Oil Prices, Ben Bernanke, Inflation, and the Fourth Energy Recession*

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Good morning, it is a pleasure to be here. Although I have been to Japan often, this is my first visit to Korea, and I have to say that I am very impressed. My wife and I saw several museums and walked down the new development on the river, and it has been quite interesting and enjoyable. The hillsides look much like the southern California that I grew up in, though I know it gets much colder here. It's more like where I live now, up in the Rocky Mountains, where we've already had snow; but I really feel at home in the mountains, and I look forward to coming back.

I would like to talk about the two worlds of economic policy. The first world of economic policy today is one of macroeconomics, monetary policy and trade. It's the one we're most familiar with at the Institute for International Economics, and the one you're most familiar with here. The second world of economic policy is energy.

What I want to say today is that these two are on a collision course. Macroeconomic policy has been promoting growth through price stability, free trade, the trade motion being discussed right now in Busan, and monetary policy. The energy side today is warning of resource limits while blocking efforts to conserve. For instance, in the US you see people driving larger and larger SUVs: you turn it on, and it consumes a liter of gasoline before it even moves. We don't care about this, and efforts by the energy policy people who warn of resource limitations keep blocking the effort to conserve. At the same time the energy and environmental policy makers are constructing classic trade barriers; not tariff trade barriers, but quotas. For example, in the US, we have imposed rules that limit the importation a product that is 30 parts sulfur per million. Europe has gone to very low sulfur diesel fuel, and the US next year will go to diesel fuel that essentially has no sulfur. Foreign refiners in Brazil, China, and other areas can't produce those products and essentially are barred from import. That means that you have a limited supply, and if one thinks of international trade theory, prices go up. It's the classic protected home market. So in the US gasoline prices rose all summer, and we

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were dealing with wholesale gasoline of nearly three dollars per gallon.

What's that mean to Korea? Well there's an arbitrage between products and crude. I make my living working with traders at a number of the big oil companies, and that rise in gasoline prices was translated into higher crude prices, so Koreans paid almost 60 dollars per barrel for crude because our gasoline prices went up. To finish the example, following the hurricanes, Katrina and Rita we had a shortage of products: gasoline prices were three dollars per gallon at wholesale and the government temporarily suspended those import quotas. Gasoline prices are now a dollar and a half. The International Energy Agency produced a report last week that showed while US refining activity was down by a million barrels a day, (which would be about 1.25% of world capacity), OECD refining output hadn't changed on a year-to-year basis because other refineries had been brought back into operation, producing a product that didn't quite meet our specifications.

So the energy sector in conflict with the macro sector is creating shortages and pushing prices up. The collision is going to have to be arbitrated at the Federal Reserve Board and central banks around the world by either allowing double-digit inflation, or forcing a recession. I'll start by noting that the last three major economic recessions occurred because energy prices increased and central banks intervened to prevent the prices from going up. In 1973, the central banks squeezed money supply when Arthur Burns was chairman with the Federal Reserve Board. So what happened is, for the fourth quarter of 1973-74, GDP dropped by 5%--one of the largest post-war declines in GDP. We didn't see that coming. I was a young economist working with Auto Extine in a little company called Data Resources where we were forecasting. Along with everyone else we thought the economy would weather the price increase. In the December 1973 quarter, the consensus of economists was that we would see 2% growth. As late as August 1974, we projected 1% decline, and it came in at 6%. Housing prices fell by half, and we had a serious recession. In 1979-80, Paul Volcker famously raised interest rates to 20%, and we had a serious recession, and oil prices dropped from 38 to 10 dollars per barrel.

My concern is, if we don't do something to deal with these trade barriers and other restrictions being imposed by the energy side in the short-term, and we don't move quickly to conserve for the long-term, the Federal Reserve Board will be forced to take the same step. Recently, Paul Roberts published a book entitled *Running On Empty*, and Matthew Simmons published a book entitled *Twilight in the Desert*. Both perceived

declines in global oil supply, and Simmons has gone as far to say that we will see oil prices at 160 dollars per barrel next year. I don't agree with him, but I set it up as a standard.

At the same time, central banks (especially with the ending of the 18-year period of Alan Greenspan's leadership of the Federal Reserve Board), everyone on the macro side is very sanguine. We see declining inflation, and 3% growth next year, and that's predicated on an oil price that goes to about 45-50 dollars per barrel, so the Federal Reserve Board is relaxed, with no concern today. I was thinking of a Korean analogy from a bit of a Korean history book that I read on the flight here; I recall that your country had done little to defend themselves before the Japanese invasion when they were attempting to invade China, and they just swept in throughout three or four weeks. The central bankers today have the same relaxed attitude towards the potential for coming oil inflation. For years, they'd been worried about NARU, the non-accelerating rate of unemployment; we call it the Phillips curve. Central banks look at unemployment rates, and they used to say that if unemployment gets down to about 4%, inflation would start. In 1980 at the end of the Carter administration, NARU was thought to be around 7%, and if the economy got much lower than that, inflation would start.

