

The Wages of Science

By Sam Vaknin

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In the United States, Congress approved, last month, increases in the 2003 budgets of both the National Institutes of Health and National Science Foundation. America is not alone in - vainly - trying to compensate for imploding capital markets and risk-averse financiers.

In 1999, chancellor Gordon Brown inaugurated a \$1.6 billion program of "upgrading British science" and commercializing its products. This was on top of \$1 billion invested between 1998-2002. The budgets of the Medical Research Council and the Biotechnology and Biological Sciences Research Council were quadrupled overnight.

The University Challenge Fund was set to provide \$100 million in seed money to cover costs related to the hiring of managerial skills, securing intellectual property, constructing a prototype or preparing a business plan. Another \$30 million went to start-up funding of high-tech, high-risk companies in the UK.

According to the United Nations Development Programme (UNDP), the top 29 industrialized nations invest in R&D more than \$600 billion a year. The bulk of this capital is provided by the private sector. In the United Kingdom, for instance, government funds are dwarfed by private financing, according to the British Venture Capital Association. More than \$80 billion have been ploughed into 23,000 companies since 1983, about half of them in the hi-tech sector. Three million people are employed in these firms. Investments surged by 36 percent in 2001 to \$18 billion.

But this British exuberance is a global exception.

Even the - white hot - life sciences field suffered an 11 percent drop in venture capital investments last year, reports the MoneyTree Survey. According to the Ernst & Young 2002 Alberta Technology Report released on Wednesday, the Canadian hi-tech sector is languishing with less than \$3 billion invested in 2002 in seed capital - this despite generous matching funds and tax credits proffered by many of the provinces as well as the federal government.

In Israel, venture capital plunged to \$600 million last year - one fifth its level in 2000. Aware of this cataclysmic reversal in investor sentiment, the Israeli government set up 24 hi-tech incubators. But these are able merely to partly cater to the pecuniary needs of less than 20 percent of the projects submitted.

As governments pick up the monumental slack created by the withdrawal of private funding, they attempt to rationalize and economize.

The New Jersey Commission of Health Science Education and Training recently proposed to merge the state's three public research universities. Soaring federal and state budget deficits are likely to exert added pressure on the already strained relationship between academe and state - especially with regards to research priorities and the allocation of ever-scarcer resources.

This friction is inevitable because the interaction between technology and science is complex and ill-understood. Some technological advances spawn new scientific fields - the steel industry gave birth to metallurgy, computers to computer science and the transistor to solid state physics. The discoveries of science also lead, though usually circuitously, to technological breakthroughs - consider the examples of semiconductors and biotechnology.

Thus, it is safe to generalize and say that the technology sector is only the more visible and alluring tip of the drabber iceberg of research and development. The military, universities, institutes and industry all over the world plough hundreds of billions annually into both basic and applied studies. But governments are the most important sponsors of pure scientific pursuits by a long shot.

Science is widely perceived as a public good - its benefits are shared. Rational individuals would do well to sit back and copy the outcomes of research - rather than produce widely replicated discoveries themselves. The government has to step in to provide them with incentives to innovate.

Thus, in the minds of most laymen and many economists, science is associated exclusively with publicly-funded universities and the defense establishment. Inventions such as the jet aircraft and the Internet are often touted as examples of the civilian benefits of publicly funded military research. The pharmaceutical, biomedical, information technology and space industries, for instance - though largely private - rely heavily on the fruits of nonrivalrous (i.e. public domain) science sponsored by the state.

The majority of 501 corporations surveyed by the Department of Finance and Revenue Canada in 1995-6 reported that government funding improved their internal cash flow - an important consideration in the decision to undertake research and development. Most beneficiaries claimed the tax incentives for seven years and recorded employment growth.

In the absence of efficient capital markets and adventuresome capitalists, some developing countries have taken this propensity to extremes. In the Philippines, close to 100 percent of all R&D is government-financed. The meltdown of foreign direct investment flows - they declined by nearly three fifths since 2000 - only rendered state involvement more indispensable.

