



Economic Impact of an Energy Downturn - Revisited

Posted by [Gail the Actuary](#) on February 11, 2009 - 10:18am

Topic: [Economics/Finance](#)

Tags: [food prices](#), [medicare](#), [oil prices](#), [peak oil](#) [[list all tags](#)]

Last spring, I was asked to give a short talk about the expected economic impact of an energy downturn, as part of a public health program called "Converging Environmental Crises: A Teach-in on Energy, Climate Change, Water, Agriculture and Population." This is the text, which has been posted previously on The Oil Drum. These are the PowerPoint [slides](#) I show. This is a [link](#) to the recorded version of my talk.

Good afternoon. My name is Gail Tverberg. Some of you know me as "Gail the Actuary" on TheOilDrum.com web site. The Oil Drum is a web site about energy and our future.

Today, I will be talking to you about **The Expected Economic Impact of an Energy Downturn**. If, after this talk, you would like to learn more about peak oil and about resource depletion issues of all types, TheOilDrum.com is a good site to go to for more information.

Let's talk a bit first about the energy downturn. As everyone is aware, the price of gasoline and diesel has been rising recently. The reason the price is rising is because the world's supply of oil cannot keep up with demand.

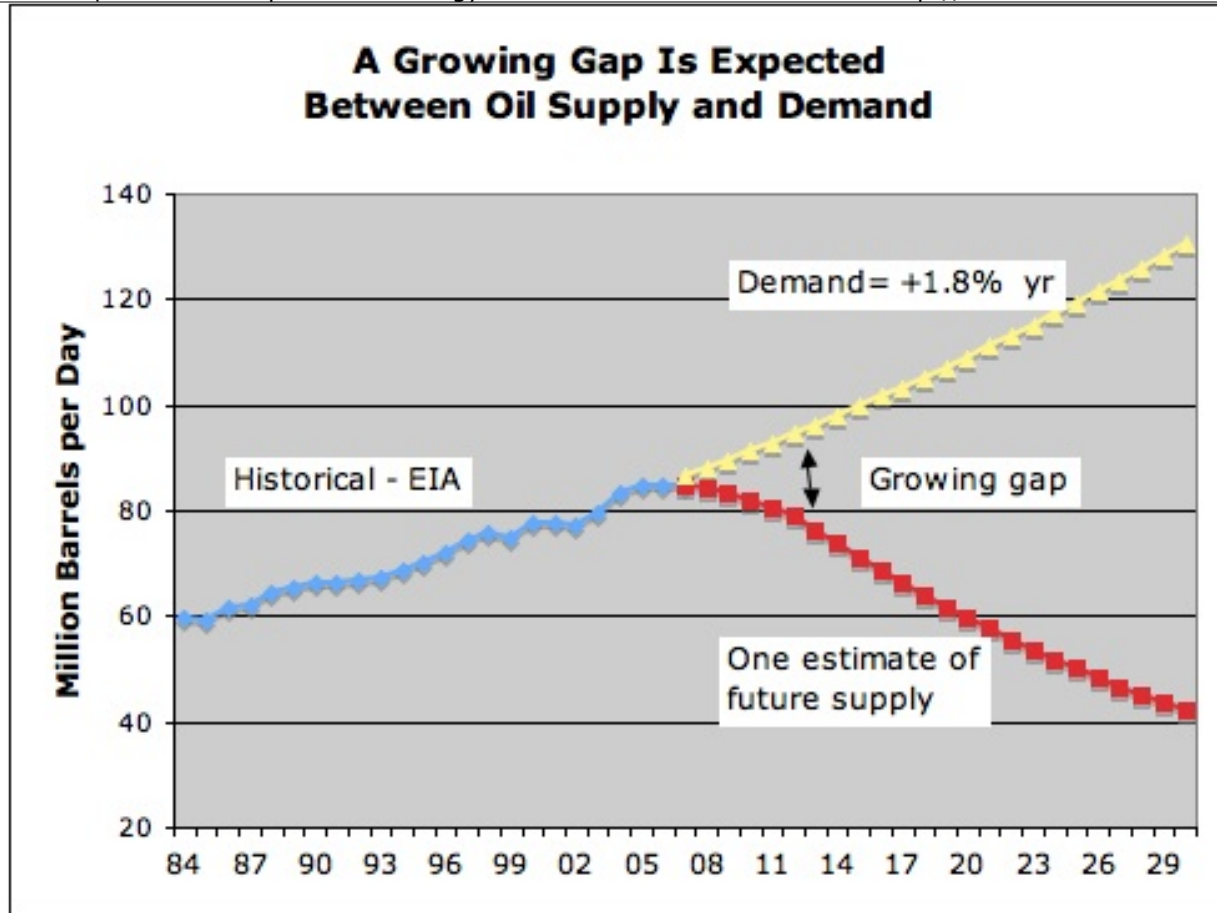


Figure 1

I have illustrated the situation we are facing in Figure 1. In this chart, I show demand increasing in the future at about the same rate that consumption has increased in the past. One reason for increasing demand is growth of economies of developing countries such as China and India.

The supply of oil has leveled off. Oil production for 2007 was about the same as it was in 2005 and 2006. Many people believe that sometime in the next few years, supply may actually begin to fall. Even if supply remains level, as it has in the past three years, there will be a growing gap between expected future demand and supply.

Why Does a Drop in Oil Production Make a Difference?

Why does a drop in the production of oil, or for that matter, any type of energy, make a difference? After all, oil doesn't cost a lot. We only pay about 4% of the US gross domestic product for it.

In many ways, oil is like food for your car, or food for the earthmover that makes our roads. Without food, we can't do anything. We would starve. Without oil, or the fuel made from oil, all of our big equipment won't work. Our electric power plants use other types of fuel, but if they don't have the fuel they need, we won't have the electric power we need either. Our houses will be dark.

We talk about substitutes, but in the real world they are still a very long way off. Think about plug-in battery-operated cars--that's the kind that use only electricity. First of all, we really don't have this kind of car perfected. Even if we did, it wouldn't solve our need for a whole lot of other

kinds of vehicles, like semi-trucks and earth-moving equipment.

Suppose we did have the plug-in cars perfected. We still would have to figure out how to build the cars in quantity. Engineers are looking at the possibility of using lithium batteries, but the supply of lithium isn't necessarily sufficient for making millions of batteries for cars.

