Globalization, society and policy making

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Since this meeting is being held in the overall context of globalization, let me begin with a few remarks on that subject. I am aware that very little that is new can be said.

Globalization means free trade, free flow of capital and people, and free access to ideas and technology across the world. It is not a new phenomenon. The first great expansion of European capitalism took place in the 16th Century, and the late 19th Century saw a great expansion in world trade and investment. This trend was slowed down by the First World War and the subsequent disenchantment with free trade, but, on hind sight, it appears to have been a temporary let up in the inexorable trend of globalization. The rapid industrialization following the Second World War hastened it; the fall of the Berlin Wall and the collapse of the Soviet Union removed the remaining obstacles. The development of the internet enabled the organization of business on a wider scale with far greater facility and speed than ever before.

What is new in our era is the incredible speed with which the flow of capital and ideas takes place across the world. This has opened up enormous opportunities for creativity and economic growth. Indeed, some countries have been quite successful in adapting to this environment. But the benefits of globalization have not been felt universally, and some countries have lost out. This unevenness is only one reason for the resentment against globalization. Globalization seems to have diminished cultural diversity and disrupted social relationships and local traditions. The resentment arises also because free migration of people leaves in its wake intense problems for both the donor and recipient countries. This is not an anti-immigrant sentiment but rather an anti-immigration view. On balance, intense globalization has been a mixed blessing.

The universal values of science make it, in some sense, a natural ally of globalization. The sense that the world is one unit was, in fact, enhanced through science and its derivatives, such as the establishment of the International Date Line and time zones, the nearly universal adoption of the Gregorian calendar, of international standards for weights, measures, telegraphy, signaling, and so forth. Especially after the Second World War, the adaptation of English as the primary language of science has hastened globalization. Internet, satellites, electronic publication, distance learning, sharing of experimental facilities and data (often necessitated by escalating costs), have all made it more natural to practice science on a global platform. It is quite easy for scientists to communicate adequately, whatever their cultural or ethnic backgrounds.

Following the general pattern of migration, scientists have also migrated from poorer to richer industrialized countries. Of the 2% or so of the world's population that is presently in the process of

migrating to a new country—some of it legally, some of it otherwise—the number of scientists is but a miniscule fraction. Yet, their migration has wide impact on education, scientific culture, technological development, and national morale. To emphasize my point, let me recall the following facts:

> The migration of scientists from Europe to the U.S. during and immediately after the Nazi era shifted the center of gravity of science from Europe to the US. The process involved relatively few people, but the impact on science and on university education has been immense for both Europe and the US. The technical superiority that the US acquired during these years continues even now—one might say, because of its sustained policy (with occasional deviations) of embracing immigrant scientists. For example, three of the four US Nobel Prize winners in 1999 were first-generation immigrants.
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> Conversely, after the '70s a large number of scientists from developing countries moved, and are still moving, to the US and Europe. This migration is regarded as "brain drain" on the whole, constantly eroding the scientific capacity of the developing world.
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> After the '90s, a rapid migration of scientists occurred from the former Soviet Union to Europe and to the US. It is estimated that some 200,000 scientists have moved away, essentially decimating the once-thriving centers of excellence in USSR, causing an estimated annual loss of 50 billion dollars.

It is perhaps appropriate to recall the remark attributed to the 17th century French scientist, Blaise Pascal (1623-1662). He said that France would become an idiot nation if some 300 of its scientists left the country.

Altogether, therefore, the issue of migration of scientists deserves special attention. This is what I shall comment upon, and discuss how it feeds into public policy.

It appears relatively clear that the permanent immigration of scientists has had detrimental effects on donor countries. But the mobility of scientists and their free movement for purposes of building connections and common projects has been extremely beneficial and, in fact, essential. The most spectacular example of the benefits of mobility of scientists is modern China. After the concerted migration of Chinese scientists to the U.S. in the 80’s and early 90’s, many returned to China and drastically altered the scientific and technical landscape of their country. This kind of mobility makes the concept of "brain drain" less meaningful for countries like China. Regretfully, however, the situation is less sanguine for some other countries, especially in the sub-Saharan Africa. For those countries, the mobility of scientists has made the risk of losing the best and the brightest even more real than before.

