

## Outlook for Light Vehicle Sales Under A High Oil Price Scenario

A White Paper by Global Insight Automotive, 20 August 2008

### ► Overview – Base Case Oil Price Outlook

Global Insight's oil price forecast projects prices peaking in October at \$135/b before falling consistently through the remainder of the year and into 2009, reaching a price of \$128/b by December next year. While there are the usual upside risks to the forecast (environmental impacts, geopolitics, supply), we now see a greater preponderance of downside risks. Our supply and demand projections indicate that we are set to see a significant increase in spare capacity over the next 6-18 months, as a string of new projects enters production. New supply was always going to be heavily weighted to the second half of the year, and delays to several projects has pushed back a number of developments due in the first half of the year. This has meant a tighter-than-expected first half of 2008, contributing to the very sharp increase in prices, but also means that a significant amount of capacity will be added to supply in the second half of 2008. OECD demand is also likely to remain weak due to a combination of consumer behavior (in response to higher prices) and a faltering economy. Although we do still expect to see relatively strong growth in non-OECD economies, even here there are downside risks present and it is possible that weaker OECD growth will have an impact on developing economies in the second half of 2009. There are signs that many of these economies are close to over-heating given rising inflation. These risks are compounded by the downturn in the non-OECD's key export markets. Nevertheless, even with these risks to the forecast, we do expect non-OECD demand growth to offset declines in the OECD; but because of the surge in supply, there will be enough oil available to more than adequately meet demand.

The timing of both supply and demand growth in 2008 has helped shape a year that is showing two distinct phases. The first half of the year has seen a tightening market. Demand growth from non-OECD countries continued to grow at broadly the same pace it had in 2007. At the same time, new project start-ups were limited, and many delayed until the second half, or in some cases pushed back into 2009. Supply problems in Nigeria, and higher-than-expected decline rates in Mexico and the North Sea, have exacerbated this problem. Finally, a global surge in middle distillate demand highlighted current capacity constraints in the refining complex, and also boosted demand from marginal refineries for distillate-rich crudes. Because gasoline, naphtha, and fuel oil margins remained extremely low (and in some cases negative), this created an unbalanced market for particular crude streams. Middle Eastern producers refused to discount heavier grades to encourage purchases, and this meant that some oil was essentially kept out of the market as a result of pricing issues. Iran's chartering of 14 very large crude carriers (i.e.: oil tankers) to hold crude Iran could not find buyers for is the best example of this. A tight situation became tighter due to aggressive pricing policies and constraints in the refining sector.

This tight market had an extreme effect on price, which widened an existing disparity between OECD and non-OECD demand levels. Widespread subsidies in the OECD insulated consumers against the very steep price rises and the credit crunch had little impact on countries that continued to experience very strong levels of economic growth. Demand continued to grow at very high rates in non-OECD countries. At the same time, the credit crunch began to impact highly indebted OECD consumers who responded very quickly to rising energy costs by rapidly reducing consumption. Overall demand growth remained positive due to non-OECD growth that more than offset the fall in non-OECD consumption.

That background helps to set the context for what we now expect to be a steadily improving balance. The factors that contributed to a rather tighter balance than we had initially expected

have slowly dissipated. The shift began to take effect in May, with widespread reductions in fuel subsidies throughout the non-OECD. Continued price rises also kept OECD demand growth negative, and allowed Saudi Arabia to raise output in two stages by 500,000 b/d. Gulf producers also began to finally increase discounts for heavier crudes in June, releasing more crude into the market. With additional projects also now ramping up or about to be commissioned, the outlook is less concerning; though of course supply risks are ever present in the market.

Taking these factors into account, we do expect the high prices seen in the first half of 2008 to ease significantly. Our base case forecast reflects an improving balance, but is also conservative, as the volatility seen over the past 6-12 months could result in a rebound in the market if capital inflows into commodities pick up again, or the dollar weakens. The fundamentals do point towards a surplus of crude oil, and the tightness in the refining sector should begin to ease. OPEC may take action to halt any signs of price weakness through precipitous output cuts, and this will limit the extent of any price fall.

