## REFERENCE REPORT #34

# THE GOOD, THE BAD AND THE UGLY ABOUT THE OIL SHOCK IMPACT ON EMERGING MARKETS

On July 18, 2007, The National Petroleum Council (NPC) in approving its report, *Facing the Hard Truths about Energy,* also approved the making available of certain materials used in the study process, including detailed, specific subject matter papers prepared or used by the Task Groups and their Subgroups. These Topic Papers were working documents that were part of the analyses that led to development of the summary results presented in the report's Executive Summary and Chapters.

**These Topic Papers represent the views and conclusions of the authors. The National Petroleum Council has not endorsed or approved the statements and conclusions contained in these documents but approved the publication of these materials as part of the study process.**

The NPC believes that these papers will be of interest to the readers of the report and will help them better understand the results. These materials are being made available in the interest of transparency.

The attached Topic Paper is one of 38 such working document used in the study analyses. Also included is a roster of the Subgroup that developed or submitted this paper. Appendix E of the final NPC report provides a complete list of the 38 Topic Papers and an abstract for each. The printed final report volume contains a CD that includes pdf files of all papers. These papers also can be viewed and downloaded from the report section of the NPC website (www.npc.org).

**NATIONAL PETROLEUM COUNCIL**

**MACROECONOMIC SUGROUP**
**OF THE**
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Emerging Markets Research
Global Energy Strategy
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October 21, 2005

# The Good, the Bad and the Ugly about the Oil Shock Impact on Emerging Markets

- **The sharp oil price rally of the past two years has represented a massive positive shock to the terms of trade of net oil exporters in Emerging Markets**
- **But the effect on growth is not unambiguously positive for all net oil exporters since many are hurt by the indirect effect of slower global growth**
- **Except for Eastern Europe and a few countries in Asia and the Middle East, most Emerging Market countries subsidize domestic oil prices—net exporters and importers alike**
- **Depending on the degree to which subsidies are used, there is an wide variation in the impact of the oil shock on inflation within and across regions**
- **Contrary to previous oil booms, the majority of Emerging Markets oil exporters are saving part of the windfall or using it to prepay debt**
- **While aggregate data is unavailable, there is anecdotal evidence that many countries are recycling back petrodollars by investing in the oil sector**
- **The largest reserves of natural gas are in Emerging Market countries, but their benefits are limited by the fact that natural gas is not yet a global commodity**
- **Concerns about the security of energy supply is prompting many Emerging Market countries to diversify sources and set up oil stockpiling facilities**

Higher oil prices represent a positive terms-of-trade shock for Emerging Markets as a whole, since all regions except for Asia are net oil exporters. While this holds true regardless of the level of oil prices, the conventional wisdom that high oil prices are generally supportive for Emerging Markets—since nearly 50% of the EMBIG capitalization is composed of net oil exporters—was maybe more apparent when the price of one barrel of oil moved from US$20 to US$30 or even US$40. Yet the validity of such a conclusion has become more questionable ever since oil prices started to reach levels above US$50 or US$60. At these levels, beyond the burden on the balance of payments of net oil importers, many net oil exporters have started to face growing pressure to adopt the same subsidy schemes applied by several net oil importers in order to shield domestic consumers and producers from higher world oil prices. These subsidies not only create inefficiencies but they also bring about growing direct or indirect fiscal costs. Moreover, higher oil prices tend to put upward pressure on inflation in both

## Contents

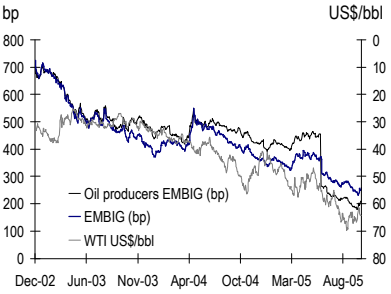


## JPMorgan's price forecasts

| | | Spot | 05Q4 | 06Q1 | 06Q2 |
|---|---|---|---|---|---|
| Oil (WTI) | US$/bl | 61.0 | 60.0 | 57.5 | 55.5 |
| US Natural Gas | (US$/Mmbtu) | 13.1 | 13.3 | 12.0 | 8.0 |

Source: JPMorgan

## EMBIG, EMBIG oil exporters, oil price




Source: JPMorgan

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net oil exporting and importing countries alike, which threatens consumption and makes monetary policy management more challenging. Finally, there are the indirect effects coming from a potentially widespread global growth slowdown triggered by higher energy costs.

This report discusses the implications of higher oil prices for Emerging Markets, including the macroeconomic impact on net oil exporters and importers, the ways in which the oil windfall is being utilized, and how some governments are dealing with the threats to inflation and future energy supply. While an overview of the economic impact and policy responses to high oil prices suggests that the individual country cases are too diverse to allow for comprehensive conclusions, five general messages can be extracted. **First**, while the sharp oil price rally of the past two years has represented a massive positive shock on the terms of trade and fiscal accounts of net oil exporters, the effect on GDP growth is not unambiguously positive for all of them because of the second-round effects related to the impact of the oil shock on global growth, which could dampen external demand and growth in Emerging Market economies. However, since the impact of the oil shock on global growth has been moderate so far, this indirect effect has not played out strongly yet. **Second**, except for Eastern Europe and a few cases in Asia and the Middle East, most Emerging Markets countries subsidize domestic oil prices—net exporters and importers alike—in order to cushion the oil price shock and prevent high passthrough to inflation. In many cases, the growing fiscal cost of these subsidies are reaching levels that are proving difficult to sustain, and their reduction is prompting central banks to tighten monetary policy in order to contain the ensuing inflation pressures.

**Third**, in stark contrast with previous oil boom episodes, the majority of net oil exporters are either saving part of the windfall, using it to prepay debt and/or invest in the oil sector. That said, the degrees to which countries are maximizing the benefits or managing the windfall optimally vary widely. **Fourth**, although the largest proved reserves of natural gas are located in Emerging Market countries, their capacity to exploit these reserves economically are limited by the fact that natural gas is not yet a global commodity. However, trade flows of natural gas are growing and may ease (or alternatively compound) the challenges imposed by the oil price shock in the future. **Fifth**, the three-year oil price rally has heightened interest in many Emerging Market countries to develop strategic government-controlled oil storage facilities to address growing concerns about the security of energy supply. However, with a few standout exceptions, most countries have a long way to go to build strategic reserves given the technological scope and the high cost of this kind of project.

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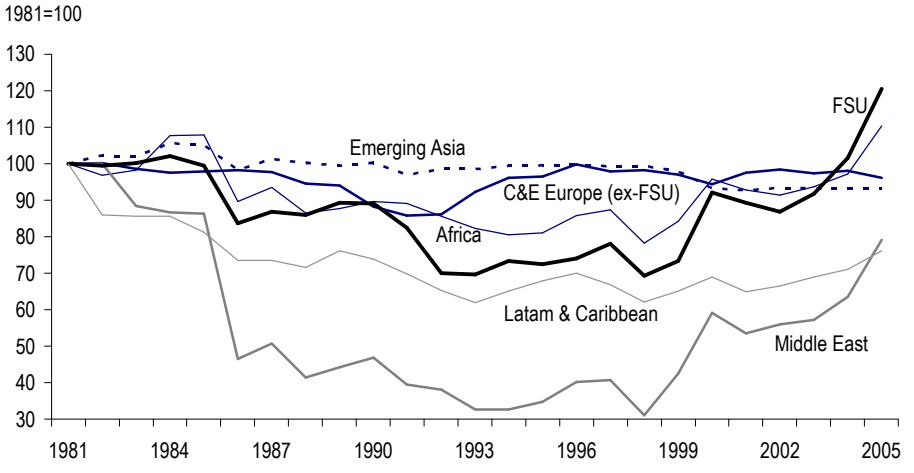
## Net oil exporters are the lucky ones

**The sharp oil price rally of the past two years has represented a massive positive shock to the terms of trade of net oil exporters in Emerging Markets.** Latin America, Eastern Europe, the Middle East and Africa are all net oil exporting regions when taken as aggregates (see table A1 in the Appendix section on page 22). Although the relative size of net oil exports varies widely by region (from 3.3% of regional GDP in Latin America to 42% of regional GDP in the Middle East), each of their terms of trade get a boost from higher oil prices. The opposite is the case in Asia, where all countries except for Malaysia are net oil importers and net oil imports represent 2.6% of regional GDP, making this region the clear loser from high oil prices (see *Emerging Asia's losers and bigger losers from an oil price shock*, September 2). Chart 1 shows that except for Emerging Asia and Central and Eastern Europe (excluding the former Soviet Union countries), all regions in the emerging world have been experiencing an improvement in terms of trade since the beginning of the decade thanks to the surge in the price of oil and other commodities. This has helped to sharply improve the current account balances of net oil exporters and put appreciation pressure on nominal and real exchange rates. Table 1 on the following page shows that in countries like Malaysia, Colombia, Mexico and Russia, where oil accounts for less than a third of total exports, a US$1/bbl increase in the yearly average oil price leads to a current account improvement of up to 0.3% of GDP, while in countries like Algeria, Nigeria, Saudi Arabia, Qatar and Venezuela, where oil exceeds 80% of total exports, the external gain from such a sustained price increase can exceed 1% of GDP.

