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Report on the Project LINK Meeting

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Prepared by:
Global Economic Monitoring Unit
Development Policy and Analysis Division

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1. Introduction and Opening of the Meeting

The fall 2006 Project LINK Meeting was held from 30 October to 1 November 2006 at the Palais des Nations in Geneva, Switzerland, co-hosted by the United Nations Department for Economic and Social Affairs (DESA) and the United Nations Conference on Trade and Development (UNCTAD). More than one hundred participants from over fifty countries and international organizations attended the meeting. The agenda of the meeting covered the global economic outlook, current economic issues, the modeling of global linkages, and international macroeconomic policy coordination. This document summarizes the content of the presentations and discussions. The LINK Global Economic Outlook prepared by the Economic Monitoring and Assessment Unit prior to the meeting, the LINK Country Reports prepared by country participants, and most of the documents presented at the meeting are available on the United Nations website (http://www.un.org/esa/policy/index.html) and the Project LINK Research Centre website at the Institute for Policy Analysis at the University of Toronto (http://www.chass.utoronto.ca/link/).

Mr. Lawrence Klein (University of Pennsylvania) opened the session by stating that this meeting promised to be particularly interesting considering the turning point at which the world economy is currently finds itself.

Mr. Dirk J. Bruinsma (UNCTAD) expressed deep appreciation to Mr. Klein for his continued intellectual leadership of this project, which was initiated under his auspices back in 1968, and to Mr. Peter Pauly for his dedicated management of the project and its network.

Mr. Bruinsma pointed out that project LINK has earned a very high reputation for its quantitative analysis of the international economy, thanks to close collaboration among its members from around the world. It has expanded from a core of seven country models to a truly global system containing almost 79 models, and boasts a network of participants from more than 60 countries. This network of country experts is the most valuable asset of the project, and the country forecasts and reports are inputs that make the LINK global economic forecast possible.

Mr. Bruinsma added that the United Nations has been involved with Project LINK since the early 1970s, when it began providing the basis for much of its macroeconomic analysis, forecasting and policy recommendations at the global and regional level. The project meetings have always offered an invaluable platform for expert discussions and exchanges. The results of these analyses and discussions feed into the World Economic Situation and Prospects, an annual UN publication produced jointly by DESA, UNCTAD and the Regional Commissions.

Generally, improved analytical work is much needed, given the current uncertainties of world economic developments, so ass to allow a well-grounded interpretation of global economic interdependencies.

Regarding the current global economic outlook, one possible view is quite optimistic. The world economy is growing at a relatively rapid pace for the fourth year in a row. This has been a broad-based expansion that has reached all regions. Developing countries, including many of the poorest, have benefited from strong demand and rising prices for primary commodities, despite higher oil import bills for some of them. The debt overhang loosened in several cases, owing to improved current and fiscal accounts in emerging countries, and to the HIPC initiative in low-income developing countries. Recent financial turbulence in some emerging markets has been confined to a small number of countries with fairly high current-account deficits, and there is little evidence of a looming financial crisis comparable to those faced by Asia and Latin America a decade or more ago. On the contrary, access to international financial markets remains quite easy; spreads on sovereign debt have fallen to near-historic lows; and several emerging market economies have repaid, in advance, the debts to the IMF that they had accumulated during past financial crises.

Despite high energy prices and the tightening of monetary policies, growth in the developed economies appears to be better balanced, with Western Europe and Japan growing faster and the United States experiencing a slowdown since the second quarter of this year.

However, even the most optimistic forecasts mention downside risks, mainly related to current account imbalances. The dollar depreciation after 2001 and the present economic slowdown have not yet reduced the US trade deficit. With imports 80% higher than exports, a significant reduction of this deficit would require a substantial adjustment of import growth - which would be difficult to obtain without further depreciation of the dollar or a recession. Such developments would have important repercussions for the rest of the world.

The question of how sustainable these imbalances are, and how exactly they may be resolved, continues to divide the experts. For some people, the problem has been overstated and can simply be left to market forces. For others, the solution depends on isolated adjustments in a small number of key economies. As a result, no coordinated initiative seems to be in place for reducing global imbalances. Can the market do it by itself, without harming global economic growth and financial stability? Or is it possible to continue in a “Bretton Woods II” system, with surplus countries endlessly financing those in deficit?

Other related issues are of special interest for developing countries: is the recent improvement in the terms of trade of primary exporters likely to continue? How best to profit from this favorable conjuncture? Should they anticipate a possible reversal of fortune and prepare for rainy days? How should development strategies be adapted to the various scenarios?

Mr. Bruinsman hoped that some answers to these and other pressing issues will be presented by the experts and wished the participants a fruitful debate.

2. Global Economic Outlook and Global and Regional Issues

2.1 Global Economic Outlook

Mr. Rob Vos (United Nations) presented the LINK Global Economic Outlook. As 2006 draws to a close, the world economy is likely to register another year of robust growth, but world economic growth is moderating. Gross world product (GWP) is expected to increase by 3.2 per cent in 2007, decelerating notably from an estimated growth of 3.8 per cent in 2006.

The slowdown so far has been most noticeable in the United States, particularly in its housing sector. At issue are to what extent the cooling down of the decade-long housing boom will lead to a broad downturn in the United States, and, more crucially, to what extent the weakening economy of the United States will cause a slowdown in the rest of the world.

In the baseline outlook, a measurable slowdown is expected in the United States, as the growth of household spending will be curtailed notably in response to the sliding housing sector. GDP growth will drop from 3.2% in 2006 to 2.2 % in 2007.

Some optimistic analyses predict that the recent strengthening of the economies in Europe and that of Japan should be able to fill the gap left by the United States, thereby achieving a successful rotation of the engines of global growth. The LINK outlook, however, takes a less sanguine perspective: growth in both Europe and Japan is expected to decelerate, the slowdown in the latter being more pronounced as its external sector will weaken in 2007.

Among the economies in transition, the *Commonwealth of Independent States* (CIS) has maintained its strong growth pace in 2006, largely due to high international prices of, and strong external demand for, oil, gas and metals, but domestic demand has also continued to grow. In the outlook, robust regional growth is expected to continue in 2007, but at a more moderate pace than in 2006. Growth in *South-eastern Europe* regained dynamism during 2006 as GDP accelerated to 5.6 per cent. Supported by strong FDI inflows, modernization of production bases has continued in the region. In the outlook, growth is expected to maintain the same pace in 2007.

Growth deceleration is also expected in the developing countries, to varying degrees, across countries and regions (except in Africa). The boom in the group of developing countries over the past few years seems to have become increasingly endogenous to the group -- namely, it has been propelled by a rapid industrialization and growth of modern services in China, India and a few other large developing economies. Nevertheless, the growth of many other developing countries remains highly sensitive to the economic fluctuations in the major developed countries. A large number of developing countries, especially those in Africa and Latin America, continue to be highly dependent on the production/exports of primary commodities, and the major developed countries still account for the lion's share in the global demand for these commodities. Although the influence of China, as well as India, on the growth of other developing countries has increased, these

large developing economies are not immune to a slowdown in the major developed countries, as a large proportion of their exports still depends on their demand.

The growth of world *merchandise trade* in volume has been robust during 2006, increasing at a pace of approximately 10 per cent. In the outlook, the growth of global trade is expected to moderate to about 8 per cent in 2007.

The world trading system suffered a serious setback during 2006 as the *multilateral trade negotiations* under the Doha Round in the World Trade Organization (WTO) were suspended in July. So far, the setback in the world trading system has not generated any visible adverse impact on international trade flows, but it may have created the potential for more trade conflicts in the future.

Oil prices have been on a steady upward trend over the past few years, but the volatility seems to have increased notably during 2006. For example, the price of Brent crude reached a record high of $78.69 per barrel on 8 August 2006, but has since dropped by about 30 per cent, to below $60 per barrel in late October.

In general, tight worldwide oil production and refinery capacity, coupled with solid global oil demand, has been the fundamental factor behind the upward trend in oil prices. Increased geopolitical tensions are among the major factors driving the volatility. This situation will likely remain, and therefore, oil prices are expected to stay on an upward trend amid relatively high volatility. However, oil prices could drop further should the ongoing moderation in world economic growth develop into a "hard-landing". Meanwhile, the Organization of Petroleum Exporting Countries (OPEC) has recently decided to reduce production quotas by about 1 million barrels per day to prevent the prices from falling further.

The annual average prices of base metals and minerals have increased further. Only the prices of a few beverage and food commodities have experienced some moderation. However, the increased volatility in these prices during 2006, as indicated by a sharp decline of 20 to 30 per cent in the prices of many commodities during the months of May and June and more periodic retreats in the second half of the year, may indicate further reversals in these prices in the outlook.

Capital flows to emerging market economies have, as anticipated, moderated during 2006, and a further dwindling in the volume of the net inflows to this group of countries is expected in 2007. The *external financing costs* for emerging market economies remain low.

The outlook for the global economy encompasses a number of uncertainties and downside risks. A possible disorderly unwinding of the large global imbalances, the likelihood of a burst of the housing bubbles in a number of countries and the uncertainties around oil prices are among the major concerns. The risks of an outbreak of avian influenza and unpredictable geopolitical shocks are also not negligible. Current-account imbalances across countries have further widened during 2006. The deficit of the United States is estimated to rise to about $870 billion by the end of 2006. Most developing regions are running surpluses, with the surplus in the group of oil-exporting countries increasing the

most in 2006 and estimated to reach $500 billion. The surplus in developing Asia remains above $200 billion, concentrated almost exclusively in China, Hong Kong SAR and Taiwan Province of China. Latin America has managed to run a surplus for an unprecedented four consecutive years, while Africa is also showing a small surplus. While the surplus in the CIS has surpassed $100 billion, mainly because of the Russian Federation, the group of other economies in transition in Europe is running a sizeable deficit.

Worldwide, the phenomenon of a pervasive "investment anaemia" underlying the global imbalances, as delineated in the previous LINK Global Economic Outlook and *World Economic Situation and Prospects 2006,* has improved only slightly. As a result of its widening current-account deficit, the indebtedness of the United States has deepened, further threatening the sustainability of the global imbalances. The net international investment position of the United States will likely worsen by some $400 billion by the end of 2006, to reach over $3 trillion. Notwithstanding the expected reduction in the global imbalances for 2007, the risks of a disorderly adjustment have not dissipated.

The slowdown of the housing sector in the United States, as indicated by various measures, has accelerated during the course of 2006, despite some month-to-month variation in the data. For example, new home sales, which had been on a steady rise for several years, declined in 2006 by about 20 per cent from the level of 2005 to the level of 2003. Further weakening of the housing sector is expected for the United States in the outlook.

To illustrate the implications for world economic growth if some of the downside risks were to materialize, the LINK forecast also includes a pessimistic scenario. In this scenario, global economic growth could drop to 1.5 per cent in 2007.

In order to reduce these downside risks, international organizations, including the United Nations, the International Monetary Fund (IMF) and the World Bank, have reiterated the need for implementing a set of economic policies in both the deficit and surplus economies in a coordinated way. However, with the exception of some small progress in strengthening multilateral surveillance and multilateral consultation at the IMF, no other concrete actions have taken place. Although there seems to be a number of formidable obstacles to such policy coordination, history shows that inaction or delayed action could have potential costs.

Mr. Thomas Hebling (IMF) noted that there had been robust GDP growth in the first two quarters of 2006, with good indications for the third quarter. The Euro area and Japan are growing robustly while the U.S. is weak. Over the past two years, there has been a broad-based expansion with many countries growing above trend. The global output gap is closing pending to the building up of inflationary pressures. Headline inflation picked up last year, while core inflation is picking up this year. In the second half of 2006 commodity prices have been declining but demand is still strong. In the U.S., productivity has slowed while which pressure has led to rising unit labour costs. This is also true in emerging markets but less so in the E.U. and Japan.

Macroeconomic policies were generally tightening in 2005 and 2006 in terms of soft structural fiscal balances and the real 6-month LIBOR. In 2007, Japan and Germany will be tightening fiscal policy, but higher inflation will keep real interest rates down. In the U.S. and Canada monetary policy will be tighter as inflation expectations come down and real rates increase.

World growth was higher in 2006 and the forecast is for a soft landing back to trend. It is assumed that the policy tightening in the baseline is enough to get inflation to moderate. In 2007, the U.S. is expected to slow from 3.4 to 2.9 per cent, due to the weak housing market and slowing residential investment (which should cut ½ per cent from GDP growth), but business investment and net exports are expected to be strong. The Euro area is expected to decelerate from 2.4 to 2.1 per cent, which is just above trend.

In emerging markets and developing countries, domestic demand is strong. In emerging Europe, the strength of domestic demand has followed, in particular from strong bank lending. However, but there has also been real currency appreciation and current account deficits are large while fiscal positions are weak. Hungary and Turkey are expected to slow but Poland is expected to pick up. In Asia, growth in India and China is expected to slow as exports decelerate.

Upside risks include stronger growth in emerging markets. Emerging markets have had large forecast errors, underestimating growth over the past few years, which may indicate an upside risk - China was underestimated as was Russia. Another upside risk is that given the strong corporate balance sheets, capital investment is weaker than historical norms, so that investment could be stronger than expected.