We also have to think about how people will pay for all the new cars. If there isn't a good supply of oil, the old cars suddenly are worth very little. How many people are going to be able to buy a new car, if they can't trade in their old car as a down payment on the new one?

Scientists have looked at a lot of other solutions as well, but they all seem to be a long way off. It is hard to get people to tell us the truth about the problem. Politicians don't want to admit there is a problem that they don't have a solution for. Even a publication like Scientific American won't admit there is a problem. They would like us to think that our scientists can fix any problem. No one wants to admit that the solutions they are looking at are a long way off.

Earth Is Finite

What is happening is that the earth is finite, and we are starting to reach some of its limitations. At this point, most of the "easy to extract" oil has already been removed. There is still oil in the ground, but what remains is becoming more and more difficult to remove.

When we try to find alternatives, we encounter limitations of other types. In some situations, natural gas might be a substitute, but in North America it is also in relatively short supply. Coal is in better supply, but it has serious climate change issues.

We hear a lot about ethanol from corn. Growing corn for ethanol requires huge amounts of agricultural land and fresh water. Both agricultural land and fresh water are in limited supply. About 25% of the corn we grow in the United States is now being used to produce ethanol. Even using this huge amount of corn, we don't produce very much ethanol. The energy content of the ethanol produced is equal to only about 1% of energy of the oil we use. Clearly, there is no way we can scale up this process, to cover any reasonable shortfall of oil.

Even the minerals that we might use in batteries, and the uranium we might use in nuclear reactors, are becoming increasingly difficult to extract. We have already removed most of the high quality ores of many minerals. What is left is ores of lower concentration. These ores can still be extracted, but it takes more energy resources to process this ore. The energy resources used for processing the ore are often oil and natural gas, and they themselves are in increasingly short supply.

Immediate Economic Impacts

We are all aware that the price of oil is rising. With the increase in price in oil, the price of things made from oil, such as gasoline, diesel fuel, and asphalt also rises. In some cases, it is possible to substitute one fuel for another. Because of this, prices for other fuels, like natural gas and coal, also tend to rise. Electricity is made from coal and natural gas, so its price tends to increase as well.

Food prices are also rising. This is partly because oil is used in growing crops and transporting them to market, and the cost of oil is higher. Higher food prices also reflect the fact that food production is not keeping up with demand, now that demand is so much higher because of biofuel use.

