



Global Macroeconomic and Trade Scenarios to 2025

Escenarios Macroeconómicos y del Comercio Global al 2025

DRI / WEFA, Inc.

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Resumen Ejecutivo

Executive Summary of the Project

Introduction

In this study prepared for the Autoridad del Canal de Panamá, DRI•WEFA presents its latest world macroeconomic forecast to 2025 and two alternative scenarios. In the study, DRI•WEFA projected macroeconomic and trade conditions of the world, covering nearly 100 countries. This report summarizes the macroeconomic results for a group of fourteen selected countries, which are the representative economies of the various regions of the world. These projections were carried out in the midst of a global recession, when the U.S., Europe, Japan, and other major countries were all experiencing negative real growth in their economies. Therefore, the development of long-term scenarios from this point depends to a great extent on the implementation of government stimuli and how consumers view the economy ahead, as well as more traditional drivers of long-term growth such as labor productivity. These and other factors were considered in the general methodology.

General Methodology

This study was carried out using the latest econometric models and data available at DRI-WEFA. It used the latest U.S. macroeconomic model with the most current values for all macroeconomic variables that tend to influence global markets at the local (U.S.) and international levels. The development of the study consisted primarily of three parts. For each country, DRI-WEFA used its own country model and the most current information regarding economic, political, and social, climate in each country and developed a baseline forecast – the Most Probable case. This forecast provides DRI-WEFA’s most recent expectations about these economies in the short to long term. Second, we modified the country’s model to incorporate a new set of positive assumptions (described below) regarding the most probable case and evaluated the results. These results were defined as the “Best case”. Third, we modified the country’s “Most Probable” case model to incorporate a new set of negative assumptions (described below) regarding the “Most Probable” case and evaluated the result. These results were defined as the “Worst case”.

The three macroeconomic scenarios were then run through the DRI•WEFA world trade model, a detailed representation of how 77 commodity groups will be shipped internationally across more than 3,600 trade routes worldwide. Seaborne trade measured in tons was the primary focus of this secondary analysis, although trade values and other modes (air and over land) were also estimated for the same group of commodities and routes.

In developing the Most Probable Case, DRI•WEFA first researched all economic conditions at a particular point in time and created a “present day” economic reality, and calibrated each country model to “present day” conditions. Then, DRI•WEFA made several assumptions regarding the immediate future based on current data. Finally, we extended this forecast to the year 2025. In turn, the economic projection has a short term, based on current expectations and a long term projection based on long term trends. For example, we first look the current

situation of the US and created a current-day scenario based on the extent of the economic recession and the impact of the terrorist attacks. Based on current assumptions we then developed a forecast for the short term and then extended the forecast to the year 2025. We defined the short term in terms of the period between 2001 and 2005, the medium term as being the period between 2006 and 2010, and the long term as being the projection between 2011 and 2025.

Short Term (2001 – 2005)

For the short term, DRI•WEFA first looked at the causes of the current recession. This economic recession was mainly caused by an economic structural adjustment. During the 1990s, promoted by technological progress, pushed by eager entrepreneurs and investors, and lured by irresponsible or even greedy financial analysts, there was over investment in the IT industry. When the IT investment surpassed the demand in both the consumption and production sectors, the bubble burst. This mostly happened in the United States. The vertical chain reaction hurt all industries, and the horizontal chain reaction hurt other countries. Thus for the short-term assumption we assessed the lightest possible chain reaction and the heaviest possible chain reaction.

Originally we had expected that the economic structural adjustment could be complete by the end of 2001 or the beginning of 2002. Unfortunately, the September 11 terrorist attack on the United States destroyed the prospective adjustment process and brought the economy down to the edge of a global recession. This required us to assess the impact of the terrorist attack besides economic structural adjustment for the short term.

Most Probable Case Scenario

For each country/region in our global economic and trade coverage, the macroeconomic forecasting exercise has taken into account three groups of factors. The *first* include the country's normal economic conditions and special issues. For example, for Japan we needed to understand the problems in its financial institutions and the structural problems in its electronic industry, and for Argentina we needed to understand the problems with its foreign debt and the problems with its exchange regime. The *second* group of factors include the magnitude of a country's own economic structural adjustment and the impacts from other partner countries' adjustment. Finally, the *third* group of factors include the magnitude of the impact of the terrorist attacks and the impacts from other countries.

In addition, DRI•WEFA assumed that:

- A) The existing DRI•WEFA short-term most probable case forecast is assumed to hold through 2006;
- B) Any cyclical or other patterns seen in the short-term forecast (2006) are not assumed to continue in the longer term;
- C) Each economy's trends toward its natural state of equilibrium, in which supply is sufficient to meet demand in the real sector;

- D) Fiscal policy is accommodative and does not impose pinch points, such as credit crunches;
- E) The world moves more toward open trade, as barriers are reduced over time;
- F) Consumers move in line with current economic trends locally and globally, based on the most current data and trends i.e consumer confidence indices, etc.
- G) Government policy continues to move along its recent path in terms of action and response — based on the most current data and trends.
- H) Investment continues to move along the expected trends based on recent history.
- I) Trade continues to follow the path of economic conditions locally and globally.
- J) Exchange rates move to their natural free-market levels based on economic growth, inflation, and relative interest rates.

Worst Case Scenario

In the “Worst Case” scenario we assume that we have sufficiently accessed the country/regions’ normal economic conditions and special issues in the “Most Probable” case, so for alternative scenarios we focus on the variation of the impact of economic structural adjustments and the impacts of the terrorist attacks. For the **Worst Case scenario**, such impacts will result in a lower real GDP growth and higher inflation, which in turn results in higher international commodity prices.

Because the economic structural adjustments begin and are the strongest in the United States, and the terrorist attacks unfortunately were also on the US, in the worst case scenario the heaviest setback is seen in the US. Other country/regions will receive the negative impact through their international trade and industry linkages with the US. We rank all other country/regions according to their international trade and industry linkage with the US, ranging from the strongest (Mexico, Canada, Japan, Germany, etc.), to the weakest (Russia). The magnitude of real GDP growth could decline from the baseline forecast in the order this rank. In 2002, US real GDP growth could decline by 2.4% from the “Most Probable” case, Japan by 2.3%, and for Russia it could decline by 0.6%. We also consider exceptions to the trade and industry linkage with the US. For example, for the Other India Subcontinent region, which excludes India and Pakistan but includes Afghanistan, we estimate the impact of the on-going antiterrorist war. For Egypt, we estimate the impact of terrorism on its vital tourism industry. For these countries real GDP growth could decline by 2.5% or more from the forecast in the Most Probable case.

In such a serious situation, lowering interest rates to stimulate economy and the destruction of productivity can cause inflation and in turn higher international commodity prices. But the worst case is that, if the antiterrorist war does not go as well as expected and causes an instability in the Arab world, it will cause a panic on crude oil supply and in turn higher oil prices. In this case, we would anticipate that the price growth of energy commodities could be 3.5% faster than the forecast in the “Most Probable” case. But for other commodities, such as electronics, the price hike from the “Most Probable” forecast could be less than 1.5%, due to weak demand.

Additional Assumptions in the **Worst Case**:

- A) Consumers are pessimistic about economic conditions.
- B) Governments react slowly to accelerate growth.
- C) Investment slows inline with decreasing investor confidence and other macroeconomic conditions.
- D) International trade moves in line with slower economic conditions globally.
- E) Total factor productivity grows slowly.