But downside risks dominate and include potential adverse growth effects of monetary policy, the weak U.S. housing market, consumer uncertainty in the E.U. and Japan, global imbalances, and oil prices.

Monetary policy is synchronized in all three major economic areas. In the past, global growth usually slows when all three areas tighten at once. A retrenchment of global liquidity through contraction of M1 and US dollar denominated foreign exchange reserves usually leads to a contraction in private capital flows to Emerging Markets due to the better yield in the U.S. and other developed countries. However, currently these flows are strong as investors search for higher yields.

The US housing market is another risk. From 2002 to 2005, prices did not reflect fundamentals - the house price-to-rent ratio was too high and prices in both real and nominal terms grew much faster than income, but behaviour was quite diverse at the regional level. In the 1979 housing cycle the Fed tightened policy, and consumption and GDP slowed. The 1987 cycle was mostly regional, and the aftermath was much smoother, with a far pronounced less consumption slowdown but some slowing of investment. The peak of the current cycle was in 2005. So far, the U.S. is in a situation similar to the one in Austria, the Netherlands and the United Kingdom, but this episode is characterized by an unusually large run up in prices and hence could result in a large price decline.

With the slowdown in the U.S., a key issue is the strength of consumption in the E.U. and Japan. While growth has been strong in the E.U. and Japan, consumption expenditure has yet to rebound convincingly, due to weak disposable income and labour market uncertainty.

Global imbalances remain substantial. The forecast assumes constant real exchange rates and thus an orderly unwinding. But this means that international investors would increase the share of U.S. assets in their portfolios. If not, the risk premium on U.S. assets will increase and the currency will depreciate as the savings/investment balance changes. This would lead to a much sharper slowdown in the U.S.

Finally there is the risk from oil prices. With low spare capacity, volatility can be high. The fan chart from the forecast shows that downside risks from oil prices predominate.

Instead of presenting the World Bank's (WB) outlook for the global economy, which will be launched in December 2006, **Mr. Hans Timmer (World Bank)** decided to comment on what was already presented.

The WB also agrees with the global perspective that the economy of the United States will slow down in 2007 while the developing countries will continue to grow strongly. Monetary policy in the developed countries will be tighter but interest rates will still be at low levels and capital flows will continue to go to developing countries. The outlook is benign but with some risks, such as the global imbalances, the U.S. housing sector and the threat of the avian flu outbreak.

The WB's outlook differs from the rest in terms of the tone of the analysis of the risks, which are in fact blessings in disguise. This is a unique opportunity to have a smooth adjustment of the global imbalances with a gradual slowdown of U.S. growth and an increase in savings. This adjustment should start in the U.S. and not vice versa. The real risk lies in the absence of any slowdown in the U.S. economy.

Beneath this benign outlook, various challenges can be identified at the country level. For example, in Latin America, Argentina faces challenges of rising inflation and recurs to price fixing while monetary policy remains loose. Venezuela's economy seems to be overheating. Inflationary pressures also exist in Asia, especially in India and Pakistan. Oil importers in Central and Eastern Europe have current-account deficits of around 5% of GDP. Oil exporters in Northern Africa are growing fast but face challenges on how to spend the windfall revenues, while the oil-importing countries have large fiscal deficits due to subsidies for oil consumption.

On the role of the accumulation of reserves, Mr. Timmer questioned whether there was a one-to-one relationship between the current-account deficit in the U.S. and the increase in reserves in the rest of the world. The existence of this relationship would imply that an increase in reserves in the rest of the world in euros would then increase the current account surplus in the U.S. He also posed the question of whether one should try to prevent a hard

landing of the U.S. The answer would have different implications to the question of whether or not there should be any macroeconomic policy coordination.

Peter Richardson (OECD) explained that the growth rate of trade of goods and services is expected to slow sharply from 10.1% in 2006 to around 7 to 7.5% in 2007. Revised data shows that trade will grow much stronger in Asia and Europe. The regional distribution of trade will be robust but more modest for OECD countries. Brent crude oil prices will be declining but will still remain at high levels creating inflationary pressures. Monetary policy has tightened but financial conditions remain supportive. Fiscal deficits are lower but not near their target levels while business confidence based on expectation surveys remains strong in the OECD area. Short-term GDP indicators will continue to be strong in Europe and Japan but slow down in the U.S. The main uncertainty is the U.S. economy's weakness, especially due to the state of the housing sector, although the OECD expects a soft landing. Mr. Richardson also pointed out that a global slowdown would decrease oil prices, not increase them. Also, developed countries should share policy information in order to analyze the risks.

Ms. Dawn Holland (NIESR) discussed the global outlook. The NIESR outlook was similar to the other outlooks - the decline in the U.S. housing market was expected to push down growth in 2007. The major difference was that they were more optimistic on Japan, with GDP growing by 2.5% in 2007. This came from strong productivity growth and a stable labour input.

Some alternative scenarios were presented, first on the housing market in the U.S. The housing investment-to-GDP ratio has been rising for 5 years and has reached a very high level, 6% of GDP, so that a correction is imminent. The baseline forecast is for housing investment to grow more slowly than GDP, so that the ratio is restored. The main risk is for a more rapid correction, and so the effects of a housing crash were investigated. First it was assumed that house prices fall by 20%. This led to consumption falling by 1.5% for 2 years and GDP falling by 0.5% for 2 years. It did not lead to a recession; as GDP declines, long term rates fall and the exchange rate depreciates, providing some offset to the shock. Second it was assumed that housing investment overcorrects, and goes from 6% of GDP to 3% of GDP. This, plus the fall in house prices, did yield a recession, in the form of three quarters of negative growth. In the early 1980's, there was a sharp drop in housing investment, but the speaker thought that this was unlikely in the present circumstances, and so the impact on the rest of world should be modest. The EU would see a drop in economic growth by1¼ percentage points for 2 years, but the negative effect would be larger for Canada and Mexico. The second scenario would enter a permanent improvement in the current account balance by 1% of GDP.

Another issue discussed was the U.S. current account balance and its sustainability. If it is based on investment choices with a risk premium then it is sustainable, however if the risk premium increases then the exchange rate would fall. A 5% fall would yield a 0.6% fall in GDP, so a 30% fall would cut GDP by more than 3%.

Finally the presenter discussed migration in the EU, which acts as a labour force shock. Approximately 500,000 to 1 million people have left Poland, so a scenario was analysed in which 500,000 workers go to the U.K. and 400,000 to Germany. In the short run, unemployment rises and the real wage falls. In the long run, the labour capital ratio gets restored as investment picks up. Potential output increases permanently in the UK and Germany and decreases in Poland

2.2 Global and Regional Issues

Global Adjustment and Employment Growth

Mr. Lawrence Jeff Johnson and Mr. Christoph Ernst (ILO) gave a joint presentation on global employment trends, highlighting recent changes in employment, unemployment and working poor figures and comparing these with the Millennium Development Goals (MDGs) of reducing poverty. Mr. Johnson began the presentation by explaining the definitions of the statistics providing some background on the estimation methodologies, mainly focusing on the issue of missing values. Because so many of the countries have missing data at the national level, the numbers are published at the aggregate level. Mr. Johnson also acknowledged that there were problems with the data for sub-Saharan Africa but noted that he felt confident with the figures for that region. Finally, he discussed the role of productivity in job creation, in particular decent job creation.

Mr. Ernst focused on the issue of jobless growth. Mr. Ernst began with a description of three possible scenarios of jobless growth: no job growth, low employment elasticity, and declining elasticity. He presented regional output to employment elasticity figures from 1991-2003 at the aggregate and broad sectoral level. The figures showed that there was a slight decline in output to employment elasticity over time; however, the elasticity was greatest when output growth was the highest. Across sectors, the elasticity was highest in the service sector, where it was rising in some countries (e.g. Spain), but declining in others, such as the United States. Mr. Ernst noted that elasticity was not a useful measure for analysis in the developing countries because in the estimation of the figures, the labour force is used as a proxy for employment. Also, the elasticities only make some sense in the formal sector.

During the discussion, Mr. Ernst clarified that the definition of unemployment is one hour or more of work per week. This definition encompasses both a cultural and statistical perspective. Currently the ILO is trying to integrate other aspects into the figures in the next World Employment Report. It is difficult to say much about the Phillips curve when unemployment means different things in different countries.

Panel discussion on inflation and employment trade-offs

Mr. Lawrence Klein (LINK) discussed the importance of productivity for employment growth. In addition, he pointed out that for employment growth to occur, there needed to be a mix of monetary and fiscal policy rather than inflation targeting in country policies. Particularly noteworthing seems in this context the impact of the war in Iraq on US

productivity as the cream of the productive youth are going to Iraq, at least partly causing the (low) productivity growth in U.S. What should be more prominent in the discussions about the economic situation in the world should be the burden of war on the US economy and the price of oil associated with uncertainty in the Middle East. Mr. Klein also noted that China was keeping up the exports of many countries—which could have a potential for increased productivity.

Mr. Torsten Schmidt (Rheinisch-Westfaelisches Institut fuer Wirtschaftsforschung, RWI) presented his findings on the inflation-unemployment trade-off in Germany, against the backdrop of Germany's experience of rising and prolonged unemployment since the early 1970's. For his analysis, he used both a new Keynesian Phillips curve, and a traditional Phillips curve. He showed that there exists a trade-off between unit labour cost and unemployment when using a new Keynesian Phillips curve, but that the statistical fit improves when import prices and prices of intermediate goods are also included. A traditional Phillips curve corroborates this finding, pointing towards a trade-off between wage-inflation and unemployment.

In addition, Mr. Schmidt pointed out that while there exists a significant correlation between inflation and employment, this relation seems to have shifted substantially over the last few decades, as the non-accelerating-inflation rate of unemployment (NAIRU) is varying over time. In fact, there is widespread agreement that the observed increase in the German NAIRU is owing to restrictive labour market institutions. According to Mr. Schmidt, recent labour market reforms seem to have been successful in increasing the effectiveness and efficiency of labour market services and policy measures, activating the unemployed and fostering employment demand by labour market deregulation.

Ms. Pami Dua (University of Dehli) presented her findings on the inflation-unemployment trade-off in selected Asian countries, which she determined by using an open economy Phillips curve, in the new Keynesian tradition. Her study covered developed (Japan), as well as newly developed (Hong Kong Special Administrative Region (SAR) of China, Republic of Korea, Singapore) and developing countries (China, India, Thailand, Philippines). Her findings reveal stark differences between the group of developed and newly developed countries, and the group of developing countries. She finds the expected correlation between the unemployment gap and output gap in developed and newly developed countries, as well as a significant impact of both exchange rate movements and import price inflation on domestic inflation in all countries within this group (with the exception of Hong Kong (SAR), owing to the peg of the Hong Kong dollar to the US dollar). In contrast, she does not find a significant inflation-unemployment trade-off for the group of developing countries.

Pami Dua provided several possible reasons for this discrepancy in the results. In addition to the often limited data availability and coverage in developing countries (especially concerning unemployment), the apparent lack of a Phillips curve trade-off in these countries could be owing to high labour force growth, and the fact that a large proportion of the work force is employed in the agricultural sector. As a result, the scope for monetary policy to help mitigate unemployment in these countries is limited at best.

During the discussion, it was pointed out that when estimating a Phillips curve, one should be careful to separate the long term from the short term. In this context, the question arises as to what drives NAIRU in the long term. Ms. Dua clarified that for her estimation, she had isolated short-term trade-offs by using unemployment gaps and output gaps (i.e. the deviation from potential unemployment and output, as determined by a Hodrick-Prescott filter), instead of absolute levels.

Ms. Délia Nilles (Institut Créa, Université de Lausanne) commented on the inflation situation in *Switzerland*. The average CPI inflation during the first three quarters of 2006 was 1.3 per cent, and seemed to be on a declining trend (with 0.8 per cent in September), owing to a decline in energy prices. In line with this development, there was a noticeable switch in inflation drivers since the middle of the year. While earlier in the year, it had been import prices - and particularly oil prices - that drove inflation, the decline in the latter, combined with a pick up in Swiss GDP growth since the middle of the year, increased the relative impact of domestic price inflation. Overall, however, inflation is low in 2006 and is expected to remain so in the coming years (as GDP growth is expected to slow and international oil prices to decline). Against this backdrop, there would be no need for further interest rate increases by the Swiss National Bank. However, the weak Swiss franc may push import prices up.

Mr. Svante Oberg (Sveriges Riksbank) gave an overview of the inflation situation in *Sweden*. He pointed out that owing to the Riksbank's inflation targeting policy, inflation expectations are the major determinant of inflation in Sweden. The current situation is one of high growth and decreasing unemployment, combined with low inflation. The reasons for this benign situation include: high productivity growth over the last ten years, coupled with only modest wage increases over the same time period (owing to coordinated wage agreements), as well as low import price inflation, and an increase in the quality of labour. Current expectations are that CPI inflation will rise to 2 per cent in 2006 (the Central Bank's target), as a result of healthy GDP growth, an uptrend in housing prices, and an expansion of credit. While monetary policy was expansionary over the last three years, recent policy has been characterized by increasing interest rates, and is expected to continue on a tightening stance over the medium term, in line with market expectations.