### ► **High Oil Price Scenario (\$150–200)**

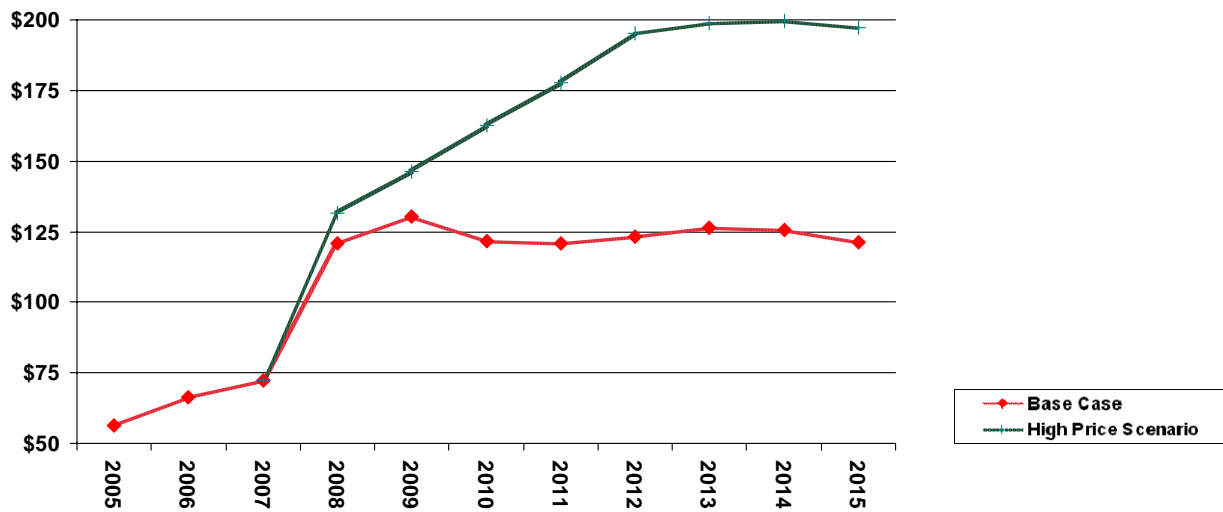
Despite the sound arguments against "peak" oil, there is quite a bit of controversy surrounding not only how high the price of oil might go, but also the long-term direction of oil prices, up or down. Thus, Global Insight has prepared an alternative forecast of the WTI price and consequent projections of Light-Vehicle Sales in the U.S. and major Asian markets, and for West European Passenger Car Sales, building upon the current base case (which anticipates continued high oil prices) and subsequent years of "peak" oil. In the "High Oil Price Scenario," the price of oil increases faster than the base case for 2008 and 2009, reflecting either a faster-than-expected deterioration in non-OPEC supply and/or a production disruption from a major producer. Subsequently, the perfect storm is generated, where all negative factors come together:

- severe supply constraints
- financial and speculative issues remain in force
- demand from emerging markets continues strong for some time after the U.S. downturn
- market psychology supports peak oil, despite sound fundamentals pointing to the contrary

This drives the average for the WTI from just under \$150 per barrel in 2009 to average a \$160 in 2010 and eventually \$195 by 2012. The price stays there through 2015 and retreats only slowly over the next few years. This initially triggers a deeper recession in the United States and other developed economies. Eventually, the emerging markets join in a global recession. While it is extremely difficult to put a hard probability on this type of scenario, it could be as high as 25-30%.

The U.S. situation is more problematic due to the still relatively weak dollar, penchant for cheap gasoline, and preponderance of big trucks has aggravated the impact of soaring oil prices. Europe is somewhat insulated by the strong euro, earlier adaptation to higher gasoline prices, stricter emission standards, and a better mix of small cars and diesel engines. The Asian region is more complex, due to the wide diversity of markets in terms of stage of economic development, motorization stage, vehicle demand dynamics, fuel subsidies and taxes, just to mention a few factors.

**Price of Crude Oil  
West Texas Intermediate (WTI)  
(\$/Barrell)**



► **United States**

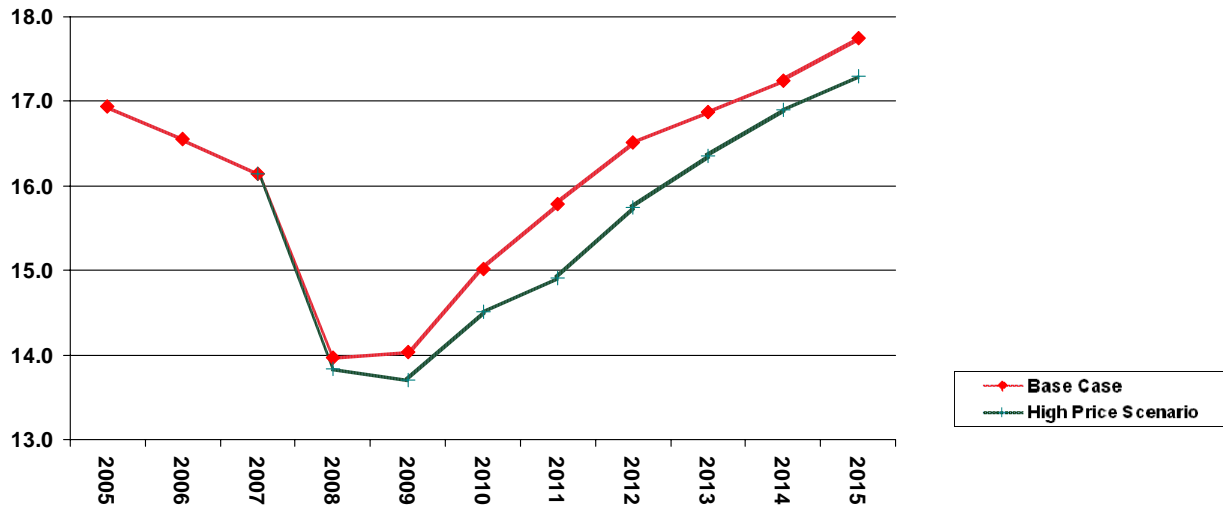
The combination of high oil and the subprime mortgage/credit crisis has pushed the U.S. economy to the recession point. A move on up to \$200/b would abort the recovery and trigger a deeper recession. With the current base case forecast, light-vehicle sales really take a pounding this year and next, falling from 16.100 million units in 2007 to roughly 14.000 million in both 2008 and 2009. As the price of oil moderates only to \$120 per barrel, light-vehicle sales improve modestly to 15.000 million units in 2010 and 15.800 million by 2011. In the "High Oil Price Scenario," as oil prices are higher, the market falls to 13.900 million units this year and declines further in 2009, 13.800 million units.