Impacts of Higher Food and Oil Prices

A major impact of higher food and oil prices is to squeeze out discretionary spending, such as eating out at restaurants and flying overseas on vacation. Some students may have to temporarily drop out of college, if their families can no longer afford to help with tuition. Families will cut back in many different ways to keep their budgets balanced.

Another impact of higher food and oil prices is more defaults on loans. We first heard about higher default rates on subprime mortgages. As prices of food and energy continue to rise, defaults can be expected to spread to other kinds of loans, such as credit card debt, auto loans, and student loans.

As families cut back on spending, financial difficulties can be expected to spread to businesses. Some types of businesses that are particularly vulnerable include restaurants, airlines, auto manufacturers, and homebuilders. Businesses with high levels of debt are especially vulnerable, since a drop in revenue is likely to make it difficult to make loan payments.

Financial institutions, such as banks, hedge funds, insurance companies, and pension funds are also likely to be affected by rising default rates. When individuals or businesses take out loans, these loans are often held by one of the various types of financial institutions. If there are defaults, it adversely affects these institutions. Banks and hedge funds often borrow money themselves, so they may find themselves squeezed in the middle if default rates rise. Insurance companies and pension funds may find themselves unable to meet their obligations, if defaults become a serious problem.

Finally, recession is an important impact of higher food and oil prices. Higher energy prices in the past have led to recessions, including the very severe recession that took place in 1973 to 1975. It is likely that higher energy prices are one of the causes of the current recession.

Longer Term Impacts

The graph I showed earlier suggested that the gap between oil supply and demand is likely to get wider, as time goes on. If the shortfall in oil continues to get worse, and it is not possible to offset this shortfall in other ways, this recession may become permanent. The recession may get worse with time, turning into what we would think of as a long-term depression.

We are now reaching limits of many kinds. One way of representing the economy at various points in time is as disks of various sizes. Each year, society has various resources available to it, in terms of oil, natural gas, fresh water, soil productivity, minerals of various types, good climate, and people available to work with these resources. Based on the investments we have made over the years, society is able to produce a collection of goods and services using these resources. The amount of these goods and services has been growing. Let us look at this graphically.

In the recent past, the economy has been growing:

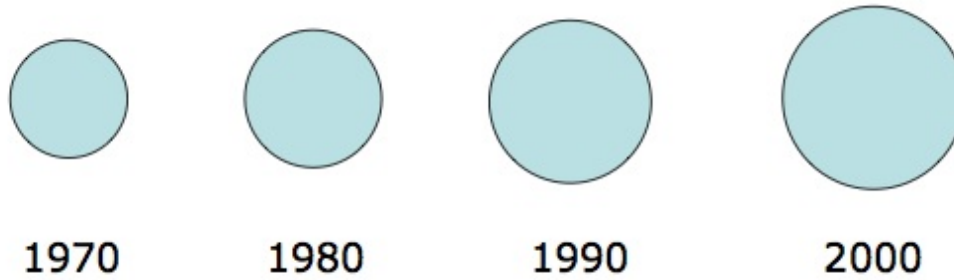


Figure 2

With a long-term recession, it may change to a no-growth economy:

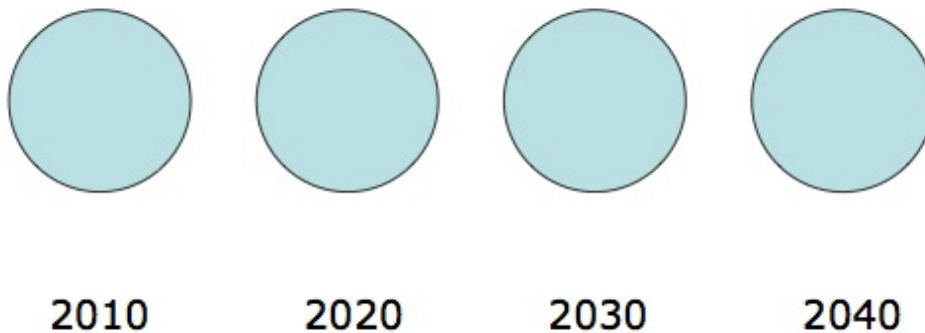


Figure 3

More likely, the economy will decline as resources deplete:

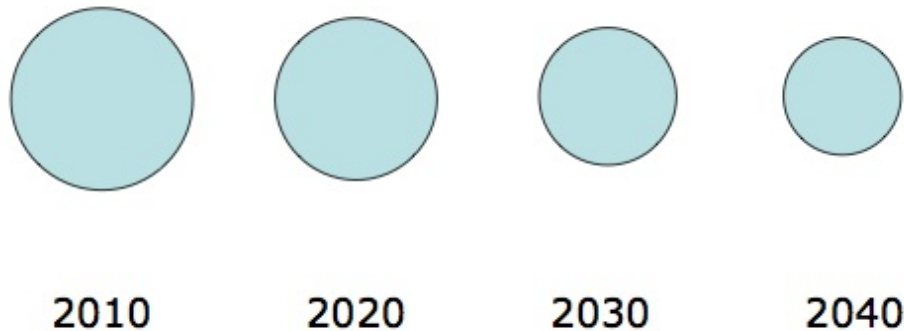
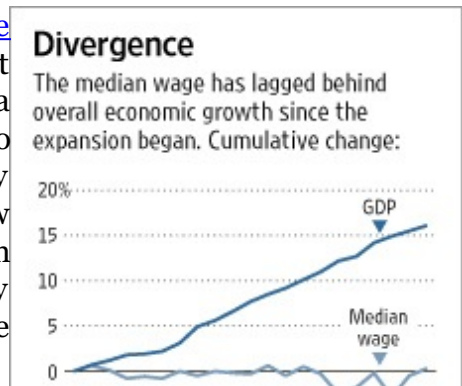
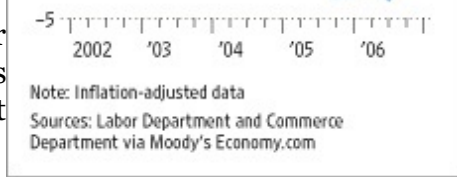


Figure 4

(TOD readers: In the article [The financial crash has a simple cause and a simple solution](#), Jerome a Paris discusses the fact that since 2002, the US median wage has stagnated. Thus, for a large share of the population, we have already reached the "no growth" scenario. This lack of growth in median wages is likely the reason that the financial services industry developed new forms of loans that made home-buying look more affordable than it really was. The lack of growth in median wage is also a likely reason that those same schemes are now falling apart. To the right is the graph Jerome showed.)



With a declining resource base, the median wage, adjusted for inflation, is likely to decline. This decline in median wage means that default rates on loans are likely to increase, and that discretionary spending will continue to decline.



Future Promises

It is not very obvious just looking at an array of discs, but a change from a growing economy, to a flat or declining economy, is really a major change. With a growing economy, future promises are relatively easy to fund:

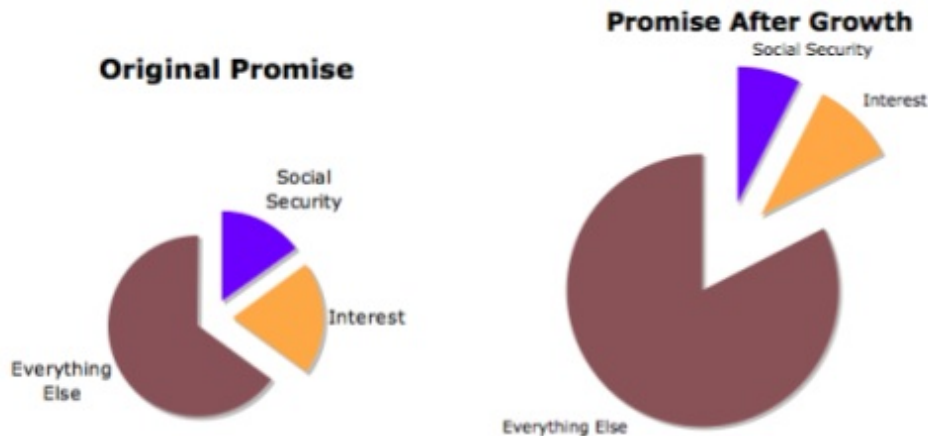


Figure 5

The reason promises like interest payments and social security payments are relatively easy to fund in a growing economy is because these payments are generally not growing as fast as the economy as a whole. When promises such as these are made, the expectation is that the payments will be less of a burden in the future, because the economy will have grown. With this growth, there should be plenty of funds left over for other things.

