Introduction:

World market prices for major food commodities have increased substantially in the past two years. Identifying the cause of this run up in prices has been the subject of much conjecture and speculation as well as the subject of many recent studies working from a variety of different starting points in the search for the truth. Some studies point specifically to one or two factors such as crude oil prices or U.S. biofuels policy, while others conclude that a much broader set of factors are in play helping to drive up food and commodity prices. With this document we have worked to assemble a small sampling of some of the more prominent of these food price studies with many of them focusing on bio-fuel’s role in the commodity price run up. We hope that this will enable the reader to quickly decipher the basic assumptions made in each analysis that led them to the principle conclusions that they’ve drawn as a result. Eight major studies are included in the document below:

1. Farm Foundation - What’s Driving Food Prices
2. Merrill Lynch - Biofuels Driving Global Oil Supply Growth
3. USDA/USDOE - Global Agricultural Supply and Demand: Factors Contributing to the Recent Increase in Food Commodity Prices
4. Former USDA Chief Economist Keith Collins - The Role of Biofuels and Other Factors in Increasing Farm and Food Prices
5. FarmEcon, LLC. - Biofuel Support Policy Costs to the U.S. Economy
6. Texas A&M, The Effects of Ethanol on Texas Food and Feed
8. Donald Mitchell – A Note on Rising Food Prices (World Bank Report, released under author’s name, contributing no ownership of findings to World Bank)
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<th>Principle Author/ Funder of Study</th>
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| P. Abbot, C. Hurt, W. Tyner - Purdue University, Department of Agricultural Economics, *What’s Driving Food Prices?* | • Study asked if there is some major driving force behind all the large commodity price increases or is it a coincidence of supply and demand circumstances, or is it a combination of factors?  
• Study reviewed 25 recent studies dealing with food price effects.  
• Major themes of analysis:  
A) Supply and utilization shifted from surplus to shortage but differs by commodity in relative importance and underlying cause.  
B) Linkage of surging commodity prices with the falling US$ exchange rate.  
C) The new correlation between energy and agricultural markets evidenced by biofuels growth.  
• Analysis made no attempt to calculate what percentage of price changes are charged to the many disparate causes and concludes that it is impossible to do so. | • Analysis found that 3 broad sets of forces are driving food price increases:  
1) Global changes in production and consumption of key commodities.  
2) Depreciation of U.S. Dollar  
3) Growth in the production of biofuels  
• Growing food demand & a shift to more animal protein in developing countries has resulted in global consumption increasing faster than production. We’ve moved from surpluses to shortages in recent years. India and China are not the major drivers though - because they trade very little in agricultural commodities. India and China come into play as large consumers of crude oil.  
• The surpluses of the 80s and 90s led to a lack of investment in agricultural research and productivity growth has slowed. Increasing Ag research investment will not be a quick fix to the problems facing us. Short term solutions to this problem will be policy changes and more widespread adoption of existing technology.  
• There is the potential for a large global supply response to the high prices. Higher prices could spur production increases and productivity in developing countries. Policy measures need to try to address the short term food problems without killing longer term potential for economic gain for third world farmers.  
• Increased speculation has played a role. Volatility has increase due to increase trading volumes, but there is little evidence from existing research to show that speculation has increased overall price levels.  
• The depreciation of the US$ is understated in most other studies. Most commodities are priced in US$ but are purchased in the local currency.  
• Biofuels programs have led to greater use of corn and vegetable oil for biofuels which has increased the prices of these commodities. Subsidies (began in 1978) allowed the US ethanol industry to come into existence. The industry would not have survived without them. The ethanol subsidy today serves to enhance the effect of higher oil prices. This differs from its original impact during the 1980s and 1990s, which was to permit the industry to exist and grow slowly.  
• Oil price portion of equation has shifted. With high oil prices and the fixed ethanol subsidy it brought about a boom in investment in ethanol production and a boom in ethanol demand for corn. The increased demand for corn (mostly due to ethanol industry growth) has led to higher
• Higher oil prices have been driving corn prices: ↑ Crude prices = ↑ gasoline price = ↑ ethanol price = ↑ ethanol production = ↑ corn demand = ↑ corn price.
• Study concludes that most of the corn price increase is due to the higher oil price, though US ethanol subsidy and import tariff have contributed as has the lower US$.
• With no subsidy or mandate, corn moves from $1.71 at $40 oil to $5.26 at $120 oil.
• With the subsidy, corn moves from $2.26 at $40 oil to $6.33 at $120 oil.
• About $1 of the corn price increase was due to the subsidy, and $3 to the higher crude oil price.
• Because the RFS mandate is non-binding the impact of removing it is null.
• With no subsidy and just a RFS, corn would still be $5.26, because the market would produce a bit more than 15 billion gallons of ethanol. If oil were to drop back to $40, corn would be $3.15, instead of $1.71 with no subsidy or $2.26 with the subsidy.
• As such, the RFS has an impact at lower oil prices, but not at high oil prices. The oil price is the primary driver.
• Conclusion: Price increases are due to a combination of diverse and complex factors involving commodity supply and utilization, US$ depreciation, and biofuels.
• The challenge will be to find policy options that deal with the short-term effects created by rising food prices without creating a new set of long-term problems.