**Chart 1: Terms of trade in Emerging Market economies**




Source: IMF

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### Table 1: Impact of higher oil prices in Emerging Market countries

| Country | Oil exports % of total | Oil imports % of total | Impact of US$1 change in fiscal accounts % of GDP | Impact of US$1 change in exports/imports* % of GDP | Impact of US$1 change in exports/imports* US$ million | Average price of oil basket US$/bbl YTD | Price differential WTI - oil basket US$/bbl YTD | Oil price in 2005 budget US$/bbl |
|---|---|---|---|---|---|---|---|---|
| **Net oil exporters** | | | | | | | | |
| Algeria | 95% | 5% | 0.60% | 1.00% | 660 | 53.45 | 2.1 | 19 |
| Argentina | 17.9% | 4.3% | 0.02% | 0.05% | 100 | - | - | - |
| Colombia | 25% | 2% | 0.08% | 0.13% | 150 | 56.24 | -0.7 | 26 |
| Ecuador | 56% | 10% | 0.30% | 0.43% | 130 | 44.60 | 10.9 | 25 |
| Iran | 90% | 7.2% | 0.50% | 0.65% | 1100 | 46.12 | 9.4 | 20 |
| Malaysia | 11.5% | 6.0% | - | 0.12% | 140 | 57.29 | -1.8 | - |
| Mexico | 14.0% | - | 0.10% | 0.13% | 900 | 41.98 | 13.5 | 27 |
| Nigeria | 98.0% | 28.0% | 0.90% | 1.30% | 840 | 54.95 | 0.6 | 30 |
| Oman | 75.0% | - | 0.60% | 0.95% | 260 | 49.55 | 6.0 | - |
| Qatar | 86.0% | - | 0.34% | 1.20% | 500 | 52.35 | 3.2 | - |
| Russia | 32.3% | - | 0.40% | 0.30% | 2400 | 49.52 | 6.0 | 28 |
| Saudi Arabia | 95.0% | - | 1.10% | 1.20% | 3000 | 52.95 | 2.6 | - |
| Venezuela | 82.0% | 13.0% | 0.60% | 0.80% | 960 | 45.42 | 10.1 | 23 |
| **Net oil importers** | | | | | | | | |
| Brazil | 5.6% | 11.8% | 0.06% | 0.01% | 50 | | | |
| Bulgaria | 7.8% | 12.7% | - | 0.06% | 16 | | | |
| Chile | - | 12.0% | - | - | - | | | |
| China | 2.4% | 8.6% | - | 0.07% | 1100 | | | |
| India | 8.6% | 27.9% | - | 0.10% | 660 | | | |
| Indonesia | 25.9% | 25.4% | 0.20% | 0.07% | 180 | | | |
| Korea | 4.1% | 22.4% | - | 0.02% | 136 | | | |
| Peru | 6.7% | 16.4% | - | - | - | | | |
| Philippines | - | 10.7% | - | 0.15% | 130 | | | |
| South Africa | - | 12.4% | - | 0.06% | 120 | | | |
| Thailand | 3.1% | 14.0% | 0.05% | 0.15% | 240 | | | |
| Turkey | 3.0% | 16.5% | 0.02% | 0.07% | 250 | | | |

* Impact on exports for oil exporters and on imports for oil importers.
Source: JPMorgan

**But generalizations about the impact of oil on terms of trade are more difficult to make when moving from the regional to the individual country level because non-oil commodity prices have also surged.** Contrary to the historically low and often negative correlation between oil and non-oil commodity prices, the latter have also been rebounding strongly in recent years (see chart 2 on the following page), helping many net oil importers to cushion the oil price shock (for example, Brazil is marginally a net oil importer but its terms of trade have improved somewhat since early 2003 because of higher non-oil commodity prices). In this respect, regional terms-of-trade figures conceal the fact that many large Emerging Market economies away from Asia—like Brazil and Turkey—are actually net oil importers even though they are located in net oil exporting regions.

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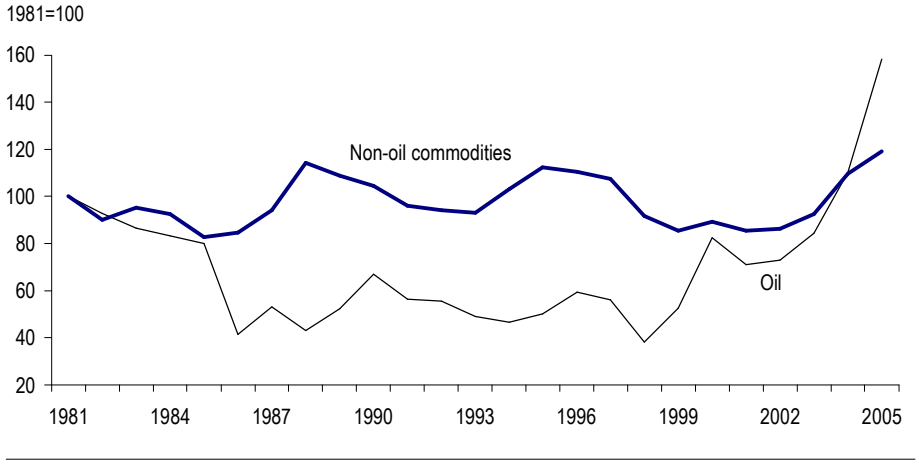
**Chart 2: Prices of both oil and non-oil commodities have rallied**




Source: IMF

**In addition to terms of trade, the fiscal position of net oil exporters—and even some net oil importers—benefits from higher oil prices, although the windfalls are being eroded by growing subsidies in many cases.** The degree to which the fiscal accounts of net oil exporters improve when oil prices increase varies significantly. As seen in table 1, a US$1/bbl increase in the annual average oil price represents a fiscal improvement of less than 0.1% of GDP in Argentina and Colombia to 0.6% of GDP or more in Algeria, Nigeria, Saudi Arabia and Venezuela. Fiscal accounts of some net oil importers also benefit since higher oil prices often leads to higher tax collection on fuel consumption. But as will be discussed later, the widespread use of direct or indirect subsidies to limit the impact of higher oil prices on economic activity and inflation makes it hard to estimate the magnitude of the net fiscal impact in many countries. In any case, with oil prices on average US$23 above the 2005 budget assumptions so far in the year means that the non-budgeted fiscal windfall for net oil exporters will be substantial—from 1.8% of GDP in Mexico to over 15% of GDP in Algeria and Nigeria.

## Impact on growth not unambiguously positive

**Contrary to the positive impact of the oil price shock on terms of trade and fiscal accounts, the effect on GDP growth is not unambiguously positive for all net oil exporters.** The impact of high oil prices on growth is harder to estimate to the extent that oil is one of many intermediate goods whose price itself is affected by GDP growth. The direct impact of the oil shock on growth can vary widely depending on the size of net exports or net imports relative to the economy, the oil intensity of each country, and the degree to which subsidies are used to shield consumers and firms. But there are second-round effects related to the impact of the oil shock on global growth, which could dampen external demand and growth in Emerging Market economies. The IMF estimates that the direct effect on real GDP growth after one year of a US$5/bbl oil price hike is zero for Latin America, -0.2% for Asia, and +0.4% for Emerging Europe and Africa. However, after taking into account the Fund's estimated second-round effects on the current account (which

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includes a decline in exports due to a 0.3% fall in global demand and an increase in short-term debt payments due to an 80bp hike in global interest rates), the impact on real GDP growth is -0.1% for Latin America, -0.4% for Asia, and a mere +0.1% for Emerging Europe and Africa. Overall, Asia experiences the largest negative impact on growth, while the impact on the other regions is mixed.