Best Case Scenario

Though the US is the origin of this economic shock, it is also the largest locomotive for the world economic recovery. In the **Best Case**, we assume that the antiterrorist war is effective, and US public confidence on economic recovery is fully resumed. This will allow economic structural adjustments to complete their own course by the beginning of 2003, and the US economy will gradually resume its normal growth momentum under a balanced economic structure. The magnitude of this momentum transmitted from the US to other country/regions also will follow the strength of these country/regions' international trade and industry linkage with the US. In 2002, US real GDP growth is higher by 0.63% compared with its forecasts in the Most Probable case, Japan by 0.61%, and for Russia it will be 0.4% higher.

When the economy resumes its momentum, there is no pressure for further interest cuts to stimulate it. The inflation risk becomes lower. When the antiterrorist war is effective and the Arab world is more stabilized, there will be no panic in oil supply and we do not expect international energy prices to change much from the baseline forecast. For manufactured products, especially high-tech products, we expect that investment in R&D will resume its normal share after the completion of economic structural adjustments. This will result in higher productivity and we can expect that the growth of international prices of these commodities will decrease by about 0.5% from the baseline forecast.

Additional Assumptions in the **Best Case** scenario:

- A) Consumers are optimistic about economic conditions.
- B) Governments react positively and promptly to accelerate growth.
- C) Investment continues to be funneled into the economy with increasing confidence.
- D) International trade moves in line with rising economic conditions globally.
- E) Total factor productivity advances slightly faster so incomes grow more quickly, *ceteris paribus*.
- F) Energy prices move along the forecasted path.

Long Term (2006 and Beyond)

From 2006 to 2025 the immediate impact of economic recession and terrorist destruction will gradually fade away. Starting in 2006, the global economy will resume its long-term development path. For the long term, the "Most Probable" case scenario forecast a country's

economic growth based on the development of its normal economic and demographic conditions. For the alternative global trade scenarios, we assume that the development of the country's demographic conditions are the same as in the "Most Probable" case scenario, and focus on the alternative forecasting of economic development. When demographic conditions and labor force conditions are given, productivity becomes the key factor in determining economic and in turn international trade growth. Our macro economic assumptions for alternative global trade forecasting are based on our alternative assumptions of productivity evolutions across countries and commodities.

For the long term we rank the countries from high to low ability in technology R&D and its adoption. This ranks the US among the highest and regions in Africa among the lowest. We expect that, for the "Worst Case" scenario, the productivity drop from the baseline for country with higher ability will be smaller than for a country with lower ability. For the best scenario, the productivity rise from the baseline for a country with higher ability will be greater than country with lower ability. Therefore, in the worst scenario, real GDP growth in the US could drop by 0.5% from the forecast in the "Most Probable Case", but for regions in the backward Africa regions it could drop by as much as 1%. Conversely, in the "Best Case" scenario, real GDP growth in the US could rise by 1% from the baseline forecast, but for Africa regions it could only rise by 0.5%.

Productivity also affects commodity prices. Since the beginning of the 1990s, the growth of international prices for manufacturing goods has been slowing substantially. For some high-tech goods, the price has been declining. These effects are mainly due to high productivity growth in these industries. But we also realize that, in the 1990s, high-tech firms used investors' money to subsidize their price competition, which later became investors' big losses, as we have seen. Having learned this lesson, we do not expect that investors will continue to provide that kind of subsidy, and we expect that the growth of manufactured goods prices will not decline as fast as in the 1990s. For the "Best Case" scenario, we assume that international commodity prices will grow at a rate that is still slower than it was before the 1990s, but faster than in the 1990s and the "Most Probable" forecast. For the "Worst Case" scenario, we assume that the growth of international commodity prices is slower than the "Most Probable" forecast, but is not as slow as in the 1990s. This is the assumption for manufactured goods. Over all, we group the 77 commodities in the order from more natural-resource-constrained and less natural-resource-renewable to less natural-resource-constrained and more natural-resource-renewable, and from low tech to high tech. Along this order, their prices vary from growing the fastest to the slowest for both the "Worst Case" and "Best Case" scenarios. It should be mentioned that international energy prices are frequently affected by both economic and political struggles in the international arena. In turn, energy prices are a major source of risk for the forecast.

To sum up, comparing with the most probable case scenario, in the "Worst Case" scenario we assume a lower real GDP growth and higher commodity price growth, while in the "Best Case" scenario we assume a higher real GDP growth and lower commodity price growth. Because import elasticity is positive with respect to real GDP and negative with respect to commodity price, we can expect that in the "Worst Case" scenario international trade will grow slower than in the "Most Probable Case" scenario, and in the "Best Case" scenario, trade will grow faster. However, this strictly refers to international trade as measured in real commodity terms. (If measured in nominal value, the volume of international trade in the

“Worst Case” scenario would be larger than that in the “Most Probable” case and “Best Case” scenarios because it is measured in higher prices. However, we always look into the real value to see the real development.)

For the international trade scenarios, no changes were made in drivers at the trade level. It should be noted that it was assumed that there are no constraints on the future levels of economic-derived international trade – in effect, the trade projections represent the demands for each commodity group, and this demand will be satisfied from supplier nations without any outside-imposed restrictions.

Probabilities

Assigning probabilities to the economic and trade results of a set of assumptions is more an art than a science, even when the results are derived from a set of rigorously estimated, proven econometric models. Many events cannot be captured statistically in such models. Indeed, the terrorist attacks in the U.S. in September 2001 are a good and poignant example of this fact of economic forecasting. Also, the historical variation in any particular economic variable, such as labor productivity or commodity prices, is not necessarily a good guide to future variation and, therefore, may not be usable to estimate future probabilities within some predefined range.

The probability of a particular scenario occurring is an estimate of the likelihood that the general economic picture portrayed in the model output will come true. Of course, the likelihood that every variable in the model will assume the precise value displayed in the output files, for every year of this 25-year forecast, is almost zero. Therefore, it must be realized that the probabilities assigned to the scenarios for this study are used more as *ordinal rankings* of the scenarios than as exact probabilistic estimates. The probabilities were set based on the considered opinion and experience of the economists who compile the economic data, review each country's economic and political landscape, and run the models by making critical assumptions about key economic drivers.

Also, we must constrain the sum of the probabilities to be 100% since we are examining three outcomes that are mutually exclusive.

The scenarios developed for this project for the Panama Canal have the probabilities shown:

Scenario	Description	Probability
Most Probable Case	A long-term forecast of the major economies and key variables under the assumptions	60%
Worst Case	A long-term forecast using assumptions of weaker growth in key economic areas, such as productivity	25%
Best Case	A long-term forecast using higher growth assumptions for key areas of each economy	15%

As a result, the study provides a comprehensive set of expected macroeconomic conditions for each country along with plausible alternatives that serve as the upper and lower bound for a particular point forecast. The resulting trade scenarios have the same probabilities by default since no changes in the assumptions were made at the level of international commodity trade.