Since the market remains well below 15.000 million units for four years (2008–11), considerable pent-up demand is generated. This mutes somewhat the negative impact on light-vehicle sales of the close to \$200 price tag for oil reached by 2012. Under this scenario, sales rise slowly in 2012 and 2013 to 15.747 million and 16.356 million units. This is still almost 800,000 units less than the base case in 2012 and a half a million in 2013. Outbound, the economy and market will adjust to living with drastically higher oil. From a market perspective, the mix of vehicles will change dramatically. Diesels, hybrids, new technologies, and lighter materials will abound. This pushes volume to 17.300 million by 2015 versus 17.750 million in the base case forecast.

Because this is a very high oil/gas price scenario, the impact on the light-truck market is particularly brutal. Not only does the market lose considerable volume, but light trucks also give up market share. As the price of oil approaches \$200 a barrel, light-truck share falls below 30%. This translates to a truck market of roughly 4.700 million units per annum in the 2012 to 2014 span, down from 8.600 million units last year. Regression results indicate the conventional direction of segment share relative to oil prices. On the truck side, high oil prices are a major negative for sport utilities, a measurable negative for pickups, and less so for vans. They are a positive for CUVs. On the car side, they are a major plus for lower mid-size cars, minor plus for subcompacts and neutral for compact cars. Higher oil and gas prices really hurt larger and sporty cars.

Translating the raw mathematics of higher oil prices on prices at the pump is truly staggering. Under the current Base Case Oil Price forecast, retail gasoline prices peak at roughly \$4.20 per gallon this year. At an average of close to \$150 per barrel in 2009, gasoline prices average about \$4.30. At \$200, gasoline prices hit \$7.00 per gallon.

### U.S. Light-Vehicle Sales Scenario Impact—Millions of Units



### ► Western Europe

Europe still continues to be partly insulated from the full impact of the surge in oil prices. The combination of the strength of the euro and the high excise taxes in Europe means that the percentage increase in fuel pump prices has been only a fraction of the hike in world oil prices. In addition, a smaller more-fuel-efficient fleet of cars and lower annual distances traveled by European drivers mean that Europeans have been saved from the savage increase in direct running costs seen elsewhere.

All this means that the European market has been largely insensitive to high and climbing oil prices, at least until early this year. This is now being tested under both our new base case forecast for oil and notably under more extreme oil price scenarios. In both May and June 2008, European car markets tipped downwards and the decline accelerated in July, as consumers have come under sustained pressure on their household budgets.

In addition, the global cost of diesel has been increasing far faster than that of gasoline (as short-run supply has been unable to keep up with diesel demand). Given that more than one in every two cars sold in Europe are now diesels, there is a latent negative impact still waiting to be felt.

The new base case forecast for oil amplifies the problems associated with slowing global and Eurozone economies, higher inflationary pressures, credit restrictions, and the bursting of housing bubbles. This means that new car sales will, in all likelihood, slip substantially below 14 million units in 2009, for the first time since the mid-1990s.

Under the "High Oil Price Scenario," the car market would then virtually stagnate, failing to recover back above the 14-million-unit threshold, until 2013.

Under this "High Oil Price Scenario" (gradually building up to the near \$200 mark by 2012/13), typical gasoline prices in Germany would increase from the current €1.47 per liter to €2.30 (almost \$14 a U.S. gallon), and annual refueling costs would increase to over €2,800 (double the typical spend during 2007, draining an extra 1,400 euros from households' discretionary budgets). The build up of oil prices through to 2012 has the effect of preventing any natural cyclical recovery in the European car market; causing a mild double dip in 2012, registering a loss of almost 800,000 units from the revised base case forecast. The wider economic impact would then hold back sales by as much as 550,000 units for the following two years. This is despite the fact that a parc (cars and trucks on the road) replacement effect will start to kick in; as drivers start to replace older cars with more fuel-efficient (lower CO2) new cars in an attempt to lower running costs. We note that at 130g/km of CO2 by 2012-15, new cars on sale will be almost 30% more fuel efficient than the overall parc of vehicles at that time. The incentive from this parc renewal effect would really start to kick in around 2015 and last for several years after that.

