

# History matters: Trading technologies and the marketplace for ideas

by

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Societies are naturally conservationist by at least one measure: they recycle ideas and attitudes. Unlike for raw materials, however, this isn't always a good thing. Intellectual nostrums continue to hold currency even after they have been fully discredited. The constant ebb and flow of what is current and topical disguises what matters, what lies just beneath the froth.

Today, in the midst of pronouncements of economic doom and gloom—or by contrast, during the halcyon 1990s decade of heady dot-com mania, the opposite, pronouncements of everlasting prosperity—it is easy to forget what endures in the broad sweep of human progress, and instead to conflate what is permanent with what is immediate.

So here's a reminder. Or at least here's a list of the large facts I keep in my mind and constitute my best guess of what's permanent and important.

## 1 100 Years of Well-Being: Growth and Distribution

One hundred years ago Earth held one billion people. Today six billion roam the planet. One hundred years ago the average human had real income barely one-eighth that of his counterpart today. Today world income is fifty times what it was a hundred years ago.

This dramatic improvement in welfare is not confined to economic measures like income. One hundred years ago the average human born on earth looked ahead to living a full life under 40 years in length.

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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 list goes on. Worth noting is that nothing even close to this modern economic development—prosperity so sustained, progress so widespread—ever occurred any time in the previous 50,000 years of human history. What I find additionally remarkable comes from comparing not just these measurements across time but across economic phenomena now extant. Today, no fact about business cycles, unemployment, inflation, corporate governance malfeasance, or financial market mania—important though each of these is—comes anywhere close quantitatively to matching the awesome scale and silent beauty of the process of economic development.

Once, everyone in the world was equally miserable and dirt-poor, in effect scratching the soil beneath them in an effort to keep body and soul together, the modern world's prosperity beyond their imagination. But now even as so many people are unbelievably better off, so too the gap between rich and poor can be difficult to comprehend. In 1993 the richest 1% of people in the world received in total as much income as the bottom 57%—the 50 million very rich versus the 2.7 billion very poor. Average income in the top 5% of the world's population was 114 times that in the bottom 5%. In the half decade until 1993, average world income grew 6% but real incomes in the bottom 5% fell by a quarter; those in the top 5% rose by an eighth.

So the world remains a profoundly unequal place. Not only that, but hard-earned economic progress can be swiftly annihilated. The country Botswana is regularly ranked by investors as the best, safest country risk in Africa. It is rich with diamonds, copper, and nickel. Since independence in 1966 Botswana had transformed itself from one of the world's poorest countries to a putatively well-performing middle-income country; its annual per capita growth rate has regularly been among the highest worldwide. But Botswana also has 35% of its adult population HIV/AIDS-infected—the highest rate of infection in the world. And, despite the abundance of natural resources, life

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expectancy at birth in Botswana is now only 35 years, having declined from as high as 65 years only a decade ago.

To summarize, there is economic growth, and there is economic inequality. Over the medium to long run, the impact on human welfare of the each of these dwarves practically everything else. And for the two of these, I have described how there is good news and there is bad news.

For brevity, let's call *growth and distribution* the circle of observations and ideas I have just described.

What is my guess for the important touchstone issues on growth and distribution? Abstracting from many important details, begin by noticing that when economic growth occurs in the aggregate, it lifts everyone, both rich *and* poor. That is what the data tell us, and loudly. Thus, simplifying dramatically, I think the sets of issues are twofold: First, to understand the market for technology, i.e., to understand the economic exchange of knowledge and ideas, or intellectual assets in general. Second, to understand why, beyond the difficulties we can recognize in those markets and while acknowledging the massive benefits that accrue to so many from economic growth, there are still those who erect yet additional obstacles to the flow of ideas and to economic progress more generally.

I mention the second because it is obviously important in the world out there. It is about why bad things happen to good societies. The modern theory of political economy seeks to understand this. But having mentioned it, I don't have anything further to say about it here. Let me focus instead on the first set of issues, about which I know a little more.

## 2 The high-tech economy

Economic growth occurs through advances in technology. That has always been so. Technology advances, in turn, through innovation, i.e., the instantiation of new knowledge and new ideas. The creation and dissemination of ideas comes through balancing incentives and costs. There should be well-functioning markets for intellectual assets

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to guide their production and use, just as there are for pencils and umbrellas and most other goods and services. Unfortunately, not so. The world today has no well-functioning markets for intellectual assets.

Contrast what market we have for intellectual assets with that for financial assets—in my view, one is evil twin to the other. Only it's difficult to figure out which is which.

The absence of well-functioning markets in intellectual assets is likely drowned out in public perception by the hype surrounding markets in *financial* assets surrounding technology. These financial markets draw intense interest and attention.

### 3 Financial assets and financial crises

Very early on, economists had figured financial markets to be the quintessential perfect market in economic theory. These markets were friction-free and transparent. Participants in them were highly motivated, and their goals were clear and well defined. When a need for a new financial good arose, new markets spontaneously emerged. Financial markets now cover every conceivable combination of risk, return, and exposure.