Mr. Nicholas Zonzilos (Bank of Greece) highlighted that *Greece* is currently one of the faster growing countries in Europe. Concerning inflation, there is no clear sign of a strong pass-through of higher energy prices to the general price level. But inflation is expected to increase due to strong domestic demand. In the longer term, Greece needs to reform its labour markets (including the wage negotiation mechanism), and to liberalize its product markets in order to enhance competition.

Mr. Hannu Viertola (Bank of Finland) commented that *Finland* currently enjoys the highest GDP growth in the Euro area, as well as the lowest inflation rate. The prolonged decline in inflation rates started in 2000, and inflation in Finland reached its low-point in 2004. The main reason was a pronounced decline in the import prices of consumer goods, as imports from Asia increased. Accordingly, inflation of non-energy industrial goods decreased,

but that of services has increased recently, driven by an increase in telecom prices, and a slowdown in productivity growth in this sector. Overall, HICP inflation in 2006 will remain at 1.3 per cent - about 1 percentage point below the Euro area average. In 2007 and 2008, inflation is expected to increase only slightly, reaching about 1.6 per cent in both years, under the assumption that international commodity prices will decline.

The world oil market and prospects for oil price developments

Mr. Robert Kaufmann (Boston University) focused his presentation on the evolution of prices since 1998 and in particular the volatility in prices since 2006. Oil prices increased to very high levels during the second and third quarters of 2006 because of fundamental changes on the demand and supply side owing to supply disruptions, increased demand from Asia, and speculative fears such as geopolitical events in Nigeria, the Middle East and Iran. Oil prices began to fall in the latter part of 2006 due to the disappearance of the speculative fears such as a quieter hurricane season, containment of conflicts (such as in Lebanon and Iran) and fundamental changes such as a return of capacity and stock-building.

The second quarter of 2007 presents a problem for OPEC because that is when demand typically tapers off but new non-OPEC production will increase supply making OPEC a marginal producer. In the short run, OPEC will re-instate the quota system as there is talk of some 1.2 million dollars in cuts. OPEC's consensus on the new price floor for the short run is between $50 and $55.

In the long term, uncertainty in the market will be governed by fears of nationalization of oil fields especially visible in South America, rising costs as higher prices put every drilling rig in operation creating a tight labour market and increase in wages, and alternative fuels.

Mr. Kaufmann proposed a new price forecast methodology based on downstream capacity. Since the 1990s there has been a lot of spare capacity. Mr. Kaufmann models the capacity utilization impact on prices as well as supply of oil and finds a negative correlation. As downstream capacity utilization increases the price of crude oil declines. The model also includes the difference between future and current stocks (market contango), the effect of which is positive. As future oil prices are higher, the price of oil increases.

Looking one step ahead, Mr. Kaufmann then discussed the contango backwardization model, which seems to be a better predictor. Using a vector error correction model, he finds that motor gas prices do not influence crude oil prices. On the other hand, using an impulse-response function, as crude oil stock prices rise, gasoline prices rise too, but by more than the rise in stocks. The upstream factor matters for crude oil, but it does not look like product prices matter.

During the discussion, it was noted that oil prices are normally denominated in dollars, but that they are more stable in Euro. It was also pointed out that the risk premium which is approximately $5 to $6 in value and refining capacity are important factors affecting oil prices. Mr. Kaufmann clarified that the risk premium is part of the error term, as refinery

utilization becomes tight, price actually falls. In addition, to model uncertainty, he explained, one analyzes not only price volatility but the very low elasticity of demand and supply. Regarding the new price floor, he added that right now there are supply constraints (e.g. the 2005 hurricane left little idle capacity) and that a new higher floor would be more demand constrained with OPEC would having to contain production to keep that price. Since crude oil reserves were of substandard quality, this did not lower prices. The production of ethanol, Mr. Kaufmann explained, is not efficient (except maybe in Brazil) as the amount of energy it takes to produce ethanol is equal to the amount of energy that is saved by using ethanol.

Regional perspectives regarding the impact of higher oil prices on low-income countries

ECLAC calculated the oil trade balance for 19 countries in Latin America, of which 14 are net oil importing countries and made observation regarding the terms of trade, current account, and inflation. The results showed that the terms of trade improved overall in the region, but at the expense of higher dispersion among the countries within the region. There was an improvement in only 5 countries. Similarly, there were only 5 countries where the current account improved. Finally, there was a greater increase in inflation in the net oil importers due to the higher price of imported oil. Finally, it was noted that the effect on output volatility is not as clear as the effect on the terms of trade.

ESCAP explained that in spite of oil price increases, there is still significant growth in 2005 and 2006. All countries in the region are net oil importers. The reasons for the strong growth can be attributed to China and India, the revival in Japan and buoyant electronics exports. A 10 per cent increase in the price of oil would reduce growth by 0.33 percentage points, while inflation would increase and the current account balance would deteriorate. The effect of such a shock would have been greater in 2005 than in 2006 because of greater demand switching from oil to oil substitutes and improvements in oil efficiency. However, the impact on inflation would be greater in 2006 because of reductions in subsidies. The urban poor are the most affected since their consumption is high and the have only limited access to oil substitutes. Meanwhile, the rural population tends to switch to alternative sources of fuel.

ECA explained that African net oil importers are hit hard by rising oil prices because their oil import dependency is almost 100%. Oil imports as a ratio of GDP are very high. Overall there has been modest growth because of higher commodity prices and macroeconomic stability, but the poor have been hit especially hard. Rising oil prices continued have resulted in lower employment prospects; higher inflation (fuel and transportation); and cuts in government spending. The trade balance of oil importers has worsened, but in sub-Saharan Africa overall it has actually increased. In order to improve the situation, dependency on and use of oil should be reduced, macroeconomic stability should be sustained and donors and international financial institutions should provide support.

Management of Foreign Reserves and Exchange Rate Policy in Developing Countries

Mr. Ramon Moreno (Bank for International Settlements) first highlighted the recent trends in international reserve accumulation. Second, he pointed out different reasons for central bank reserve accumulation, and he continued by discussing its potential costs.

Global foreign reserve accumulation picked up sharply in 2002, and peaked in 2006, with China emerging as the world's largest reserve holder (at more than one trillion US dollars). The increase in foreign exchange reserves during this period was largely explained by current account surpluses, setting this development apart from the period of fast reserve accumulation in the mid-1990's, when it was driven mainly by capital inflows, in the case of Latin America, and to a somewhat lesser extent in emerging Asia. As a consequence, the current situation is characterized by a smaller risk of sudden reversals, but it is also an indicator of lower investment, consumption, and as a result, economic growth.

There are different reasons why central banks may wish to intervene in the foreign exchange markets and accumulate foreign exchange reserves. First, it is commonly accepted that central banks should accumulate a certain amount of reserves for precautionary reasons. To determine the appropriate level of reserves, several rules of thumb can be applied. The most traditional rule suggests that the ratio of reserves to imports should be enough to cover 3 to 6 months of imports. After the financial crises in the late 1990's, it became clear that the large short-term capital flows presented a more severe risk for financial stability, and a new reserve adequacy measure deems foreign exchange reserves as sufficient when they are equal to a country's short-term foreign currency debt. A third measure takes into account the possibility of a capital flight by residents – in order to prevent runs, foreign exchange reserves should cover about 10 per cent of broad money (M2). Against this backdrop, foreign exchange reserves in many countries surpass precautionary levels as assessed by all three adequacy rules.

In addition to the precautionary motive, there are other rationales for foreign exchange reserve accumulation. On the one hand, there is a desire by many central banks - especially in many Asian countries - to smooth exchange rate volatility by resisting rapid movements ("leaning against the wind"), and to maintain an orderly, liquid foreign exchange market. On the other hand, some central banks use interventions in order to maintain an undervalued exchange rate, in order to sustain export competitiveness. While such a neo-mercantilist strategy is not usually acknowledged by the respective central bank, current trends in exchange rate movements and reserve accumulation strongly point into this direction.

Financial costs of holding foreign exchange reserves are partly due to the yield spread between US Treasury bonds (in which reserves are usually held) and domestic bonds which are used to sterilize the effect of increasing reserves on the monetary base. Among major reserve holders, only China is currently not incurring such losses, since its central bank issues special, low-yield securities to mop up excess liquidity. Another – potential – cost of holding reserves is the danger of a devaluation of the major reserve currency, the US dollar, which

would cause a loss in value of reserve holdings in domestic currency terms. Some countries are also facing the dilemma of maintaining "the impossible trinity," that is, a liberalized capital account, fixed exchange rate and an independent central bank. Furthermore, if the accumulation of reserves after intervention is not sterilized, this results in looser monetary conditions, as witnessed currently in some Asian countries. While no direct pass-through to headline inflation can be observed, there are clear indications of an inflation of asset prices.

Mr. Arturo O'Connell (Central Bank of Argentina) pointed out that although much of the shame for the global imbalances has been put on China, the developed countries account for 40% of the current account surpluses. Although the accumulation of reserves can have either mercantilist or precautionary motives, a paper by Aizenman and Lee (2006) concludes that most countries accumulate reserves for precautionary reasons. The Central Bank of Argentina accumulates reserves to prevent financial crises, which is crucial to protect its domestic financial system. The costs are small in terms of GDP. Sterilization may cause domestic debt to rise, but in the short run, it prevents crises and lowers inflation. The current-account surplus in Argentina is small due to the recovery of imports.

Mr. Eustaquio Reis (IPEA) gave an account of President Inacio Lula da Silva's tenure. Growth performance in Brazil during Lula's first term was a little better than under President Cardoso with respect to GDP per capita and wages. Lula increased protection coverage of 3 million families and the Gini coefficient has decreased significantly. Inflation has also been decreased but interest rates remain high. The cost of this has been high as industrial growth has been low. Real interest rates should be brought down to single digits. Primary surpluses have increased and public debt has decreased due to appreciation of the real. Trade balances have increased. International reserves have increased to maintain the exchange rate and not for precautionary motives. However, the exchange rate has decreased substantively.

Mr. Dongchul Cho (Korea Development Institute, KDI) presented the experience of the Republic of Korea with different exchange rate regimes over time. He first outlined the evolution of the exchange rate system and the trend of the nominal and real exchange rates, and then proceeded to examine three different periods of heavy central bank intervention and its outcomes. He concluded his presentation with lessons learned.

The exchange rate regime of the Republic of Korea has so far undergone four distinct phases, evolving in lockstep with capital account liberalization. Until 1979, the Korean won was pegged to the US dollar, with occasional adjustments by the government. In the 1980's, a Multiple Currency Basket Peg System was in place, with daily adjustments by the government. Beginning with the partial liberalization of the capital market in 1990, and until 1997, the exchange rate was determined through a Market Average Exchange Rate System (with a daily band), and since 1998, the won is floating freely (without a daily band) against the backdrop of a completely liberalized capital account.

The first episode of intervention discussed by Mr. Cho was the "Big Bubble" episode between 1986 and 1988, when the government continued to devalue the won against the dollar, despite the sharp appreciation of the yen after the Plaza Accord. The resulting

depreciation of the real effective exchange rate helped to generate the desired surplus in the current account. However, it also contributed to strong reserve money growth, contributing to an asset price bubble which subsequently collapsed, with serious consequences for the real economy.

The second episode of intervention was the one leading up to the 1997 currency crisis. Beginning in 1996, the won came under downward pressure, owing to the collapse of semiconductor prices. The government resisted those pressures, however, and in 1997 resorted to an engineered "gradual depreciation" of the won, which together with a liberalized capital market allowed for "safe" speculation. After the plunge of the Thai baht in response to speculative pressures in July 1997, the government of the Republic of Korea continued to defend the won, speeding up the depletion of foreign exchange reserves, without being able to avoid further depreciation.

The third episode occurred in the wake of the G7 finance ministers' meeting in September 2003, when the Korean won faced appreciation pressures along with the global weakening of the US dollar. While the massive intervention of the Korean government did not prevent the won from appreciating eventually, the necessary sterilization of the corresponding accumulation of reserves proved extremely costly (several billion dollars).

Discussing the lessons learned from these three episodes, Mr. Cho concluded that the events support textbook lessons on the "impossible trinity". With capital controls, the government can manage exchange rates, but at the cost of an independent monetary policy; with an (even partially) liberalized capital account, an attempt to defend the currency is very risky, and may indeed trigger crises; and with a fully liberalized capital account, direct market interventions are of limited effects at best, and they are likely to be very costly.

Mr. Tongsan Wang (Chinese Academy of Social Sciences, CASS) presented an overview of developments in Chinese foreign trade, foreign exchange reserves, and the foreign exchange rate since economic reforms started in 1979. Overall, the process of domestic reform and increased international integration led to a dramatic increase in both exports and imports, and China consistently posted trade surpluses over the last 20 years. In line with this development, foreign exchange reserves also increased steadily, taking off notably since the late 1980's – interrupted only by a short period of stagnation during the 1997-98 Asian financial crisis. Against the backdrop of these developments, the main focus of Mr. Wang's presentation was on the effects of different exchange rate regimes.