Today it's now down to less than 4%. Why? Labor lost market power. Even as oil prices are rising in the US today, autoworkers are forced to take wage cuts. Even as oil prices rise, airline workers are forced to take pay cuts. Labor has no power for three reasons:

- Trade: we've opened our markets to China, Korea, and other countries have done the same thing, so across the world, labor is losing market power.
- Deregulation: All airline labor used to be able to negotiate higher wages, and the airlines would pass on the higher prices because the whole international airline system and domestics were all regulated. I did my PhD thesis on airlines; it's easy now to create an airline, and it's a great way to lose money too, I can tell you from personal experience.
- Information Technology: The introduction of new technology systems has allowed firms like Wal-Mart to drive costs down through inventory management, just-in-time ordering.

So the whole system is working against inflation, and because we have inflation tamed,

the Federal Reserve Board has been able to ignore the rise in oil prices over the last five years. If you think about it, when oil prices started to rise from ten dollars in 1999, they got to 40 dollars about two years ago, and the central banks did nothing. Had we been in the Volcker times, interest rates would go up. This time, the interest rates went down because the Federal Reserve Board under Ben Bernanke was very concerned about deflation. Technology, free trade, and deregulation were driving other cost core inflation down, so the oil prices were permitted to rise. That drop in interest rates from 2001-04, the short-term rate went from 3% to 0.5% fueled the housing boom, led to rise in housing values, allowed consumers to tap the increased equity from their homes which contributed 6% to consumption, and led to a consumption boom and world growth.

Now the problem as we look forward is that the FED has to raise interest rates cutting back the refinancing of homes, stopping the rise in home-equity values, and cutting consumption. But even with those adjustments, most are projecting 3% growth of the US economy, and 3.25% growth of global economy next year. Here's the problem, 3% growth will require more energy (oil, natural gas, coal), but in the US, we're in a situation where there'll be less gasoline and diesel, as the economy shifts to the right, the supply curve is gradually shifting to the left. This means prices have to go up. The second problem is that the price elasticity of energy demand in every country in the world is much smaller than the income elasticity. So if income goes up by 2%, you need probably 2% more petroleum, even if you are more efficient. To snuff out that 2% of growth in consumption, you need a 6-8% rise in retail prices--so prices have to go up next year. And when you're at the limits of supply, you don't' get an 8% price increase, some days are 0% and some days are 50%.

In the US, we have two added problems. Mother Nature causes one. I'm sure you've seen the pictures of the devastation of New Orleans, but you haven't seen the devastation to the natural gas system. For every barrel of oil we use half a barrel of natural gas, and we lost 5% of our natural gas supply following those hurricanes which is gone until next year. What happened was platforms out in the Gulf of Mexico were destroyed. There was one huge Korean-built platform that one of my students oversaw for BP that almost sank. They managed to keep it up. But supply structure has been hurt, and it will be some time before it is brought back.

Now there is one thing to think about next year. I have it on very high authority that there will be a hurricane season next year, because there is a hurricane season every

year (they tend to run in 30-year cycles), so we may lose more natural gas next year. What this means is high prices for heating, electricity and chemicals. Some of our chemicals industry is going to move here to Korea, some will move to Saudi Arabia as they join the world trade organization in December, and their natural gas is much less expensive. But the problem is that we're going to have higher gas prices, and you will as well because we're competing on the LNG markets. So we'll be bidding up spot LNG which is not moving on long term contracts and will tend to go with the US and Europe. We're all getting tied together on the natural gas side. On the oil side, we lost some refining capacity. That will be repaired. But next year we'll lose refineries because certain refineries to be shut down for maintenance were not shut down, and those refineries will have to be shut down next year on a planned schedule, or they'll shut themselves down in a very disastrous unplanned way.

So we have these natural supply constraints due to the hurricanes, and also due to the fact that we didn't build enough infrastructure in the US. For the last 15 years, the oil industry has not expanded oil-refining capacity the way they should've. Why? Returns were poor and so the firms tended to put money into exploration. Also because our merger policy in the US with the creation of Exxon-Mobil and Chevron-Texaco forced companies to divest refineries so smaller firms would buy them, and those smaller firms didn't have the capital to expand. In addition, refiners were forced to spend very large sums of money to produce cleaner products. We have a war in the US between the auto and oil industries. When I was growing up in southern California, there was a brown cloud over Los Angeles, and now it's gone. We consume more gasoline, but we produce a very clean gasoline. Go to Moscow or Beijing if you want to find out what poor petroleum products smell like.

Now some of the investment could be put into the automobile. Both the auto industry and the oil industry negotiate with EPA (Environmental Protection Agency), and the EPA decides whether the capital expenditure will be made by the auto or oil industry, and they usually pick the oil industry. The oil industry actually didn't resist this. They objected in a perfunctory fashion, but instead of really fighting it they would say that they were creating a world where nobody could import. China, which had built refineries for years, used to supply gasoline to the west coast. The west coast was cut out and now they wouldn't be exporting anyways giving their growth. But Singapore, Venezuela, and Brazil were all cut out. So the companies invested to make clean products, and since they made it while no one else could, the supply was reduced,

making the price higher.