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<th>Francisco Blanch, Commodity Strategist, Merrill Lynch, Biofuels Driving Global Oil Supply Growth</th>
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<td>• Biofuels are making up a huge portion of oil supply growth, due to a favorable policy wave.</td>
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<td>• Biofuels are the single largest contributor to non-OPEC world oil supply growth.</td>
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<td>• Almost 25% of the US corn crop was used for fuel ethanol in 2007 and this will likely increase to almost 35% in 2008.</td>
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<td>• This number is lower on a global scale, and when global corn, soybeans, rice, wheat and sugar production are aggregated only 7% of the calories contained in these crops were turned into fuel in 2007.</td>
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<td>• US corn ethanol will not save the oil markets.</td>
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| Retail gasoline prices would be $21/bbl higher on average, without the incremental biofuels supply. |
| • Increased ethanol production from corn in the US has pushed up corn prices by 21% since 2004. |
| • Corn-based ethanol has helped increase the supply of transportation fuels, but has also taken away significant amounts of food from the market. |
Corn ethanol is highly inefficient. The energy return on investment (EROI), defined as the ratio of energy delivered to the energy used as an input into the production process is 1.5. Conventional fuel sources like crude oil show an EROI of 20, and coal can reach an EROI of 80 in some cases.

- If US Natural gas prices were to converge towards oil parity, corn ethanol would likely turn unprofitable very quickly.
- Though corn ethanol is an inefficient source of energy, it provided some relief to the extremely tight oil markets in the last few years, but as corn goes to record price levels the market will look for a shift towards 2nd or 3rd generation biofuels technologies, and until they become scalable, Brazilian sugar based ethanol will prosper. i.e. if US ethanol prices increase, the arbitrage will open up, spurring imports of cheap Brazilian ethanol.


- The growth in biofuels production has coincided with rising grain and oilseed prices.
- From 2005/06 to 2007/08, the avg. farm price of corn and soybeans has nearly doubled.
- Analysis (scenario) compared actual and estimated corn and soybean prices over the period 2005/06-2007/08, and assumed corn used for ethanol and soybean oil used for biodiesel production in the U.S. remained unchanged from the amount used in the 2005/06 marketing year.
- Estimating the effects of increased ethanol and biodiesel consumption on domestic agriculture and domestic food prices necessitates segmenting the portion of the increase in corn and soybean prices due to the expansion in ethanol and biodiesel consumption and the increase in corn and soybean prices due to other factors.

