reproduce freely and instantaneously on demand.

The upshot is that trade in ideas differs from trade in most other

things economically valuable. The reasoning we rehearsed above on why voluntary exchange succeeds in delivering so much good to so many breaks down for ideas. When an idea-owner sells the good, he continues to have it; similarly, whoever he's sold the idea to. Both of them and all others in similar situations will see incentive to keep selling (and in the process making) copies of the idea as long as that idea's market price remains positive, given market competition, and given that the opportunity cost to them of providing further copies of the idea is zero—for they continue to retain the idea to use or consume however they wish. The process ends only when the market is completely saturated. But a forward-looking, purposeful idea-maker—the creative knowledge-worker, the putative newly-entitled intellectual asset owner—will realize this dynamic is in place long before we reach total saturation: He sees no gain for himself in instantiating the idea in the first place, and moves on to do something more financially rewarding (perhaps becoming a plumber in north London).

Societies can put in place some friction to that free competitive exchange and dissemination of ideas. Useful ideas could be kept as trade secrets, divulged only to specific individuals or to particular industry groups, forming trusted coalitions. Ideas could be handed over only with tight restrictions on what can be done with them. Laws could be set up that do no more than disallow competition between alternative idea-producers. Technologies might be built that slow down the transmission of ideas. Whatever it turns out to be—and in the real world, combinations of all of these can be observed—these arrangements work by *disrupting* markets. Through curtailing the distribution and dissemination of ideas, these arrangements raise the exchange price of ideas, and thus incentivize creativity.

Intellectual property rights are one such disruption in markets; they are not ordinary property rights or Hernando de Soto-type entitlements. Intellectual property rights prevent perfectly competitive dissemination of ideas, so that ideas end up under-used in the world. Intellectual property rights restrict how ideas can be built on, sequentially refined, and iteratively improved. They prevent development of socially desirable, closely-competing ideas. They encourage applying

creativity and ingenuity to circumvent their strictures through finding legal loopholes, but without improving the lot of humanity by pushing outwards the technology production possibility frontier. They create monopolies in the market for ideas. But intellectual property rights are also, if not a strictly necessary evil, for now at least an evil that gets the job done in incentivizing knowledge-creation.

The world would be a dire place were no new ideas being constantly created. But at the same time having so much of the creative output of humanity cordoned off can't be a good thing either.

Let's call this the essential, inherent tension in intellectual assets. Reserve the term intellectual *property* for when the artificial construct of property rights are asserted over such assets.

This inherent tension is, in one form or another, long recognized, even if not always openly acknowledged in contemporary policy debate.

William Nordhaus analyzed them in his economics PhD dissertation at Yale in the late 1960s. Two centuries before that, Thomas Jefferson, one of the drafters of the Constitution of the United States of America, wrote powerfully on the nature of ideas, articulating the concept of nonrivalry and infinite expansibility. While he founded the US Patent Office and provided in the US Constitution a clause that protects intellectual property, he considered the monopolies thus created a national embarrassment. (This particular founding father of the United States of America never thought it un-American to dispute the status of intellectual property.)

Remember this delicate tradeoff: society-wide curtailment and under-employment of ideas—what Thomas Jefferson called a national embarrassment—set against the potential good that incentivizing creativity ought to deliver.

But is this tradeoff for real, does current IPR practice succeed at the second task, that of incentivizing and rewarding?

3 A singular honour for failing twice

Some propositions in economic theory fail to hold in reality. Some empirical regularities from the real world pose puzzles for economic theory. But current formal systems of intellectual property might hold a singular distinction in economics for failing their proposed function not just in theory but in practice as well.

3.1 Ruthless giant multinational corporations

Thing is, not all monopolies of invention reside in ruthless, giant multinational corporations confronting hapless consumers who have to buy their computer software from those corporations; nor exclusively in rich, developed countries facing down poorer, Third World economies who want nothing more than to get a look in on advanced manufacturing and engineering ideas.

Most of the successful nations in the world carry the conceit of the lone inventor, puttering about in the garage or in the woodshed at the bottom of the garden, coming up with world-beating inventions on the weekend, but gaining nothing financially. Without a social infrastructure that provides protection and through their own rank amateur lack of business savvy, these inventors' ideas bring them no financial remuneration, and instead are ripped off by some ruthless giant multinational corporation. Even with IPR slapped around an idea, because patent infringement is a civil rather than criminal offense, a patent-holder still has to take the offender to court via costly litigation. Not every lone inventor in the garage or garden woodshed can afford to do that.

Even as in theory intellectual property rights confound the workings of markets and potentially inflict social damage when they work as they're supposed to, in practice intellectual property rights sometimes don't even achieve the good they're supposed to: Protect the economic gains to and thus incentivize the creative originators of ideas.

3.2 Entrepreneurial savvy

But a perverse opposite holds as well. If the deserving don't seem to get rewarded appropriately from the current system of intellectual property rights, what rewards come inappropriately from it go to the apparent undeserving.