Some economists argue that the solution is to impose tariffs on products that don't meet environmental standards. The idea being it's enough so people will only bring products in when the supplies are short. This would provide a relief valve so prices wouldn't go up dramatically. That policy is rejected every time we go to environmental regulators. The environmentalists come in and say that we would be paying to pollute--how terrible--paying a fee to kill little children. So we have this absolute trade barrier. And this year because of under-investment and because we've had economic growth, we hit the limits and wholesale gasoline prices rose dramatically, and retail prices followed.

Now on fuel economy, I was in the Carter administration working in the treasury. We passed some taxes to give people some incentive to buy more fuel-efficient cars. Congress had passed standards, and those standards have not changed for 30 years. Had we stayed on the trend we were on coming out of the Carter administration that continued through 1990, we'd be consuming about 15% less motor fuels today. The fuel consumption would be down and we'd have lower gasoline and crude prices.

Now there's another problem coming out of Europe. They have followed a policy of providing a tax incentive to buy diesel cars. Again we get into the capacity issue and the problem of regulation. On environmental regulations, the Europeans this year insisted that diesel fuel be cut to about 20 parts per million. And the European diesel is fine, you don't' have any sulfur smell in cities, but this cuts out imports from Russia. Russia has a number of old refineries, but they cannot make high quality diesel fuel, so they can't come into Europe, thus diesel prices have gone up. At the same time, it has dawned on European governments that the refining industry hasn't invested in the capacity to make clean diesel, and they are short 10 refineries. So suddenly they are facing high priced diesel again, and it works its way through to the consumer price index and creates problems for the European central bank, which is trying to create a stable currency.

So look at Europe and the US, we have these trade barriers and prices are going up. And next year it is going to get worse because the US is moving to a very clean diesel that engineers and the oil industry aren't sure they can move through the pipeline structures to get to the retail outlets. They've set some standard of essentially 0% sulfur diesel hoping that maybe it can get to consumers with the required sulfur level or lower. The problem is shipping different products in the same pipelines is difficult, and it's almost

an unreasonable goal. So we face the potential for a shortage of diesel fuel that will have effects for world trade because we move most of the goods we buy in the US by trucks.

In addition, the new energy bill reduces the supply of gasoline by 2%, so next May US domestically produced gasoline is going to be reduced by 2% when there should be about a 2% growth.

Add all this up and it leads to a situation where you're talking about dramatic price increases for energy. I've gone through several technical reasons, but the fundamental reason is--and I want to emphasize the point that we built this foundation for much higher energy prices very well, this was not built on sand--we have really set ourselves up for much higher energy prices, and this is going to work its way through to the consumer price index and other measures in inflation.

I did a recent study examining the errors of forecasting of CPI by the macro forecasters. What I found over the last 10 years is that there is a very close correlation between the forecasting error (one year ahead inflation rate) and the error on their assumption about oil prices. So now, the forecasters project inflation rates of something like 2.5% for the fourth quarter next year, and that's predicated on a 50 dollar per barrel oil price. But if you look at how crude prices are going to come out, if product prices go up, the inflation rate is going to be closer to 5.5%, and that is a high enough rate that it's going to catch Ben Bernanke's and the Federal Reserve Board's' attention. By then they'll be looking at a situation where energy isn't transitory, but energy prices are rising, and they're going to recall Matt Simmons's forecasts about a 160 dollar per barrel oil, and reminded of the fact that we have these tight natural gas supplies.

This leads me to conclude that central banks will be forced to take action within the next year to slow economic growth because of energy just as they did in 1973, 1979 and 1990. So we are going to get the fourth energy recession. In 1973, no one thought there would be a recession in the fourth quarter of 1974. What I didn't tell you is that the entire reason for that is that when the forecasts were made in 1973, people foresaw 4% inflation, and actual inflation was 12%. So the inflationary pressure is going to be such that the FED is going to be required to really squeeze.

Now this is avoidable. We relaxed these import regulations following the hurricanes

because the environmental protection agency in the US is allowed to grant 20-day waivers. At the same time the IEA released product stocks to the US which offset the loss of gasoline production. So essentially we tapped the IEA, which we've all been working with for 30 years, and gasoline prices dropped by about 50%, from three dollars to a dollar and a half. Crude prices fell from 70 to 57 dollars per barrel, and they're going down. Natural gas prices fell because we've had warm weather.

We started our trip in Oklahoma City, and stopped over in Chicago before heading out to London. In Chicago, they had 70 degree weather, and since they close the golf courses October 31st, those golf courses just looked beautiful, and forlorn because it was 70 degrees, a great day to go out and play golf in summer attire. But the weather forecasters who seem to do a better job than the economists at telling us that we are going to have a cold winter. And a cold winter in the northern US is going to lead to much higher heating prices, and to high gasoline prices in the summer because they can't build inventories. Europe has also been warm, but their forecasters are predicting a very cold winter and shortages of natural gas in England for industrial users. So we are going to see much higher prices in Europe and the US if the weather forecasters are right.