But this is not a universal trend. South Korea, for instance, effected a successful transition to private venture capital which now - even after the Asian turmoil of 1997 and the global downturn of 2001 - amounts to four fifths of all spending on R&D.

Thus, supporting ubiquitous government entanglement in science is overdoing it. Most applied R&D is still conducted by privately owned industrial outfits. Even "pure" science - unadulterated by greed and commerce - is sometimes bankrolled by private endowments and foundations.

Moreover, the conduits of government involvement in research, the universities, are only weakly correlated with growing prosperity. As Alison Wolf, professor of education at the University of London elucidates in her seminal tome "Does Education Matter? Myths about Education and Economic Growth", published last year, extra years of schooling and wider access to university do not necessarily translate to enhanced growth (though technological innovation clearly does).

Terence Kealey, a clinical biochemist, vice-chancellor of the University of Buckingham in England and author of "The Economic Laws of Scientific Research", is one of a growing band of scholars who dispute the intuitive linkage between state-propped science and economic progress. In an interview published last week by Scientific American, he recounted how he discovered that:

"Of all the lead industrial countries, Japan - the country investing least in science - was growing fastest. Japanese science grew spectacularly under laissez-faire. Its science was actually purer than that of the U.K. or the U.S. The countries with the next least investment were France and Germany, and were growing next fastest. And the countries with the maximum investment were the U.S., Canada and U.K., all of which were doing very badly at the time."

The Economist concurs: "it is hard for governments to pick winners in technology." Innovation and science sprout in - or migrate to - locations with tough laws regarding intellectual property rights, a functioning financial system, a culture of "thinking outside the box" and a tradition of excellence.

Government can only remove obstacles - especially red tape and trade tariffs - and nudge things in the right direction by investing in infrastructure and institutions. Tax incentives are essential initially. But if the authorities meddle, they are bound to ruin science and be rued by scientists.

Still, all forms of science funding - both public and private - are lacking.

State largesse is ideologically constrained, oft-misallocated, inefficient and erratic. In the United States, mega projects, such as the Superconducting Super Collider, with billions already sunk in, have been abruptly discontinued as were numerous other defense-related schemes. Additionally, some knowledge gleaned in government-funded research is barred from the public domain.

But industrial money can be worse. It comes with strings attached. The commercially detrimental results of drug studies have been suppressed by corporate donors on more than one occasion, for instance. Commercial entities are unlikely to support basic research as a public good, ultimately made available to their competitors as a "spillover benefit". This understandable reluctance stifles innovation.

There is no lack of suggestions on how to square this circle.

Quoted in the Philadelphia Business Journal, Donald Drakeman, CEO of the Princeton biotech company Medarex, proposed last month to encourage pharmaceutical companies to shed technologies they have chosen to shelve: "Just like you see little companies coming out of the research being conducted at Harvard and MIT in Massachusetts and Stanford and Berkley in California, we could do it out of Johnson & Johnson and Merck."

This would be the corporate equivalent of the Bayh-Dole Act of 1980. The statute made both academic institutions and researchers the owners of inventions or discoveries financed by government agencies. This unleashed a wave of unprecedented self-financing entrepreneurship.

In the two decades that followed, the number of patents registered to universities increased tenfold and they spun off more than 2200 firms to commercialize the fruits of research. In the process, they generated \$40 billion in gross national product and created 260,000 jobs.

None of this was government financed - though, according to The Economist's Technology Quarterly, \$1 in research usually requires up to \$10,000 in capital to get to market. This suggests a clear and mutually profitable division of labor - governments should pick up the tab for basic research, private capital should do the rest, stimulated by the transfer of intellectual property from state to entrepreneurs.

But this raises a host of contentious issues.

Such a scheme may condition industry to depend on the state for advances in pure science, as a kind of hidden subsidy. Research priorities are bound to be politicized and lead to massive misallocation of scarce economic resources through pork barrel politics and the imposition of "national goals". NASA, with its "let's put a man on the moon (before the Soviets do)" and the inane International Space Station is a sad manifestation of such dangers.