Oil sustained in the \$150-200 range would act as a true pan European CO2 tax, something that politicians would never consider in such a time frame. This would 'double-up' on many CO2 based car taxes now being rolled out across European Union member states and push consumers further and faster into downsizing mode.

Higher oil prices will speed up the payback periods for more expensive fuel-efficiency technologies, leading to an accelerated take up rate for full hybrid vehicles, for example. Diesel share will increase further as the fuel-efficiency benefit of diesel increases still further as fuel prices increase (although this is crucially dependent on an increase in diesel refining capacity). Despite conventional wisdom, manufacturers of smaller and more-fuel-efficient cars may not be the hands down winners in either of these high oil price scenarios. For one thing, at least in the short term, their core private buyer groups are typically those most sensitive to higher household expense and car running costs, and their sales will suffer as new car purchases are put on hold. To some extent, this counter-intuitive effect can already be seen in recent developments in the Italian car market.

### Western Europe Passenger Car Sales Scenario Impact—Millions of Units



## ▶ Asia

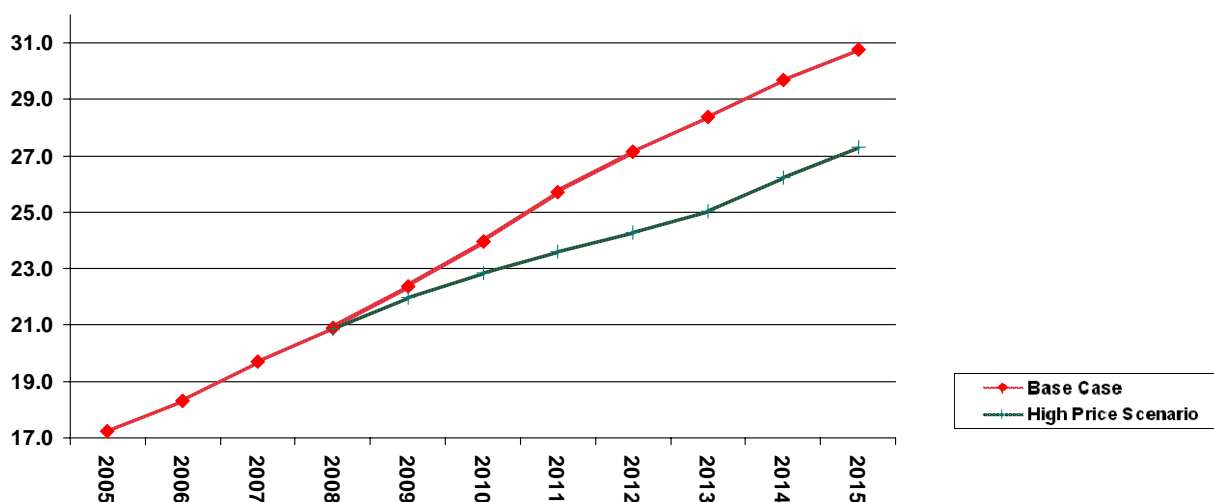
Surging oil demand from Asia, especially China and India, is often cited as a major factor behind the surge in world oil prices. Will higher oil prices curb vehicle and energy demand in this region, or will subsidized fuel prices continue to support strong demand growth and put further upward pressure on world oil prices?

There is now little doubt that a global slowdown or a recession will hit Asia's export dependent economies and will trigger significant slowdown in the domestic economies. Inflation is a huge concern and monetary tightening to control it is exacerbating the impact on consumer spending and vehicle demand. It is also becoming clear that the state of public finances in virtually every country in Asia, apart from China, means that the high levels of fuel price subsidies are not sustainable. These broad subsidies are being reduced in stages, resulting in controlled increases in fuel prices. The good news is that economic growth in the region will moderate from very high levels rather than grind to a halt, providing healthy fundamental support for vehicle demand.

Asia's diversity, in areas such as stage of economic development of the major countries, export dependency, the energy intensity of the economies, motorization stage, vehicle demand dynamics, and, most importantly, the nature and outlook for fuel subsidies and taxes merits a country/sub region specific approach. The impact in Japan, South Korea, China, India, and the ASEAN Big Four countries (Thailand, Malaysia, Indonesia, and Philippines) is discussed below.

Overall, for the entire Asia-Pacific region, light-vehicle demand is expected to rise from 19.7 million units in 2007 to 28.4 million units by 2013 in the base scenario. In the "High Oil Price Scenario," governments have the option of sheltering consumers from the full impact. Growth rates, however, will still moderate significantly, cutting the size of the total light-vehicle market by around 3.4 million units to around 25.0 million units in 2013.