Since the beginning of economic reforms in 1979, the Chinese renminbi was governed by four different exchange rate regimes. During the first phase, between 1979 and 1993, the exchange rate was for the most part determined by a two-tiered system, where the renminbi was usable only domestically, and foreigners were forced to use foreign exchange certificates. During this period, the renminbi also underwent a series of devaluations, to correct the large overvaluation resulting from its use as a financial planning tool during the previous period of central planning. In the early 1990's, the two-tiered system was abolished as the establishment of foreign exchange swap centers made the renminbi more convertible.

In January 1994, the official renminbi exchange rate and the foreign exchange swap market rate were integrated, starting a market-based, managed floating rate system that was to last until 1997. Under this regime, the renminbi was allowed to float against the US dollar within a narrow daily band, resulting a slight nominal appreciation over the period. Over the same period, the trade surplus, as well as foreign exchange reserves increased significantly. This phase of managed float came to an abrupt end in 1997 with the onset of the Asian financial crisis.

By 1998, in the midst of the deepening financial crisis, market expectations for a devaluation of the renminbi were strong. In order to defend the currency against speculative pressures, China's central bank intervened by curbing capital outflows, and by adopting a quasi-peg regime. The government made a commitment not to devalue the renminbi, keeping it at a level of 8.28 per US dollar. This peg was maintained until 2005, and while the renminbi remained pegged at a constant rate to the dollar, it fluctuated against other currencies, resulting in an increase of its average nominal and its real effective exchange rates by 11.5 per cent and 9.8 per cent between 1998 and 2001, respectively. Since 2002, with a weakening of the US dollar, China has come under increased criticism from its trade partners for keeping its exchange rate artificially undervalued, thus creating an unfair price advantage for its exporters in the global market.

In July 2005, China abandoned the much-criticized peg to the US dollar and switched to a basket peg, tying the renminbi to a number of principal currencies. The initial revaluation by 2.01 per cent was followed by a slow additional appreciation, resulting in a total increase by 3.5 per cent over the course of the first year. Since then, the appreciation has accelerated, reaching 4.7 per cent over its July 2005 level. China's stellar export performance over the first nine months of 2006 and its record trade surplus suggest that the appreciation so far has not dented the competitiveness of this country's exports. Meanwhile, foreign exchange reserves have also reached record highs, contributing to current domestic macroeconomic problems. Against this backdrop, a further gradual market-based revaluation of the renminbi is likely over the medium term.

During the general discussion, the issue was raised whether it was time to diversify away from the US dollar. While Mr. O'Connell pointed out that especially developing countries were already starting to diversify their reserves by increasing their euro holdings, this was a slow process owing to inertia and market uncertainty. Mr. Moreno also emphasized that there were significant network externalities associated with the choice of reserve currencies, and that the US dollar would remain attractive as long as it remained the major unit of account and the primary unit of international trade. Responding to a question about the optimal exchange rate regime for Latin American countries, Mr. Moreno noted that central banks may have reasons to intervene, even in the presence of a floating exchange rate. On the other hand, central banks in the region are acutely aware of the risk of speculative attacks, and are therefore careful not to target specific levels of exchange rates.

3. Current issues in modeling global linkages and international macroeconomic policy coordination

3.1 Modeling the Adjustment of Gl0bal Imbalance

Mr. Seklim Elekdag (IMF) pointed out that the IMF model is a structural one that finds its academic foundation in publications such as Obstfeld and Rogoff (1996). In the field of monetary policy, the model's focus is on interdependencies, offering also room for analyzing coordinated policy approaches. The model assumes that firms are price setters, although the implied degree of competition reduces firms' ultimate pricing power, and considers four geographic regions, namely the U.S., Europe and Japan, emerging Asia and a set of remaining countries. Further key features of the model are the assumption of two goods, two factors of production (capital and labour), sticky prices, risk-adjusted interest rate parity and rule-based fiscal and monetary policies. Everything in the model is based on the first principle and the two production factors are used to produce two intermediate goods (one traded, one non-traded), which in turn are inputs for two final goods (one investment good, one consumption good). In modeling the imbalances, the first step is to replicate the current imbalances in the model in order to illustrate the causes for the current situation. The latter include, for example, in the U.S. an expansion in fiscal spending and a reduction in savings, as well as anemic growth in the Euro area and Japan. The next step then involves the analysis of various future scenarios regarding the unwinding of the global imbalances. The baseline scenario entails a gradual rebalancing, involving, in the US, a return of the savings rate to its historically normal level, output growth that is in line with potential growth, a lower current account deficit of around 4% of GDP, and a real effective exchange rate depreciation. Emerging Asia would see slower economic growth, lower private savings, stronger domestic demand, exchange rate appreciations and a reduction in its current account surplus from 5% of GDP to 2%. The second scenario is based on a more disruptive adjustment in the world economy, implying a flight away from US assets, a risk-premium shock to the US economy, and a temporary decline in global competitive pressures. The remaining risks in this scenario are major financial market disruptions and a surge in protectionist policy measures. In a third, strengthened-policy scenario, Asian economies pursue more flexible exchange rate regimes, alongside with a fall in their currency reserves and more domestic fiscal capital accumulation. The US sees fiscal consolidation with lower government spending and higher taxes, with private savings returning to more normal levels. The euro area and Japan follow policies aimed at structural reforms, while the rest of the world and especially oil-exporting countries increase investment and their productive capacity. In parallel, world interest rates fall by 0.25 percentage point, supporting global economic growth. The combination of these developments creates various spillover effects that support individual countries in their specific policy strategies. Future modeling work will be focused on an expansion of the model to 5 geographic regions, splitting up the euro area and Japan, as well as the development of a more elaborate oil market component in the model.

Mr. Hans Timmer (World Bank) first gave an overview of the structure of the model, which covers multiple regions, is a sectoral general equilibrium model and takes into account a series of factors such as skilled and unskilled labour, land and natural resources. It

contains semi-segmented labour markets, allows purchasing power parity adjustments in the case of migration and is linked to micro simulation models and data on income distribution, poverty and the Millenium Development Goals. The closure rules relate to a public fiscal target that is fixed through lump-sum transfers as well as savings and investment for the closure of the balance of payments. This modeling framework can then be used to analyse, for example, future investment and saving behaviour, for which demographic changes represent a major input. In high-income countries, investment exceeds savings and both are expected to decline gradually over a time span of 20 years, accompanied by current account deficit. Developing countries will see savings in excess of investment, combined with current account surpluses, with savings remaining at a relatively high level for a longer period than in high-income countries before the effects of an ageing population become relevant. He then explained the impact of an endogenous current account on trade policy analysis, using India as an example. In addition, he showed the use of the model for assessing the impact of capital flows on terms of trade, referring to a shift in capital from China to the United States as one possible scenario.

Mr. John Walker (Oxford Economic Forecasting) focused in his presentation on the role of capital flows within a global macro model. While it is often argued that a depreciation of the US dollar would be needed for a correction in the current imbalances, gaining a more comprehensive view of the circumstances of any adjustment process requires the analysis of both capital flows and capital positions in the US. In this sense, the approach would be to assess globalization in terms of financial developments. Returning to the theme of currency depreciation, he pointed out that the US dollar did depreciate against the Euro, the Canadian dollar and the British pound but that overall, there has not been yet the expected broad-based fall in the value of the US dollar. One possible explanation for this is the composition of demand for US dollars, which derives not only from foreign central banks, but also from continued private investment. The main results are that, first, contrary to common belief, the modeling exercise does not suggest an immediate fall in the US dollar, as capital flows to the US continue, supporting the US dollar. Second, these capital flows are still supported by a favorable interest rate spread for the US dollar, while, third, the size and liquidity of the US equity and bond market is a further source of attractiveness for foreign capital flows.

Mr. Peter Pauly (University of Toronto) described all the presented models as mature and complementary in their nature, each of them exhibiting a particular structure so as to address specific questions. He then reflected on the three implied modeling paradigms, starting with the IMF model, which is a cohesive representative agent structure that allows to analyse disequilibrium adjustments. While its weakness lies in the difficulty of considering composition effects such as an aging population as well as its rudimentary structure, it is a useful tool to think through macroeconomic theory. The latter does not offer room for forecasting, but has its strength rather in the assessment of economic shocks. The World Bank model represents a large disaggregated general equilibrium model that can serve a useful purpose in analyzing relative price mechanisms, for example in the field of savings and investment. Finally, the Oxford Economic Forecasting model is a standard econometric model that is oriented according to the available data and which fills a gap left by the lack of coverage of international capital markets in other modeling exercises. However, one of the

remaining questions pertains to the potential rationale for investors to eventually get out of US dollar investments.

Mr. Rob Vos (UN-DESA) emphasized the question on the possible need for action to address the current global imbalances and the possible role of automatic stabilizers in the world economy. He also argued that the similarity of the modeling results seems worrisome in view of the dissimilarity of the models. With respect to the IMF model, he pointed out that while it is a rich model with clear theoretical underpinnings, the question remains as to the sensitivity of the outcomes to certain assumptions. In the World Bank model, most of the adjustments occur through changes in relative prices and exchange rates, but it remains unclear as to what effects an aging population will have on trade balances and current account balances, besides the impact on consumption patterns considered in the model. The Oxford Economic Forecasting model leaves open the question regarding the composition of debt holders, which is important for assessing the sustainability of the public debt.

In reply to the discussants' contributions, Mr. Elekdag pointed out that the IMF model's focus is on the short and medium term and that it does not include portfolio choices and, hence, portfolio effects. Mr. Timmer explained that the presented models served different purposes and that high-frequency data is aimed at getting a grip on turning points while other approaches imply more modeling work. He added three observations, the first being the potential advantage of exchanging information between individual models, especially between high frequency data work and medium-term forecasting approaches. Second, there is a need to incorporate financial linkages in different models, especially with respect to long-term issues. Third, he concurred with the observation that it is surprising how similar the results coming out of the three models are. Mr. Walker argued that all three models faced certain theoretical constraints. In this sense, they may produce different adjustment mechanisms, but the similarity in results could be an understandable outcome.

Adjusting trade imbalances and unsustainable net foreign asset positions in the Cambridge World Model

Mr. Alex Izurieta (University of Cambridge) first pointed out that the objective of the model was not so much forecasting but rather establishing some stylized facts that are relevant for economic policy. In this sense, he argued that it seemed important to understand the historical processes that have created the current imbalances and that the imbalances ought to be seen in the context of income inequality. The main findings of the analysis are that the top 20% of the global population have 60% of world income; the top 20% of global income generate 75% of world exports; and the bottom 50% of global income generates 7% of world exports. He emphasized the importance of trade for income generation and subsequently presented the results of three modeling exercises. The first one's focus is on trade and income, illustrating that market prices are important for exporters of primary commodities, while real demand is more relevant for exporters of manufactured goods and services. Trade shares seem to be more dependent on the combination of a series of factors such as history, culture, trade and investment policies, education and infrastructure than on exchange rates.

Mr. Francis Cripps (Alphametrics, Ltd.) then presented the results of the second model, which analyses the balance of payments. Real exchange rates have shown high volatility in nearly all countries, but there is no correlation between financial flows and exchange rates. He finds that real and nominal exchange rates are closely related and it seems possible to conclude that a low real exchange rate does not automatically lead to higher exports. The third model refers to the role of financial markets and shows that movements in financial markets have an important effect on investment and consumption. However, although the market valuation of assets is relatively uncertain, investors still measure possible benefits in financial terms.

Macroeconomic policy coordination and the NIESR model

Mr. Ray Barrell (NIESR) pointed out that policy coordination may increase welfare if markets do not produce the first-best outcome and if it is not possible for policymakers to achieve the first-best solution on their own. In order to accurately model policy coordination, the modeling framework must specify all markets and economic agents, and rational expectations are especially important in this context. However, an important question is what can be the role of policy per se in addressing the global imbalances. Monetary policy cannot do very much, unless it changes trend inflation, while fiscal policy can have some effect by accelerating the move of the economy to its new equilibrium state. In addition, supply side policies may be important in dealing with global imbalances. Specifically with respect to the U.S.'s imbalances, it would be necessary to have a clearer picture of the multiplier effects in the economy. The model shows that a permanent fiscal contraction in the U.S. would reduce output by 1% of GDP and improve the current account balance by 0.5% of GDP. The role of Europe in this context seems more difficult, as a fiscal expansion is not feasible and the participation in monetary policy coordination is unlikely. One remaining option is to focus on supply side measures, especially labour market flexibility and labour force participation rates. The model was used to assess the effects of three shocks, namely technological progress in Germany; wage flexibility in France; and a change in the labour force participation rate in Italy. The welfare gain is defined as the difference between the output deviation in percentage of GDP and the squared deviation of inflation from its target. The main results were that policy coordination on structural issues, notably on labour market reforms, is more important with EMU and that the U.S.'s imbalances are a U.S.-specific problem, with limited scope for international policy coordination.

International policy coordination

Mr. Stephen Hall (University of Leicester) focused on the formal approaches to the modeling of policy responses. Modeling policy response is important both for domestic and international reasons. At the national level, as policy feedback rules are included in a model, the structure of these individual rules dominates the simulations based on such models. The results from each national model will differ from those obtained by international models, as common policy rules differ from individual and computability problems will inevitably arise in the process of coordination. When expanding the models with rational expectations, policy rules should be introduced to close the models and reach a solution. The paper deals with how to set policies in an optimal control framework, namely to set up the targets and the

instruments for policy coordination process. The advantages of such an approach are in the transparency of setting up these rules. Although models often claim to be robust, such models usually have complex rules, are highly model-specific and finally include time-inconsistency. Mr. Hall pointed out that the alternative would be setting up simple rules, such as the Phillips Curve. Recent policy formulation, based on the Taylor rule, has been more limited and simple, and thus useful in modelling its feedback.