**In fact, second-round effects of the oil price shock on global growth can overwhelm the positive direct effect on growth prospects of net oil exporters.** Table 2 shows JPMorgan's qualitative assessment of the impact on growth for selected countries if oil prices move up by another US$10/bbl on average during 2006, which takes into account the direct and indirect effects. Interestingly, when both effects are considered, the impact of higher oil prices on GDP growth is not unambiguously positive for all net oil exporters. For example, Mexico's economy would probably decelerate relative to JPMorgan's growth forecast of 3.5%oya for 2006 given its high integration with the US economy, which would most likely slow down in such a scenario. Similarly, Malaysia's high dependence on exports along with the rest of Asia means that it would be affected by the indirect effect of slower global growth despite being a net oil exporter. While these forward-looking estimates are important to keep in mind in case oil prices continue to grind higher, the second-round effects have not yet played out significantly since the dent to global growth from the oil shock has been moderate so far.

**Table 2: What happens to JPMorgan's 2006 macro forecasts if oil prices move up by US$10/bbl?**

| | JPMorgan's macro forecasts for 2006 | | | | Impact of US$10 change in oil prices on: | | | |
|---|---|---|---|---|---|---|---|---|
| | GDP growth | CPI Dec/Dec | CA % of GDP | Fiscal balance % of GDP | GDP growth | CPI Dec/Dec | CA % of GDP | Fiscal balance % of GDP |
| Argentina | 3.5 | 10.0 | 0.0 | 1.5 | - | ↑ | ↑ | ↑ |
| Brazil | 3.7 | 4.6 | 0.5 | -3.0 | ↓ | ↑ | - | ↑ |
| Bulgaria | 5.8 | 4.0 | -7.8 | -1.0 | ↓ | ↑ | ↓ | - |
| Chile | 6.0 | 3.0 | -3.0 | 0.5 | - | ↑ | ↓ | - |
| China | 8.5 | 2.5 | 5.3 | -0.8 | ↓ | ↑ | ↓ | ↓ |
| Colombia | 3.6 | 4.5 | -1.0 | -2.0 | ↑ | ↑ | ↑ | ↑ |
| Ecuador | 3.0 | 3.5 | -0.3 | 2.0 | ↑ | ↑ | ↑ | ↑ |
| India | 7.0 | 4.0 | -1.6 | -4.5 | ↓ | ↑ | ↓ | ↓ |
| Indonesia | 5.4 | 7.9 | 1.2 | -1.2 | ↓ | ↑ | ↓ | ↓ |
| Korea | 4.2 | 3.5 | 1.2 | -0.5 | ↓ | ↑ | ↓ | - |
| Malaysia | 4.2 | 2.9 | 9.6 | -3.5 | ↓ | ↑ | ↑ | - |
| Mexico | 3.6 | 3.4 | -2.0 | 0.0 | ↓ | ↑ | ↑ | ↑ |
| Peru | 4.5 | 2.5 | -0.7 | -1.0 | ↓ | ↑ | ↓ | - |
| Philippines | 4.4 | 5.0 | 4.2 | -2.5 | ↓ | ↑ | ↓ | - |
| Russia | 6.0 | 10.1 | 6.2 | 5.1 | ↑ | ↑ | ↑ | ↑ |
| South Africa | 4.1 | 4.8 | -3.2 | -1.2 | ↓ | ↑ | ↓ | - |
| Thailand | 5.3 | 3.0 | -2.0 | -0.8 | ↓ | ↑ | ↑ | ↓ |
| Turkey | 5.5 | 4.8 | -5.5 | -3.5 | ↓ | ↑ | ↓ | - |
| Venezuela | 6.5 | 13.0 | 8.3 | -2.0 | ↑ | - | ↑ | ↑ |

Source: JPMorgan

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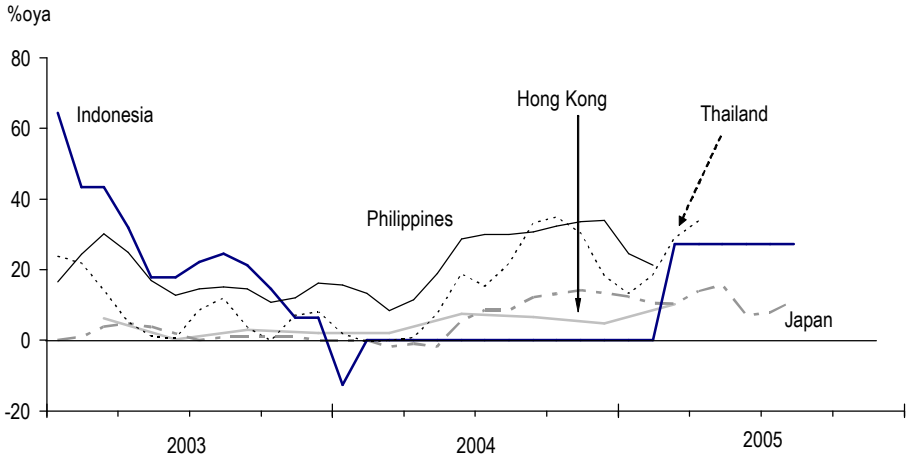
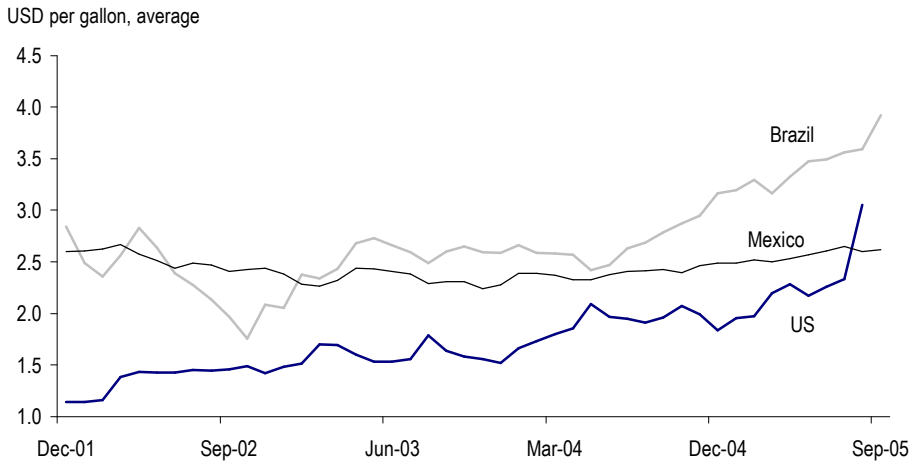
**Depending on the degree to which subsidies are used to shield consumers and firms, there is an even wider variation in the impact of the oil shock on inflation within and across regions.** Many Emerging Market economies have administered energy prices that prevent a full passthrough of oil price shocks to inflation, and which do not depend on whether the country is a net oil exporter or importer. The IMF estimates that a sustained US$5/bbl oil price hike pushes inflation higher within a year by 0.6% in Latin America, 0.7% in Asia, and 0.3% in Emerging Europe and Africa. But regional averages mask the wide dispersion of cases within each region. Charts 3 and 4 show that there are sharp differences in the passthrough of the oil shock to retail fuel prices among countries within the same region. The next section describes in greater detail the various subsidy schemes in place across Emerging Markets, as well as their fiscal and monetary policy implications.

**Chart 3: Pump prices for gasoline in Asia**




Source: JPMorgan

**Chart 4: Brazil, Mexico, and US retail unleaded gasoline prices**

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## Subsidies cushion the impact on inflation

**Except for Eastern Europe and a few countries in Asia and the Middle East, most Emerging Market countries subsidize domestic oil prices—net exporters and importers alike.** The prevalence of subsidies for fuel retail prices in many Emerging Market economies marks a stark contrast with developed market economies. In most cases, the governments or state oil companies are the ones absorbing the gap between international and domestic prices, which helps to shield firms and consumers from the oil price shock while preventing a full passthrough to inflation. But with oil prices moving steadily higher, the fiscal cost of maintaining these subsidies are prompting some countries around the world to reassess their subsidy schemes and in many cases phase them out. This is particularly the case in Emerging Asia, where all countries except for Malaysia are net oil importers. Indeed, direct subsidies have grown steadily in recent years, reaching levels as high as 5% of GDP in the case of Indonesia. Consumers are also relatively protected in most of Latin America, where fuel prices have either been fixed for a long time (Venezuela and Ecuador) or are being adjusted only moderately and with a significant lag (almost everywhere else). Table 3 shows that while retail prices for gasoline tend to be higher in net oil importing countries, the dispersion is quite wide regardless of the existence of subsidies. Moreover, there are cases in which no subsidies are applied but retail prices are low because local extraction costs are low (like Qatar), and others where a subsidy scheme exists but retail prices are high nonetheless (like Brazil, Chile or Peru). This divergence is oftentimes explained by the high excise taxes on fuel consumption.