With a flat or declining economy, funding for promises becomes almost impossibly difficult. Food and energy costs become a bigger share of the economy, over time, because of energy shortages. Future promises like interest, social security, and Medicare payments also become bigger, relative to the total. I have illustrated this in another graph. The combination of the two types of increases, that is the food and energy costs plus the cost of future promises, becomes a *huge* problem. There is not enough left over for "everything else".

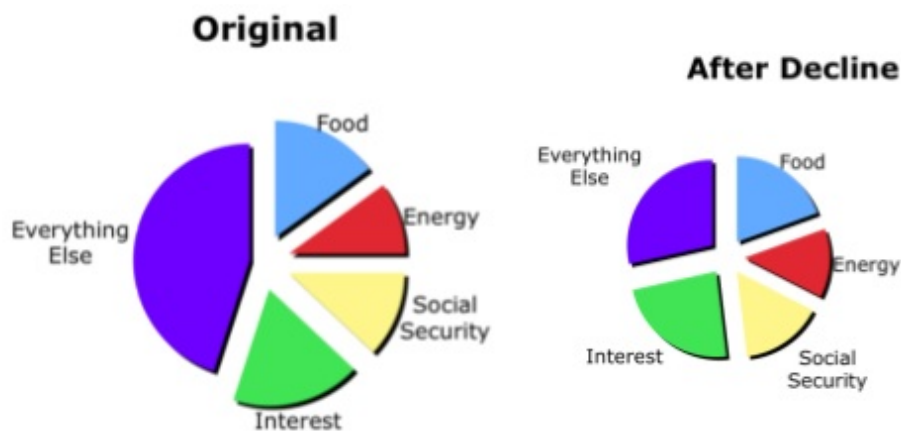


Figure 6

Lenders Will Soon Catch on to Decline

If the economy is in long-term decline, it will not be very long before lenders start to catch on. Some creditors may actually figure out that the economy is not growing, and that it is not likely to grow in the future, because of energy shortages and other limits. Other lenders may only figure out that the default rate is very high, and, because of the way the economy is headed, it can only go higher. Regardless of their reasoning, many lenders are likely to come to the same conclusion, namely, that it *no longer makes sense to offer loans*.

For the United States, the balance of payments deficit is very much like debt. For years, the United States has been importing nearly twice as many goods as it exports. Once trading partners realize that the US economy is in long-term decline, they will realize that it will be almost impossible for the United States to make up for its export shortfall in the future. They are also likely to realize that buying US treasury bonds is not a good substitute for an even trade balance, since the Treasury bonds are likely to decline in value in the future, in terms of the goods they can buy. These issues could lead to a crisis in US imports of all kinds.

World Is Headed for a Credit Unwind

It seems likely that the world is now headed for a major unwind of credit. There has recently been a crisis in the financial markets. This crisis looks very much like the beginning of a major shift toward reduced credit availability. As energy supplies get tighter, economic conditions are likely to get even worse. People will be spending more for food and gasoline, so will be more likely to default on loan payments. If people are out of work, they are more likely to share living spaces. This will reduce demand for houses, and further depress prices.

I expect that the shift toward reduced credit availability will expand in the future. This may even be the "great unwind", in which debt and financial instruments of all types, including derivatives, become very much less common. The real question now is what form the unwind will take. How major will it be? Will it take place in steps, or will large sections of it occur all at once?

The impact of a credit unwind is very much like cutting up a person's credit cards. The person (or business or government) still owes as much debt as in the past, but the organization has no way of obtaining new credit. The debtor must now repay the loans out of current income, in addition to paying current expenses out of income. For many, this will not be possible. Bankruptcy seems likely for many, including a large number of businesses and some governments.

It is possible that a correction to the balance of payments situation, mentioned previously, could be part of the unwind. If this happens, imports of all kinds could drop by as much as half, very quickly.

Looking Ahead 20 or 30 Years

If we look ahead 20 or 30 years, it seems likely that the world will be very much poorer. Personal autos may be rare. Electricity may be unreliable. It is likely that we will have much less in the way of goods and services than we have today. A growing population may add to our problems. If the smaller supply of goods and services is divided among more people, living standards are likely to be much lower than they are today.