Thoughtful people now agree that building scientific capacity in any part of the world is essential. This situation is truer now than before, for two reasons: first, the world is connected more than ever, and, second, our planet is under such pressures where poor decisions

may lead to irreversible exhaustion of its resources. Such prospects include climate changes, the depletion of fisheries, minerals and water resources. In the long run, large-scale depletion of scientific capacity in any part of the world is detrimental to all its parts. The prospect of development in a sustainable context will only underline the need to enhance scientific capacity in all parts of the world.

It thus appears natural to conclude as follows: whatever the merits or drawbacks of wholesale transfer of goods and capital, it is not beneficial, as a rule, for wholesale immigration of scientific communities to occur from poor countries to rich ones. It is important, however, to have a free mobility of scientists for short periods of time, crossing national boundaries periodically and developing international communities within which free exchange of ideas is rendered possible.

Thus, the first policy issue that I would highlight is this: how to discourage permanent migration of scientists from poor countries to industrialized nations, while at the same time enable their mobility on short term, so that everyone who is competent is enabled to pursue his best scientific interests? This requires the development of scientific competence within the broad mandate of encouraging diversity. To do justice to both diversity and excellence is demandingly difficult, but it is necessary to attempt it.

The world has witnessed a true revolution in ITC——or information and telecommunication technologies——and it is only natural that we should use ITC more and more effectively to supplement the physical mobility of scientists. But the promise of these technologies has been limited in developing countries by what is known as the “digital divide”. For instance, the speed of internet connectivity in Africa (on the average) is a few hundred times slower than in the US (on the average). Thus my second issue: What enlightened policies should the governments pursue in order to make easy access to internet and the knowledge base available to its population?

Even if the speed of the internet in developing countries can be enhanced, there is almost nothing that can supplant personal meetings when it comes to matters of science. What is required is a judicious combination of the mobility of scientists and the use of ITC to hasten the building of scientific capacity all over the world.

The third policy issue is related to intellectual property rights. If intellectual property is potentially a tool for the benefit of large parts of the poor population of the planet, it should be particularly made available to them. For example, the platforms of new biotechnologies, nanotechnologies and genetic engineering could help the alleviation of suffering from deadly diseases. Yet, many of the cures are owned by small groups of people who are in the business of making money for themselves.

More generally, the important policy issue is the enhancement of the connection between science and wealth creation. The precise connection is tortuous and unclear, but it is clear that there exists one. For those countries in which this connection has been clear, the support for science and its practice have generally flourished. Where the connection is tenuous, science has been seen as a luxury and stagnated.

A century ago, perhaps, economic development did not have to consider the finiteness of earth's resources as seriously as now. We have indeed encroaching on the limits of sustainability. While some details of sustainable development are also controversial, the basic tenet is not. Whatever the past, there is no question that poor countries in quest of economic development cannot follow the same technological path that industrialized countries followed during their ascension. Take energy, for example. The path that the industrialized countries followed——which was a function of the history, available resources, ability to harness them, and so forth——was based on the oil-rich world. This cannot be sustained because the resources cannot keep up with the increasing demands.

It is thus clear that developing countries, some of which have the "luxury" of taking a fresh look at the energy crunch, should look for new and alternative approaches. This requires clear awareness of the issues involved, deep understanding of potential technologies and, as a precondition, much research and knowledge of science. I cannot argue in favor of science any stronger than by stating that it is a matter of survival: an increasing number of problems will depend on science for their solutions. This is my major, though general, point. How to increase a sense that one should not trade today's well-being for tomorrow's disasters, not only as it relates to one's own country or neighborhood but also as it relates to the world as a whole? This seems to be a big policy issue of enormous political dimension. International institutions like UNESCO have to step up to the fore in forging this attitude but they seem to lack both the resources and the willingness.

In summary, globalization is not a transient phenomenon. It is clear that terrorism, extremism, provincialism, protectionism, and so forth, will slow the trend——alas, at great cost and suffering——but it seems that the technology is advancing in the direction that cannot be reversed. It is therefore especially important to protect cultural diversity and heritage, and to protect the environment. This should underlie all bottom lines calculations in business; this should be the emphasis of all policy matters. True globalization will eventually react to environmental disasters, but presumably only after they have occurred and a profit made.

Once upon a time, the overwhelming threat to the world was through the nuclear weapons. That threat has not fully disappeared but the matter of comparable urgency for our time is one of sustainable development. Keeping these matters on the front burner of all policy making processes is the challenge of our times.