**Table 3: Oil price subsidies in Emerging Market countries**

| Country | Are oil prices subsidized? | Who bears the cost of the subsidy? | Has the subsidy risen in the past 12-18 months? | Are there plans to reduce the subsidy? | Domestic price of gasoline US$/gal* |
|---|---|---|---|---|---|
| **Net oil exporters** | | | | | |
| Algeria | Yes | Government | No, it has declined | Yes | 0.83 |
| Argentina | Yes | Private companies | Yes | No changes before October | 2.65 |
| Colombia | Yes | State oil company | Yes | Yes, reduction under way | 3.00 |
| Ecuador | Yes | State oil company | Yes | No | 1.45 |
| Iran | Yes | Oil fund | Yes | Yes, but not until 2006-2007 | 0.26 |
| Malaysia | Yes | Government | Yes, despite price hikes | Yes, but not until late 2006 | 2.76 |
| Mexico | Yes | Government | Yes, but not significantly | No | 2.65 |
| Nigeria | Yes | Government | No, it has declined | Yes | 0.76 |
| Oman | Yes | Government and oil fund | - | Yes | 1.17 |
| Qatar | No | - | - | - | 0.78 |
| Russia | No | - | - | - | 2.27 |
| Saudi Arabia | Yes | Government | - | Yes | 0.91 |
| Venezuela | Yes | Government | - | No | 0.16 |
| **Net oil importers** | | | | | |
| Brazil | Yes | State oil company | No, being reduced | Further reduction likely | 3.57 |
| Bulgaria | No | - | - | - | 3.07 |
| Chile | Yes | State oil company | It was just established | - | 4.54 |
| China | Yes | Oil refiners | Yes | Yes | 2.04 |
| India | Yes | Government and state oil company | No, it has declined | No definite plans | 4.09 |
| Indonesia | Yes | Government | No, it has declined | Yes | 1.73 |
| Korea | No | - | - | - | 5.34 |
| Peru | Yes | Stabilization fund | Yes | - | 4.00 |
| Philippines | No | - | - | - | 2.23 |
| South Africa | No | - | - | - | 3.57 |
| Thailand | No | - | - | - | 2.16 |
| Turkey | No | - | - | - | 7.95 |
| **Memo Item** | | | | | |
| US | | | | | 3.03 |
| Germany | | | | | 6.16 |
| Japan | | | | | 4.75 |

* Price of one US gallon of premuim gasoline.
Source: JPMorgan

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**Most governments in Emerging Asia have some form of subsidy scheme, but at the margin these buffers are being withdrawn.** Most Asian countries have either an explicit subsidy or some form of mechanism that prevents a full passthrough from international oil prices to domestic prices. However, the growing fiscal costs of these schemes are forcing many countries to phase them out and lift domestic prices—at a cost of adding pressure on inflation. **Indonesia** has an across-the-board subsidy on fuel that implies a fiscal cost of US$14 billion (5% of GDP), and which the government is looking to trim through the recent price hikes of 88% for motor gasoline to 185% for household kerosene. **Thailand** had used the Oil Fund to subsidize domestic oil producers and importers, but gasoline and diesel prices were liberalized earlier this year. **Malaysia** has hiked domestic oil prices three times this year, but the rise has been insufficient to reverse the growing subsidy costs estimated at US$4.17 billion this year. Although the 2006 budget suggests that gradual price hikes will continue, the subsidy scheme will be far from being dismantled. **India** continues to heavily subsidize local fuel prices owing to political pressure, which has so far limited the impact of high oil prices on growth and inflation. However, fiscal pressure forced the government to announce a 7% hike in local fuel prices in early September. **China** has no explicit subsidy mechanism, but there is a lag in price adjustments borne by refiners (mostly state-owned) that protects consumers. But these price caps are providing incentives for refiners to divert supplies to more profitable exports instead of selling to domestic customers, which is generating problems of smuggling and aggravating the supply bottlenecks within China. In turn, the **Philippines** has already dismantled its oil subsidy scheme and domestic oil prices are market determined. **Singapore** and **Korea** have no subsidies, although the latter has an indirect cushion provided through the reduction of import taxes on oil products.

**In EEMEA, most net oil exporters in the Middle East and Africa subsidize domestic oil prices, while exporters and importers in Eastern Europe do not.** There is no direct domestic oil price subsidy in **Russia**, although natural gas prices are subsidized. However, domestic oil prices are low because local producers do not pay international prices for their oil, while pipeline constraints and high export taxes prevent a redirection of oil supplies to export markets. There are no subsidies in **Bulgaria**, **South Africa** and **Turkey** either. In the Middle East, the only net oil exporter that does not subsidize domestic oil prices is **Qatar**. Otherwise, **Iran's** parliament froze domestic prices for gasoline and other fuels at 2003 levels, and plans to reduce the subsidies only in 2006-2007. We estimate that domestic subsidies on gasoline and other fuels will amount to US$13.8 billion or 7.8% of GDP in 2005. **Saudi Arabia** and **Oman** also maintain subsidies—which are financed by the oil windfalls—but there are plans to reduce them. In Africa, **South Africa** does not subsidize domestic oil prices, but both **Algeria** and **Nigeria** do. In the latter, however, the subsidy on domestic oil sales by the Nigerian National Petroleum Corporation (NNPC), which had accumulated an estimated cost of around US$12 billion by August, is now being phased out.

**In Latin America, all countries subsidize domestic oil prices to some degree, preempting a significant passthrough to inflation.** For net oil exporters like **Mexico**, domestic oil prices are subsidized on an opportunity cost basis (local prices are not indexed to international prices), but not on a cost basis. The government sets

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the gasoline price equal to Pemex's producing cost and then gives back to Pemex the difference relative to the international benchmark price by means of a negative tax. In **Venezuela**, domestic gasoline prices have not been adjusted since the late 1990s so the implicit subsidy borne by PDVSA has been increasing year after year. Although **Ecuador** is a net oil exporter, it lacks refining capacity and imports a large share of the oil derivatives consumed locally, which are sold at subsidized prices. The cost of the subsidy is estimated at US$1.1 billion (3.6% of GDP) for 2005 and the 2006 budget has penciled an even higher burden. If oil prices keep going up, the cost of the subsidy could eventually exceed the revenue gain from crude exports. In **Colombia**, Ecopetrol plans to keep increasing fuel prices gradually in order to reduce the subsidy by around 50% to US$735 million (0.6% of GDP) in 2006. Although there are no formal subsidies in **Argentina**, prices in practice are quasi-fixed by the fact that private oil companies are constrained from raising retail oil prices by the strong opposition from the government and the population. As a result, gasoline prices have barely changed during the last year. Among the net oil importers, **Brazil**'s Petrobras periodically adjusts the local prices in order to close the gap with prices abroad. However, the timing and magnitude of the local prices movements is oftentimes driven politically. In **Chile**, the government recently established a temporary ceiling for internal fuel prices that may be eliminated after the December presidential elections. In **Peru**, fuel prices were already quite high even before the oil price rally due to the high excise tax, but the government has tried to limit the impact on inflation through a temporary excise tax cut and a price stabilization scheme funded by the Treasury.