Selected Results

The study provides us with a way to evaluate the possible growth trends for a particular country or region, and to visualize the possible trade opportunities existing along these macroeconomic paths. For example, between 2000 and 2025, we expect compound annual growth for GDP in the U.S to escalate annually by 3.1% in the “Most Probable Case”, by 2.5% in the “Worst Case” and by 4.0% in the “Best Case.” By the same token, Japan’s GDP is expected to grow by 1.8% per year in the “Most Probable Case” by 1.3% in the “Worst Case” and by 2.7% per year in the “Best Case”. In the “Most Probable Case”, the fastest growing economy in real 1995 dollars is expected to be China, which will grow by 7.3% per year between 2000 and 2025, followed by Chile and Taiwan, which will expand annually by 5.6%, and 5.5% respectively. The slowest growing economy in the “Most Probable Case” will be Japan, which shows an overall annual growth rate of 1.8% between 2000 and 2025, followed by Italy and the UK, which are expected to grow annually by 2.2% and 2.3% respectively during the same period.

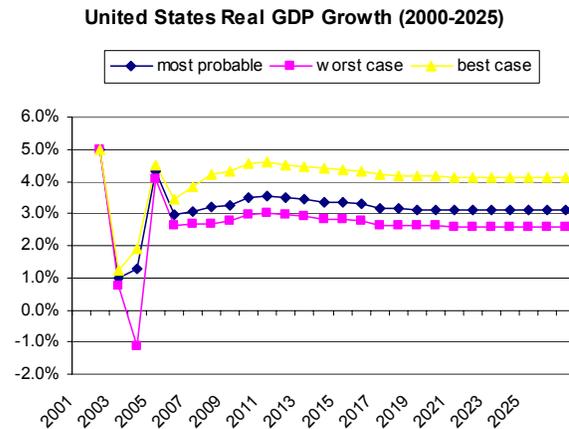
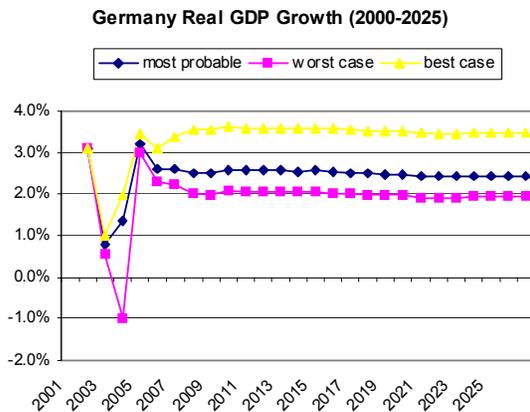
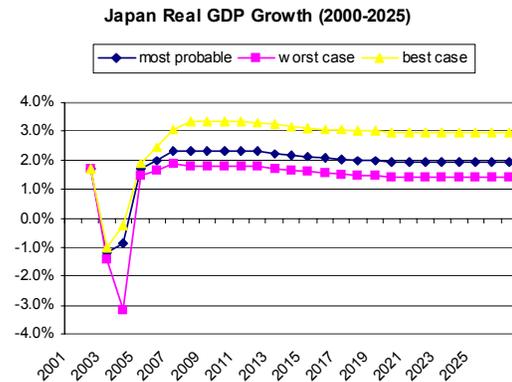
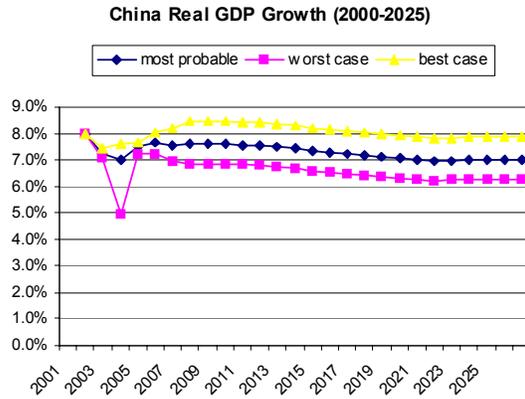
In the “Best Case” forecast, the fastest growing economies between 2000 and 2025 will be China, Taiwan, and Ecuador, which will be expanding annually by 8.0%, 6.2%, and 6.1% respectively. At the same time in the “Best Case” the three slowest growing economies will be Japan, Italy, and the UK, which will expand annually by 2.7%, 3.0%, and 3.2% in the same period respectively .

REAL GDP GROWTH			
Compound Annual Growth Rate 2000-2025			
Scenario			
Country	Most Probable	Worst	Best
US	3.1%	2.5%	4.0%
Japan	1.8%	1.3%	2.7%
China	7.3%	6.5%	8.0%
Germany	2.4%	1.9%	3.3%

Source: DRI-WEFA Inc.

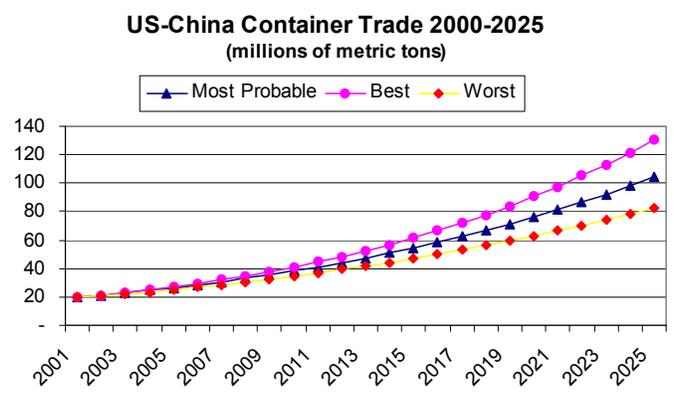
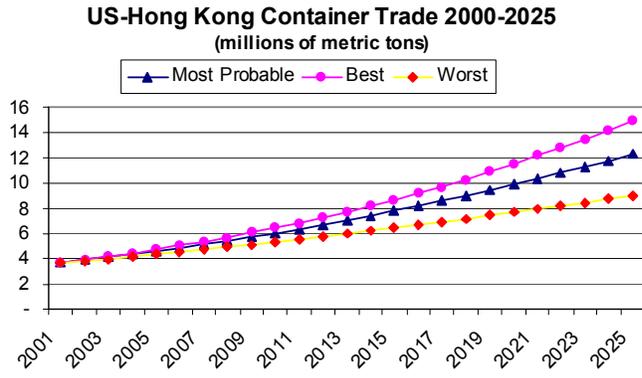
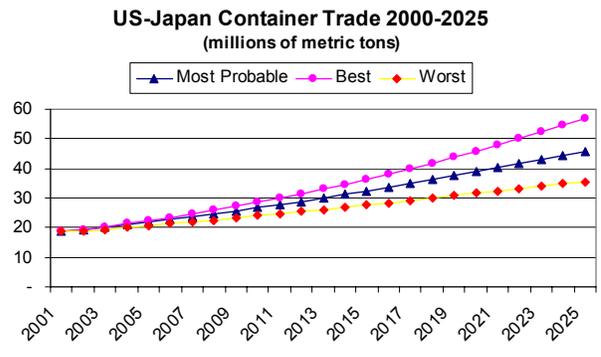
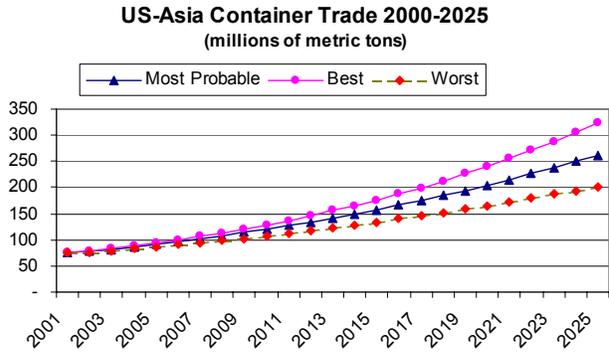
In the “Worst Case” forecast, the fastest growing economies will be China, Taiwan, and Chile, which will expand annually by 6.5%, 4.7%, and 4.6% per year respectively. On the other hand, the slowest growing economies will be Japan, Italy, and the UK, which will grow between 2000 and 2025 by 1.3%, 1.6%, and 1.8% respectively.