There are several issues in modelling policy coordination within the suggested framework. First Mr. Hall discussed how to close the models. The parameters of the models could be fixed in an arbitrary way (i.e. consensus coefficients), they could be estimated from actual data, or chosen on the base of comparing models and rule structures. While the arbitrary parameters are inherently 'ad hoc', they do not represent the policy of governments, and are often highly sensitive to specific model changes. The estimation of parameters is related to problems as identifying a reaction function, regime changes, and/or comparing different rules. The optimal parameters avoid some of these disadvantages – they are not 'ad hoc', have clarity of comparison with other rules, can comparing rules – and allow for the implementation of game approach, which is a relevant formal setting for the policy coordination process. Calculating optimal feedback rules raises further questions as to what type of game is being played out between the countries' policies – implying different game structures, such as Nash or Stackelberg games – and how the optimisation should be carried out in the case of multiple policies. Selecting parameters of the rule by optimal control will allow minimising the variance of the outcomes of the games.

Instead of calculating the variance of the outcomes through stochastic simulation, a new algorithm was proposed. The algorithm allows to choose the parameters of a set of rules so as to minimise the variance of some variables (such as output, or inflation) being subjected to a particular set of stochastic shocks. Such a framework is seen to imply the options for playing different strategies during the interaction between policy makers, i.e. during the coordination process. Instead of evaluating the variance (which alone will need a stochastic simulation of thousands of conventional model simulations) the problem is simplified, thus bringing innovations to the policy formulation problem. The idea of this simplification is based on finding a solution for the controlled variables of any monotonic transformation of the objective function. This special transformation includes two elements: the first is the technique of antithetic errors in stochastic simulation and the second constructs a minimal set of replications, which makes the problem computationally feasible, including a full game setting. Mr. Hall gave an example of how such an algorithm has been used for evaluation of policy coordination effects based on a medium size econometric model of the G3 economies (developed at Oxford University).

Towards a new OECD Global Model: Strategy and Developments

Mr. Peter Richardson (OECD) highlighted the key features of the former OECD INTERLINK model, the properties of the new OECD modelling system and the steps already taken in developing this model. The OECD INTERLINK is a macro model that features not only long-term-supply-side properties but also short-term Keynesian dynamics. The model covers 30 OECD countries and six non-OECD regions. It was used as a vehicle for short to

medium term projections while serving at the same time as an instrument for simulating external and policy shocks.

Another important feature of the OECD INTERLINK is its focus on international consistency. Similar to the U.N.'s LINK system, the model is built on unified trade linkages, which ensure that trade volume linkages and trade price linkages are coherent and consistent and that current account consistency holds. In addition, the model takes on board limited financial linkages, including exchange rate movements and capital flows. The model presents some advantages, among others the reliance on a unified database and data submission system and the ability to generate a consistent trade linkage system. These two features ensure a reasonably homogenous structure for diagnosis. The model is also designed both as a forecasting tool and a policy simulation instrument. The model, however, presents some limitations. Among those is the relative inflexibility of its structure and problems of data frequency. The system may be viewed as being "less transparent" than it appears to be because it relies heavily on in-house data manipulation and solution software systems. This, however, can sometimes be considered as an advantage. There are also some concerns about the size of the model and the research and maintenance costs.

Against this backdrop, a new strategy was designed. The strategy includes four key components or phases, which all embody a broadly similar structure and philosophy. The objective of the first component is to be able to come up with a short-term assessment and briefing function, that is, current and next-quarter analysis using high frequency indicator models, especially those designed by Sedillot and Pain. The second component of the strategy is to arrive at capabilities needed for forecasting and baseline assessments. The objective is to be able to generate detailed quarterly country forecasts within a unified system while taking into account key identities and relationships, trade linkages, and current account consistency. The third component deals with medium-term analysis, with multi-country baseline scenarios housed within the same data structure as short-term projections. Furthermore, the system should be user friendly, so it should be supported by TROLL while having Excel as front end. The first three components have already been completed. The fourth component, which deals with global analysis within a new econometric model, is still work in progress. The idea is to design a tool that could capture global and regional issues, allow forecast updates, and medium to long-term baselines, and have full simulation capabilities.

The new global model relies entirely on quarterly data and focuses more on global and regional issues. As a result, the structure of the model tends to be more compact than the OECD INTERLINK. It gives prominent consideration to globalization and linkage issues, analyses portfolio shifts and wealth effects, and relies heavily on fiscal and monetary policy rules.

Developing the new global model comes with some requirements. Among them is the need for a new modelling software. Also, the system ought to be able to generate inputs that feed into forecasting exercises as well as analytical studies. The model should also take on board more up-to-date modelling features, including forward-looking expectations, policy rules, error-correction estimation and panel estimation techniques, and domestic and global

stock-flows consistency. Finally, it should allow for more advanced simulations, especially anticipated/unanticipated shocks, portfolio shifts, and policy settings.

The new model is a regionally aggregated model that includes U.S., Japan, the Euro Zone, other OECD Europe, other non-European OECD members, and a more detailed framework for the non-OECD regions including China, Other Asia, CEE, and rest-of-the-world blocks. The model has four sectors (households, companies, public and foreign sector). As in the former OECD LINKAGE, the new model features short-term Keynesian dynamics with consistent neo-classical supply-side properties. In addition, the model is subject to fiscal and monetary rules. The financial asset and liability positions of the four sectors are determined by the stock accounting framework, and the model makes an effort to bring up linkages between current account positions and changes in net domestic wealth. The supply side of the model is characterized by the existence of a Cobb-Douglas production function for the business sector and a monopolistic competition environment. The optimization process helps determine the demand for labour and capital. The potential output depends on the trend of total further productivity (TFP), the NAIRU, both of which are exogenous, the growth of the labour force, and the real cost of capital. On the demand side, consumption is modelled in line with the life-cycle theory, which emphasises wealth as a determinant factor for consumption, and also features short-term dynamics with real balance effects, real interest rates and precautionary saving. The investment equation is based on an accelerator model with supply side equilibrium while government consumption and investment are determined by policy rules. With respect to international linkages, trade volumes and price equations are regionally aggregated versions of forecast monitoring equations, as in Pain et al. 2004. Real oil and non-oil commodity prices are drawn from reduced form equations. The investment income flows depend on the rates of return on domestic and foreign assets. The long-term output price equation is determined from the supply side while the real wage rate is a function of productivity and the unemployment gaps.

Some progress has been made in developing the new modelling system and the accompanying dataset. There have been three main achievements regarding the data. First, the aggregation procedures were worked out. Second, the calculation of supply variables at a zone level was completed. Third, the calculation of aggregated trade matrixes was completed. Preliminary versions of the modelling systems for the U.S., Japan, the Euro are , other OECD Europe and other OECD blocks were completed and some single-country simulation exercises have beenstarted. Non-OECD maquettes are currently being calibrated. The linkage version is in process. Finally, trade and financial linkages are yet to be finalised and tested.

Discussants:

Mr. Hans Timmer (The World Bank) pointed out some lessons from the presentations on global modelling. One of the lessons from the Cambridge Alphametrics model is to have an open eye while estimating models. Mr. Timmer argued that it is important to look at long-term patterns and allow to be surprised as there might be more correlations to encounter. Mr. Timmer inquired about the data source for the global Lorenz curve. As for the NIESR model for policy coordination, he observed that there is room for policy and policy coordination only if market failures and market externalities exist. If this is

the case, there is a need to define and formalise those externalities in a specific form. In addition, Mr. Timmer argued that the suggested model does not give a clear direction of monetary policy in Europe. Higher interest rates would imply currency appreciation and a weaker dollar, while lower interest rates would spur demand and export demand from the United States. The evaluation of the policy formulation in an optimal control framework as in "International policy coordination" concludes on several modelling issues: the need to have optimal policies if models are to be compared, the importance of model closure and the choice of model instruments. With respect to the OECD model, he saw the advantage of a big model in the construction and maintenance of a unified database, while the modular structure allows considering manageable components separately.

Mr. Pingfan Hong (UN/DESA) argued that it is very difficult to compare the models because of their different structures. The Cambridge-Alphametrics Model of the world economy features two interesting properties. First, it focuses on income distribution issues. Second, the model fully integrates financial flows into the analysis. Mr. Hong, however, had some reservations and comments. Principal among those is the use of a Lorenz Curve of income in conjunction with a Lorenz Curve of exports. While the Lorenz curve of income can easily be derived from households, this is not the case for the Lorenz curve of exports. Export is typically an aggregate indicator that cannot be split among households. This implies that the Lorenz curve of exports, as shown in the presentation, reflects the distribution of exports among countries only. Real exchange rate volatility is always viewed in the analysis as detrimental to economic growth and development. Such judgment should be contrasted with the argument that emphasizes a positive role of real exchange rate volatility as a buffer mechanism. He pointed out that Mr. Barrell's presentation illustrated the constraints on policies, although optimal policies would be aimed at removing these constraints. In addition, while it is accurate to characterize the United States current account deficit as a country-specific cause of the global imbalances, it still holds true that in terms of the consequences, it is a global problem. With respect to Mr. Hall's presentation, Mr. Hong argued that while it is fair to consider households and the private sector as rationale agents, it should be equally legitimate to assume that governments act in a consistent and coherent manner.

During the discussion, Mr. Richardson emphasized the advantages of having unified databases and sets of identities and that maintaining such a consistent system is crucial for evaluating problems, including in the policy field. Mr. Barrell emphasised the different political conditions which exist when governments are making decisions on policy issues: it is not only a question of smooth adjustment, but each government has sovereignty, which should not be given up. For economists, however, such constraints do not exist: they assume there are gains from policy coordination and that their task is to convince the policy makers about these gains. He raised the point that the specification of the objective function in the optimal policy formulation framework cannot reflect any systemic risk, such as the global imbalances. He underscored that in terms of causes the U.S. deficit is a U.S. problem, but in terms of consequences, it is a world problem. Mr. Cripps noted the difficulties that arose while constructing the Cambridge Alphametrics model. One problem is the Lorenz curve itself, where data from the Human Development Indicators were used. Another problem is modelling the supply side where there is not enough data by institutions. Data problems were

also addressed by other LINK participants, who underscored the need to improve statistical coordination. In this respect, the U.N. Statistical Division needs to be supported in its coordination efforts by international organizations, such as the OECD, EUROSTAT and the IMF, and by national statistical offices as well. Becoming the supply side, problems designing a mechanism to coordinate real economies were raised. Mr. Hall agreed with Mr. Hong's comment and indicated that both government and private agents are considered as rationale in the optimisation processes.

Critical review of global models and quantitative analysis of policy coordination

Mr. Ken Wallis (Warwick University) introduced a critical review of global models for policy coordination based on his vast experience in model comparison projects, which includes comparative research on multi-country models carried out by independent researchers, and conference-based model comparison, in which model owners got broad outlines, ran experiments, and presented and discussed results at conferences. One example of a model comparison exercise with an independent third party is the project implemented at the University of Warwick and funded by the Economic and Social Research Council (ESRC). The three multi-country models that participated in the project were MSG2 (MacKibbin-Sachs Global), MULTIMOD, and NIGEM. The exercise consisted of sending complete models and associated databases to Warwick University that was entrusted to implement all the stages of the comparison project. The three models share some common features. All combine Keynesian paradigm of short-to-medium term adjustment with a neoclassical view of long-term macroeconomic equilibrium. Different models may generate a large spectrum of simulation responses if the assumptions on fiscal and monetary rules differ from one model to another. Avoiding this requires the adoption of a standardized policy format, with common fiscal closure rules and monetary policy assumptions. Starting from a common policy framework, three simulation experiments are conducted. The first assumes an increase in government expenditure; the second an increase in the money supply, and the third considers a rise in the world price of oil. The outcomes of the experiments suggest that the dissimilarities in the simulation responses are attributed to different approaches to quantification as well as differences in theoretical foundations.

One recent example of a conference-based model comparison involves the aggregate model of the European Central Bank, AWN, and three multi-country models, especially MULTIMOD Mark III, NIGEM, and QUEST. Another project involves seven models. The comparison provides some insights on the potential advantages and shortcomings associated with aggregate models and multi-country models. The widely perceived view is that desegregation (multi-country models) is potentially superior to aggregation (single aggregate model) if the component models are very diverse. But choosing an approach involves considering resources and design issues.

Mr. Wallis pointed out various issues coming out of the three models. First, this is the requirement to determine the objective of the model, which can be policy simulation,

forecasting, or both. The suggestion is to use "one workhorse for one course". Second is the level of aggregation and desegregation with respect to sectors, countries, time, and policy instruments. As mentioned before, the desegregation is potentially beneficial if components behave very differently. Desegregation provides a good grasp of distributional effects. This is more applicable if the components are well defined, suggesting therefore a trade off associated with every approach. Another interesting feature in the three models is the systematic attempt to take stock of recent modelling developments, including new theoretical developments and a stock-flow consistency framework.