Some of this pressure can be temporarily mitigated by changes in environmental regulations. The way I think to achieve this--having tried to negotiate with environmental negotiators over the years--is to say in exchange for short-term fees on imported products, we will take some serious steps towards conservation. But I am very worried that we won't do that, and instead we'll have a recession. Now the good news from a recession is that we will get much lower prices, because given the commodity market structure right now, once prices start to fall the refining constraints go away, the natural gas becomes available, and the prices begin to fall in a classic commodity market spiral. If you read today's headlines, there's a story about copper in China. There was a similar story in 1976 when Mr. Hamanaka and Mr. Sumitomo failed, and the copper prices declined by 50%. So we could see much lower prices once the economy slows down. Saudi Arabia could try to cut production to try to stop that, but the way these markets are structured right now, prices will fall dramatically due to financial engineering, and energy derevity products will apply huge downward pressures. That leads to the conclusion that we find ourselves in a very tough situation in setting ourselves up so that the central banks are going to be forced to act, and that we really have to take a recession to moderate energy prices.

Let me conclude by talking about what I think Ben Bernanke's concern is: if we take a recession, the core rate of inflation falls below zero, and we start having falling prices and the US could slide into a deflationary cycle like that experienced by Japan from 1990-2004. From an energy perspective that would be good because by the time we got out of it we will have cut our oil use dramatically. The US does have alternative fuel such as ethanol, and we can and will switch to using bio-fuels for 1/3 of our fuel supply. At one meeting at the Institute for International Economics we realized that it's possible to resolve a WTO dispute with Brazil over cotton by going to an extreme bio-fuel solution by shifting half our fuel to an ethanol based on poplar trees. If we were to go into a period of slow growth, we'd begin to see this penetration of bio-fuels and our dependency upon Middle Eastern oil might fall from 10 to 8 million barrels a day. We've seen changes like that in the past and it's quite possible to see a change in the future.

But the primary message is that our energy policy in the US and Europe is in direct collision course with monetary policy. The monetary policy is going to have to change given these restraints on refining products in both countries; there's really not much a way out of it unless we move to a more rapid period of inflation and raise the money supply. However, that has other implications in terms of the exchange rate of the dollar--international monetary stability, so I don't think we'll see that happening.

Question & Answers:

Q Your analysis seems to be very narrowly focused on the factors specific to the US, and in view of the fact that these days the hefty increase for energy in the world demand comes from China, how does that factor in? You also noted a three to one ratio of elasticity of the US oil prices to the income elasticities. But how about the Chinese impact as the US decreases consumption, will they in turn use the Chinese demand for fuel?

A That is an excellent question. First if the US economy slows, the Chinese economy will slow because growth of the Chinese economy is tied in part to the US retail consumer. So that should mean that energy demand should slow. I didn't go there because it's a complicated issue. Every time I go there the experts in China say if growth slows, China's demand will slow. There is a terrible political problem of

instability in China, and I don't understand that nearly as much as you do.

Second, China can get its oil. Up to March 1999, we had plenty of crude and refining capacity, and low crude prices as they declined to 10 dollars per barrel. From March 1999 to April 2004, Saudi Arabia ran the world oil market. In march 1999, Saudi Arabia invited all the major oil-producing countries to the opening of the new Shaba oil field. Prince Abdullah, now king Abdullah, met with them. Also the Mexican, Norway, and Russian oil ministers were all there. Prince Abdullah explained that Saudi Arabia was producing seven million barrels a day, prices were 10 dollars per barrel, and that if things continued, they were going to go to 11 million barrels a day and the price would drop to five dollars per barrel. If everyone wanted to cooperate and cut, prices would rise. And for the first time, OPEC became a monopoly.

From that time until 2004, Saudi Arabia followed the policy of trying to keep global inventories tight. That wasn't accidental. They talked to a commodity economist who had studied the relationship between the shape of the forward price curve and so on. The Saudis aggressively stuck to this low inventory strategy, and they took prices from 10 to 30 to 40 dollars per barrel. And in April of last year, we hit the refining constraint that I described, and OPEC essentially lost control of the market. Since then OPEC has boosted production. So there's a lot of crude out there now, so China doesn't have a problem with getting crude oil, they have a refining constraint. But the Chinese unlike Korea or the US resolved it pretty quickly because they can build refineries more rapidly. In the US, it takes five years to build a new refinery if you have all the permits, and up to 15 years to go from deciding to build it, finding the building site, getting the permits, and going through with it.

The Chinese have also educated a lot of chemical engineers. In 1980 in the US, we educated something like 25,000. Now we only educate 3,000 each year because there's no opportunity for chemical engineers. So the Chinese are building refineries--not advanced refineries that produce the really clean fuels--but fuels nonetheless. So I don't see a huge problem for the next two or three years of China meeting it's fuel needs, particularly given the policy of the government on consumption. Last year companies were buying great amounts of gas oil because the electric power system was so questionable. Everything I can read has said that a lot less gas oil has been used to generate electricity because the grid system is a lot more reliable now.