From these scenarios, DRI•WEFA ran its world trade model to obtain the possible scenarios for trade in commodities. One important commodity that has important implication for the canal is containerized cargo. Looking at total trade in containerized cargo between 2000 and 2025 in the “Most Probable Case” we expect that total trade (in metric tons) between the U.S. and Asia will expand by 5.2% per year and reach 261.6 million metric tons by 2025. In the same period, total trade between the U.S and China will rise annually by 7.0% and reach 104.1 million metric tons. Between 2000 and 2025, total trade between the U.S and Hong Kong will escalate by 4.9% per year and reach 12.3 million metric tons, while that between U.S. and Japan will advance by 3.7% per year and reach 46.0 million metric tons in 2025.

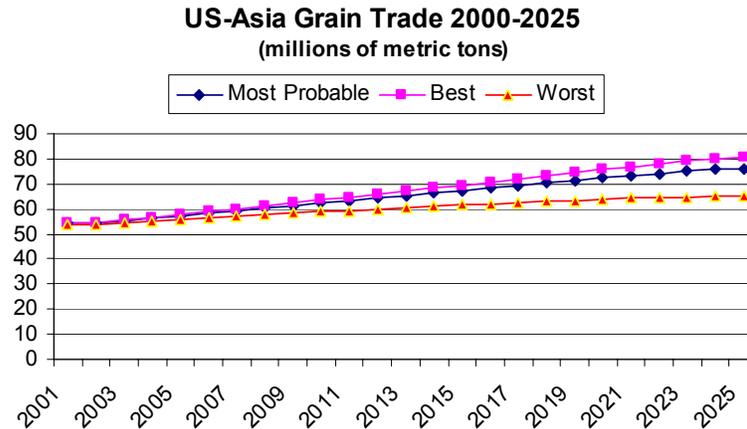


Containerized Trade		Annual Average Growth			
Total Trade	Scenario	2001-05	2005-2010	2010-25	2000-25
US-ASIA	Most Probable	5.1%	5.6%	5.3%	5.2%
	Best	5.7%	6.5%	6.4%	6.1%
	Worst	3.8%	4.5%	4.3%	4.1%
US-CHINA	Most Probable	7.4%	7.6%	6.9%	7.0%
	Best	8.0%	8.7%	8.0%	8.0%
	Worst	6.1%	6.6%	5.9%	6.0%
US-HONG KONG	Most Probable	5.4%	5.6%	4.8%	4.9%
	Best	5.9%	6.4%	5.8%	5.7%
	Worst	3.9%	4.2%	3.5%	3.6%
US-JAPAN	Most Probable	3.7%	4.1%	3.7%	3.7%
	Best	4.2%	5.0%	4.7%	4.6%
	Worst	2.4%	3.0%	2.6%	2.6%

Source: DRI-WEFA

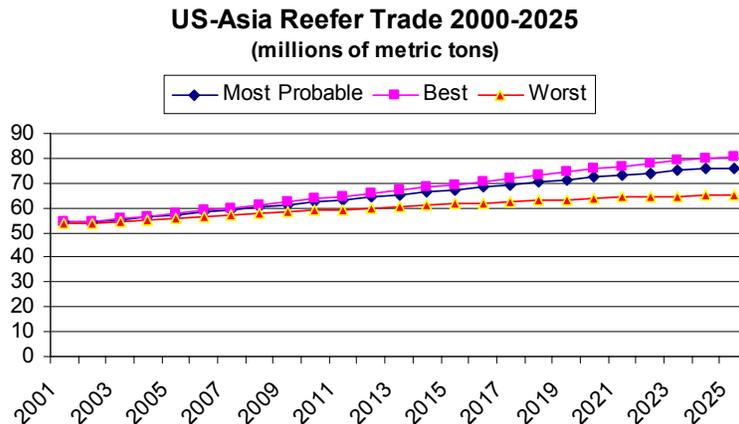


Another commodity that is also important for the Panama Canal is Grain. One trade route that impacts the canal is that between the U.S. and Asia. In the “Most Probable Case”, total trade in grain between the U.S and Asia will grow annually by 1.4% per year and will reach 76.2 million metric tons in 2025, while in the “Best Case” total trade will expand annually by 1.6% per year and reach 80.8 million metric tons. In the Worst Case, total trade between U.S and



Asia will expand by 0.7% per year and will reach 65 million metric tons by 2025.

Finally, another significant commodity for the canal is refrigerated goods (reefer), which include fruits and other perishable goods. One particular trade route affecting the canal is that between Ecuador and the U.S. Most of this trade is bananas, but there are other agricultural products as well. In the “Most probable Case”, total trade between the U.S and Ecuador in refrigerated goods between 2000 and 2025 will expand by 3.7% per year and will reach 3.5 million metric tons. In the “Best Case” it will rise by 4.1% per year during the same time period and will reach 3.6 million metric tons in 2025. Finally, in the “Worst Case”, total trade between Ecuador and the U.S. will expand by 2.7% per year and will reach 2.6 million tons in 2025.



Section V Includes the individual executive summaries from the three scenarios. These are repeated in each of the more detailed expositions of the “Most Probable”, “Worst Case”, and “Best Case” scenarios.

Most Probable Case

World Macroeconomic Outlook

The **most probable case**, which is presented in this Volume I of the report, is built on the following assumptions:

- The existing (November 2001) DRI•WEFA short-term most probable case forecast is assumed to hold through 2006;
- Any cyclical or other patterns seen in the short-term forecast (2006) are not assumed to continue in the longer term;
- Each of the economies trends toward its natural state of equilibrium, in which supply is sufficient to meet demand in the real sector;
- Fiscal policy is accommodative and does not impose pinch points, such as credit crunches;
- The world moves more toward open trade, as barriers are reduced over time;
- Exchange rates move to their natural free-market levels based on economic growth, inflation, and relative interest rates.

The last two decades of the 20th century witnessed vast changes in political structures and economic institutions across the globe. Political challenges to post-World War II policies and policy mechanisms resulted in a redefinition of social agendas, a redistribution of political power, and a reorganization of economic institutions. In the dawn of the new century, momentum continues to drive the world towards fundamental social and economic change. Europe is proceeding towards full union and will welcome Eastern European members over the next decade. Russia continues to struggle, but, nonetheless, treads the path of economic liberalization. Asia appears to be recovering from a period of structural weakness and speculative excess and is climbing back to its pre-crash growth path. Latin America, still working through political reform and currency distress, is committed to liberalization. Africa, under the guide of the IMF, is gradually implementing structural reforms, while the Middle East is just beginning to see pockets of change.