### Asia/Pacific Light Vehicle Sales Scenario Impact—Millions of Units



**Japan:** Vehicle demand in Japan has been in the doldrums for more than a decade and the downward shift in the segmentation profile has been underway for almost a decade. Rapidly ageing population and excellent public transport infrastructure means that driving for pleasure will continue to decline. Car ownership is no longer regarded as essential either in terms of meeting transport needs or social aspiration. This means that Japan has now matured into a "de-motorization" stage. Hence, even in our base case scenario, light-vehicle demand is expected to

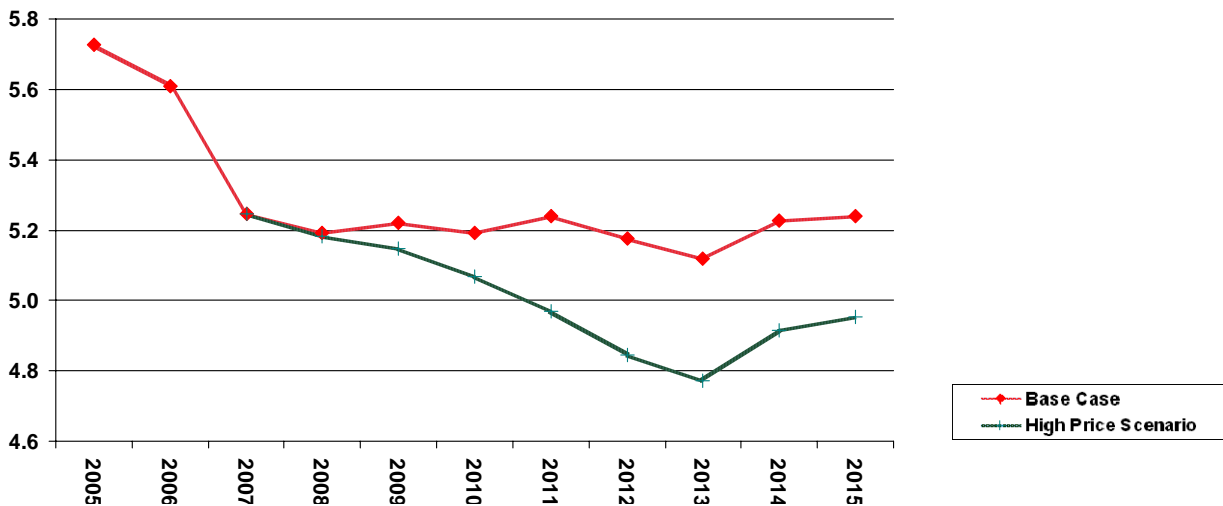
remain stagnant at 2006/07 levels during the next decade. Fluctuations in annual sales are more determined by timing of major model launches than any fundamental factors.

Although there is currently much political debate in Japan regarding the way in which funds from fuel tax surcharge can be used (currently they can only be used for road construction), we currently do not expect any significant change in the structure or level of fuel taxes in the coming years.

Under the "High Oil Price Scenario" (gradually building up to the near \$200 mark by 2012/13), the broader economy will follow the United States and Europe into a recession. A steady appreciation of the yen will partially offset the impact of higher U.S. dollar-denominated oil imports; but the price of regular gasoline will rise by over 20% to around 230 yen per liter by 2012, from the level of 180.9 yen per liter in late July 2008. Under such a scenario, discretionary driving would be cut back further and consumers will be even more reluctant to own and purchase cars. We can expect light-vehicle demand to fall to around 4.77 million units in 2013, compared to 5.12 million in the base scenario.

In terms of the segmentation profile, unlike the United States, there is less scope for downsizing as vehicles in Segment A/B already accounted for over 47% of all passenger car sales in 2007 and has been stable in the last five years. We would expect this to remain at current levels in the base scenario and rise to around 55% by 2013 under the "Higher Oil Prices Scenario." There are few indications that diesel penetration will improve; but hybrids are more popular and hybrid take-up will certainly increase driven by demand, as well supply improvements.

**Japan Light-Vehicle Sales Scenario Impact—Millions of Units**



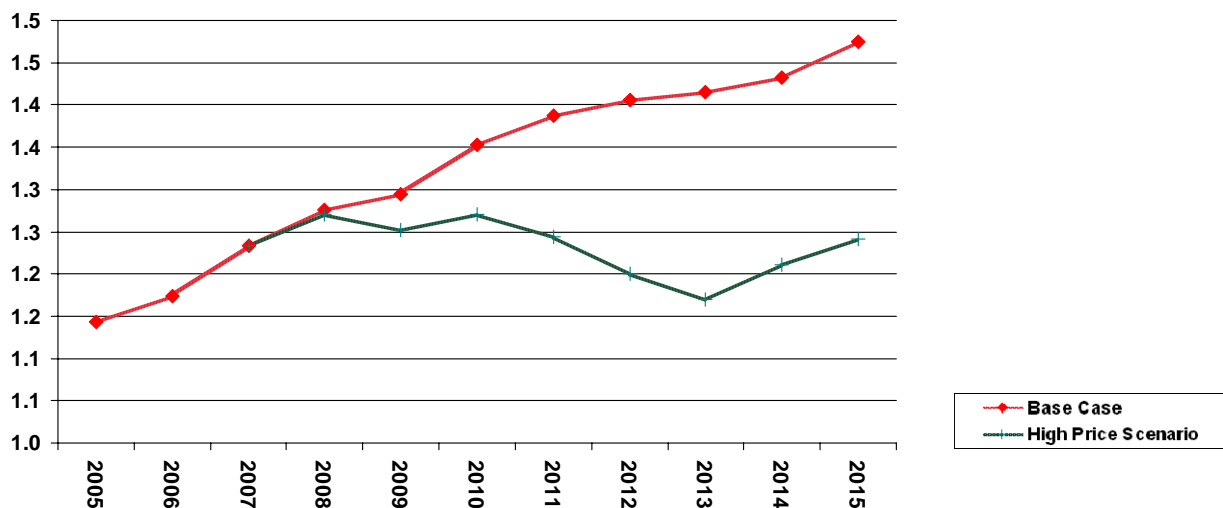
**South Korea:** South Korea can be regarded as a fairly mature country in terms of motorization. Fuel prices are not subsidized and, therefore, consumers are not sheltered from the surge in world oil prices. Unlike the euro and yen, the Korean won has actually weakened against the U.S. dollar in the past year. This has exacerbated the impact of rising world oil prices.