At the turn of the twentieth century, Thomas Edison built an economic empire around his creative output of inventions—the modern lightbulb, electricity provision by networks, the phonograph, the modern dynamo, and hundreds of others. Edison founded the company that went on to become the world's largest, arguably most successful corporation still. He accumulated personal wealth that placed him within the top 400 of the US's richest individuals.

Yet Nicholas Tesla—who was Edison's contemporary and great rival, who held over 700 patents on radio, fluorescent light, the alternating current motor, and wireless communication, among other things—died miserably poor, spending his last years feeding pigeons outside New York's Public Library. It was Tesla's AC motor that allowed viable electricity transmission over Edison's networks, yet Edison wrongly persisted in wishing to retain direct-current engineering technology.

In the event, Tesla's critical idea that ultimately prevailed for technical, scientific, and engineering reasons went unrewarded, while Edison's wrong-headed one, which eventually folded, evolving towards Tesla's, garnered the economic success.

Public relations and entrepreneurial savvy trump the raw intellectual idea. IPR protection did Tesla no good, generated him no wealth.

This negative message echoes in example after example: Gary Kildall's operating system for personal computers, CP/M, that was developed a decade before Bill Gates's deal with IBM, did not give Kildall even a tiny fraction of Gates's hundred billion dollar wealth, and did not save him from an ignominious death in a bar-room brawl with some bikers (at least according to one colorful legend). Eli Whitney's 1792 patent on the cotton gin didn't make him rich, won him no part of the US's 900-fold increase in cotton exports over the ensuing

70 years (to where cotton accounted for half the value of total US exports to the rest of the world in 1860). Xerox Corporation held patents on the laser printer, Ethernet, graphical-interface computer operating systems, using multiple windows, mouse, and keyboard, and WYSIWIG word processing. These concepts have been successfully exploited by everyone, but Xerox Corporation itself.

3.3 Intellectual land grab

But even as intellectual property rights haven't always protected an innovator, neither does their strengthening necessarily generate greater innovation.

The Figure plots, over time, software patents awarded (the dashed line) and real spending on computer/software R&D (the solid line) in the US from 1975 through 1995. The dramatic increase in strong intellectual property rights awarded reflects, in part, court decisions extending patent protection for software. However, this strengthening and extension of IP coverage did not obviously elicit greater innovation effort in the industry. Between 1987 and 1994 real R&D spending in the computers and software industry fell 20%, while the number of patents awarded increased 200% and real R&D spending in corporate America overall rose 25%. New startups declined sharply, from 850 in the early 1980s to 300 in the early 1990s in computer hardware, from 2500 in the early 1980s to 800 in the early 1990s (Source: NSF and Bessen and Maskin, 1997, *Intellectual property on the Internet*).

What have we learnt from this? In theory, property rights on ideas inflict losses in social efficiency; humanity ends up under-using ideas. Again, in theory, societies tolerate this because those property rights are needed to reward and incentivize the creators of ideas. In practice, however, we have just seen many cases where intellectual property rights don't do this last bit well at all, either through not providing enough reward to the right people or through providing too much to the wrong ones. In all those situations and many others like them, society has simply sacrificed economic value to no good purpose whatsoever. Our loss from current arrangements for managing

intellectual assets is double.

4 Alternatives

But societies and economies are surprisingly successful adaptive organisms. When an itch manifests, a mechanism for scratching that itch eventually appears as well, without necessarily anyone consciously designing that scratcher. The process, however, can be slow, and nothing says we shouldn't try to speed things up.

Mechanisms that can circumvent the economic difficulties that ideas, creativity, and knowledge introduce can be divided into two kinds: Conscious intervention and hands-off, spontaneously emergent social behavior.

4.1 Intervention

The economic historian Paul David has noted how institutions like patronage and procurement can provide substitute incentive mechanisms in place of intellectual property. Both of these are found in the real-world—Research Council support for academic research; military or space exploration contracts; wealthy patron support for the arts—constitute some prominent examples. These distance the incentive for creating an idea from the individual rewards arising in its dissemination,

Yet other suggested schemes work similarly, by separating dissemination reward from instantiation incentive. Jenny Lanjouw, a former PhD student here at the LSE, has proposed global market segmentation in intellectual property rights for pharmaceuticals that could potentially benefit the poor and disease-afflicted in the Third World, without disincentivizing pharmaceutical innovation in the more affluent West. Michael Kremer at Harvard has suggested that patents be auctioned off generally, but with governments randomly buying some of the intellectual assets for release into the public domain, thereby freeing those intellectual assets into socially efficient usage.

Finally, perhaps an even crazier suggestion: Divert what gov-

ernment and legal resources societies currently expend on determining and protecting intellectual property rights—patents, copyright, trademarks—into building instead mechanisms for providing an appropriate and reliable flow of intellectual services derived from the underlying intellectual assets. Unlike the intellectual assets themselves, such services would be rival and finite, and will show none of the market failures described above. That is, since we already have a Financial Services Authority, we might also have, in parallel, an Intellectual Services Authority.²

4.2 Hands off

Interestingly, the computer software industry describe in the earlier graph on intellectual landgrab is also the one that has seen greatest innovation in institutional mechanisms.

