

GDP Size & Its Impact on World Economy

By Naoyuki HARAOKA

The latest economic crisis has brought into bold relief discrepancies between nations enjoying fast growth despite the crisis and those suffering from slow growth and deflation. The *Table* shows the author's forecasts of dollar-based nominal gross domestic product (GDP) of major countries and regions in 2030 based on figures contained in the "World Economic Outlook" of the International Monetary Fund (IMF). The GDP data forecasts for 2030 were calculated by using the respective growth rates currently anticipated for a period from 2007 through 2014; namely, the average annual growth rates between 2007 and 2014 were presumed to continue in the 2014-2030 period.

According to these forecasts, the proportions of GDP of the respective countries/regions in the 2030 world total 20 years hence will be 21.4% for the United States, 21.3% for the European Union and 30.4% for the BRICs (Brazil, India, Russia and China; 20.1% for China), while Japan will account for 7.6%. Evidently, the United States, the EU and China will together assume the most important presence with a combined share of more than 60% in the world economy.

Countries Playing "Catalyst Role" Vital

Numerous knotty problems of the global scale, including the current economic crisis, the protection of the global environment and the liberalization of world trade, have so far piled up with no effective and smooth solutions yet in sight. That is why a new framework of global governance is now called for. When viewed from the angle of economic scale under these circumstances, the participation of the BRICs – particularly China – in global governance is deemed indispensable rather than the Group of Eight (G-8) structure that has so far functioned.

Be that as it may, it is important to set up rules if we are to resolve various complicated economic problems. For instance, the expansion of world trade requires thorough enforcement of the principle of free trade. To that end, multilateral trade negotiations are being conducted under the leadership of the World Trade Organization (WTO) in an

TABLE
GDP trends of major countries & regions (\$1 billion)

	2007	2014	2030
Japan	4,380 (7.9)	5,792 (7.8)	17,503 (7.6)
US	14,078 (25.5)	17,419 (23.0)	49,267 (21.4)
EU	16,939 (30.6)	19,055 (25.5)	48,992 (21.3)
BRICs	7,111 (12.9)	14,475 (19.4)	69,884 (30.3)
China	3,382 (6.1)	8,283 (11.1)	46,366 (20.1)
India	1,101 (2.0)	1,908 (2.6)	7,560 (3.3)
Brazil	1,334 (2.4)	2,156 (2.9)	7,965 (3.5)
Russia	1,294 (2.3)	2,128 (2.9)	7,993 (3.5)
World	55,270	74,660	230,523

Note: Figures in brackets denote ratios to World GDP.

Source: "World Economic Outlook Database," International Monetary Fund, October 2009

attempt to slash customs duties on both agricultural products and mining/manufacturing industry products. Moreover, the 15th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP15), recently held in Copenhagen as part of effort to settle global environmental issues, confirmed the importance of setting up rules for cooperation in the reduction of CO₂ emissions with the consent of all countries. It is extremely important for key economic powers to exercise leadership in laying out such rules. But equally important are countries that can play the role of a catalyst in the drafting process.

Game Theory: "Prisoner's Dilemma"

The theory of games represents a relatively new sector of research in economics. In recent years, however, it has come to be applied not only to such economic spheres as the theory of industrial organization, but also to political negotiations, including security. Let me emphasize the importance of catalyst countries in international cooperation by using the elementary knowledge of this theory of games.

First, let us think about the "prisoner's dilemma" that frequently appears in the theory of games. In the *Chart*, if Prisoner 1 and Prisoner 2 are not allowed to talk and cooperate with each other and keep silent while under interrogation, either prisoner faces the danger of being convicted and sentenced to 10 years' imprisonment if the other prisoner, eager to have his prison term limited to three months, betrays him and confesses to a crime they committed. Therefore, since both prisoners are thus influenced by an incentive to confession, they confess in the end and both of them are sentenced

CHART
Prisoner's dilemma

		Prisoner 2	
		Silence kept	Confession
Prisoner 1	Silence kept	1 year/1 year	10 years/3 months
	Confession	3 months/10 years	8 years/8 years



to eight years in prison. This is a solution of equilibrium to the game when both are denied mutual cooperation.