**While subsidies have helped many Emerging Market economies reduce the inflation impact of the oil price shock, the passthrough effect and the need to tighten monetary policy have not been avoided altogether.** As seen above, the growing fiscal costs of the subsidies are prompting many governments to confront the political cost of hiking administered fuel prices. This has prompted central banks of most net oil importers and some net oil exporters, many of which have an inflation targeting regime, to adopt a more restrictive monetary policy stance. As a net oil importer, **Emerging Asia** is the region where monetary tightening is more generalized, as core inflation in many countries has drifted above the mean of the past couple of years. Although oil is not the only factor driving inflation higher (some of it owes to the gradual dismantling of price controls), higher energy costs are ratcheting up inflationary expectations.. Indeed, Bank of Korea's 25bp hike of its overnight call rate last week made it the last Emerging Asian central bank to tighten over the past year. As is the case with its regional peers, BoK officials are now slowly shifting focus from growth to inflation. In the case of **Latin America**, inflation pressures fueled to a great extent by higher energy prices led central banks in Brazil and Mexico to start hiking policy rates last year, but both have now switched to easing mode as inflation is finally declining. Elsewhere in the region, Chile's central bank continues to hike in order to contain the energy-led inflation uptrend, while Argentina and the Andeans maintain their expansionary monetary stance, as energy prices are not yet a main driver of inflation. In **EEMEA**, policymakers in South Africa and the Czech Republic have joined central bankers from the US and the UK in talking tough about inflation, but little action is expected for now. However, Hungary, Poland and Turkey are all expected to continue cutting policy rates into 2006.

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## More savings than consumption this time around

**As opposed to previous oil boom episodes that led to higher consumption, the majority of net oil exporters Emerging Markets appear to be either saving a good portion of the windfall or using it to prepay debt.** Most net oil exporters—from Russia to the Middle East (Qatar and Iran), Africa (Algeria and Nigeria) and Latin America (Colombia and Venezuela)—are taking the oil boom as a transitory shock and have set up some form of stabilization fund that aims to save a portion of the windfall, or have established specific rules to allocate the gains (Mexico and Ecuador). Obviously, not all countries display discipline in following their own rules, so some of the oil windfall ends up being spent discretionally or simply used to cover fiscal deficits (table 4).

**Table 4: Are countries doing a good/bad job at saving the oil windfall?**

Scale: 5 = very good; 1 = very bad

| Country | Mechanics | Good/Bad |
|---|---|---|
| **Algeria** | Oil revenues above the budgeted assumption are channeled intothe oil stabilization fund (FFR). Funds in the FFR declined in 2004 from 2003 due to debt buy backs. The government has also been using the FFR to finance a larger public sector budget. | 3-4 |
| **Colombia** | The FAEP oil stabilization fund captures the oil windfall of the state oil company Ecopetrol and regional governments. FAEP savings can be used to stabilize revenues of Ecopetrol and government transfers to oil regions (the latter can also use it to prepay debt). | 4-5 |
| **Ecuador** | The FEIREP oil fund was originally created to capture the oil windfall and use c70% to reduce public debt. But the government has changed the law and now 80% of the fund goes to the budget. | 1 |
| **Mexico** | The budget law anticipates how the oil windfall will be spent each year. Out of the US$8.3 billion total windfall in 2005, 65% will go to Pemex, 20% to the states and municipalities infrastructure fund, 10% to other state-owned enterprises, 0.5% to the oil stabilization fund and 4.5% to pay down external debt. | 4-5 |
| **Iran** | A portion of tax revenue about the oil price assumption in the budget goes into the macro stabilization fund. Iran has used the fund to expand domestic energy production and subsidize prices. | 2 |
| **Nigeria** | Nigeria has created a Petroleum Equalization Fund to save its oil windfall. So far, the fund has been used to finance the budget deficit and in part to build up savings. | 2-3 |
| **Saudi Arabia** | No formal mechanism for saving the oil windfall although there are several smaller funds for reserve accumulation and infrastructure development. US$84bn accumulated in the past 18 months was spent on infrastructure, transfers to the population and jobs. | 3-4 |
| **Qatar** | Qatar has set up four funds to save the oil windfall. The savings are spent on investing in energy projects and road, pipeline, and healthcare infrastructure. | 4-5 |
| **Russia** | Oil windfall is accumulated in the stabilization fund. The Ministry of Finance has been strictly adhering to the rules of accumulation of resources into the fund. The money has been spent on repayment of foreign debt. | 4-5 |
| **Venezuela** | The existing macroeconomic stabilization fund (FEM) was created to capture the windfall whenever oil prices exceed budget assumptions, but no contributions have been made in the past three years despite the record-high prices. There are plans to change the rules of the fund in order to re-start savings in 2006. | 1 |

Source: JPMorgan

**A noteworthy development for Emerging Markets is that part of the oil savings is being used to reduce public debt.** Russia is the prime example: its oil windfall has been used to prepay US$3.3 billion to the IMF and US$15 billion to Paris Club creditors, with more prepayments expected in the coming months. Other examples of this are Mexico and Algeria. Interestingly, even countries with more discretional management of the windfall are embarking on debt reduction—either deliberately or in a passive fashion. For example, Nigeria is expected to use a portion of the oil

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windfall to buy back official debt later this year. In turn, Venezuela has announced that it will not tap the external market in the remainder of 2005 and in 2006, using its oil windfall instead both to cover its external borrowing requirements and for future debt buybacks. In the case of Ecuador, the lack of market access has forced the country to use its oil windfall to cover its financing shortfall and pay down multilateral and bilateral debt over the past 18 months.

**Russia stands out as the country that has used most of the oil windfall to prepay its public debt.** Oil windfalls in Russia are accumulated in a stabilization fund introduced in January 2004. The fund reached US$29.2 billion in early September—a figure that is net of the US$18.3 billion that has been used to repay sovereign debt so far this year. The Ministry of Finance has been strictly adhering to the rules of the accumulation of money into the fund. According to the budget code, if the fund has less than US$18 billion it can only be used to finance budget deficits in periods when the oil price falls below the reference level, but after it exceeds that level it can be used for other purposes, including non-interest spending. However, in practice no attempts have been made to spend the fund in the latter. Instead, this year the government has repaid US$18.3 billion to the IMF and Paris Club creditors. We expect another US$10 billion repayment to the Paris Club in 4Q05.

**In the Middle East, the sheer size of the oil windfall has allowed net oil exporters to increase infrastructure and social spending while accumulating significant savings.** There is no formal oil stabilization fund in **Saudi Arabia**—the world's largest oil producer—but we estimate that around US$84 billion were accumulated over the past 18 months in the various reserve funds, which include the government's foreign assets held by the Saudi Monetary Authority (SAMA), the State Pension Fund and the GOSI pension fund. Although there are no specific rules to allocate the oil windfall, the current surplus is being used to fund infrastructure spending, transfers to the population, and job creation programs. **Kuwait** has two major oil savings funds: the Reserve Fund for Future Generations (RFFG), which by law captures 10% of oil income and is estimated to have around US$74 billion, and the State General Reserve (SGR), which has assets worth US$25 billion that are mostly invested in short-term funds. Neither is formally a stabilization fund nor has been used for fiscal reasons. In **Oman** there is no explicit oil stabilization fund either, but the accounts of the Ministry of Finance at the central bank reflect an oil windfall of around US$3.3 billion this year. The government has been spending the windfall discretionally on the development of the natural gas sector, oil and gas exploration and pipeline construction, road network expansion, and health care projects. By contrast, **Iran** has set up a macro stabilization fund that captures a portion of tax revenues above the oil price assumption in the budget. Although there are no specific rules to spend the fund (which has grown to US$14 billion this year), the government has been using the windfall to expand energy production and subsidize domestic energy prices. Similarly, **Qatar** recently set up four funds to save the oil windfall, which is being spent on energy projects, and road/pipeline/healthcare infrastructure.

**African oil exporters have been financing fiscal deficits with part of the windfall, but a portion is being used for debt buybacks.** Revenues earned from oil prices above the budgeted assumption in **Algeria** are channeled into the oil stabilization fund (*Fonds de Regulation des Recettes*—FRR), which had accumulated US$16.8

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billion by the end of August. Although the government has used the FRR so far to mainly finance a larger public sector budget, there have also been some debt pre-payments. In turn, **Nigeria** created the Petroleum Equalization Fund in 2004 to capture oil revenues in excess of the budgeted oil price target, and around US$11 billion has been collected this year. There are no specific rules to allocate the oil windfall, and so far it has been used to finance the budget deficit and to build up savings. We expect the government to use a portion of the oil windfall to buy back Paris Club debt at a discount later this year following the IMF approval of a two-year Policy Support Instrument (PSI) this week.