- Increased biofuels production is partially responsible for the increase in corn and soybean prices.
- Under alternative scenario, lower corn and soybean oil use lowers the prices of corn and soybeans. Other crop prices may have been lower because of increased plantings, and feed costs would likely have been lower.
- In 2007 the expansion in ethanol and biodiesel consumption is estimated to have increased the Consumer Price Index (CPI) for all food by 0.10-0.15 percentage point. Therefore, ethanol and biodiesel consumption accounted for approximately 3-4 percent of overall rise in retail food prices. During the first 4 months of 2008, the all food CPI increased by 4.8 percent, with increased ethanol and biodiesel consumption accounting for about 4-5 percent of the total increase while other factors accounted for 95-96 percent of the increase.
- Biodiesel use has had a negligible effect on diesel fuel prices since biodiesel production is so small compared to total diesel use.
- Without ethanol gas prices gasoline prices would be between 20 cents per gallon to 35 cents per gallon higher.
- Without ethanol (estimated use of 9 billion gallons in 2008) we would need
| **Commodity prices, both Ag and Non-Ag, have risen sharply mostly for reasons unrelated to biofuels. Higher incomes, population growth, and depreciation of the dollar all increase the demand for processed foods and meat in rapidly developing countries like India and China. Drought and dry weather has lowered production and reduced stocks, and several countries have imposed export restrictions. Finally, record gasoline and diesel fuel prices are increasing production, transport and processing costs of all food products.**<br>**Assumes that all of the increase in farm commodity prices is passed on to consumers through higher retail food prices, yet farm prices of commodities only account for 20% of retail food costs to consumers.**<br>**The cost of ethanol to refiners after accounting for the blender's credit has been lower than the production cost of conventional gasoline. This is why production has exceeded the RFS.** | **5% more gasoline (7.2 billion gallons) from somewhere to maintain current levels of travel. This demand for more gasoline would only be met by a further increase in gasoline price.**<br>**Since mid 1999 when food, all commodity, and crude oil price indexes were at the same level, food commodity prices have jumped 98%, All Commodities 286%, and Crude Oil 547%.**<br>**Main culprit = crude oil prices.** |

| **Keith Collins, for Kraft Foods Global Inc. *The Role of Biofuels and Other Factors in Increasing Farm and Food Prices*** | **It is impossible to give precise estimates of the impacts of each of the many factors affecting corn and other major crop prices.**<br>**But: expanding foreign incomes, declining value of the dollar, higher prices for other crops, increased animal numbers, weather effects, changing foreign agricultural policies, higher energy prices and farm production costs, increased financial investment in commodity markets, expectations of even tighter markets and steady increases in biofuels production all play a role.**<br>**Nearly all of the increase in total use of corn over the past two years has been due to use of corn by ethanol plants, thus most of the corn price increase has likely been due to ethanol.** | **60% of the expected increase in feed grain and oil seed product costs between 2006/07 and 2008/09 is accounted for by biofuels. This translates into ↑ U.S. personal consumption expenditures on food, over a 2-3 year period, of 1.8 percent. 1.8 percent appears to be small, but must be viewed in the context of the long-term annual average increase in food prices of about 2.5 percent per year. Thus, the increase in retail food prices due to biofuels is estimated to be 23-35 percent above the normal increase in food prices that would occur over 2-3 years. Therefore, biofuels have now become a significant factor in higher food prices.**<br>**High prices for farm products have led to significant retail food price increases, rising 4.9 percent during 2007, the highest increase in 17 years.**<br>**Biofuels account for a ~30% increase in retail food prices above and beyond the normal increase in food prices that generally occurs over 2-3 years.**<br>**Increased oil prices, government ethanol support policies all expanded ethanol production. Ethanol producer risk is lessened and spurs investment, production and higher corn and ag commodity prices. The** |
Ethanol is the increasingly important factor in farm prices. Ethanol growth was slow between 2000-2004, but a combination of ↑ crude prices and government support for ethanol made ethanol emerge as major demand force.

The increase in needed corn from 2006/07-2008/09 is equivalent to the production of corn on 12 million acres. The ↑ in corn demand from ethanol is rising faster than growth in yield/acre. Thus, corn has to attract acres from elsewhere to meet demand.

More corn acres raise prices of other crops, yet overall acreage is limited

There is no assurance RFS levels would be met without the mandate.

support system reduces the normal ability of high corn prices to reduce demand and ration short supplies across users.

RFS would not necessarily be reached without the mandate. Declining ethanol margins, plant operation and expansion costs are rising; ethanol transport costs are rising as distances to new blend markets reach further outside the Midwest. In this environment, the tax credit, and RFS help maintain investment in ethanol. Without these policies, ethanol would likely decline to its energy equivalent value to gasoline, some ethanol plants would have negative margins, reduce capacity or cease production, and corn prices would decline.