Some issues have received less attention in the three presentations. One is the question of tractability. Another important issue that receives less attention is the degree of transparency of the models. All the documentation on these models should be readily available to the public. The portability/accessibility of the models is also critical to ensure a continued flow of resources to support the maintenance and the development of these quantitative tools. Equally important is the uncertainty of the results that come out of the models. There has been no discussion of the sensitivity of the simulation responses. Although the need for consistent and coherent dataset was constantly reaffirmed, there has been no mention on the necessity to reinforce the capacities of national statistical offices in collecting and disseminating data. Finally, a key challenge in the future would be to integrate the environmental dimension (climate change) into the discussion of economic policy coordination.

Mr. Lawrence Klein started his presentation on issues in global modelling by discussing problems of databases. After World War II, data on the U.S. economy was poor, quarterly data on a comprehensive base was not available and coverage of the few existing indicators was also poor. Therefore, it was important to exploit various resources to gauge the direction of economic processes. Mr. Klein emphasised that efforts to continue further options in the same directions are needed now as well, especially for countries with less developed high-frequency databases. Next, he gave examples of how one could assess expectations, in view of their important role in the economy. Nowadays, futures and forward market prices are available on a daily basis and could be used for different analytical purposes. The U.S. Treasury yield curve is also estimated frequently, every morning at 9 a.m., which together with other high frequency data, such as the spread between inflation-protected securities and non-inflation protected yield, could be used to estimate expectations. Also, survey data provide any additional source of information about expectations of incomes, job security, etc. As a result, there are three to four different measures of expectations in the U.S.

Mr. Klein outlined the importance of the social accounting system. The input-output flow of funds in a system could be beneficial to many areas of economic analysis, such as explaining the higher productivity gains in the U.S. economy or the economic performance in the former USSR. Many answers could have been found if annual input-output tables would have been maintained, or transformed in the case of available input-output tables for those countries for any period of five years. A set of input-output tables, with uniform classification and concept, is a good source for estimation of production functions by sectors, including the financial sector, the manufacturing sector and whole-sector production

functions. Hence, good estimates could be obtained for information technology and rising productivity by systematically tracing that sequence through time (even an ordinary Cobb-Douglas production function will provide useful insights as well as a forecast of economic activities). In addition to information technology, setting up a team to work on an integrated input-output system with biotechnology details would be beneficial.

Finally, Mr. Klein noted that putting emphasis on demographics is an excellent source of further understanding economic development, though it is not an easy task for modelling. This concerns not only problems related to aging, but also controlling diseases (as with SARS in China).

4. Business Meeting and Closing Session

Mr. Peter Pauly (University of Toronto) pointed out that the meetings have helped to take stock of where the state of the art of modelling stands and presented some conclusions on the way to move forward for Project LINK. He proposed to include resources such as from the World Bank with the cooperation of Mr. Hans Timmer to help in the continuation of the system. There has been substantial progress at U.N. headquarters in New York to make the system more interactive, transparent and accessible. Ideas from LINK participants on how to run LINK better are most welcome.

Mr. Rob Vos (United Nations) reiterated the importance of thinking on how to move forward in addition to discussing the global economy. He emphasized the importance of having a good set of data. Mr. Vos informed the members on the progress made in the forecasting system, which has moved from the U.N. mainframe to the PC's. He welcomed the possibility of sharing the forecast tools with the World Bank and to link proto-type models to the data. This would give greater scope for discussing policies and policy coordination using models. From the discussion, there still is a need to analyze what is the best kind of model to use for policy simulation; it seems that a simple and transparent system would work best either "with various horses with various courses" or "a unique course". More concrete results are expected by the meeting next fall.

Mr. Pauly announced that the next meeting will be sponsored by the Chinese Academy of Science in the week of 14 May 2007 in Beijing and the fall meeting will be either in Geneva or New York. The focus in Beijing will be China and world economic trade issues, and suggestions for specific topics are welcome. Also, the next meetings will expand on the modelling paradigm and perhaps some modelling work in progress in Africa and Central America, for which suggestions are equally welcome.

Annexes

2006 Project LINK Fall Meeting

October 30-November 1, 2006
United Nations, Geneva

Agenda

Monday October 30

10:00 -10:15 Opening Address
Chair: Lawrence Klein

Dirk Jan Bruinsma, Deputy Secretary General, UNCTAD

10:15 – 13:00 Global Economic Outlook
Chair: Heiner Flassbeck

Presentations:
a. LINK/UN-DESA (Rob Vos)
b. IMF (Thomas Helbling)
c. World Bank (Hans Timmer)

Leading discussants:
Peter Richardson (OECD, Paris)
Dawn Holland (NIESR, London)

13:00 – 14:00 Lunch

13:25 – 13:55 Special session: Introduction of a new modeling framework for the world economy – prospective cooperation between the World Bank and the UN/LINK
Speaker: Hans Timmer (World Bank)

14:00 – 17:30 Global and regional issues (1)
Chair: Bert Hickman

Panel discussion one:
Global adjustment and employment growth
Speakers: Lawrence Jeff Johnson and Christoph Ernst (ILO)

Panel discussion of inflation and employment trade-offs:
United States: Lawrence Klein (LINK)
Germany: Torsten Schmidt (RWI)
Asia: Pami Dua (Delhi University)

Contributions from the floor on inflationary trends and policy implications: selected European participants

Tuesday October 31

9:30 – 13:00 Global and regional issues (2)
Chair: Byron Gangnes

Panel discussion two:

The world oil market and prospects for oil price developments
Lead presentation: Robert Kaufmann (Boston University)

Panel discussion with regional perspectives regarding the impact of higher oil prices on low-income countries: participants from ECA, ESCAP and ECLAC

Panel discussion three:

Management of foreign reserves and exchange rate policy in developing countries
Lead presentation: Ramon Moreno (BIS)

Panel discussion with regional perspectives:
Latin America: Eustaquio Reis (IPEA), Arturo O'Connell (Central Bank of Argentina)
Asia: Dongchul Cho (KDI), Tongsan Wang (CASS)

13:00 – 14:00 Lunch

13:25 – 13:55 Special session: An Area-wide Real Time Database for the euro-area
Speaker: Jérôme Henry (European Central Bank)

14:00 – 17:30 Current Issues in Modeling Global Linkages and International Macroeconomic Policy Coordination
Chair: Roberto Mariano

Modeling the Adjustment of Global Imbalances: the IMF experience
Speaker: Selim Elekdag (IMF)

The World Bank LINKAGE model: adjusting trade balances in a CGE framework
Speaker: Hans Timmer and Dominique van de Mensbrugghe (World Bank)

Policy Coordination and the Oxford World Macroeconomic Model
Speaker: John Walker (Oxford Economic Forecasting)

Discussants: Peter Pauly (University of Toronto), Rob Vos (UN-DESA)

Wednesday, November 1

9:30 – 13:00 Global modeling issues (2)
Chair: Thomas Wilson

Adjusting Trade Imbalances and Unsustainable Net Foreign Asset Positions in the Cambridge-Alphametrics Model of the World Economy
Speakers: Francis Cripps (Alphametrics Ltd.) and Alex Izurieta (Cambridge University)

Macroeconomic Policy Coordination and the NIESR model
Speaker: Ray Barrell (NIESR, London)

International Policy Coordination
Speaker: Steve Hall (University of Leicester)

Towards a New OECD Global Model: Strategy and Developments
Speaker: Peter Richardson (OECD)

Discussants: Hans Timmer (World Bank); Pingfan Hong (UN-DESA)

13:00 – 14:00 Lunch

13:25 – 13:55 Special session: Software Applications for Econometric Forecasting. Special Case – Current Quarter Model for China

Speaker: Vladimir Eskin (PROGNOZ)

14:00 – 16:00 Global modeling issues (3)
Chair: Peter Pauly

Critical review of global models and quantitative analysis of policy coordination: Summing up of conference and current issues and prospects for global models
Speakers: Ken Wallis (Warwick University); Lawrence Klein (LINK)

16:00-17:00 Business meeting and closing session
Chair: Peter Pauly

Elena Abramova
Center for Macroeconomic Analysis and Short-Term Forecasting
47, Nakhimsovsky prospect
117418 Moscow, RUSSIA
tel: 7-495-129-1722
fax: 495-718-9771
e-mail: EAbramova@forecast.ru

Salahuddin Ahmad
Dean, School of Business
Uttara University
House 11 Road 7D, Sector 9, Uttara
Dhaka - 1230, BANGLADESH
tel: 880-2-895-0014
fax: 880-2-891-3501
e-mail: I_d_p_i@yahoo.com

Clive Altshuler
DESA
United Nations
2 UN Plaza Room 2176
New York, Ny 10017, USA
tel: 212-963-4707
fax: 212-963-4116
e-mail: altshuler@un.org

Dennis Arroyo
National Planning and Policy Staff
NEDA
5/F, NEDA sa Pasig Building
12 Blessed Jose Maria Escriva Drive
Ortigas Center, Pasig City1605, PHILIPPINES
tel: 632-631-3283/3712
fax: 632-631-3721
e-mail: dmarroyo@neda.gov.ph

Faiza Awad Mohamed Osman
Macro-economic Oplicie Directorate
Ministry of Finance and National Economy
P.O. Box 2092
Nile Avenue B.O. Office 296
Khartoum, SUDAN
tel: 249-183-784-536
fax: 249-183-780351
e-mail: faiza_awad@hotmail.com

Stella Balfoussias
Center of Planning & Economic Research
22, Hippokratous Str.
GR 106-80 Athens, GREECE
tel: 30-210-363-0130
fax: 30-210-361-1136
e-mail: stbalf@kepe.gr

Kanemi Ban
Graduate School of Economics
Osaka University
1-7, Machikaneyama
Toyonaka
Osaka 560-0043, JAPAN
tel: 81-6-6850-5221
fax: 81-6-6850-5256
e-mail: ban@econ.osaka-u.ac.jp

Ray Barrell
National Institute of Economic and Social Research
2 Dean Trench Street
Smith Square
London SW1P 3HE, UNITED KINGDOM
tel: 44-207-654-1925
fax: 44-207-654-1900
e-mail: rbarrell@niesr.ac.uk

Erin Bell
Institute for Policy Analysis
University of Toronto
140 St. George Str., Suite 325
Toronto, Ontario M5S 3G6, CANADA
tel: 416-978-5353
fax: 416-971-2071
e-mail: ebell@chass.utoronto.ca

Omar Bello
Economic Affairs Officer
ECLAC
P.O. Box 179-D
Santiago, CHILE
tel: 56-2-210-2319
fax: 56-2-210-2359
e-mail: omar.bello@cepal.org

Dmitry Belousov
Center for Macroeconomic Analysis and Short-Term Forecasting
47, Nakhimsovsky prospect
117418 Moscow, RUSSIA
tel: 7-495-129-1722
fax: 7-495-718-9771
e-mail: DBelo@forecast.ru

Suzana Maria de Fatima Camacho Monteiro
Banco Nacional de Angola
Av 4 de Fevereiro 161
Luanda CP 1243, ANGOLA
tel: 244-2-335-988
fax: 244-2-337-817
e-mail: suzycamacho@yahoo.com

Adolfo Castilla
Julian Hernandez 8
28043 Madrid, SPAIN
tel: 34-91-510-0398
fax: 34-91-234-2144
e-mail: acastillag@telefonica.net

Dongchul Cho
Korea Development Institute
207-41 Chongnyangri-dong
Tongdaemun-gu
Seoul, 130-012, KOREA
tel: 82-2-958-4046
fax: 82-2-958-4088
e-mail: dccho@kdi.re.kr

Ray Y. Chou
Institute of Economics
Academia Sinica
128 Sec. 2, Academia Rd.
Nankang, Taipei 11529, TAIWAN PROVINCE OF CHINA
tel: 886-2-2782-2791
fax: 886-2-2785-3946
e-mail: rchou@econ.sinica.edu.tw

Constantin Ciupagea
SERA
Inst. Of World Economy/Romanian Centre for Economic Modelling
Str. Constantin Radulescu Motru no. 14
Bloc 27A, ap. 94, sector 4
Bucharest, code 040365, ROMANIA
tel: 34-69-434-4024
fax: 34-95-448-8326
e-mail: Constantin.Ciupagea@cec.eu.int

Marva Corley
United Nations
2 United Nations Plaza, Room 2286
New York, NY 10017, USA
tel: 917-367-9478
fax: 212-963-1061
e-mail: corley@un.org

Alfredo Coutino
Center for Economic Forecasting of Mexico (CKF)
P.O. Box 38521
Philadelphia, PA 19104, USA
tel: 215-219-6214
fax: 302-777-3403
e-mail: acoutino@att.net

Francis Cripps
Alphametrics Ltd.
109/1 Moo 2 tambon Mitrapab, Muak Lek
Saraburi 18180, THAILAND
tel: 6-636-343-010
fax:
e-mail: fcripps@alphametrics.co.th

Jane Cunningham
National Inst. for Economic & Industry Research
416 Queens Parade
Clifton Hill
Victoria 3068, AUSTRALIA
tel: 61-3-9488-8444
fax: 61-3-9488-3262
e-mail: janec@nieir.com.au