**In Latin America, Mexico and Colombia are the countries that most closely follow their existing rules to allocate the oil windfall.** Congress agrees each year on the specific treatment of the oil windfall in **Mexico**, but rules do not vary much from year to year. In the 18-month period ending in June 2005, the oil windfall above the projected budget figures reached US$14.4 billion. For 2005, Congress allocated 50% of the net gains generated by oil prices above US$27/bbl to Pemex, and 25% each to both state governments and the oil stabilization fund. The government has discretion over the use of the oil stabilization fund, which has to be spent in the calendar year (i.e., the fund is not a vehicle to accumulate savings with a multi-year horizon). Positively, the fund has been used to reduce public indebtedness instead of increasing current expenditures. If oil prices declined on a sustained basis, there is a formula in which the government can use the oil stabilization fund initially and submit an expenditure cut proposal to Congress thereafter. In the case of **Colombia**, the FAEP oil stabilization fund accumulates the oil windfalls of the state oil company Ecopetrol and the local governments of the oil-producing regions, which can be used to stabilize Ecopetrol revenues and the transfers to oil regions when oil prices fall (regional governments can also use their savings to prepay debt). The government estimates that the windfall saved into the FAEP will grow almost 20%oya in 2005, and that the fund will reach US$1.26 billion by year-end. Since these resources are managed outside of the central government's accounts, the impact of oil in the latter is quite limited.

**By contrast, the growing discretion over the use of the oil windfall in Venezuela and Ecuador makes them the most vulnerable countries to a sharp decline in oil prices.** With oil representing nearly 80% of exports and 50% of government revenues, **Venezuela** is one of the countries most exposed to swings in oil prices in the region. At the end of the 1990s, the government created the Macroeconomic Stabilization Fund (known initially as FIEM and later as FEM) that captured above-budget oil revenues from the central government, PDVSA and the local governments. At its peak the FEM had accumulated over US$6 billion, but most of it was spent around the time of the strike in early 2003 that temporarily crippled oil revenues. Since then no contributions to the FEM have been made, although the government is planning to resume savings in 2006 after a recent revamping of the fund that now excludes the state oil company PDVSA (which will instead contribute directly to other funds—including the so-called Fonden—that will be spent at discretion by the government on social/infrastructure projects and in liability management). In **Ecuador**, the government of President Palacio amended the Fiscal Responsibility Law this year that eliminated the Feirep oil fund (which was expected to accumulate US$760 million this year) and created instead new allocation rules that will include most of the oil windfall above the line in the government's budget.

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**While it is difficult to collect aggregate data, there is anecdotal evidence that many net oil exporters are recycling petrodollars back to the oil sector by investing in expansion of oil reserves, production, and/or infrastructure.** As mentioned before, so far in 2005 oil prices are on average US$23 above this year's budget assumptions of net oil exporters in Emerging Markets. As receipts have exceeded expectations even in countries that produce the relatively low quality, heavy/sour crude grades that have underperformed relative to benchmarks (West Texas Intermediate and Brent), many of them have unveiled ambitious investment plans for the coming years. For example, Saudi Arabia plans to invest US$50 billion in its energy sector over the next five-year period—more than double the investments made in the previous five-year period. In Venezuela, PDVSA announced in August a US$56 billion "strategic plan" for the 2006-2012 period to increase the country's output to 5.8 mbd by injecting about US$8 billion per year into the oil sector, compared to about US$5 billion of capital expenditures penciled into the company's 2005 budget. According to the plan, PDVSA will spend US$10 billion to increase domestic refinery capacity, US$21.7 billion on exploration and production, and the balance on other projects such as expanding the domestic tanker fleet and improving the pipeline system. Caracas would fund 70% of the planned investment, and will look to the private sector for the rest. While the planned spending in many net oil exporters is rhetorical at this stage, it does highlight the increased emphasis on reinvestment of oil revenues in the sector.

**Although the oil windfall is not being used to boost public spending indiscriminately this time around, it appears that the "breakeven" price that would get many countries into fiscal troubles has increased to a higher and wider range of US$20-35/bbl from the US$15-20/bbl that generally applied in the 1990s.** The estimate of the breakeven oil price for net oil exporters in Emerging Markets is not so straightforward. Apart from the lack of transparency about how the windfall is being spent in many cases, a drop in oil prices would mean not only lower revenues but also lower subsidy costs in the case of net oil exporters that subsidize domestic fuel prices. In any case, the breakeven prices that result from a sensitivity analysis of fiscal accounts for major net oil exporters suggest that they have increased over the past decade. For example, while a budgetary cut would be difficult to implement in **Saudi Arabia** if oil prices declined substantially, the fiscal troubles would only appear if oil prices dropped to the low 20s for an extended period of time. Similarly, it would be quite challenging for the governments of either **Algeria** or **Nigeria** to scale down expenditures if oil prices decline given the increasing dependence on budget revenues from oil and the political and social pressure to hike spending to boost growth and employment, but fiscal troubles in these countries would probably be triggered only if oil prices dropped to the low 20s for a long period of time. **Venezuela** is a more extreme case since the limited windfall savings of the past three years have allowed primary expenditures to increase sharply from US$20 billion in 2003 to US$25 billion in 2004 and to a projected US$31 billion in 2005. This suggests that if the price of the Venezuelan oil basket dropped to the low to mid 30s, the government could face a challenging fiscal situation unless it undertakes massive spending cuts, which would likely prove politically difficult. A similar threshold probably applies to **Ecuador** given the government's reliance on the oil windfall to compensate for the difficulties it faces in accessing exceptional financing from multilaterals and international capital markets. In turn, although current government expenditures have increased in **Russia** during 2005 as a result of higher oil prices, the hike has been moderate and would pose no major difficulty for the government to scale down non-interest spending if oil prices declined.

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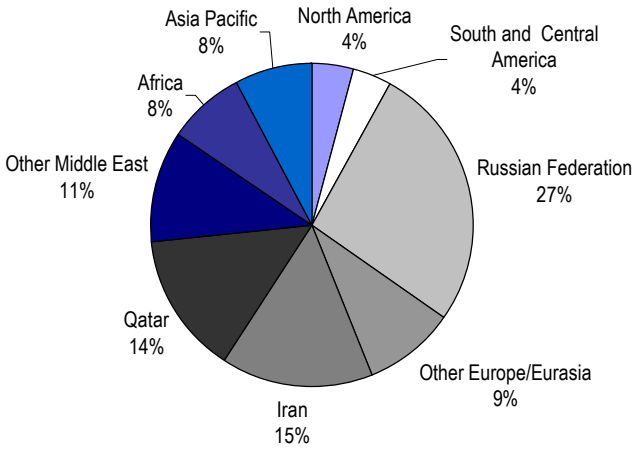
## Natural gas helps but is not yet a global commodity

**It is harder to compare natural gas pricing internationally because, unlike oil, there are no global benchmarks for gas.** Although the largest proved reserves of natural gas are located in Emerging Market countries, their capacity to exploit these resources economically is limited by the fact that natural gas is not yet a global commodity (chart 5). While the evolution of liquified natural gas will eventually change this, right now the lack of viable export infrastructure seriously limits international flows. A country like Nigeria, for example, still flares much of its oil-associated natural gas production. In that sense, although gas currently trades at US$13.50/MMBtu in the New York Mercantile Exchange, Nigerian gas effectively has no comparable value. Where export infrastructure is limited, domestic pricing of natural gas is hard to put in an international context.

**Chart 5: Most of the proved reserves of natural gas are in Emerging Market countries**




Source: JPMorgan

**But trade flows of natural gas are growing, which may tilt the energy trade balance of many countries in the future.** This means that a more complete picture of the impact of higher energy prices on Emerging Market economies requires looking also at the dynamics of production and consumption of natural gas, given that they could either ease, or alternatively compound, the challenges imposed by the oil price shock. For example, natural gas is traded cross-borders in North America. Although Mexico is a net exporter of crude, it imports from the US 15% of the natural gas that it consumes and that percentage is likely to keep growing in the future (the increase in natural gas prices after Hurricane Katrina, which ravaged the Gulf of Mexico, prompted the Mexican government to decree a subsidy on domestic gas for consumers in September, cutting the price to US$7.65/MMBtu from the US$9.88/MMBtu indicated by the South Texas index for that month). In South America, Peru finally started commercially exploiting the natural gas from the Camisea fields last year. When the second phase of the Camisea project is completed, exports of liquified natural gas to the US West Coast and Mexico would eventually turn Peru from a net energy importer to a net exporter. There are also plans to build a pipeline system for natural gas that would allow Peru to export to Chile and the Mercosur countries. Bolivia may eventually be connected to this system once political conditions favor such integration.