That doesn't mean that China isn't a huge factor in the energy market. One of the reasons we got caught short in 1973 was because we suddenly faced a surprise increase in demand. In 1973 it came from Europe and Japan where growth picked up and consumers suddenly shifted to larger cars and in the US where oil production dropped and environmental rules forced users of coal to switch to oil. It added an unexpected five million barrels per day to demand, which would've been about 10% at the time, over a five-year period. This time the unexpected growth of demand from 1995-2005 has come from India and China, and its added five million barrels again. And in 1973 we had crude supplies, but we didn't have the refining capacity, and prices went up. Now in 2005, we have the same problem.

The reason I focus on the US is because there is an arbitrage relationship between products and crude. So if the prices of gasoline go up, crude prices follow. And the reason this arbitrage works is that at every trading company, you have people buying crude on one side of the table, and people buying and selling products on the other side. And they are continually making the arbitrage the way foreign exchange traders and banks do. And it's not a case of one crude oil, just as a foreign exchange desk will trade a multiple number of currencies, the oil-trading desk trades a multiple number of crude oils, and there's a limited supply of crude oils that can go to most refineries that make these products.

So I have a little model that connects the daily change in crude prices to the daily change in product prices. And the current prediction comes within 10 cents of the actual WTI price. And the basis of the crude prediction is the December 1996 crude price. So if you sit down on this daily basis, you can predict within 10 cents where the crude prices come out based on the cumulative change of product prices. That's one of the things that all these trading groups do every day. Now this model has been off track only once during the last two hurricanes. And so the reason that one focuses on the products in the US is because that tightness sets the price of the light crude oils, WTI and Brent, and that then filters down to all the other crudes that come across the globe. That's the marginal market, and as they teach in economics, you go to the margin to find the balance.

Q Did you take into consideration the Russian oil exports in the European line as well as the Pacific line, especially Suku line one, two, and three, which are scheduled to supply before the Beijing Olympics?

A Another excellent question. For those who are not familiar, there are several projects in Russia, as they're debating building a pipeline either to Beijing or to a Russian port west of Japan, along with Russian exports to Europe. First, those are crude lines, and our problem is not crude, but refining capacity. Until the automakers can make vehicles that can run on crude oil, we have to worry about refining capacity. Those people who do long-term supply/demand balances factor it in and say it's going to help meet demand three or four years from now. My concern is next year; we really have to deal with what we have on our hands right now. Now the interesting thing is that Russia has a number of refineries right now that are idled, which can produce products that meet demand that work in vehicles, but are higher in sulfur. So the question is, how can that product get into the system in a way that does the least amount of environmental damage, but protects us some against the economy?

So my focus is more on the next year or two, because if we get high-energy prices, we will have a recession, and by the time that product comes online, we won't need it. Now in the US we talk about the tax that had price controls on oil of which I was the author along with two others. One of the things we were worried about was that energy prices were rising, and when we decontrolled, more cash would go into the energy sector, and there wouldn't be any capacity to use it and we would get inflation in the energy sector. Salaries would be bid up and price of steel and cost of rigs would be bid up. So we wanted a very high tax for the first year that would drop off over time to try to provide an orderly transition. Free-market economists just don't believe in orderly transitions. So our design wasn't put into action, and the cash flowed into the oil industry and went from 15-80 billion dollars, and the industry bid up rig-rates to find engineers. So instead of paying $80,000, they were paying $200,000. Geologists were bought out of the major companies to work the small companies for huge sums and promises. But prices collapsed, and in 1986, the industry spent 20 billion dollars again. All those rigs were idled, all the people were laid off, and we lost a huge chunk of infrastructure.

The real concern now is that we are going to go through this higher price period, and they don't want to go through this cycle again. So they're trying to keep some order and hopefully spend the money. But my concern is what if instead we get the recession and a lot of those projects look like big money losers.

This is an industry that has gone through periods of feast and famine. I was on the

Valero Board of Directors from 1990-94, which was a company no one had heard of, now they have the largest US refineries. When I went on the board, they told me that what I had to understand in refining is that if you have a good quarter, you need to save it because you get one good quarter every 10 years. So looking at these pipelines, Vladimir Putin clearly understands this. He has resisted attempts to put the pipelines into private hands, so they can keep some control over the flow of oil. They're building a pipeline directly to Germany so Poland and the Ukraine cannot exercise market power in terms of forcing down natural gas prices. And putin is going to make sure that if markets start to soften the Russian exports will get cut back. I think he will cooperate with the Saudis because the one thing Russia never wants to do again is to go to Washington D.C. and have to ask the IMF for money. The Russians will say they were very lucky that Bill Clinton was president, and the US worked with them. One Russian I know said, "God help us if we'd have to deal with George Bush in a negotiation to get money from IMF". And so that argues that even if we get a price collapse it will be quick and the Russians will back off. This is why they're reserving so much cash.