The current fuel levy is 855 won per liter for gasoline and 655 won per liter for diesel. The recent surge in diesel prices has meant that pump prices for diesel exceed gasoline prices. In late July 2008, the pump prices were just over 1900 won per liter for both fuels. In the base scenario, only a modest increase in light-vehicle sales is expected during the next decade. Mid-size sedans

dominate the segment profile and SUVs have also been popular, but a gradual migration to smaller more fuel efficient vehicles is anticipated.

Under the “High Oil Price Scenario,” Korea’s external balance and the currency would both face severe pressure. The economy is also highly vulnerable to global economic slowdown. Without any major changes to the current fuel-tax structure, we can expect a 33% jump in pump price to around 2500 won per liter by 2013. The government will also most likely introduce extra measures to curb vehicle use to control oil imports. The contraction of light-vehicle demand would be significant under these circumstances with a net fall in demand in the period 2009–15. We expect light-vehicle demand to reach around 1.17 million units in 2013, compared to 1.41 million in the base scenario. We can also expect consumers to shift even more rapidly to more fuel efficient small and compact cars. Diesels are rapidly losing their attractiveness, while hybrid demand will also be modest.

### South Korea Light-Vehicle Sales Scenario Impact—Millions of Units



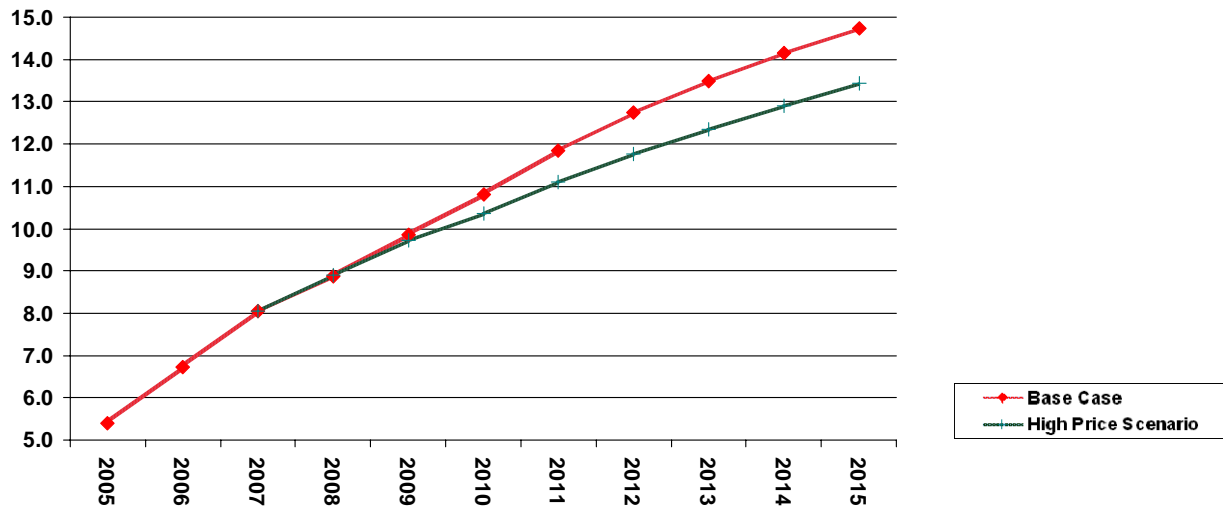
**China:** Between 2002 and 2007, light-vehicle demand surged from 3.05 million units in 2002 to nearly 8 million units in 2007. This incredible boom was supported by very strong fundamental drivers, but occurred in an environment of high-subsidized fuel prices. Even after the 17% hike in gasoline prices and 18% rise in diesel prices in June 2008, the price of 93 octane gasoline price stood at just 6.05 yuan (90 U.S. cents) per liter, compared to 2.5 yuan per liter in 2002.