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## Security of energy supply becomes a concern in EM

**Many Emerging Market countries are showing growing concerns about the security of energy supplies.** Increased import dependency in many Emerging Market countries—which in many cases means increased exposure to geopolitically unstable oil producers—has led many net oil importers to consider policies aimed at reducing vulnerability (table 5 and tables A2 and A3 in the Appendix section on page 23). Relative geographic isolation of Asian countries, in particular, has always kept the region focused on the potential for disruptions, and the sharp increase in prices in recent years has only served to heighten that awareness. Diversifying import sources has been one strategy for addressing this vulnerability. China, for example, imports a growing percentage of its crude from non-traditional sources such as West Africa, replacing barrels that would historically have come from within the Asia-Pacific region or from the Mideast Gulf (table 6). Both China and India have also bid aggressively for commodity assets abroad—such as oil and gas production fields and metals smelters—that are viewed as strategic acquisitions. Additions to sovereign tanker fleets have also been cited as key for ensuring security of energy supply.

**Table 5: Suppliers of major oil importers in 2004**

% of total imports

| | Destination | | | |
|---|---|---|---|---|
| Origin | United States | OECD Europe | Japan | China |
| Algeria | 1.9% | 3.2% | 0.1% | 2.5% |
| Angola | 3.0% | 0.5% | 0.0% | 13.2% |
| Colombia | 1.7% | 0.0% | 0.0% | 0.0% |
| Indonesia | 0.3% | 0.0% | 3.5% | 2.8% |
| Iran | 0.0% | 6.7% | 14.5% | 10.8% |
| Iraq | 6.2% | 2.2% | 2.2% | 2.9% |
| Kuwait | 2.3% | 1.1% | 7.6% | 2.0% |
| Libya | 0.2% | 9.2% | 0.0% | 3.3% |
| Mexico | 15.2% | 1.4% | 0.1% | 0.0% |
| Nigeria | 10.1% | 2.6% | 2.0% | 1.6% |
| Qatar | 0.0% | 0.0% | 8.6% | 1.4% |
| Russia | 1.4% | 28.2% | 0.7% | 8.8% |
| Saudi Arabia | 14.0% | 10.8% | 25.3% | 14.0% |
| Sudan | 0.0% | 0.0% | 0.0% | 4.7% |
| UAE | 0.0% | 0.0% | 26.0% | 1.4% |
| Venezuela | 15.7% | 0.7% | 0.0% | 0.0% |

Source: IEA, China OGP

**Table 6: Chinese crude imports by region of origin**

| | 2002 | 2003 | 2004 |
|---|---|---|---|
| Mideast | 49.9% | 50.9% | 44.8% |
| Asia | 17.3% | 16.5% | 11.0% |
| North Africa/Mediterranean | 9.3% | 6.5% | 5.7% |
| Atlantic Basin | 20.7% | 23.7% | 30.5% |
| Americas | 0.0% | 0.8% | 1.7% |
| Western Europe | 4.9% | 1.3% | 1.6% |
| Western Africa | 13.1% | 16.5% | 19.2% |
| Former Soviet Union | 5.6% | 7.2% | 10.0% |
| OPEC | 39.6% | 37.6% | 31.7% |

Source: JPMorgan, China OGP, Reuters

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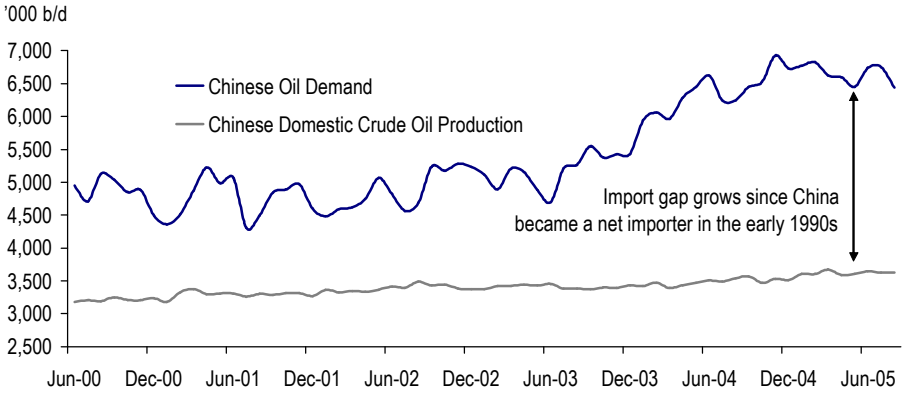
**Government stockpiling is one of the policies that some Emerging Market countries are considering to address growing concerns about the security of energy supply.** As mentioned above, Asian countries have always been particularly apprehensive about the security of energy supply. As some regional production areas—such as Indonesia—see a geological decline, and countries such as China become bigger net importers of oil, access to energy supply from other regions is increasingly vital (chart 7). In addition to planning a strategic crude reserve, the Chinese Five Year Plan, for example, cites other energy security imperatives such as the acquisition of a sovereign tanker fleet, demand management strategies, and development of alternative fuels and increased investment in exploration. But with a few standout exceptions, most Emerging Market countries have a long way to go to build strategic reserves, given the technological scope and cost of this kind of project.

**Chart 7: China's oil self-suffciency deteriorates**




Source: JPMorgan, China OGP

**While there has been some speculation that oil may be considered as an alternative to traditional reserve holdings in some Emerging Market countries, we see concerns about security of energy supply as the real driver of these initiatives.** As a form of stored value, oil is far from ideal. For starters, storing oil is technically challenging and expensive, not least of all because it takes up a lot of space. Storing large volumes of oil in government-owned above-ground tanks is impractical; most of the world's existing strategic stockpiles are stored either in salt caverns (in the US) or by the commercial oil industry on behalf of sovereigns (in Europe). Maintenance of oil storage is also challenging. Even moving oil into or out of storage requires infrastructure that would be costly to add, particularly in countries without a significant existing oil industry. All in all, the costs associated with oil storage for most countries outweigh the potential attractiveness of the commodity as an alternative form of stored value for sovereigns.

**Additionally, unlike gold—which, at the end of the day is more like a currency than a pure commodity—oil lacks fungibility.** In addition to high transport and storage costs, oil quality varies widely. Not all barrels of crude are created equal, and market values of crude grades not only differ but their relative value also changes constantly in response to physical market conditions. The slope of the oil

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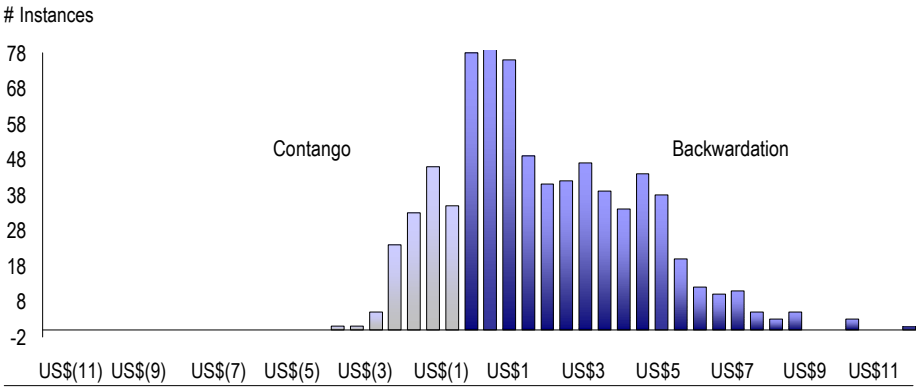
futures curve shifts widely and quickly relative to other markets. More critical to would-be oil stockpilers is the fact that historically the oil futures curve has been in backwardation—or downward sloping—more often than it has been in contango—or upward sloping (chart 6). Periods of backwardation have generally been steeper than periods of contango. This means that more often than not oil has had a negative carry, and that over, say, the past ten years, buying spot crude barrels and storing them would have cost governments money above and beyond the physical costs of storage.