Nonetheless, if the two prisoners can communicate and talk with each other, and both of them choose not to confess, they can have their prison terms limited to one year. Accordingly, keeping silent becomes the best game strategy for both prisoners. In game theory, the former case is called an individually rational strategy, and the latter a group rational strategy. If a group rational strategy is chosen and both prisoners choose a strategy of no confession, the best result can be obtained as indicated in the *Chart*.

This strategic solution is described as "Pareto optimality." If an individually rational strategy is chosen, the best result cannot be obtained. Yet a certain equilibrium is available. This equilibrium, called Nash equilibrium, is characterized by a situation in which as long as other players pursue an equilibrium strategy, based on an individually rational strategy, the choice of an equilibrium strategy becomes optimal for all players.

Case Study: Free Trade & CO₂ Reduction

Let us apply the above rule to the earlier-mentioned drafting of international rules. For instance, there are two strategies – a strategy of liberalizing agricultural trade (that is, by eliminating customs duties) and a strategy of maintaining protectionism. In such a situation, let us consider a model of two countries. If the two countries betray each other and maintain protectionism in the absence of adequate mutual communication, liberalization by one country alone spells a loss for that country.

Therefore, a solution, based on an individually rational strategy of equilibrium, is the maintenance of protectionist trade policy. As a result, this so-called Nash equilibrium becomes an optimal strategy of equilibrium for all players as noted above. However, if both countries understand through sufficient mutual communication that the choice of a liberalization strategy will bring about the best result, liberalization as an earlier-mentioned group rational strategy becomes a solution for equilibrium, making it possible to obtain a Pareto-optimal result.

The same may be said about the problem of global environmental protection. If there is little communication among countries and the possible effects of cooperation are not fully understood, each country inevitably fears the impact of CO₂ emission reduction on its industry. Consequently, a strategy of mutual betrayal and reluctance to proceed with the full reduction of CO₂ emissions becomes a dominant strategy of equilibrium. Nevertheless, if countries realize that the mutual reduction of CO₂ emissions through full cooperation will better serve their long-term interests, a strategy of cooperation for reduction becomes a solution for equilibrium and, as such, a rational solution for Earth as a group rational strategy.

It is of immense importance to set up rules for free trade and CO₂ emission reduction for improving the global environment as foundations for facilitating cooperation for the choice of the above-mentioned group rational strategy as a dominant policy around the globe.

Moreover, once negotiations get under way for such cooperation, the country serving as chair will have an important role to play in smoothly pushing ahead with the negotiations.

Fair Leadership, Not Economic Power

Specifically, it is necessary first of all to ascertain problems requiring cooperation through such mutual international understanding before they assume serious proportions. For example, it was Sweden at the Trade Committee of the Organization for Economic Cooperation and Development (OECD) toward the end of the 1980s that first raised the key issue of so-called "trade and environment" concerning the great impact of environmental problems on international trade, which was once considered for addition to the agenda for WTO negotiations.

Today, corporate social responsibility (CSR) is frequently pointed out, and the International Standards Organization (ISO) is studying institutional harmonization of CSR among nations. It was pointed out for the first time in a US proposal at the OECD's Industry Committee (now known as the Committee on Industry and Business Environment) during the mid-1990s.

Secondly, it is essential to always provide theoretical support to negotiations so that they will be guided by theory and reason and thus kept from becoming a "power game" by the use of force. For instance, at the OECD's secretariat, staffed with many people of diverse nationalities including Japan, a Canadian member of its large multinational staff has come up with an objective theory of "merits and demerits of free trade" from an economist's point of view and distributed documents setting forth his theory among trade negotiators for the purpose of enlightenment and propagation regarding his theory.

Thirdly, negotiations already under way need a chairman capable of a fair and just approach that is rational and well balanced, thus helping eliminate sensationalism with due regard to various interests involved in the negotiations. The OECD dealt with the formulation of the Multilateral Agreement on Investment (MAI) during the 1990s to ensure harmonious rules on international investment, and negotiations for this agreement were chaired by a Dutchman. Likewise, the OECD's negotiations concerning export credits were conducted by a Swiss chairman on many occasions.

Countries that can provide a well-balanced, fair and just chairman capable of proactive, forward-looking, analytical and knowledge-based judgment as instanced above have an important role to play regardless of their economic scale because they are the very countries that can play the role of a catalyst for transforming individual rationality into group rationality in game theory.

I cannot help hoping that in Asia, this role will be played by the Economic Research Institute for ASEAN and East Asia (ERIA), based in Indonesia. **JS**

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