Corn prices are likely to remain high for several years and exceed current government long-term projections.

Increased corn production needed to meet demand increases the prices of other crops and foods made from these crops.

The increase in corn ethanol and other biofuels is raising retail food prices because they hold the dominant position in expanding demand. Some analyses conclude corn price increases have little effect on food prices, those analysis do not account for the time lags between increases in feed grain, oilseed meal and other crop prices and their incorporation into retail animal product and other food prices.

Forecasters have been under estimating food price inflation: The December 2006-Dec. 2007 increase in the food CPI was the largest in 17 years. For the past 4 years, the annual USDA baseline forecasts have underestimated the increase in food prices, and it will do so again this year.

Food prices are affected by several factors: high energy costs, general inflation, foreign income growth, devaluation of the dollar, foreign policy changes, and weather – these factors are largely outside of the control of the U.S. government. But, biofuels policy can be controlled and it should be reconsidered.

Government support for corn ethanol ensures a permanent, significant, and increasing demand for corn.

Thomas Elam, FarmEcon, LLC  
*Biofuel Support Policy Costs to the U.S. Economy*

To estimate the impact of biofuels policy, models of a biofuels production system and costs were needed. A model from University of Minnesota was used for ethanol production and an Iowa State University model was used for soy-based biodiesel.

Assumptions for crop year 2007/08, compare history with biofuels policy effects against

By dramatically increasing demand for limited supplies of feedstocks our Federal energy policy has increased the total cost of biofuels production well beyond what the free market alone would have allowed. Biofuels producers are not reaping the benefits – biofuels support payments have become ‘windfall’ profits for grain and soybean producers.

The model tells us that if biofuels were to compete with other uses, without tax credits or the RFS, fewer gallons of biofuels would be produced, and at lower costs and prices. Other users of corn and soybeans...
what the model suggests would have happened without biofuels policy. Model assumed in 2004 the $0.51 ethanol tax credit was eliminated, the $1.00 biodiesel tax credit was never enacted, and there is no RFS for biofuels. In the model, post-2004 biofuels compete in the feedstocks and energy markets on an unaided basis alongside other feedstock users and fuels.

- To model the price effects of biofuels policy it was assumed that without federal policy biofuels are priced in the market at energy parity with the petroleum fuels they replace.
- February 8, 2008 USDA estimates were used as baseline for corn and soybean balance sheets.
- Assumptions for crop year 2008/09; ethanol plant profitability was assumed to be affected by overcapacity as more new plant capacity will come on line by the end of 2008 than there is corn available. Ethanol was assumed to be priced at an energy parity of 66% of the price of gasoline. Methyl ester was assumed to need to sell for the same prices as diesel fuel to have a viable long term market.

Joe Outlaw, Texas A&M, *The Effects of Ethanol on Texas Food and Feed*

- The two most significant policy/regulatory changes that have resulted in the growth of the ethanol industry are: the decision not to provide oil companies protection from litigation for using MTBE as an oxygenate, and the enactment of the 2005 energy bill that required a specific amount of renewable fuels be blended into fuel supplies each year from 2006 through 2012.
- In the short run, it can be argued that some encouragement is needed to develop a new industry through government policies, but in the long run the cost of production will determine whether or not biofuels can be

would have more the feedstock crops available – also at lower prices. With the lower prices of the ‘no-policy’ scenario, costs of producing meat, poultry, dairy and other food products would be lower.

- The “no-policy” model also reduces the crop production distortions of biofuels policy. Corn acreage is reduced, and soybean acreage is increased, versus the price distorting effects of the policy.
- Corn and soybean prices are lower if there are no biofuels tax credits or RFS, but still higher than 2000-2005 averages. This is due primarily to the higher price of gasoline.
- Ethanol production increases, even without tax credits or the RFS, but at a much slower pace than if the credits or RFS are available.
- U.S. biofuels support policy has achieved its goal of promoting increased production of ethanol and biodiesel. Both fuels are currently being produced at rates much higher than marketplace forces would have allowed.
- Increased production rates are coming at a heavy cost to U.S. economy.
- Increased costs of biofuels feedstocks are slowly filtering through the U.S. food production and marketing system. It is hard to point to any one item and say that the retail price has been affected by a given amount, but it is a fact that biofuels support policy is paid for at the gas pump, in the grocery store and at restaurants.