There is a view, however, that in reality financial markets don't seem to always work well. Actually, wait a minute. For some observers, the statement I have just made errs so egregiously on the side of circumspection, the sentiment in it is just plain wrong. For such observers, many financial markets and many financial instruments are tantamount to financial weapons of mass destruction. Financial crises bring down governments and inflict massive pain on societies.

But the thing is we have always had financial crises; they are not new. Financial markets and financial instruments do much that is good; they are more than just where lots of crises occur. By most accounts, the late 19th century was a golden era of economic growth, with many poor countries becoming rich, and catching up with the leading economies. Massive flows of people, capital, and ideas swept across the world. Exports as a share of income doubled. Sixty mil-

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lion people left their homes in Europe to live and work in North America and Australia; a comparable number left China and India for Southeast Asia. All told, one tenth of the world's population migrated across national boundaries. Fully half of Britain's national savings was invested in foreign lands. Foreign capital relative to income tripled in Africa, Asia, and Latin America. The end result of all this: Growth rates of world per capita income increased three-fold between 1870 and 1914.

It was a time of massive improvement in economic prosperity. But that era also had financial crises galore. For that you didn't need dot-com tech mania chasing sticky eyeballs on the Internet or foreign exchange traders frenziedly sending sell instructions into an electronic bitstream moving at lightspeed. Speculation was rife in commodities that were as solid, literally, as metals, construction, railroads, and . . . beer! In the US the post Civil War boom saw financial speculation that nearly brought down the US Treasury and devastated the Grant administration, as Wall Street financiers sought the aid of the federal government in cornering the market for gold, leading instead to financial ruin for thousands on Black Friday 24 September 1869. In the 1870s Viennese building sites had their prices driven way off realistic construction earnings by speculative buying for profitable resale.

US railroad bonds crashed in the early 1870s and financing dried up, interrupting rail construction, as domestic circumstances led Germany and Austria to stop lending to the US. In the 1880s brewery shares in Britain went through the roof, as private breweries, one after the other, went public in what we might now think of as a hops-com mania. Guinness the brewing company had its IPO over-subscribed many times, and its market valuation quickly doubled in short order. A French syndicate in 1888 cornered the world market in copper futures and in copper itself—160,000 tons of the heavy metal—only to have the metal price crash by over 50% in 1890, requiring rescue to the tune of 140m francs by the Bank of France. The 1890 US Sherman Silver act precipitated a financial crisis in 1893. In Boston in 1920 the original Ponzi scheme devastated the finances of thousands of ordinary people.

But through this all, painful as each individual financial crisis

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turned to to be, the juggernaut of economic growth marched on, steadily improving the lives of hundreds of millions of people.

The real killer, in this reading of economic history, was not the errant behavior of financial markets. It was the large-scale shutting down of trade and resource flows across countries that ended the golden era of economic growth in the late 19th century. Put differently, it was the closing in on itself of the world international economic system as global wars and self-serving nationalism raised tariff barriers and sealed off state boundaries. It was the reversal of globalization.

Markets for financial assets are markets that we thought worked well in theory but not in practice. The world has devoted billions of dollars first to organizing such markets and then, apparently surprised by the outcome, has spent considerable resources studying them—and, afterwards, sometimes proposing to spend even more to shut them down.

Markets for intellectual assets, on the other hand, are markets that we have always known from economic theory not to work. That they don't work well in practice is then an immediate given. But unlike markets for financial assets, markets for intellectual assets have been by and large totally ignored. Why are they increasingly important now?

## 4 Growth in the high-tech new economy

Fig. 1 shows a simple schematic for understanding economic growth and technology. In the bottom left, knowledge accumulates, driving technological progress and thus economic growth. Because knowledge is nonrival, it has to be wrapped in an intellectual property rights (IPR) system—IPRs like patents, for instance—before knowledge can be used in markets-based exchange. Such a system generates monopoly rents—knowledge is not allowed to disseminate until marginal benefit equals marginal cost of reproduction, but instead spreads only as the monopolist finds profit-maximizing. It is those excess rents that incentivize the creation of knowledge by skilled work-

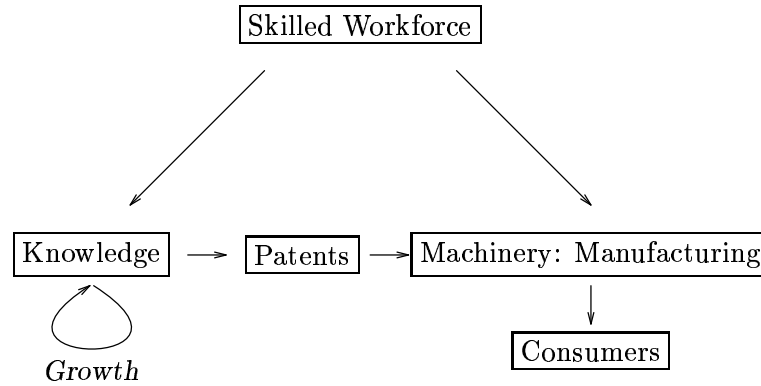


Figure 1: Economic growth is driven by knowledge accumulation. But knowledge needs to be wrapped around intellectual property protection before it can be used or consumed.

ers who see competing uses for their time and energy.