Open Source Software is the most notable such example. The term describes software that is provided with the underlying code available for others to refine, develop, and learn from.

`SourceForge.net` the largest repository of Open Source code and applications, as of this morning, hosts over 71,000 software projects, all freely available for downloading over the Internet. Some of these are, admittedly, of interest primarily to the technical community, but significantly many others are of general consumer and end-user interest: office productivity, information management, and database suites that rival commercial market leaders'; messaging clients that outgun any commercially sold; video and music applications providing functionality beyond any commercial software; and some truly remarkable computer games.

These ideas are given away, not sold. Worldwide communities of capable software engineers and hobbyists—better than money can buy—converge, metaphorically at least on the Internet, to code and debug useful software, that is then released to the world to use and

² Should the LSE spearhead this effort, our Director Howard Davies will then have run both an FSA and an ISA, completing an almost-alliterative lifetime tour of duty.

to improve. Corporate backing from companies such as IBM, Intel, Nokia, and Sun Microsystems, and corporate success providing support services (at companies like Red Hat) have provided credibility and legitimacy to the Open Source movement.

As with markets, these developments show emergent behavior, with no strong, single central command but with global efficient outcomes spontaneously arising from uncoordinated individual actions.

Economists have begun to study the workings of this Open Source mechanism.

We might now understand how, say, individual Open Source programmers could be doing this work only for its high-profile apprenticeship signalling function, those programmers building reputations and then lying in wait for transition to high-paying, IP-protected jobs. But we don't really understand why such spontaneous, emergent behavior achieves the successes and social optimally outcomes that it has. Why are the products that result so often systematically better and more innovative than their commercial, IP-protected counterparts? We can only conjecture that, somehow, in separating the dissemination rewards from those accruing to instantiation, the Open Source mechanism attempts, with no explicit guidance, to reinstate endogenously one socially efficient outcome.

And perhaps it's a model we can use for other ideas too, not just software. Ian Ayres and Barry Nalebuff at Yale University have attempted to initiate such a model in their recent book, "Why not? Using Everyday Ingenuity to Solve Problems Big and Small" and its associated `whynot.net` website. That website has already begun to long some truly whacky, way-out suggestions.

It's all a little crazy, but not obviously much more so than the current system we have for managing intellectual property.

5 Conclusion

In this talk I have described for you the inherent tension in intellectual assets—the knowledge output from creative individuals. While ideas have always been important—society-wide, not just for individ-

ual business firms—their pervasiveness and economic significance will only continue to rise ever more sharply from here on out.

This tension, essential to intellectual assets, has led societies, through the course of history, to experiment with many different kinds of institutions to generate and disseminate ideas.

What we have now, at the beginning of the 21st century, in institutions such as intellectual property rights, work well neither in the idealized circumstances of theory nor in the gritty realism of practice.

To end this lecture, a small personal confession if I may: At the height of the late 1990s dotcom mania, when everyone and their dog became multibillionaires on paper, setting up shop in Silicon Valley garages on no more than an idea and a credit card, I looked with envy on my math, science, and engineering colleagues at universities like Stanford and Berkeley. These people, some of them personal friends of mine, had real and significant contributions to make to society—in streamlined computer chip design; in more efficient, more elegant, faster mathematical algorithms for network routing and digital encryption—at the same time that their ideas were breaking new ground in academic journals. And to top all that, they were handsomely and appropriately compensated by the marketplace for just doing the things that all academics seek to do anyway. These colleagues were meeting the market test. I believed then, as I do now, that a marketplace for ideas ruthlessly and honestly, when functioning well, evaluates the worth of those ideas—much more than might self-serving and faddish followers of intellectual fashion.

So, all these math, science, and engineering academics: Just how grand can one life get?

Social science seemed so out of it as to be not even worth a mention. As social scientists, we might interpret what was going on; explain what was going on; measure what was going on; but we would always be on the outside of that knowledge economy, only ever looking in, our noses pressed against the windowpane.

But now, more sombrely, we see how marketplaces for ideas, institutions for creating and spreading economically valuable intellectual assets badly need to be redesigned. These markets and institutions weren't supposed to work spectacularly well in the first place—many

of us had forgotten that—and it turns that in reality they function even worse than we might have feared.

Remaking such idea-institutions is something that falls squarely on the lot of social scientists—like the ones we have at the LSE—who understand individual incentives and social efficiency. We have a job to do, rethinking and redesigning the market for ideas, satisfying a badly-needed social want, not only to maximize a government’s revenue intake or only to increase a corporation’s annual profit, but to improve the lot of humanity. And just for doing the right thing, we might now even get the market to reward us appropriately.