Q Your analysis this morning is contrary to the conventional wisdom that is prevalent to this part of the country. Surely your analysis seems to focus on the short-term perspective, and you're focusing on the final product rather than crude. When here our concern is more on crude than on the refining. However, nobody will dispute that the consumption of the US market will one way or another sway the price tendency of the refined product and consequently crude oil. So, what you're saying we cannot really dispute because you are suppose to know more about your situation that us. But if that's what it is, then why is the oil price recently going down? A lot of people are talking about how this tendency may continue for the rest of this year and perhaps even through to next year. This goes directly against what you were saying. Is this because of the refining capacity discrepancy, or is it something else we don't know about?

A Let me start by saying, there is a publication called The International Economy. A year ago I published a paper in it stating why we're heading to 60 dollars a barrel. I didn't think it was going to hit there this year. I explained that there's an arbitrage between products and crude. And you're right, I focus on the short-term because I think it has implications for the macro economy, and all of our long-term energy forecasts are predicated on continued growth of the economy, and if we have a Japanese-like 10-year period of very low growth, we're going to have to tear up those long-term forecasts and rethink the whole thing. I think you will agree on that, because energy and demand just

will not grow.

Regarding the arbitrage: if product prices go up, crude goes up. And I explained that the price of crude has dropped, because we temporarily dropped our trade barriers; EPA brought down gas prices and that brought crude prices down.

Secondly, warm weather. This is a commodity. When I was working for Dr. Greenspan and the treasury, we had the integrated companies but we didn't have spot markets. We're probably better off, but if we get cold weather, we draw inventories down; we will quickly go back to a situation with higher prices. Historically, product prices tend to fall when you have warmer weather in October, but then they rise later. Abnormally cold weather can boost global oil demand by as much as 1%. Periods of warm weather north of the equator can lead to a 1% decline in consumption. So given the price elasticities, which means much lower prices. So when you're dealing with a short-term situation, you have to adjust for the weather. Everyone starts with a normal winter projection. But I'm not surprised prices declined. The hurricanes took them to record levels, leading to product shortages, and what you'd expect in terms of crude and product prices. Those problems were solved by the IEA release of products and suspension of the environmental regulations.

However, when we get to next summer, we're going to face an entirely different situation. First, we are going to see less gasoline supply in the US. We won't be able to import gasoline from Europe because of higher standards. Second, a really obscure thing decision was made regarding the energy bill: there's a product called MTBE refiners have been using, and after next spring they have to take it out of the gasoline in the US because they've lost their legal protection for using it. That cuts supply by 2%. EPA can't issue a regulatory change, so everything is stacked for higher prices next summer unless we get huge amounts of ethanol to help moderate the situation. So that will push pressures on crude up.

I've been doing this for years, and yes we focus on the short-term more because in terms of looking at the long-term problem, frankly, we never get it right. I started out working on long-term models, and there are many reasons why we don't get it right, starting with the macro. Cumulative effective deregulation free trade and the IT revolution have totally changed the economy over the last 20 years. So if you were making projections 15 years ago, you didn't having China growing as rapidly as they

are, and you didn't have ethanol coming on. Now there is this potential for what they call cellulosic ethanol, which James Woolsey, the former head of CIA advocates and people say is practical by 2010. This could definitely change the face of agriculture and fuel consumption in the US. So by 2015 we could be doing something entirely different. There's also the shift to hydrogen, but I think that is 20 years down the road given the technological and distribution issues.

But my concern right now is that if we change the macro direction and it changes because of high oil prices, its going to force us to re-examine the whole long-term outlook and quite possibly come to a very different view. And I think we have come to one of those points that comes along every 10 years or so, where one needs to focus on the short-term much more heavily than the long-term. We're at one of those points with the rise in oil prices and threat to inflation and the need for central bank action. This is where for once, the energy, environment and macro people need to get together and see if they can't come up with a policy that works together rather than conflict: that's how we can keep the global economy growing. To add another element, if we did that in the developed countries and oil prices come down, the underdeveloped countries suddenly get much more for their oil bills. And one takes lots of pressures off a lot of areas. Mr. Chavez can't go to South America and offer cheap oil to South American countries and build up opposition to US free-trade policies. So as I said, we are at one of those points where we really need to think short-term as well as long term.

Q Your analysis is quite convincing and persuasive, but what is the most likely scenario? You talk about the possibility of the fourth recession, but are we talking about this recession if everything goes wrong by 2006-07? Or with Bernanke replacing Greenspan, given his professional writings and his views known to the public has been that he will have more clear inflation targeting than Alan Greenspan, who had a more ambiguous stance with not so clear targeting. But since Bernengke's there, and all this deregulation, environmental and trade regulation, given this push by administration policy makers, what would be the most likely scenario in your view? If all these things don't work out right, will we have a recession in 2007? Even today in talking about last year, US growth rate is 5% and this year maybe 4%, and if we have a recession there would be a dramatic increase in interest rates just like what Paul Volcker did in 1973.