If the world becomes much poorer, I would expect social security and Medicare to be drastically scaled back or even eliminated. There will be so little goods and services in total that society cannot afford to set aside much for the disabled and elderly.

I expect that in 20 or 30 years, many business and governments will have failed. Bonds of these businesses and governments will have little value. Stocks of companies that remain in business will continue to have value, but this value may not be high compared to the cost of available goods. Inflation rates are likely to be high, reflecting the lack of goods and services for people to actually buy if they do have money.

Insurance companies and pension plans own stocks and bonds of other companies. When these other companies fail, the insurance companies and pension plans are likely to encounter financial difficulty as well. People who were counting on insurance companies and pension plans for benefits are likely to get nothing, or to receive benefits that are worth very little, because of hyperinflation. I expect most people will choose to continue to work as long as they are physically able to work, because of the poor retirement and pension benefits available.

My expectation is that over the next 20 or 30 years, globalization is likely to be scaled back. A decline in air travel will make it more difficult to manage international businesses. There will be less trust for other countries, because of all the defaults. Countries expecting to import goods are likely to need a corresponding amount of goods to export.

Nature of the Transition

The exact timing and shape of transition from our current economic system to the one that will be in place twenty or thirty years from now is not yet clear. Ideally, the transition will be a slow one, planned by governments. Even if it is slow, it will not look all that slow to people who are laid off, or to people who can no longer afford to drive a car.

It seems at least equally likely that the transition will not be smooth. Many people talk about the possibility of some type of implosion, if our current debt situation cannot be straightened out, or if rising food and gasoline prices make the debt situation worse.

We would like to think that our current financial system can handle multiple failures by banks, money markets, hedge funds, and insurance companies. It is possible, though, that failures will cascade through the system, because each institution owes money to multiple other institutions. If too many institutions fail at once, it is possible that the safety nets in place for the financial system will not work. A lot of people could lose a lot of money, overnight, from multiple failures of institutions holding our money.

There is a second way cascading failures of financial institutions could work out badly. Suppose multiple failures cascade through the financial system, and regulators actually succeed in keeping financial institutions propped up. It is possible that all of the extra cash added to the system may cause rapid inflation, or hyperinflation. If this should happen, we might all find that our money will purchase very little, almost overnight. Our bank accounts would still be full; we just wouldn't be able to buy much of anything.

Unfortunately, the current safety net in case of cascading failures is fairly limited. Treasury Secretary Henry Paulson has proposed a new regulatory structure that would be wider ranging, and presumably provide a better safety net. Getting agreement on what this new regulatory structure should be is likely to take months. In addition, once a new structure is agreed upon, it is likely to take at least another year or two to fully implement the new plan.

Meanwhile, the problem with failing financial institutions is a very current one. If recent trends continue, it is possible that several large financial institutions may fail within the next few weeks or months. If failures occur this quickly, it is doubtful any new structure will yet be in place. We can only hope that ad hoc methods, such as those used by the Federal Reserve so far, will be successful in keeping things patched together.

Health Care Services

Since this talk is part of a series of talks related to public health, I will close by making a few comments about changes I expect in the healthcare field.

I expect that over the next 20 or 30 years, health care services are likely to be drastically scaled back. In a poorer world, I expect that services of all kinds are likely to become less important relative to actual physical goods, and medical services will not be an exception. Fees paid to physicians are likely to be scaled back even more than health care services in general, because few will be able to afford the high fees physicians currently charge.

Public health may become more important, rather than less. If people are poorer, they may look to the government to provide some basic level of service. We might do well to look at how some of the poorer countries are handling healthcare now, for some ideas as to what we might do in the future.

If there is a shortage of oil, transportation is likely to be an issue, for both healthcare employees and for patients. Smaller facilities, within walking distance of patients, may become more important.

Because we are running into limits in so many ways, I expect that electrical interruptions will become more common in the next 20 or 30 years. These may even become a problem early on, for a whole host of reasons, including lack of water for cooling, lack of fuel for power generation, and poor upkeep of the electrical grid. Healthcare providers would be wise to plan for the day when elevators and electronic records may not be available.

Conclusion

I am sorry all of these predictions are very downbeat. As the world reaches its limits, it is clear that the growth paradigm that we are used to will have to end. Decline is in fact quite likely. The financial world does not deal well with economic decline, so economic problems are likely to be among the more severe ones facing the nation and the world, in the years ahead.

Thank you.



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