There is now growing pressure on the government to cut these subsidies and introduce fuel taxes to support its goal of encouraging fuel efficiency and reducing oil imports. Hence, with or without high world-oil prices, China’s fuel prices are expected to rise significantly in the coming years.

In the base scenario, a gradual reduction in subsidies and, hence, an increase in fuel price is assumed, with 93 octane gasoline price rising to 11 yuan per liter by 2012 and then 14 yuan per liter by 2015. Implementation of fuel taxes to replace the numerous road usage and maintenance charges would mean even higher pump prices. More measures to encourage greater energy efficiency (e.g. new consumption taxes based on engine displacement) are also expected to be unveiled soon. These developments have already been incorporated in the base scenario vehicle forecast. With also less support from fundamental drivers, this will mean a significant moderation in vehicle demand growth after 2009. The migration of car demand to small and compact car segments is also underway, although small cars will gain as much prominence as in countries such as India.

Under the “High Oil Price Scenario,” the government has the option of sheltering the consumer from the full impact of higher oil prices through higher subsidies. The most likely scenario is that the additional oil costs will be passed on to consumers, albeit in a controlled manner to ensure limited impact on the automotive industry and the economy. Inflation is a key concern. Pump prices for 93 octane gasoline could rise to 14 yuan per liter by 2012, and 19 yuan per liter by 2015. Obviously, this, together with a broad global and domestic economic slowdown, will result in a further moderation of demand growth and accelerate the migration to smaller, more fuel-efficient vehicles. Light-vehicle demand is expected to reach around 12.3 million units in 2013, compared to 13.5 million in the base scenario.

### China Light-Vehicle Sales Scenario Impact—Millions of Units



**India:** India’s economy and automotive markets are very vulnerable to high oil prices. At mid-2008 world-oil prices, India’s oil-subsidy bill is believed to be over \$40 billion, or nearly 3.0% of GDP. Unlike China, India’s public finances are now in a perilous state with less room to manoeuvre; urgent action is required to cut the oil-subsidy bill.

Even after the June 4<sup>th</sup> 2008 price hikes of 5 rupees per liter in petrol and 3 rupees per liter for diesel, it is estimated that oil companies (state owned) are losing around 15 Rupees per liter on petrol and nearly 25 Rupees per liter on diesel. This provides an indication of the level of price hikes still needed to bring pump prices in line with current world oil prices.

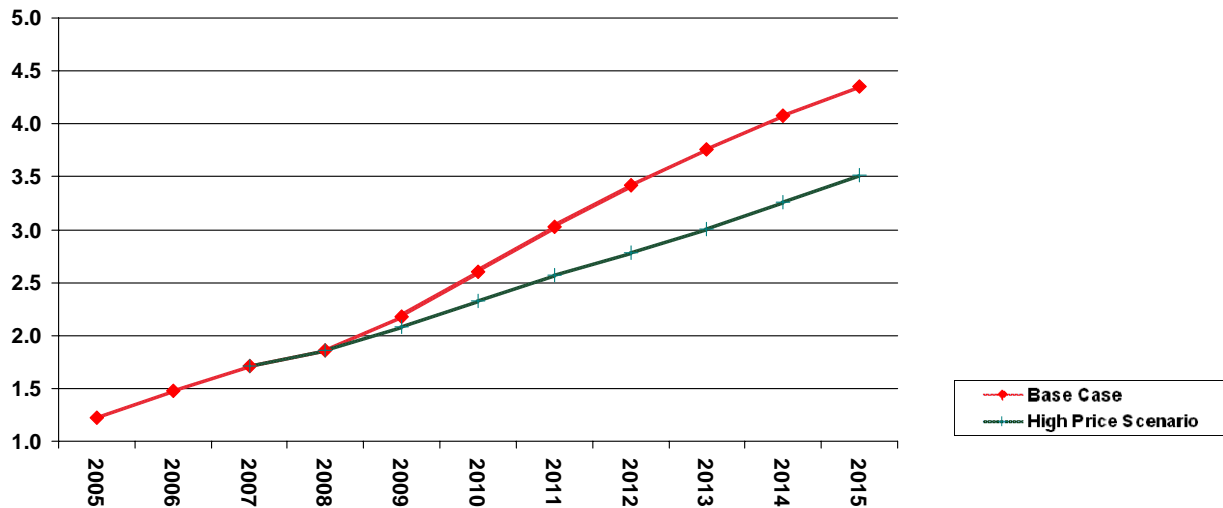
The government has to tread carefully on this politically sensitive issue and is already struggling to get the runaway inflation under control. The expected future policy direction will involve smaller but more frequent adjustments in fuel prices to keep domestic prices in line with global trends. The differential between gasoline and diesel prices will also narrow gradually. Assessment of light-vehicle demand is complicated by the “Tata Nano,” which will essentially see a sizeable transfer of motorcycle demand to this and other similar models from 2009, boosting the size of the car market. In the base scenario, these phenomena will account for a significant part of demand growth expected during 2009–12.