Walter de Wet
Department of Economics
University of Pretoria
Pretoria 0002, SOUTH AFRICA
tel: 27-82-323-8291
fax: 27-12-362-5207
e-mail: wdewet@pan-african.co.za

Oumar Diallo
Department of Economic and Social Affairs
United Nations
2 UN Plaza
New York, NY 10017, USA
tel: 212-963-8408
fax:
e-mail: dialloo@un.org

Cletus Dordunoo
ClayDord Consult
University Post Office, P.O. Box LG 46
Legon, Accra, GHANA
tel: 233-21-502721/660116
fax: 233-21-502721
e-mail: claydord@yahoo.co.uk;
ckdordunoo@yahoo.co.uk

Pami Dua
Delhi School of Economics
University of Delhi
Delhi 110007, INDIA
tel: 91-11-2766-6535
fax: 91-11-2766-7159
e-mail: dua@econdse.org;

Selim Elekdag
International Monetary Fund
700 19th Stree, N.W.
Washington, D.C. 20431, USA
tel: 202-623-4835
fax: 202-589-4835
e-mail: selekdag@imf.org

Simon Erlich
Economic Systems Analysis & Forecasting
58, Rue Blochausen
L-1243
, LUXEMBOURG
tel: 352-482-252
fax: 352-470-264
e-mail: serlich@pt.lu

Christoph Ernst
Employment Analysis & Research
ILO
5 rue Jean Dassier
CH-1201 Geneva, SWITZERLAND
tel: 41-22-799-7736
fax: 41-22-799-7678
e-mail: ernst@ilo.org

Vladimir Eskin
PROGNOZ
2000 Market Street, Floor 29
Philadelphia, PA 19103, USA
tel: 484-410-3237
fax:
e-mail: vladimir.eskin@prognoz.com

Kodjo Evlo
Department of Economics
Université de Lomé
Lomé, TOGO
tel: 228-225-5070
fax: 228-221-85-95
e-mail: koevlo@tg.refer.org

Heinz Glück
Economic Studies Division
Austrian National Bank
P.O. Box 61, A - 1011
Vienna, AUSTRIA
tel: 43-1-40420-7201
fax: 43-1-40420-7299
e-mail: heinz.glueck@oenb.co.at

Stéphane Guéné
Ministère de l'Economie, des Finances et de l'industrie
Direction Generale du Tresor et de la Politique Economique
Teledoc 679, 139 rue de Bercy
75572 Paris cedex 12, FRANCE
tel: 331-4487-7260
fax: 331-5318-3619
e-mail: stephane.guene@dgtpe.fr

Stephen Hall
Department of Economics
University of Leicester
University Road
Leicester LE1 7RH, UNITED KINGDOM
tel: 44-116-252-2827
fax: 44-116-252-2908
e-mail: s.g.hall@le.ac.uk

Hakim Ben Hammouda
Director, Trade and Regional Integration Division (TRID)
United Nations Economic Commission for Africa
P.O. Box 3001
Addis Ababa, ETHIOPIA
tel: 251 11 551-6629
fax: 251 11 551 3038
e-mail: hbenhammouda@uneca.org

Benoît Heitz
Ministère de l'Economie, des Finances et de l'industrie
Direction Generale du Tresor et de la Politique Economique
Teledoc 679, 139 rue de Bercy
75572 Paris cedex 12, FRANCE
tel: 331-4487-1482
fax: 331-5318-3619
e-mail: Benoit.Heitz@dgtpe.fr

Thomas Helbling
Research Department
International Monetary Fund
700 19th St., NW
Washington, DC 20431, USA
tel: 202-623-6051
fax: 202-623-6343
e-mail: thelbling@imf.org

Jerome Henry
European Central Bank
Kaiserstrasse 29
D-60311 Frankfurt am Main, GERMANY
tel:
fax:
e-mail: jerome.henry@ecb.int

Valeriy Heyets
Institute of Economic Forecasting
National Academy of Sciences of Ukraine
26, Panas Myrny St.
Kiev-11, 01011, UKRAINE
tel: 380-44-280-0417/380-44-280-1234
fax: 380-44-280-8869
e-mail: skrypnichenko@mail.ru;skrypnichenko@iep.i-c.com.ua

Bert Hickman
Department of Economics
Stanford University
Stanford, CA 94305, USA
tel: 650-329-8012
fax: 650-725-5702
e-mail: bhickman@stanford.edu

Dawn Holland
National Institute of Economic and Social Research
2 Dean Trench Street
Smith Square
London SW1P 3HE, UNITED KINGDOM
tel: 44-207-654-1925
fax: 44-207-654-1900
e-mail: D.Holland@niesr.ac.uk

Pingfan Hong
Development Policy Analysis Division
United Nations
DC-2-2154
New York, NY 10017, USA
tel: 212-963-4701
fax: 212-963-1061
e-mail: hong@un.org

Keiji Inoue
DESA
United Nations
2 UN Plaza
Office DC2-2174
New York, NY 10017, USA
tel: 917-367-2439
fax: 212-963-1061
e-mail: inouek@un.org

Steven James
Economic Analysis and Forecasting Division
Department of Finance
18th Floor, East Tower, 140 O'Connor Street
Ottawa, Ontario KIA 0G5, CANADA
tel: 613-992-4321
fax: 613-992-5773
e-mail: james.steven@fin.gc.ca

Ali Kadri
UN ESCWA
P.O. Box 11-8575 - Riad el-Solh Square
Beirut, LEBANON
tel: 961-1-981-301 #1457
fax: 961-1-981-510
e-mail: kadri@un.org

Pavlos Karadeloglou
European Central Bank
Kaiserstrasse 29
D-60311 Frankfurt am Main, GERMANY
tel: 49-69-1344-7649
fax: 49-69-1344-8550
e-mail: Pavlos.Karadeloglou@ecb.int

Elsie Katsonga-Phiri
Ministry of Economic Planning and Development
P.O. Box 30136
Lilongwe, MALAWI
tel: 265-1-788-888/8 302-874
fax: 265-1-788-247/131
e-mail: katsongas@mepdgov.org

Alex Izurieta
CERF
University of Cambridge
Trumpington Street
Cambridge, UNITED KINGDOM
tel: 44-1223-764-227
fax: 44-1223-760-576
e-mail: a.izurieta@cerf.cam.ac.uk

Lawrence Jeff Johnson
International Labour Office
4 route des Morillons
CH 11 Geneva 22, SWITZERLAND
tel: 41-22-799-7012
fax: 41-22-799-7678
e-mail: johnson@ilo.org

Cornelia Kaldewei
Department of Economic and Social Affairs
United Nations
Office DC2-2132
2 United Nations Plaza
New York, NY 10017, USA
tel: 917-367-3011
fax: 212-963-1061
e-mail: kaldewei@un.org

Grace Kasisira
Research Department
Bank of Uganda
P.O. Box 7120
Kampala, UGANDA
tel: 256-41-25-8411
fax: 256-41-25-8739
e-mail: gracekasisira@hotmail.com

Celine Kauffmann
OECD Development Centre
<<Le Swine Saint-Germain>>
12, boulevard des Iles
92130 Issy-les-Moulineaux, FRANCE
tel: 33-1-4524-9333
fax: 33-1-4430-6150
e-mail: celine.kauffmann@oecd.org

Robert Kaufmann
Center for Energy and Environ. Studies
Boston University
675 Commonwealth Ave., Suite 141
Boston, MA 02215, USA
tel: 617-353-3940
fax: 617-353-5986
e-mail: kaufmann@bu.edu

Matthias Kempf
Development Policy and Analysis Division
United Nations
2 UN Plaza
Office DC2-2136
New York, NY 10017, USA
tel: 212-963-4787
fax: 212-963-1061
e-mail: kempf@un.org

Dilli Raj Khanal
Chairman
Institute for Policy Research & Development
P.O. Box No. GPO 8975, EPC 994
Maitigmar, Kathmandu, NEPAL
tel: 977-1-427-1840
fax: 977-1-428-0845
e-mail: khanaldr@yahoo.com

Lawrence Klein
Department of Economics
University of Pennsylvania
3718 Locust Walk
Philadelphia, PA 19104-6297, USA
tel: 215-898-7713
fax: 215-898-4477
e-mail: lrk@ssc.upenn.edu

Malinka Koparanova
DESA/EMAU
United Nations
Two UN Plaza DC2-2160
New York, NY 10017, USA
tel: 212-963-6808
fax: 212-963-1061
e-mail: koparanova@un.org

Ralf Kruger
United Nations Economic Commission for Africa
P.O. Box 3005
Addis Ababa, ETHIOPIA
tel: 251-11-544-3483
fax: 251-11-511-0389
e-mail:

Santiago Labiano
CEPREDE / Facultad Economicas y Modulo E-XIV
Universidad Autonoma Madrid
28049 Cantoblanco Madrid, SPAIN
tel: 34-91-497-5079
fax: 34-91-497-8670
e-mail: santiago.labiano@ceprede.com

Thomas Le Barbanchon
INSEE
timbre G201, 15Bd Gabriel Peri,
BP 1000 92255 Malakoff cedex
Paris, FRANCE
tel: 33-1-4117-5990
fax: 33-1-4117-6045
e-mail: thomas.le-barbanchon@insee.fr

Ilmar Lepik
Bank of Estonia
Estonia Blvd. 13
Tallinn 15095, ESTONIA
tel: 372-668-0756
fax: 372-668-0949
e-mail: ilepik@epbe.ee

Hung-Yi Li
Institute for Policy Analysis
University of Toronto
140 St. George St., Suite 325
Toronto, Ontario M5S 3G6, CANADA
tel: 416-978-4183
fax: 416-971-2071
e-mail: link@chass.utoronto.ca

Jin-Lung Henry Lin
Institute of Economics
Academia Sinica
128 Sec. 2, Academia Rd.
Nankang, Taipei 11529, TAIWAN PROVINCE OF CHINA
tel: 886-2-2782-2791
fax: 886-2-2782-8673
e-mail: jlin@sinica.edu.tw

Kathrine Lund
Norges bank
Bankplassen 2, PB 1179
0107 Oslo, NORWAY
tel: 47-2231-6028
fax: 47-2231-6050
e-mail: Kathrine.Lund@Norges-Bank.no

Andrea Mervar
Institute for Economics, Zagreb
Trg. J.F. Kennedy 7
10000 Zagreb, CROATIA
tel: 385-1-2335-700
fax: 385-1-2335-165
e-mail: mervar@eizg.hr

Julien Michielsen
Beukelsdijk 174
NL-3022 DN Rotterdam, NETHERLANDS
tel: 31-10-476-5771
fax:
e-mail: julien@michkloo.xs4all.nl

Garabed Minassian
Institute of Economics
Bulgarian Academy of Sciences
3, Aksakov Str.
1040 Sofia, BULGARIA
tel: 359-2-957-2419
fax: 359-2-988-2108
e-mail: minasian@mail.techno-link.com

Eduardo Loria
Facultad de Economia
National Autonomous University of Mexico
Circuito Interior s/n
Ciudad Universitaria
C.P. 04510 Mexico, D.F., MEXICO
tel: 52-5-5622-2142
fax: 52-5-5622-2158
e-mail: eduardol@servidor.unam.mx

Roberto Mariano
School of Economics & Social Sciences
Singapore Management University
90 Stamford Road
178903, Singapore
tel: 65-6828-0888
fax: 65-6828-0877
e-mail: rsmariano@smu.edu.sg

William Meyers
Food & Agricultural Policy Research Institute
University of Missouri-Columbia
101 S. Fifth St.
Columbia, MO 65201, USA
tel: 573-882-9717
fax: 573-884-4688
e-mail: meyersw@missouri.edu

Kirill Mikhaylenko
Center for Macroeconomic Analysis and Short-Term Forecasting
47, Nakhimsovsky prospect
117418 Moscow, RUSSIA
tel: 7-495-129-1722
fax: 7-495-718-9771
e-mail: kvm@forecast.ru

Ahmad Mojtahed
Monetary and Banking Research Academy
No. 189 Pasdaran Avenue
Zarrabkhaneh, P.O. Box 16765-1654
Tehran 16619, ISLAMIC REPUBLIC OF IRAN
tel: 9821-285-0456
fax: 9821-285-0457
e-mail: info@mbra-cbi.org

Ramon Moreno
Bank for International Settlements
Centralibahnplatz 2
CH-4002 Basel, Switzerland
tel: 41-61-280-9126
fax: 41-61-280-9100
e-mail: ramon.moreno@bis.org

Délia Nilles
Institute 'Créa'
Université de Lausanne
BFSH1
CH-1015 Lausanne-Dorigny, SWITZERLAND
tel: 41-21-692-3353
fax: 41-21-692-3355
e-mail: delia.nilles@unil.ch

Svante Oberg
Deputy Governor
Sveriges Riksbank
103 37 Stockholm, SWEDEN
tel: 46-8-787-0109
fax: 46-8-210-531
e-mail: svante.oberg@riksbank.se

Michal Olexa
INFOSTAT, Institute of Informatics & Statistics
Dúbravská cesta 3
845 24 Bratislava 45, SLOVAK REPUBLIC
tel: 421-2-5937-9277
fax: 421-2-5479-1463
e-mail: olexa@infostat.sk