A My scenario is that fourth quarter growth of this year to fourth quarter next year is probably 2% recession. This is based on higher interest rates and also the US consumer

will dramatically reduce consumption of non-energy goods. I have a chart that I use quite frequently that shows the percentage of consumers budget allocated to energy goods, and what it shows is a declining trend from 7% in 1960 down to about 5%, then jumping back to about 7% in 1973, jumping to 9% in 1980, gradually falling to 4% in March 1999, and then going back up to about 10% next year. Now the cause of this is the rising natural gas and gasoline prices. Just if you factor in the much higher gasoline prices, consumers are going to have to spend a lot more on heating fuel and gasoline, and most of that is already in the system, even with the recent price declines.

Now the way I calculate the period out in front is that I take the forecast of consumption and I just adjust the energy share. There are a couple of reasons why that number may even get higher. In 1974 Art Okin, Lyndon Johnsons' chief economic advisor, wrote a paper talking about the 1974 recession, which is where I got my numbers on the forecasting errors. He pointed out that consumers were able to dip into their savings. So when energy prices went up, they were consuming 7% of their disposable income. You know today consumer savings, the percentage of disposable personal income after what the taxman takes is –1%. That is consumers are spending more and so either they will borrow more, or there will be a real drop in consumption of non-energy goods, and I think that's what's coming.

A colleague of mine pointed out in 1974 that suddenly around December 15, consumers just crawled into a cave and they just stopped buying things, because their first heating bills had just hit them. So when these first big cold spells come these much larger energy bills come and it's trouble. I did a survey in Chicago, and many consumers had not turned on their heaters this year, because it's been 70 degrees. They were desperately holding off turning their heaters on until the last possible moment. That is going to take a bite out of the consumer; part of the reason consumers are spending more of their own disposable personal income is because they are borrowing against their own house. Home equity loans are very popular in the US. If housing values plateau, that source of income for consumption will shrink, so you will get much lower growth in the absolute level of consumption, and also an increase in the energy share, so you get less other consumption.

So factor in higher interest rates, and backing off of the consumer who supplies 75% of the US GDP. You put the whole thing together and you get my 2%, and it goes into 2007. The question is how quickly can we get energy prices back down? If you do the

numbers, we import about 10 million barrels a day. That's four billion barrels of oil a year. And a 10-dollar cut out of the price of oil is 40 billion off our trade deficit. A drop of 15 dollars in oil prices is equal to one month's trade deficit. Dramatic drop in oil prices back down towards 30 dollars goes a long way towards helping achieve stability in other parts of the world. Of course true international economists will say the trade deficit can go up in other areas because of income balancing, but the fact is that we would get a temporary reduction, and if savings rates go up we could get a permanent reduction. That would be similar to offsetting. So in one sense, the drop in energy prices has the effect of a tax cut. I think if energy prices go up they will be forced to raise, but at the first sign of weakening in energy prices, they'll drop interest rates quite dramatically to avoid the deflationary cycle as long as the dollar remains relatively stable.

If we don't have a slowdown by next summer, I worry we could get six-dollar spiking in gasoline prices per gallon. But the whole story when I give a speech on this subject, the title is, *Will it Be Six in 2006?* No unit, and the question will be is it six dollars per gallon (and that is very much a US question), or will it be six dollars a million Btu, (which is the natural gas measure in the US), or will it be six dollars a barrel WTI? And all three are possible given the current state of the macro side. If we had an early recession, prices would drop. I think the price drop is much more likely in 2007.

Q Could development of renewable or other energy resources be able to alleviate or reduce the higher oil prices? And if so, to what extent?

A The big area for renewables is in transportation. There is potential for ethanol to replace a lot of petroleum use in transportation. As I indicated, one of the renewables done with cellulusic ethanol turns out to be fairly energy-efficient. The ethanol we use right now is made from sugar and there are studies that show for every barrel of oil equivalent we get 3/4 of a barrel from ethanol, so it's very energy inefficient. Cellulosic ethanol is much more efficient, and great for green housing, because you can use almost any form of cellulose, so you get huge absorption of Co2 while you're producing it.

The use of cellulosic ethanol is also great for the WTO because it creates the possibility to convert farms that aren't very efficient to produce cellulosic ethanol and the owners get almost as much money because you don't have to fertilize poplar trees as they're basically weeds, and they grow in these areas. That is good for the countries most

efficient (primarily Brazil) in producing a lot of the world's cotton, so you move the production to these areas and you get a great deal of ethanol.

What are the potentials? I haven't seen a good study to know, but some of the people I talk to say that 1/2-3/4 of the US's transportation fuel could come out of this by say 2015, and that's a lot of world oil. It's a potential threat to Saudi Arabia that they take quite seriously, and I've suddenly had many Saudis writing me saying that this will depress their income, and not to press so hard. Ethanol is a solution.

The better solution though, is conservation. I have a friend down the road in Colorado who has been pushing energy conservation for as long as I've been doing energy markets. And the studies the Rocky Mountain Institute have done point to ways to dramatically reduce transportation use of fuel and reduce fuel in other activities leaving petroleum primarily for air transportation. So you take a serious push on renewables and conservation and in 10 years you could change the whole shape of the energy structure.