Under the “High Oil Price Scenario,” direct (cutback in vehicle use, purchase and greater focus on fuel consumption) and indirect effects (inflation, current account deficit, and hence a weakening currency, tighter monetary policy, and hence higher auto finance costs) will combine to hit light-

vehicle sales. Light-vehicle demand is expected to reach around three million units in 2013, compared with our base scenario projection of 3.76 million units.

Passenger car demand is already highly skewed in favour of small cars and diesels are also very popular. Higher fuel price will just reinforce these trends and perhaps even encourage consumers to stay with motorcycles instead of upgrading to cars.

### India Light-Vehicle Sales Scenario Impact—Millions of Units



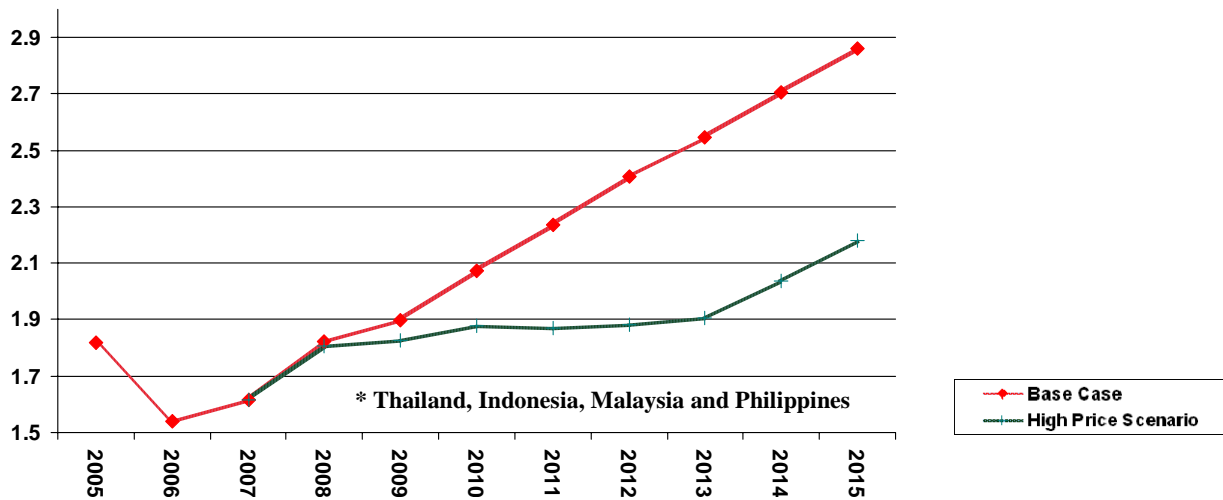
**ASEAN Region:** In comparison to Japan, China, South Korea, and India, ASEAN’s Big 4 countries (Thailand, Malaysia, Indonesia, and Philippines) account for a relatively small share of regional and global vehicle demand. In 2007, total light vehicle sales were just over 1.6 million units.

Singapore and the Philippines have no fuel subsidies; while Thailand eliminated most of the subsidies in 2005 (its current subsidy bill is largely used to support LPG and CNG prices). In Indonesia, there were significant cuts in subsidies in 2005, but it was still spending around 4% of GDP on these subsidies. This forced it to announce significant hikes in fuel prices in May 2008. In Malaysia, before the recent 41% hike in fuel prices, the fuel subsidy bill was around 7.5% of GDP, or half of all government spending.

In Thailand and the Philippines, retail fuel prices will follow developments in world oil prices. In Indonesia and Malaysia, fuel subsidies will be scaled back further to bring fuel prices in line with world oil prices. In the base case scenario, light-vehicle demand in the ASEAN Big 4 countries is expected to rise to 2.54 million units by 2013. Greater focus on fuel economy, regulatory support (e.g. Eco-Car Programme in Thailand), and greater product choice will support a migration in demand to smaller cars across the region.

In the “High Oil Price Scenario,” direct impact (fuel price hikes and hence cautious approach to vehicle use and purchase) and indirect impact (global slowdown, inflation, and higher interest rates) will combine to put a brake on the development of motorization. Indonesia is the most vulnerable. Light-vehicle sales will reach just 1.9 million units by 2013, only around 18% higher than 2007 level.

## ASEAN Big 4 Countries\* Light Vehicles Sales Scenario Impact—Millions of Units



### ► Summary

The major change in the economic environment in the last few years has been the soaring price of crude oil. The drastic shift from \$25 to \$120-140/barrel oil has brought the developed economies to the brink of recession, reduced light-vehicle demand, and is now increasingly impacting the mix of vehicles sold. It has been a major destabilizing force, and while the oil price has come down somewhat of late, the prospect of considerably higher prices represents an ever present threat (as well as for emerging markets). High oil prices have also added greatly to future uncertainty and made forward planning that much more difficult. This discussion paper has outlined some of the threats of higher oil, as well as some of the opportunities, and hopefully, can assist in serving as a frame work for future contingency plans.

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