- The underlying force driving changes in the agricultural industry as a whole, is overall higher energy costs, evidenced by current oil prices.
- With rising energy costs, corn and other commodity prices would have to increase.
- Rising fertilizer costs led to a 3 million acre reduction in planted corn acres in the 2006/07 crop year. Higher production costs will continue to pressure acres.
- Study supports the hypothesis that corn prices have had little to do with rising food costs. Higher corn prices do have a small effect on some food items.
- More speculative involvement in futures markets have led to more money in the markets, increasing volatility, which has led to wider trading limits. The end result has been to make it more difficult to use futures markets for price risk management due to the inability to finance margin requirements.
| viewed as viable energy alternatives.  
| • Analyzed possible market outcomes under the new conventional biofuels RFS, and under partial waivers of one-quarter and one-half of the conventional biofuels RFS. The waivers are assumed to be immediate and permanent. | • Potential exists for even higher corn prices, based on historical yield variability. Small yield reductions will result in even higher prices.  
| • Livestock industry has borne the costs of higher corn prices, industry structure makes it difficult to pass cost on, either up or down supply chain.  
| • Net balance to the Texas agricultural economy is negative. The TX livestock industry is bigger than the TX crop industry, so though grain producers have benefited, the net balance is negative.  
| • Relaxing the RFS does not result in significantly lower corn prices.  
| • The ethanol industry has grown in excess of the RFS, indicating that relaxing the standard would not cause a contraction in the industry.  
| • Expected corn prices are fairly steady near current levels under all scenarios. Expected prices across scenarios gradually diverge, with the $RFS$ waiver price falling about $0.30 per bushel below the full RFS price a few years into the future and the $\frac{1}{2}$ RFS waiver price falling roughly $0.50$-$0.60 per bushel below the full RFS expected price.  
| • Corn prices below $4.00 are unlikely under any scenario, given the high energy prices expected. |
Ed Gallagher, “The Gallagher Review of the indirect effects of biofuels production” – Renewable Fuels Agency (United Kingdom)

- Study commissioned by Secretary of State for Transport in UK to investigate indirect effects of biofuels production. (i.e. displaced ag production causes land use change, and impact on both the green house gas lifecycle emissions of biofuels & biodiversity.
- Energy growth is expected. More demand in India, China, Russia and elsewhere. More drivers.
- Better fuels are needed, along with other well-documented measures.
- World cannot afford to abandon biofuels as part of a low carbon transport future.
- We cannot continue to produce biofuels which are ultimately more environmentally & socially damaging than the fossil fuels they are intended to replace.
- Biofuels were seen as a solution to several global concerns: energy security, climate change, rural development which led to generous subsidies to stimulate supply.
- In 2003 with grain surpluses & farm payments for land set-asides, the EU agreed to the Biofuels Directive (targets for use)
- 5 yrs later, we’re concerned about food prices, deforestation, worried about doubtful climate benefits. Further concern spurred by Searchinger study.
- This review is based on a sometimes inconsistent and limited evidence base.
- Better future datasets (some available later this year) will help inform decision making more accurately.

- Feed stock production must avoid agricultural land that would otherwise be used for food production.
- There are high levels of uncertainty in the data, but the balance of evidence does show significant risk that current policy may lead to net greenhouse gas emission & loss of biodiversity.
- A slowdown will reduce biofuels impact on food commodity prices, esp. oil seed, which affects poorest people most readily.
- At least until 2020 there is sufficient land for food, feed and biofuels.
- Biofuels production must target idle & marginal land & use waste & residues. Current policy does not ensure additional production occurs in these areas, policy must address this issue.
- Biofuels do contribute to rising food prices that adversely affect the poorest. Long-term effects likely will have a net small detrimental effect to the poor, with significant effects in specific locations. Short-term effects likely to be significantly greater and require government intervention to alleviate effects on most vulnerable.
- A genuinely sustainable industry is possible – provided that robust, comprehensive & mandatory sustainability standards are developed & implemented.
- Indirect effects ↓ by using only idle and marginal land & by encouraging technologies that use appropriate wastes & residues.
- Based on balance of evidence – if all subsidies & biofuels supports were removed entirely, it would reduce the capacity of the industry to face the challenges of transforming its supply chain and investing in advanced technologies.
- Introduction of biofuels should be significantly slowed until adequate controls on indirect effects are established. Recommendation = lower targets, stronger controls.
Donald Michell, *A Note on Rising Food Prices*