Science is the only public good that is produced by individuals rather than collectives. This inner conflict is difficult to resolve. On the one hand, why should the public purse enrich entrepreneurs? On the other hand, profit-driven investors seek temporary monopolies in the form of intellectual property rights. Why would they share this cornucopia with others, as pure scientists are compelled to do?

The partnership between basic research and applied science has always been an uneasy one. It has grown more so as monetary returns on scientific insight have soared and as capital available for commercialization multiplied. The future of science itself is at stake.

Were governments to exit the field, basic research would likely crumble. Were they to micromanage it - applied science and entrepreneurship would suffer. It is a fine balancing act and, judging by the state of both universities and startups, a precarious one as well.

Sam Vaknin is the author of Malignant Self Love - Narcissism Revisited and After the Rain - How the West Lost the East. He is a columnist for Central Europe Review, PopMatters, and eBookWeb , a United Press International (UPI) Senior Business Correspondent, and the editor of mental health and Central East Europe categories in The Open Directory Bellaonline, and Suite101 .

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Women's Wages - Is It Justified?

By Julie Sarup

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The beginning

God made man and woman, and handed over the reins of this world in their hands. The passing time through centuries, have witnessed the God's ordinance being twisted by man, to suit his own ends. The inception observed the man and woman treading down the lanes of troubles, hand in hand.

Today

The year 2004 is witnessing all the hustle and bustle of new technologies, economy rising, fast life, and so on. Despite all this, what startles me is the ever-increasing oppression on women, around the globe – be it sexual harassment, cultural oppression, religious impositions, etc. Being a working woman myself, the most attention-grabbing anomaly I come across is the difference in the wages of men and women.

Excerpts of evidence

March 08, 2004 - 20:14, Gulf Daily News by TARIQ KHONJI

"There are many issues that need to be addressed including laws regarding women's rights and the elimination of discrimination in both the public and private sector," explained Ms Al Rowaie.

"For example, we hardly ever find women in very high positions. They are usually concentrated in middle-level management, even though their abilities are equal and often exceed those of men.

"We don't have a woman minister yet, with the exception of Supreme Council for Women secretary-general Lulwa Al Awadhi, who has the rank of minister but not a minister's portfolio."

Anne Summers' book, *The End of Equality*, paints a stark picture of women's status in Australia in the 21st century.

Despite winning equal pay for equal work more than 30 years ago, the gap between men's and women's wages is larger now than a decade ago. In May 2002, men averaged \$839 per week while women were paid just \$555 (66% of men's wages). Figures from the Australian Bureau of Statistics indicate this gap is still growing: between May 2000 and May 2002, men's wages increased by \$58 while women's rose by only \$33.

Holding reins of livelihood!

In practice, employers favor men-workers owing to their belief that men are more devoted to work than women. Women are contemplated to be less reliable because they sometimes take leave to marry, or to have children. Conventionally, men were thought of as the breadwinner, and therefore worthy of a superior wage. In accordance to this, a woman's salary was supplementary income only.

Today's scenario contradicts the myth of "supplementary income" earned by women. The awareness and adoption of education for girls have armed them adequately, in order to ease their stand on "equal wages" demand. Despite the sincere efforts of unsung heroes (and heroines), the old practice of discrimination still dominate the employer's decisions.

What can be done about it?

A quote by Voltaire, "No problem can stand the assault of sustained thinking." The foundation stone is not laid through a union's establishment, or passing of a bill in the constitution. The flame of revolution has to kindle up in each person's heart; that would mark the real change! The idea is not to profess feminist slogans here, rather for justification. When a woman is passing the entire criterion successfully, do not deny her the wages she deserves!

Mrs. Julie Sarup, the Mailing List administrator of this group is currently working as Sr. Technical Writer in a German IT company based in India. Software Documentation for the SDLC phases, and New Technologies are her key knowledge areas. In addition to Technical Writing, she has taught Software Engineering to Masters in Science in Information Technology, Gujarat University.

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