Increasingly, governments have moved to decentralize political power and budgets, to privatize state assets, and to open borders to trade in goods, services, and capital. Stimulated by liberalization, old industries have restructured, and new industries have begun to develop. Both have boosted economic growth and personal wealth. Yet, in the aftermath of this rebirth, the new century poses new difficulties, due also to these structural realignments. Political and economic change has engendered a good deal more economic uncertainty. The struggle for freedom and more democracy has led to armed struggles in many less developed regions. Increased trade liberalization has brought much growth to the economies of developed countries in the West, just as it has provided a new source of economic well being in less developed countries. Yet, legitimate concerns for the environment, equity in labor markets, and improved corporate governance have found alliance with the protectionist bogeyman. The

huge technological advances that have fueled so much of the world's growth have raised concerns about increasing distribution problems across nations and income groups within nations. Indeed, parts of Africa, the Middle East, the Balkans, and south Asia are riddled with political, religious, and ethnic conflicts. In parts of Africa and Latin America, the high debt burden is a major problem that continues to frustrate the reform effort. Debate among developed countries continues on which economic model is optimal—the Anglo-Saxon free-market approach, or the continental European model. So, as we survey prospects over the first two decades of the new century, we recognize that the broad movement towards the dominance of capitalism, liberalized markets, democratic institutions, and expanded trade will not be without difficulties.

From an economic forecasting perspective, there are three major global trends that relate the experience of the last two decades to the next two decades: globalization, economic and political convergence, and falling population growth rates. Globalization is a much-discussed term, but in the context of a long-run projection, it refers to increased trade and, hence, increased interrelations between the economies of the world. The increased number of trade alliances, the rising volume of trade, the lowering of tariffs and non-tariff barriers, the growth of international capital flows, and the increased size and global perspective of multinational corporations are all manifestations of globalization. As technology and transportation services improve, the process of globalization will only accelerate.

One consequence of globalization is the convergence of economic and political systems. The process of convergence has begun and is likely to accelerate along with globalization over the next two decades. On the economic side, income levels are beginning to converge. Since labor is not as mobile as equipment, investment is flowing into those areas of the world that are poor in capital, but rich in labor, and offer a stable economic environment. The capital and technology flows into these poorer regions of the world stimulate economic growth in the near term with expectations of further economic development. Growth in total output of goods and services has been faster in Latin America and Asia over the past ten years than in the industrialized world. This trend is expected to continue over the next 25 years, with growth in real gross domestic product (GDP) averaging 4.0% in Latin America and 5.7% in Asia outside of Japan, but only 2.4% in Europe, 2.7% in the United States, and 2.1% in Japan. Although population and labor force growth is more rapid in these regions than in the industrialized nations, real GDP per worker is still expected to grow more quickly in the developing countries. Thus, levels of productivity will converge across countries, and it is this that drives the income convergence.

From a political standpoint, monetary and fiscal policies and, to some extent, political systems are converging. As a consequence of the increasing globalization of financial markets, more countries are establishing independent monetary authorities whose primary goals are to control inflation. Even China is adopting a central banking system modeled on the Federal Reserve in the United States. Mainstream approaches argue that international capital tends to flow into countries that have stable and independent monetary systems. On the other hand, hyperinflation tends to push capital out of a country. Fiscal policies are converging towards more conservative spending and taxing policies with a low deficit-to-GDP ratio, driven by institutional arrangements in Europe (through EMU's growth and stability pact) and the IMF, as a condition for structural adjustment loans. Whereas the punishment for rising inflation from international capital flowing out of a country can be quite swift, the penalty for a lack of

fiscal discipline is not so clear. Excessive government borrowing—which usually stimulates growth in the short run—often leads to extreme asset valuations, high inflation, and/or inordinate external borrowing. Ultimately, the economy must slow, often abruptly and for a prolonged period, to adjust and restructure for growth. The benefits of prudent fiscal policy are becoming more widely learned, reinforcing the tendency in other countries. Global competition ensures that countries with immoderate fiscal policies are eventually punished.

As we have seen in recent years, economic interdependence, and financial integration in particular, is not necessarily a win-win situation. This has been most acutely so in developing countries in which there are newly created, but thinly traded, capital markets. Capital movements, large in relative size and swift in response to real-time news, have created a substantial degree of currency instability in world markets. Indeed, the economies of Southeast Asia nearly collapsed during the financial crisis of 1997–98, and if not for fast global intervention, U.S. and European financial markets would have been endangered. More recently, Turkey faced a similar financial crisis in December of 2000 and had to be rescued by the IMF. The crises in Southeast Asia and Turkey have demonstrated that investors will punish those economies that fail to reform and create more transparent and less corrupt political institutions. As a result, both developed and developing nations have been forced to adjust their monetary policies in response to global financial crises created in the wake of free and fast moving capital flows. Hence, as the world’s political and economic institutions evolve in this new era, they will need to address how global imbalances can be adjusted with a minimum of financial instability.

Labor force growth rates are also declining, but not as rapidly as population growth. As the labor market tightens with the slowing rate of labor supply, wages are bid upward. (This is true in developed countries, but not in developing countries. In developing countries, there is still a large surplus of labor. The tight labor market in developed countries does not necessarily lead to higher wages because the governments often remedy the problem by importing migrant workers.) Rising real wages bring more workers into the labor force, pushing up the participation rate—the percentage of people in the labor force relative to the working-age population. Rising real wages must be paid for with gains in productivity if the country is to remain competitive. Companies worldwide are continually making decisions on the trade-off between capital equipment and labor. Rising real wages push them towards more capital-intensive production techniques and, hence, higher output per employee.

This volume provides details of DRI•WEFA’s latest long-term projection for the world economy, which is an extension of our medium-term forecast through 2006. The medium-term forecast is from our January 2001 edition of the *World Economic Outlook*. The forecast is essentially a trend growth scenario containing no business cycles other than those that were incorporated into the medium-term forecast. For the period from 2007 to 2020, the forecast does not explicitly account for supply or demand shocks, such as wars, commodity price hikes, or abrupt policy adjustments, which traditionally have been prime causes of business cycles. The projections are based on certain core assumptions about demographic trends, productivity growth, economic policy, exchange rates, and commodity prices. These assumptions are discussed in detail in the text that follows.

Demographic Developments

World population growth is forecast to slow to 1.1% per year over the period 2000–25, from 1.5% per year over the last ten years. Africa and South Asia are expected to continue to show the highest rates of growth, averaging 2.4% and 1.5% per year, respectively, while population growth in the OECD area is forecast to subside to only 0.5% per year. Within the OECD area, Europe will experience the slowest rate of expansion, with three countries—namely Germany, Greece, and Italy—are expected to register an absolute decline in population.

Rising participation rates, particularly among women, will partly offset the impact of slower population growth on labor supply in the European economies. Male participation rates have declined over the past decade in most OECD countries, mainly due to the withdrawal from the labor market of elderly workers, induced by relatively high unemployment and an expansion of early retirement schemes. However, female participation rates have continued to rise. There is still considerable scope for further increases in female participation rates in most European countries. With the exception of the Scandinavian countries, the female participation rate in Europe is presently below the North American countries. For the male population, there is less disparity in the participation rate between countries, with virtually all groups from ages 25 to 54 registering close to 90% participation. The following table, **Labor Force Participation Rates**, shows the rise of labor force participation across the forecast horizon.