- The rapid rise in food prices has its greatest effect on the poor in developing countries who spend roughly half of their income on food.
- Paper examines the factors behind the rapid increase in international food prices since 2002 and estimates the contribution of various factors such as the increased production of biofuels, the weak dollar, and the increase in food production costs due to higher energy prices.
- U.S. position that rising food prices stem from economic growth in countries like China and India are not true.
- Successive droughts in Australia haven’t had major impacts either.
- Month by month price analysis looking for changes between 2002 and February 2008
- Other reviews of the food crisis looked at situation over a much longer period, or have not linked the three main factors (diversion of grain, land set asides, financial speculation) and thus arrived at smaller estimates of biofuels impacts. This month by month analysis of the rise in food prices is a closer examination of the link between biofuels and the food supply.

- The U.S. and EU’s demand for biofuels has taken a significant portion of the food supply, causing prices to rise.
- Price analysis found world food basket prices rose 140%, increasing energy and fertilizer cost caused a 15% rise in food costs. Biofuels caused a 75% jump in food prices.
- World Bank estimates 100 million people worldwide have dropped below poverty line as a result of rising food prices.
- Without the increase in biofuels, global wheat and corn stocks would not have declined appreciably and price increases due to other factors such as weather would have been moderate.
- Recent export bans and speculative activities would probably not have occurred because they were mainly responses to rising prices.
- Biofuels derived from sugar cane have not played much of a role in impacting food prices because Brazilian sugar cane output increased and sugar exports nearly tripled since 2000.
- Production of biofuels has distorted food markets in three main ways: 1) diverted grain away from food for fuel, 2) farmers have been encouraged to set land aside for biofuels production, 3) Has sparked financial speculation in grains, driving prices up.
- While it is difficult to compare the results of this study to those of other studies due to differences in methodologies, time periods and prices considered, many other studies have also recognized biofuels production as a major driver of food prices. The contribution of biofuels to the rise in food prices raises an important policy issue, since much of the increase was due to EU and U.S. government policies that provided incentives to biofuels production, and biofuels policies which subsidize production need to be reconsidered in light of their impact on food prices.
Summary:

A short review of these eight studies quickly points to a variety of differing viewpoints and conclusions with regard to the recent run-up in food commodity prices. All studies attempt to decipher a similar set of issues and contributing factors, but all admit to one degree or another that limited data sets, market complexities, and other factors heavily influence their ability to be able to distinguish the degree to which the many disparate causes play a role.

All studies do conclude that biofuels play some role in influencing food commodity prices, but the degree of influence varies widely among studies. Some reports peg biofuels as having a negligible effect on food prices while others find biofuels as the primary culprit responsible for over ¾ of the problem. The Farm Foundation’s findings are unique in that they are the result of an in depth analysis of twenty five other studies completed on the subject and conclusions were drawn free from policy goals. It is quite clear that the issue at hand is overwhelmingly complex, but even so, all studies point out that crude oil prices, depreciation of the US dollar, biofuels production, increased market speculation, global changes in supply and demand, weather, global depreciation, and other related factors all contributed to the rise in food prices over the past several years. It is important to note that the overall rise in energy prices (as seen in the price of crude oil) has been a major game changer for all other parts of the system, and points to its heavy role in this issue. Some studies claim to be able to determine the exact rate of increase caused by each particular factor, while others avoid such proclamations and conclude that it is a perfect storm of circumstances that have brought about the particular situation we face today.

We believe the Farm Foundation report most accurately analyzes the many forces at play in the creation of this problem. They conclude that only by addressing all of the factors at play will policy makers be able to construct policy that effectively manages short-term food price effects without creating a new set of long-term problems.