The IPR system at the heart of this scheme seeks to mediate a tension between two forces. It ex ante incentivizes knowledge creation by ex post restricting knowledge dissemination.

This tension becomes ever more pronounced (Fig. 2) as economies undergo modern structural change where what matters in consumption gets progressively closer to the chalkface of raw knowledge itself—or, more directly, are goods that have all the nonrival properties of knowledge: computer software, digital music, AIDS medication, genetic modification, videogames and digital entertainment, . . .

Intellectual assets matter greatly—they are what underly figuring out new engineering and new science that will raise economic productivity and bring about economic growth; providing AIDS medication efficiently to the poor without which 480 million over the next half century will lose their lives; improving genetic manipulation and disseminating its benefits appropriately, and spreading ideas in general (and, selfishly, maintaining the health of the education system in which we work here in universities).

The work of Douglass North has made clear one side of the tension from the earliest historical times:

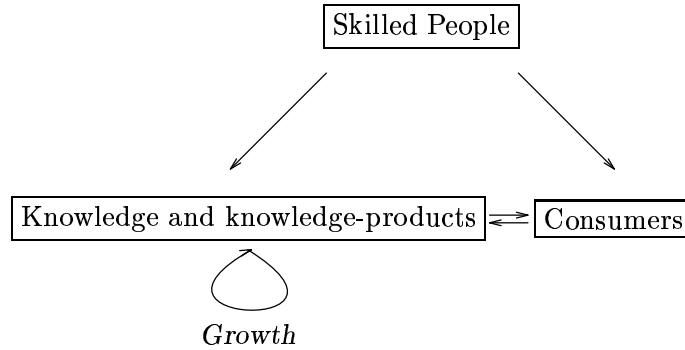


Figure 2: Modern high-tech growth brings consumption directly up against the chalkface of new knowledge

“Throughout man’s past he has continually developed new techniques but the pace has been slow and intermittent. [...] Typically, innovations could be copied at no cost to others and without any reward to the inventor. Failure to develop systematic property rights in innovation up until modern times was a major source of the slow pace of technological change.”

North identifies the incentive properties of IPRs with knowledge creation and thus technical progress and economic growth. But the ongoing high-tech change in economic structure says that it is now efficient ex post knowledge *dissemination* to which we need to devote at least equal attention.

## 5 Open Issues

The scientific and policy challenges here are plain: The assignment of property rights in markets for intellectual assets is unlike the assignment of ordinary property rights in ordinary markets. IPRs do not magically remove the negative effects of externalities and thereby restore social efficiency. In fact, the opposite—ex post IPRs create artificial monopolies and restrict the dissemination of knowledge.

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We live with IPRs because we cannot yet agree on any other robust general way to ex ante incentivize innovation, the creation of new intellectual assets. But in systems of **patronage** (such as the National Science Foundation in the US, the Economic and Social Research Council in the UK, and many other instances elsewhere) or **procurement** (space research, portions of the human genome project) nations have attempted to incentivize the creation of knowledge without subsequently overly restricting its use and dissemination. The Open Source Software movement can be viewed as a spontaneously-emergent institution that attempts—directed by no one but working through some meta-Fundamental Theorem of Welfare Economics—to resolve that ex ante versus ex post tension, admittedly originally and mostly still only in computer software. But now variants of Open Source-inspired copyright licensing have appeared in more prosaic publishing and elsewhere. All such schemes keep at a distance the direct rewards from the dissemination of output. In other markets, such distancing is death. In the market for intellectual assets, by contrast, such a scheme of governance and regulation might be exactly what is needed.

## 6 Conclusions

Intellectual assets matter for people's lives. Markets for them don't work well either in theory or in practice. Current IPR regimes have no claim to being the right way or even a good way to organize how we create and disseminate intellectual assets. And strong intellectual property rights certainly don't nudge us in the direction of well-functioning economies.

What we have today in the real world passing itself off as a marketplace in intellectual property rights is a makeshift cobbling-together of inefficiencies that just about gets by, because nothing obviously better is around to replace it. And, no one seems to care. Over the last fifty years the ratio of real resources that societies have devoted to organizing, tinkering with, and studying markets for intellectual assets relative to that expended on financial assets is, for all prac-

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tical purposes, zero. We should maintain that high denominator in the calculation. But we should also raise the numerator. We don't understand intellectual assets. We need to.