I came to Washington in 1973 and my job was to push a big gasoline tax, and I want you to know how successful I've been. One of the ideas were pushing is to put out a big gasoline tax and use the revenue to buy back inefficient SUVs and to essentially start a process to rapidly turnover the auto fleet.

Q I would like to raise a question from the perspective of oil prices and war. George Bush said that the war in Iraq was fought to expand democracy, but even among the US media there were claims that the war was to secure a stable oil supply from the Middle East region. In this regard, I would not dispute these two conflicting claims, but a war was fought. In terms of oil prices, was Bush's policy successful in securing a stable oil supply? Also, could you compare the oil prices before and after the Iraq war, and what the prospects are of the US securing a stable oil supply?

A As a Council of Foreign Relations at the time when we went to war, the BP senior fellow there and I were not big supporters of it because it looked like Iraq would split into three countries. History shows every time you have a revolution in oil-producing countries, production drops by about 50%, and the Iraqi episode proves this as Iraqi production has gone down. I don't think it assures stable supplies from the Middle East, and I'm terribly worried that this dispute with Iran over their nuclear program threatens much higher prices.

Many of you will recall that from 1980-1990 Iraq and Iran fought a war that resulted in millions of deaths. And at points of maximum desperation, Iran used its position to stop tanker traffic. I am concerned that if unilateral action is taken by a government--most likely Israel--against the Iranian nuclear program, the Iranians will take action against some oil shipments, and we don't have the military to go in and protect things if we had to. All you have to do is threaten to sink a ship, and nobody will send a commercial tanker into the Persian Gulf. Lloyds wont insure it, and that's a prescription for really high oil prices. So if you sit down and say, did we succeed in stabilizing the world oil market with our actions in Iraq? Much to the contrary, we drastically destabilized it, and I think we may pay the consequences. So far we've been lucky, but I don't know about the internal affairs of Saudi Arabia and I think very few people do. But this Iranian situation gives me sleepless nights.

Q We have high oil prices because of shortage of supply. I think there are certain things we could do both in supply and demand sides. On the supply side the consumer groups have a tendency to blame the industry that they're making too much profit, they're not expanding etc, and the industry blames the government regulation. Which side is correct? If you could elaborate a bit more on that and what you would recommend the US government do?

The demand side I think you mentioned that consumers these days aren't responding as much as they did in the 1970s I think because we haven't reached that threshold yet. The prices now aren't as high as then especially when you consider the rise of income levels and inflation over the last 30 years. I think we should do more on the supply side at this time. Also, in the beginning of your talk, you mentioned some experts saying perhaps 160 dollars a barrel, and in Korea as the former minister, the crude oil price is more relevant here than the refined products, so if you could take us over the next year, how the price of crude oil might fluctuate and why.

A As I said, products and crude are tied together. I think crude prices next year about this time, assuming economic growth continues, will be about 75 dollars a barrel for light crude oil, Brent or WTI. That also assumes we don't have another serious hurricane season on the gulf coast. If it does, we'll be talking more 90-dollar oil.

The supply side, you are right. The problem is that it takes forever to build refineries

even if you have the permits. We just didn't build the refining capacity. And its not just the US, Europe is short refineries to produce diesel fuel. So what we need to do is find a mechanism to quickly change the pattern of consumption. And again, you correctly point out that consumers are less sensitive because they're more affluent today. So I say we've hit the supply constraint and in economic terms, some huge rents are accruing to refiners, not crude producers.

The ideal solution really originates in the US with the most unpopular step possible--a big gasoline tax. I think what we do now is try to put on a significant gasoline tax, not one that necessarily takes effect immediately, but say in a year or two, and in the meantime you offer to buy back (at more than market values) all these big vehicles. So you take all these large cars off the roads and give consumers a chance to go back and buy more efficient vehicles, funding the buy-back program with about 20% of the revenue from the gasoline tax.

I'd even do that in Korea because I've seen many large vehicles here on the roads and I wonder how many SUVs you need. Where I live in Colorado, you need an SUV occasionally, so I have a very old jeep to go up the mountains and it goes 1,000 miles a year, and the rest of the time I drive an efficient car. What you want to do is get the vehicle stock flow down. A couple of good facts are that we know there's plenty of surplus capacity in the world auto industry, so it provides a stimulus to the auto industry to make much more efficient vehicles. And it also has the affect of helping consumers; many consumers in the US lease their vehicles, and they essentially have no value, or they bought it, but can't sell it because its trade in value has gone down with the rise in gasoline prices.

We have these computerized car-sales sites in the US, and I did an analysis and in the largest area I could find, which was in LA that has about 1/4 of the US auto market, there were only 13 small Toyotas in the whole area, and there were 15,000 (within two-year-old) Ford F-Series trucks for sale. Everyone wants to sell these; it's just an asset they're locked into, which slows the adjustment process. Now that would work, and it would drop gasoline and diesel consumption. Does it have a chance of passage? No. unfortunately as you found when you were energy minister, rational energy policy decisions are very hard to sell to the public because its telling the public we have to raise prices.