Yves Perardel
International Labour Office
4 route des Morillons
CH 11 Geneva 22, SWITZERLAND
tel: 41-22-799-6971
fax: 41-22-799-7678
e-mail: g12emp_strat@ilo.org

Rodwell Mzonde
Ministry of Economic Planning and Development
P.O. Box 30136
Lilongwe, MALAWI
tel: 265-1-788-888/471
fax: 265-1-788-247/131
e-mail: mzonders@mepdgov.org

Andrew Nyirenda
Ministry of Economic Planning and Development
P.O. Box 30136
Lilongwe, MALAWI
tel: 265-1-788-888/265-9-953-224
fax: 265-1-788-247
e-mail: nyirendaa@mepdgov.org

Arturo O'Connell
Member of the Board of Governors
Banco Central de la Republica Argentina
Reconquista 266
C1003 ABF Buenos Aires, ARGENTINA
tel: 54-11-4348-3596
fax: 54-11-4348-3592
e-mail: aoconnell@bcra.gov.ar

Peter Pauly
Institute for Policy Analysis
University of Toronto
140 St. George St., Suite 325
Toronto, Ontario M5S 3G6, CANADA
tel: 416-978-4331
fax: 416-971-2071
e-mail: pauly@chass.utoronto.ca

Masood Ahmed Qazi
Institute of Business Administration
Social Policy and Development Centre
15, Maqbool Co-operative Housing Society
Block 7 & 8, P.O. Box 13037
Karachi - 75350, PAKISTAN
tel: 92-21-111-113-113
fax: 92-21-453-4285
e-mail: masood@spdc-pak.com

Gauresh Rajadhyaksha
The World Bank
1818 H Street NW
Washington, DC, USA
tel: 202-478-9753
fax: 202-522-2578
e-mail: grajadhyaksha@worldbank.org

Eustaquio Reis
IPEA/DIMAC
Av. Antonio Carlos 51, sala 1703
Rio de Janeiro - RJ 20.020-010, BRAZIL
tel: 55-21-3515-8680
fax: 55-21-3515-8615
e-mail: ejreis@ipea.gov.br

Pete Richardson
Economics Department
OECD
2 rue Andre Pascal
75775 Paris, FRANCE
tel: 33-1-4524-8830
fax: 33-1-4524-9050
e-mail: pete.richardson@oecd.org

Mette Rolland
The Financial Supervisory Authority of Norway
P. O. Box 100 Bryn
N-0611 Oslo, NORWAY
tel: 47-22-93-9833
fax: 47-22-65-6022
e-mail: mette.rolland@kredittilsynet.no

Kenneth G Ruffing
OECD Development Centre
2 bis rue Jouy Boudonville
78100 St. Germain-en-Laye, FRANCE
tel: 33-1-3451-8896
fax: 33-1-3451-8896
e-mail: kennethruffing@aol.com

Natalia Salazar
Fedesarrollo
Call 78 # 9 -91
Bogota, COLOMBIA
tel: 57-1-312-5300
fax: 57-1-212-6073
e-mail: nsalazar@fedesarrollo.org.co

Ada Samuelsson
DESA/DPAD
United Nations
2 UN Plaza
DC2-2172
New York, New York 10017, USA
tel: 212-963-3819
fax: 212-963-1061
e-mail: samuelssona@un.org

Torsten Schmidt
RWI
Hohenzollernstrasse 1-3
D-45128 Essen, GERMANY
tel: 49-201-8149-287
fax: 49-201-8149-200
e-mail: tschmidt@rwi-essen.de

Ulrich Schuh
Department for Economics and Finance
Institute for Advanced Studies
Stumpergrasse 56
A-1060 Vienna, AUSTRIA
tel: 43-1-59-991-148
fax: 43-1-59-991-163
e-mail: schuh@ihs.ac.at

Rachel Sheinin
Economic Models Ltd.
Gibor Sport Bldg
7 Menahem Begin St.
Ramat-Gan 52681, ISRAEL
tel: 972-3-611-4242
fax: 972-3-611-4243
e-mail: eml@modelim.co.il

Yacov Sheinin
Economic Models Ltd.
Gibor Sport Bldg
7 Menahem Begin St.
Ramat-Gan 52681, ISRAEL
tel: 972-3-611-4242
fax: 972-3-611-4243
e-mail: eml@modelim.co.il

Andras Simon
1125 Trencsenyi u 12
Budapest, HUNGARY
tel: 36-1-202-3210
fax:
e-mail: andrassimon@t-online.hu

Rodolfo Sosa Garcia
Galilei Consulting
Mar Mediterraneo 179 A302 CP 11400
Mexico City, MEXICO
tel: 5255-5396-2045
fax: 5255-5681-5721
e-mail: galileigroup@aolcom; rsosag07@aol.com

Hans Timmer
Leader Global Trends Team, DECPG
The World Bank
1818 H Street NW
Washington, DC 20433, USA
tel: 202-458-8983
fax: 202-522-2578
e-mail: htimmer@worldbank.org/htimmer@aol.com

Massimo Tivegna
Faculty of Political Sciences
University of Teramo
64100 Teramo, ITALY
Via Caroncini 43
00197 Roma, ITALY
tel: 39-06-808-5393
fax: 39-0861-266-030
e-mail: mc1223@mclink.it

Juan-Rafael Vargas
Escuela de Economia
Universidad de Costa Rica
San Pedro, CP 2060, COSTA RICA
tel: 506-207-4334
fax: 506-207-5241
e-mail: jrvargas@cariari.ucr.ac.cr

Hannu Viertola
Economics Departmant
Bank of Finland
P.O. Box 160
FIN - 00 101 Helsinki, FINLAND
tel: 358-10-831-2425
fax: 358-9-622-1882
e-mail: hannu.viertola@bof.fi

Francisco Villarreal
ECLAC - United Nations
Av. Dag Hammarskjold s/n
Casilla 179-D
Vitacura, Santiago, CHILE
tel: 56-2-210-2635
fax: 56-2-210-2472
e-mail: francisco.villarreal@cepal.org

Lorena Vincenzi
Prometeia
Via Marconi 43
40122 Bologna, ITALY
tel: 38-51-648-0911
fax: 38-51-220-753
e-mail: lorena.vincenzi@prometeia.it

Robert Vos
Director of Development Policy and Analysis
United Nations - DESA
2 United Nations Plaza
Room DC2-2170
New York 10017, USA
tel: 212-963-4838
fax: 212-963-1061
e-mail: vos@un.org

John Walker
Oxford Economic Forecasting
Abbey House, 121 St. Aldates
Oxford, OX1 1HB, UNITED KINGDOM
tel: 44-1-865-202-828
fax: 44-1-865-202-533
e-mail: jwalker@oef.co.uk

Kenneth Wallis
Department of Economics
University of Warwick
Coventry CV4 7AL, UNITED KINGDOM
tel: 44-24-7652-3026
fax: 44-24-7652-3032
e-mail: K.F.Wallis@warwick.ac.uk

Tongsan Wang
Institute of Quantitative and Technical Economics
Chinese Academy of Social Sciences
No. 5 Jianguomennei Street
Beijing 100732, CHINA
tel: 86-10-6513-7561
fax: 86-10-6512-6118
e-mail: tswang@mx.cei.gov.cn

Aleksander Welfe
Institute of Econometrics and Statistics
University of Lodz
41, Rewolucji 1905
90214 Lodz, POLAND
tel: 48-42-6355-172, 175
fax: (48-42) 636 9432
e-mail: emfalw@krysia.uni.lodz.pl

Wladyslaw Welfe
Institute of Econometrics and Statistics
University of Lodz
41, Rewolucji 1905r
90-214 Lodz, POLAND
tel: 48-42-6355-172/522
fax: 48-42-6355-025
e-mail: emfiws@uni.lodz.pl

Thomas Wilson
Institute for Policy Analysis
University of Toronto
140 St. George St., Suite 325
Toronto, Ontario M5S 3G6, CANADA
tel: 416-978-4458
fax: 416-971-2071
e-mail: twilson@chass.utoronto.ca

Yaxiong Zhang
Economic Forecasting Department
State Information Centre
No. 58 Sanlihe Road
Beijing 100045, CHINA
tel: 86-10-6855-7129
fax: 86-10-6855-8210
e-mail: zhangyx@mx.cei.gov.cn

Baoliang Zhu
Economic Forecasting Department
The State Economic Information Centre
No. 58 Sanlihe Road
Beijing 10045, CHINA
tel: 86-10-6855-8127
fax: 86-10-6855-8210
e-mail: zhubl@mx.cei.gov.cn

Nicholas Zonzilos
Bank of Greece
21 Panepistimiou Av.
GR - 102 50 Athens, GREECE
tel: 30210-320-2374
fax: 30210-323-3025
e-mail: nzonzhlos@bankofgreece.gr

ANGOLA	Suzana Maria de Fatima Camacho Monteiro
ARGENTINA	Arturo O'Connell
AUSTRALIA	Jane Cunningham
AUSTRIA	Heinz Glück
AUSTRIA	Ulrich Schuh
BANGLADESH	Salahuddin Ahmad
BRAZIL	Eustaquio Reis
BULGARIA	Garabed Minassian
CANADA	Steven James
CANADA	Hung-Yi Li
CANADA	Peter Pauly
CANADA	Thomas Wilson
CHILE	Omar Bello
CHILE	Francisco Villarreal
CHINA	Tongsan Wang
CHINA	Yaxiong Zhang
CHINA	Baoliang Zhu
COLOMBIA	Natalia Salazar
COSTA RICA	Juan-Rafael Vargas
CROATIA	Andrea Mervar
ESTONIA	Ilmar Lepik
ETHIOPIA	Hakim Ben Hammouda
ETHIOPIA	Ralf Kruger
FINLAND	Hannu Viertola
FRANCE	Stéphane Guéné
FRANCE	Benoît Heitz
FRANCE	Celine Kauffmann
FRANCE	Thomas Le Barbanchon
FRANCE	Pete Richardson
FRANCE	Kenneth G Ruffing
GERMANY	Jerome Henry
GERMANY	Pavlos Karadeloglou
GERMANY	Torsten Schmidt
GHANA	Cletus Dordunoo
GREECE	Stella Balfoussias
GREECE	Nicholas Zonzilos
HUNGARY	Andras Simon
INDIA	Pami Dua
ISLAMIC REPUBLIC OF IRAN	Ahmad Mojtahed
ISRAEL	Rachel Sheinin
ISRAEL	Yacov Sheinin
ITALY	Massimo Tivegna
ITALY	Lorena Vincenzi
JAPAN	Kanemi Ban
KOREA	Dongchul Cho
LEBANON	Ali Kadri
LUXEMBOURG	Simon Erlich
MALAWI	Elsie Katsonga-Phiri
MALAWI	Rodwell Mzonde
MALAWI	Andrew Nyirenda
MEXICO	Eduardo Loria
MEXICO	Rodolfo Sosa Garcia
NEPAL	Dilli Raj Khanal
NETHERLANDS	Julien Michielsen
NORWAY	Kathrine Lund
NORWAY	Mette Rolland
PAKISTAN	Masood Ahmed Qazi
PHILIPPINES	Dennis Arroyo
POLAND	Aleksander Welfe
POLAND	Wladyslaw Welfe
ROMANIA	Constantin Ciupagea
RUSSIA	Elena Abramova
RUSSIA	Dmitry Belousov
RUSSIA	Kirill Mikhaylenko
SINGAPORE	Roberto Mariano
SLOVAK REPUBLIC	Michal Olexa
SOUTH AFRICA	Walter de Wet
SPAIN	Adolfo Castilla
SPAIN	Santiago Labiano
SUDAN	Faiza Awad Mohamed Osman
SWEDEN	Svante Oberg
SWITZERLAND	Christoph Ernst
SWITZERLAND	Lawrence Jeff Johnson
SWITZERLAND	Ramon Moreno
SWITZERLAND	Délia Nilles
SWITZERLAND	Yves Perardel
TAIWAN PROVINCE OF CHINA	Ray Y. Chou
TAIWAN PROVINCE OF CHINA	Jin-Lung Henry Lin
THAILAND	Francis Cripps
TOGO	Kodjo Evlo
UGANDA	Grace Kasisira
UKRAINE	Valeriy Heyets
UNITED KINGDOM	Ray Barrell
UNITED KINGDOM	Stephen Hall
UNITED KINGDOM	Dawn Holland
UNITED KINGDOM	Alex Izurieta
UNITED KINGDOM	John Walker
UNITED KINGDOM	Kenneth Wallis
USA	Clive Altshuler
USA	Marva Corley
USA	Alfredo Coutino
USA	Oumar Diallo
USA	Selim Elekdag
USA	Vladimir Eskin
USA	Thomas Helbling
USA	Bert Hickman
USA	Pingfan Hong
USA	Keiji Inoue
USA	Cornelia Kaldewei
USA	Robert Kaufmann
USA	Matthias Kempf
USA	Lawrence Klein
USA	Malinka Koparanova
USA	William Meyers
USA	Gauresh Rajadhyaksha
USA	Ada Samuelsson
USA	Hans Timmer
USA	Robert Vos