Labor Force Participation Rates

Country	2000	2010	2025
United States	67.1	68.8	71.5
Canada	65.9	66.1	67.4
Japan	62.3	62.1	61.0
Germany	75.4	76.2	77.7
France	67.9	73.9	87.1
Italy	59.2	63.2	67.7
United Kingdom	79.5	78.5	77.8
Australia	72.2	73.0	74.5
Austria	70.4	72.3	74.5
Belgium	63.4	65.1	68.9
Denmark	81.3	82.0	84.3
Finland	74.8	79.6	88.1
Greece	62.0	64.0	68.0
Netherlands	67.0	72.4	78.0
New Zealand	76.1	81.7	85.9
Norway	81.5	82.1	83.6
Portugal	70.1	73.5	78.3
South Africa	35.1	36.4	39.9
Spain	51.1	53.0	56.3
Sweden	75.9	77.4	80.4
Switzerland	73.4	75.0	78.2
Turkey	52.4	57.1	70.5

Source: DRI•WEFA, government data from the individual countries, OECD

In addition to the impact on labor force growth, the projected demographic changes will also influence other aspects of economic performance. Lower population growth in many of the industrial economies will be accompanied by an aging of the population. The share of the population aged 65 and over will rise in all countries, but Japan will experience the largest increase—from 14% of the total in 1997 to more than 24% by 2025. Most European economies will have a higher proportion of elderly in the population in 2025 compared to the present. Close to 20% of the population in Italy, Germany, Denmark, Sweden, and Switzerland will be over 65 years of age by the end of the forecast period. By contrast, the proportion of elderly in North America will be 15% by 2025.

The increase in the share of the elderly in these countries may lead to a decline in private savings rates, since the elderly tend to spend a larger proportion of disposable income and exert upward pressure on real interest rates. The relatively high reliance of the elderly on publicly provided social expenditures, especially pensions and health, will also tend to boost government spending in most OECD countries. The additional resources required by older citizens will, in some cases, be offset by a decline in the requirements of young dependents. For example, the total dependency ratio (i.e., the population under age 15 and over 64 as a proportion of the population aged 15 to 64) is expected to rise for most industrialized countries during the forecast period. The exceptions, where the rate is stable or even falling, are the United States (falls from 53% in 1997 to 50% in 2019), New Zealand (unchanged at 52%), and the United Kingdom (falls from 55% to 54%). France and Norway will see small increases, from 53% to 54% and 55% to 56%, respectively. The ratio is projected to rise quite sharply in the other G7 economies, with Japan (from 44% to 65%) expecting the steepest rise.

Productivity

Growth in economic activity can be attributed to two factors: an increase in total hours of employment and a rise in the productivity of each worker. Productivity, which is measured as total output divided by total number of hours of work for the entire labor force, is an important indicator of the health of a national economy. In advanced economies, growth of the labor force has slowed significantly in recent years as a result of declining population growth and retirement of older workers. Consequently, improved productivity through innovation and technological advances was the key contributor to economic growth.

The main sources of labor productivity growth are capital deepening and increases in multi-factor productivity. Capital deepening simply means an increase in the quantity of capital per unit of labor. Multi-factor productivity (MFP) captures the disembodied technological and organizational improvements that increase output for a given amount of various inputs. Recent technological innovations in the field of information technology, such as access to the Internet and more efficient database management systems, are two good examples of improvements in MFP during the 1990s. For most of the OECD countries, the advances in information technology (IT) were the most important source of productivity growth in the second half of 1990s.

In the United States, the productivity growth rate increased by 1% in the second half of the 1990s compared to the first. Economists have tried to determine the source of this higher productivity, and there are strong indications that information technology (IT) and related innovations have played a key role in explaining this extra 1%. Most studies attribute between one-half and three-quarters of a percentage point to IT. Some studies have also shown that multi-factor productivity growth, which captures some aspects of IT, technology plus many other factors, accounts for between 25% and 100% of this additional 1%. Between 1999 and 2000, labor productivity in the United States grew by 4.2% and 7.1% in the business and manufacturing sectors, respectively. Within the manufacturing sector, productivity grew fastest in the durable goods sector, which includes the IT equipment. The durable goods sector enjoyed a 10.5% increase in productivity, while the growth in the non-durable goods sector was only 3.2%.

During the last quarter of 2000, as the U.S. economy slowed, there was a visible decline in the rate of growth of productivity. On a quarter-over-quarter annualized basis, productivity in the last quarter was 3.1% and 5.3% in the business and manufacturing sectors, respectively. Furthermore, most of these positive growth rates were due to a decline in hours of work rather than an increase in output, as hours of work declined by 2.2% and 6.7% in the business and manufacturing sectors, respectively.

The higher productivity growth rates in the second half of the 1990s in the United States have also been registered in other OECD members. The most recent comparative OECD data on productivity show that during 1996–99 Ireland, Finland, Australia, and the United States enjoyed the highest rates of productivity growth (as well as output growth) among OECD members. Furthermore, in these countries, multi-factor productivity growth accounted for a much larger share of total productivity growth as compared to capital deepening. This provides further evidence of the sizable contribution of information technology to productivity.

Increased use of computers, telecommunication devices, and the internet has increased labor productivity through three channels. First, rapid increases in productivity of industries that produce IT products led to a sharp decline in their market price and added to economy-wide productivity. Second, strong investment in IT increased capital deepening, which resulted in a higher capital/labor ratio in OECD countries. Third, the widespread use of IT led to positive spillover effects (i.e., returns on investment in IT for each firm have been higher because a large number of other firms have made similar investments). For example, as the Internet expands and more resources become available on the Web, return on Internet-related investment increases.

In 1997, expenditure on information and telecommunication technology exceeded 5% of GDP in every advanced OECD country other than Italy and Spain. During the 1990s, for G7 countries as a group, the share of IT investment in total investment rose steadily. The share of IT in non-residential gross fixed capital formation in the United States rose from 8.7% in 1990 to 13.4% in 1996. Comparable figures for (Western) Germany were 3.5% and 6.1%, respectively. The United States remained the leader in IT investment during the 1990s. Furthermore, due to rapid productivity growth in the IT sectors, the price of IT equipment declined steadily over the last two decades. During the 1990–96 period, the comparable IT equipment price index dropped by an average of 10% per year in the G7 countries.

As mentioned earlier, multi-factor productivity (MFP) has been an important contributor to overall productivity growth in OECD countries. In the United States, MFP growth has been on a rising trend since 1979, and remained above 1% per year throughout the 1990s. For other advanced economies, MFP growth rates rose by at least 0.5% in Australia, Canada, Denmark, Finland, Norway, and Sweden during the same decade.

Economists in recent years have tried to identify the factors that lead to higher MFP growth. Evidence from the OECD nations has identified several important causal links. One of the most important factors is research and development (R&D). OECD data show a positive correlation between business R&D intensity and MFP growth. Furthermore, the statistical correlation between these two variables increased from 0.3 in the 1980s to 0.79 in 1990–98 period, indicating that R&D has become a more important factor.

Another important factor that influences MFP is the burden of administrative regulation. Evidence for OECD countries shows that the increase in productivity growth during 1990–98 compared to 1980–90 was larger in countries that had less administrative regulations. For instance, in the United States and the United Kingdom, it takes one to two working weeks to complete the administrative work for setting up a new business. The same process might take months in Spain and Italy. An important area shown to have a strong impact is employment protection regulations. In countries where the labor market is highly flexible and firms can adjust their labor force without restriction, such as the United States, Canada, Australia, and New Zealand, the increase in MFP growth has been greater than other OECD economies.

In the long run, productivity growth is expected to increase, but there is concern that in the short run poor equity market performance in the United States could adversely affect investment in new equipment and R&D. This is particularly relevant to “New Economy” activities related to information technology. Strong interest worldwide in IT firms led to the rapid rise of equity stock prices between July 1999 and January 2000, which changed the pricing behavior of IT and non-IT stocks. The current decline in the prices of IT stocks has had a negative wealth effect at the global level. Investor interest has declined, and many IT

firms, particularly Internet start-ups, have faced financial difficulties. This investor pessimism will make it more difficult for firms to finance new IT investments.

Other factors have also been put forward to explain the rise in productivity growth over the past decade, which went beyond the technology transfer model. Proponents of the new growth theory suggest that more emphasis should be given to knowledge accumulation and learning rather than merely to capital accumulation. Indeed human capital, not just physical capital, is a critical element to contemporary thinking. This is an important idea in that even if a technology is transferable, it may not be appropriate to a country until a certain level of development has been achieved. That is, unless the skills in the workforce are sufficiently matched to the technique, it may be difficult to achieve an increase in productivity. Finally, there may be a variety of institutional impediments to raising productivity, including a lack of openness in trade, poor governance, or an inadequate social infrastructure.

GDP Per Employee (% Growth at Annual Rates)

	1961-70	1971-80	1981-90	1991-00	2001-10	2011-25
US	2.3	0.8	1.4	2.1	1.8	1.7
Canada	2.7	1.0	1.0	1.4	1.4	1.3
Japan	8.7	3.8	2.9	1.1	2.3	1.5
Germany	4.3	2.6	1.7	-0.1	2.2	2.4
France	4.9	2.8	2.0	0.9	3.6	1.7
Italy	6.3	3.0	1.8	1.6	1.5	1.9
UK	2.6	1.8	2.0	2.2	2.2	1.5

Economic Policy

In our simulation, fiscal and monetary policy instruments have been set on paths that are broadly compatible with a gradual correction of internal and external imbalances, enabling economies to generally expand in line with potential growth over the long term. The 1980s saw a shift in the focus of fiscal policy in many industrial economies away from short-term demand management toward longer-term goals of reducing fiscal imbalance and the public sector's share of the economy, thereby releasing resources to the private sector. A key assumption here is that those countries with large budget deficits or high public-sector debt-to-GDP ratios will continue to take steps to try to improve their fiscal position, primarily by reining back the growth of public expenditure.

Monetary policy is expected to remain the key to controlling inflation, and policy assumptions are set to generate success to one degree or another. Hence, there is a general tendency for inflation to moderate in all the countries, particularly the industrial economies. The following countries are currently in the European Monetary Union (EMU): Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain. We anticipate that the United Kingdom, Sweden, and Denmark will join the club over the next ten years, and we may well see some of the new East European countries join EMU as well over the same period.

Coordination of economic policies among the governments of the G7 remains only moderately successful. The completion of the Single Market in the European Union; the Free Trade Agreement between the United States, Canada, and Mexico; and the strengthening of cooperation within the ASEAN bloc will reinforce regional links at the expense of non-participants. However, the GATT accord has reduced the risk that regional integration could pave the way for the creation of tightly closed and antagonistic blocs. Despite the emergence of trading blocs, the general trend in government policy is toward the reinforcement of market forces and a reduction in government intervention in the economy. This trend is obviously apparent in the former communist countries of Eastern Europe, which have gradually moved to a free market economy in preparation for potential EU membership. In the United States, the business sector, under pressure from Japan and the dynamic ASEAN economies, will again demonstrate that its great strength lies in the free market. The Southeast Asian Pacific region is also expected to open up, particularly with respect to liberalization of trade in merchandise and services, and capital transactions.

Exchange Rates

Contrary to everybody's expectations, the euro has been a major disappointment to date. Since February 2000, the euro broke through the parity against the dollar—a degree of weakness not seen (if measured in DM terms) for the past ten years. Euro weakness reflected dollar strength—the combined effect of a booming economy, moderate inflation, and an exorbitant rise in equity valuation—and even now with the U.S. economy slowing significantly, investors still expect the strong growth of recent years to return. The euro/dollar rate is not being driven by economic fundamentals at the moment, with economic growth and interest rate differentials weighing heavily in the euro's favor, Eurozone fiscal deficits shrinking, unemployment falling, and the U.S. current account balance still ballooning. When markets return to economic fundamentals, we expect to see the euro regain parity and strengthen further.

The euro was introduced at the start of 1999, and with it, in accordance with EMU agreements, a common monetary policy implemented by the newly established European Central Bank. The Eurozone countries form an economy that is larger than Japan's and only 20% smaller than the U.S. economy. As a major world currency, the euro stands to compete with the U.S. dollar and the yen for portfolio holdings and as a reserve currency as well. In any case, the long-term view of exchange rates takes explicit account of the dollar/euro relationship in which, over time, the euro appreciates against the dollar back towards its opening rate on January 1, 1999.

The yen is also expected to gradually strengthen in the future. This partly stems from the lower rate of inflation in Japan. But most of the expected appreciation arises from the gradual reduction in net capital outflows as Japan's savings rate declines in lockstep with the aging of its population.

Commodity Prices

Oil

Crude oil had enjoyed its longest price boom in more than two decades. Strong global demand and successful output control by OPEC helped push the price of oil to over \$30 per barrel in 2000. The demand was so strong that OPEC had to increase output in the second half in order to prevent the average price of the OPEC basket of crude from rising above \$28 per barrel—the target upper limit. However, as the U.S. economy slowed in the final months of last year, demand softened, and the price of oil has been on a downward trend ever since.

In response to softening global demand for oil, OPEC has reduced its output twice in 2001. This could result in a loss of market share for OPEC and make it more difficult for the cartel to reduce output further in the future. While the risk of a sharp price increase is remote, the global slowdown might become more severe and lead to a further drop in demand for oil. Under such a scenario, the downward risk to oil prices will be high.

In the medium run (2003–06), demand is expected to increase as the global slowdown comes to an end in 2002. Supply is also expected to increase as a result of the large investment in new oil fields that is currently underway. The recent price boom and OPEC's announced strategy of maintaining the price above \$22 per barrel have created a strong incentive for new investment in the oil industry. As a result, the global supply of oil will be adequate to meet the growing demand without any danger of a sharp price rise. We expect oil prices to fluctuate in the \$20 to \$30 per barrel range over the 2002–06 period. OPEC's stabilizing role will continue; although, because of its shrinking share of global output, it will be more successful in preventing sharp price increases. In the long run, we expect the growth in demand to exceed supply and lead to a gradual increase in the price of oil.

Metals

The price of most metal commodities is expected to enjoy a moderate upward trend during the next five years. In the short run, aluminum demand is expected to be lackluster, given poor market conditions in the United States and Japan. As a result, prices will remain stagnant before they begin to move up again during the second half of this year. In the long run, aluminum price growth is estimated to average between 2.0% and 2.5% per year. The market for copper and zinc has followed a path similar to that of aluminum. Copper demand was especially strong in the United States in 1999 and the first half of 2000, buoyed by a surge in construction activities. Zinc also benefited from a record increase in automobile production in the United States. The short-term outlook for those two metals is rather bearish. Like aluminum, they will begin to improve during the second half of this year. Copper and zinc prices should register growth rates similar to those for aluminum in the long run.

Agricultural Commodities

Although demand growth should be robust, global agricultural commodity prices are expected to remain weak in the short term because of large stocks, continued strong yields, and production gains in exporting countries. Supply and demand balances, in the absence of a production shortfall in a major producing area, will correct slowly. Prices and export revenues

are expected to strengthen by the end of the forecast period, due to steady growth in import demand, coupled with a reduction of global stocks. Our assumption of normal weather and yields means that prices will return to more moderate levels than the highs seen during the period 1995–97.

Due to large stocks and increasing world demand, strong growth is forecast for world agricultural trade. Despite the fact that commodity stocks diminished slightly this year, large global supplies remain. Due to excess stocks, combined with increases in world demand, strong growth is projected for world agricultural trade. Healthy economic growth rates forecast for most of Asia, Latin America, North Africa, and the Middle East support our expectation of increased world demand. Although moderate gains are expected in developed countries, strong trade growth should be supported by the relaxation of trade restrictions through ongoing unilateral policy reforms and existing multilateral agreements.

The five-year decline in cultivated crop area is expected to come to an end and increase over the long term, although about two-thirds of the area decline since 1996–97 has taken place in the former Soviet Union. Cultivated areas of the world's major crops (wheat, rice, coarse grains, soybeans, rapeseed, and cotton) have fallen steadily from their highs of 1996–97. However, declines over the 2000–2001 growing season were not as large as in preceding years. Low prices for agricultural commodities persist and have continued to take their toll, which resulted in a 5.1-million-hectare fall in major crop area in 2000. Advances in plant and farm equipment technologies will hold down the expansion of cultivated areas over the longer term.

Long-term Outlook for Agricultural Commodities

Rising demand is expected to continue over the long term, with excess supplies falling and prices recovering. Over the longer term, agricultural commodity prices are expected to recover significantly for two reasons. First, population growth will moderate only marginally; and second, GDP growth is expected to be robust in major population centers, such as China and India. Although demand for food does not grow at the same rate as income, population growth will more than compensate for the disparity in growth rates. Rising incomes will lead to an increase in consumption of meat and other protein-based products, including wheat, in China and India, as the population substitutes these products for their staple food source (rice). The resulting decline in rice consumption in these areas will, however, be met by increasing rice consumption in the West due to immigration and changing preferences. Shifting preference patterns will maintain price stability for rice. Demand for higher quality and more processed foodstuffs will rise as world GDP increases. After recovering from the livestock epidemics in Europe, rising demand for meat will drive demand for soy products and feed grains, maintaining price growth of those commodities.

Worst Case Scenario

DRI•WEFA’s “Worst Case” scenario is a comprehensive and consistent pessimistic simulation for the economies of the world. The simulation furthers the assumptions embraced in the most probable case scenario by assuming less and slower recovery cycles and lower multiplier effects of government spending throughout the economy.

Simulations of this kind, usually consist of individual changes in growth rates in the economy focusing on one economic sector or aspect. These simulations tend to lack consistency in terms of providing a full view of an impact throughout the economy. In addition, they lack robustness since these usually create imbalances in an economy and the sum of the various economic sectors would not add to the total economic effect. Our model incorporates our assumptions at the individual country level and follows the impact on each economic sector. The result is a fully comprehensive scenario that shows the various effects on each economic sector. It is measurable, and comprehensive in scope in that the model provides a full scale view of an economy with complete additive balances at each level internally within the economy and externally within major trading partners and foreign investors. These country level results are then aggregated at the regional level to provide regional estimates, and ultimately provide a full macroeconomic scenario for the world.

In providing the “Worst Case” scenario, we assume a slower recovery cycle for the driving economies of the world. Lower rates of productivity and capacity utilization along with slower fiscal adjustments and a stable natural rate of unemployment will provide an environment for relatively slow private consumption and investment. In turn, GDP should rise relatively slower in the major economies.

Slow growth rates in the major economies provide slower markets for smaller economies and provide relatively lower levels of consumption, investment, and government spending in the smaller economies. In other terms, we assume that wealth will spread from stronger economies to emerging economies at a slower rate. Since the model works one country at a time, it is able to measure directly the economic impacts on countries and their effects on their GDP and GNP. From these results, we aggregate these effects to obtain regional and world estimates.

This simulation provides a lower bound for the possible economic impacts on countries, regions, and world scenarios. This scenario should be used in conjunction with the “Best Case” scenario and the “Most Probable” case in order to obtain an appropriate range from which to gauge economic opportunities in the world. This scenario has been assigned an expected value of 25%.

Best Case Scenario

DRI•WEFA's "Best Case" scenario is a comprehensive and consistent optimistic simulation for the economies of the world. The simulation furthers the assumptions embraced in the most probable case scenario by assuming greater and faster recovery cycles and higher multiplier effects of government spending throughout the economy.

Simulations of this kind usually consist of individual changes in growth rates in the economy, focusing on one economic sector or aspect. These simulations tend to lack consistency in terms of providing a full view of an impact throughout the economy. In addition, they lack robustness since they usually create imbalances in an economy, and the sum of the various economic sectors would not add to the total economic effect. Our model incorporates our assumptions at the individual country level and follows the impact on each economic sector. The result is a fully comprehensive scenario that shows the various effects on each economic sector. It is measurable and comprehensive in scope in that the model provides a full-scale view of an economy, with complete additive balances at each level internally within the economy and externally within major trading partners and foreign investors. These country-level results are then aggregated at the regional level to provide regional estimates, and ultimately provide a full macroeconomic scenario for the world.

In providing the optimistic scenario, we assume a faster recovery cycle for the driving economies of the world. Positive rates of productivity and capacity utilization, along with prudent fiscal policies and a stable natural rate of unemployment, will provide a nurturing environment for private consumption and investment to flourish. In turn, GDP should rise fast in the major economies. Stable exchange rates and inflation differential will also encourage foreign investment and provide a healthy increase in the external sector of the economy via imports and exports. Moreover, country risk differentials and country-based comparative advantages will continue to provide opportunities to further international capital flows by encouraging foreign investment. A healthy external sector will help foreigners buy domestic commodities from abroad, preventing disruptions in exchange rates and preventing balance of payments problems.

Stronger and faster growth rates in the major economies provide greater markets for smaller economies and nurture consumption, investment, and government spending in the smaller economies. In other terms, we assume that wealth will spread from stronger economies to emerging economies as the latter improve their external sector. Stable exchange rates and inflation differentials, improved consumer empowerment and investment, along with fiscal stability, will translate into healthier growth rates for smaller economies. Since the model works one country at a time, it is able to directly measure the economic impacts on countries and their effects on their GDP and GNP. From these results, we aggregate these effects to obtain regional and world estimates.

This simulation provides an upper boundary for the possible economic impacts on countries, regions, and world scenarios. This scenario should be used in conjunction with the low growth scenario and a baseline scenario in order to obtain an appropriate range from which to gauge economic opportunities in the world. The expected value assigned to this scenario is 15%.