**Chart 6: Contango versus backwardation**




M02-M13 in US$/bbl.
Source: JPMorgan

## China ready to fill its strategic oil reserve; others thinking about it

**China has made it no secret that energy security is a priority and building a strategic oil reserve is of prime importance for the world's second largest oil consumer.** In August, China completed construction of its first government-owned strategic oil reserve facility in Zhenhai, in the eastern coastal province of Zhejiang. The reserve, which has a storage capacity of 33 million bbl, is the first of four sites initially planned. The next, also located in Zhejiang, will be able to hold 31 million bbl and may be ready to fill as early as next year. The government aims to have around 100 million bbl of strategic oil supplies by 2010, equal to about 20 days of current consumption (table 7).

**Table 7: China's strategic oil reserve projects**

| Location | Capacity (million bbl) | Completion* | Operator |
|---|---|---|---|
| Zhenhai, Zhejiang | 33 | 3Q05 | Sinopec |
| Zhoushan, Zhejiang | 31 | 2006/2007 | Sinochem |
| Huangdao, Shandong | 19 | 2007/2010 | Sinopec |
| Dalian, Liaoning | 19 | 2007/2010 | CNPC |
| **Total Planned** | **102** | | |

* Projected completion dates for Zhoushan, Huangdao, Dalian projects, subject to change.
Source: JPMorgan, Chinese media and government reports.

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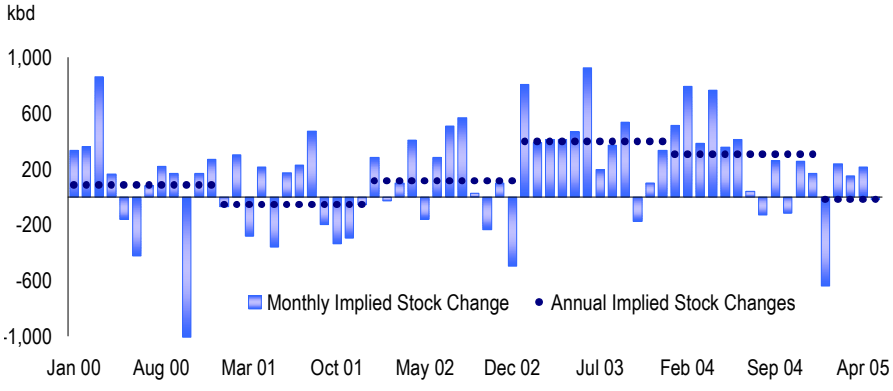
**Details on how quickly Beijing plans to fill the reserve, with what types of crude oil grades, and how the barrels will be sourced, have been sketchy.** Zhang Guobao, vice director of China's National Development and Reform Commission, last month said Beijing will defer starting the process of filling the reserve given rocketing oil prices. Earlier, he had said the fill would begin as early as 4Q05. The policy may shift yet again before the year is out. Aggressive moves by China to fill the reserve—whether it begins this year or in the next—would ostensibly boost global demand for crude oil, but it is unclear by how much. Guidance on how Beijing plans to use its strategic stockpile is also skimpy. Sinochem vice president Han Gensheng said in June that the reserve would be used to "cope with the short-term fluctuations and maintain stability in the market." Using strategic reserve barrels to manage the market would go seriously against the grain of IEA (and certainly US policy) and further complicate analysis of Chinese oil fundamentals. IEA and US policy is to use the reserve only in emergencies to meet sudden shortfalls in supply.

**While the Zhenhai facility will be the first government-owned reserve, some of the implied oil stockpiling during the 18-month period from early-2003 through mid-2004 may represent barrels held by the industry on behalf of the government.** Implied crude inventory builds in 2003 averaged 400 kbd (150 million bbl) and 540 kbd (nearly 200 million bbl) in the first-half of 2004. The trend changed dramatically in the second half of 2004; data showed the net inventory change was a mere 80 kbd (30 million bbl). For the first five months of this year, the net change was zero (chart 8). This shift corroborated anecdotal reports that available storage capacity, as held by industry, was effectively full. (Because China does not release inventory data, we calculated implied inventory changes by adding domestic crude production to crude imports, then subtracting refinery throughput, crude exports and constant values for direct burn and unspecified losses.)

**Chart 8: Implied Chinese crude oil stock changes**




Source: JPMorgan, China OGP, Reuters.

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**China is not alone in its ambitions to build strategic oil reserves.** Many of its neighbors over the years have pondered creating an oil stockpile. India is farther ahead in the planning phase than its neighbors, many of whom have either scuppered the idea or been unable to muster funding. India plans to build a government-owned strategic stockpile of 5 million tons of crude (around 37 million bbl), equal to about 15 days of demand. The location of two facilities has already been finalized: Vizag in the western coast will have a capacity of 1 million tons (7.3 million bbl) and Mangalore in the eastern coast with a capacity of 1.5 million tons (11 million bbl). Another site near Mangalore is being considered, which will have a capacity of 2.5 million tons (18 million bbl). The crude at these locations will be held in underground rock caverns that will require roughly four years to construct. India aims to begin filling the reserve as early as 2009. The government puts the cost at US$400 million to construct the storage facilities and US$1.1 billion to fill the reserve. India is in the process of deciding how to pay for the stockpile and is eyeing two options: financing through government funds outright; or imposing a special purpose tax on refiners and importers. India currently mandates that the domestic oil industry store barrels on the government's behalf. In turn, some smaller Southeast Asian countries have determined that the benefits of having a reserve are dwarfed by the costs and have dropped the plan, instead tacitly relying on IEA members, especially regional neighbors Japan and South Korea, to mitigate the economic impact of a sudden oil supply loss.

**Japan has spent years trying to sell the idea of a regional oil stockpile to the ASEAN countries, while offering to share the burden of maintaining a reserve.** However, it has failed to gain traction. Given the current high oil price environment, reluctance to establishing a regional reserve has grown. Southeast Asian oil producers—notably Malaysia—have resisted the idea. While regional oil consumers—notably the Philippines—have been supportive, Thailand, an early supporter of the plan and a major oil importing ASEAN member, recently dropped the idea given the costs. Vietnam, a net crude oil exporter and net refined product importer, said in July that it will conduct a feasibility study, funded by Japan, to determine the cost of building strategic oil storage. Of those countries that maintain some form of strategic reserves, they are held by industry, not government. Thus far, the only regional Southeast Asian energy security agreement in place is one that was signed by ASEAN members in 1986. Under the accord, the region's major exporters would supply oil to importing countries in the event of a supply disruption. This has never been implemented and may never be as ASEAN is now a net oil importer.

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## The International Energy Agency

The establishment of the IEA spurred construction of most existing strategic petroleum reserves (SPR). The Paris-based body of 26 OECD countries, which was founded in response to the 1973-1974 embargo, committed to taking joint measures in the event of an oil supply disruption. Member countries are required to hold emergency oil reserves equivalent to at least 90 days of net imports of the prior year.

- Reserves can be held as crude and refined products.
- Reserves can be held by the government or private companies located within the country.
- Reserves can be released in the event of a supply disruption of 7 percent or more to the IEA as a whole or in individual countries.

The agreement also mandated that members must have a program of contingent oil demand restraint measures and share reserve barrels in the event of a disruption in supplies. The volume of oil to be distributed is based on the member countries' annual demand figures. Members are also encouraged—though not required—to develop alternative fuel technologies and develop more environmentally-safe energy practices. Since its founding, the IEA has twice coordinated a joint draw: during the first Gulf War in 1991 and to mitigate disruptions caused by Hurricane Katrina in late-August this year.

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# Appendix

## Table A1: Global production and consumption of oil in 2004

Thousand barrels per day and % of total globally

| | Production | | Consumption | |
|---|---|---|---|---|
| | kbd | % of total | kbd | % of total |
| USA | 7,241 | 9.0% | 20,517 | 25.4% |
| Canada | 3,085 | 3.8% | 2,206 | 2.7% |
| Mexico | 3,824 | 4.8% | 1,896 | 2.3% |
| **Total North America** | **14,150** | **17.6%** | **24,619** | **30.5%** |
| | | | | 0.0% |
| Argentina | 756 | 0.9% | 393 | 0.5% |
| Brazil | 1,542 | 1.9% | 1,830 | 2.3% |
| Colombia | 551 | 0.7% | 223 | 0.3% |
| Ecuador | 535 | 0.7% | 140 | 0.2% |
| Venezuela | 2,980 | 3.7% | 577 | 0.7% |
| **Total So. and Central America** | **6,764** | **8.4%** | **4,739** | **5.9%** |
| | | | | 0.0% |
| Norway | 3,188 | 4.0% | 209 | 0.3% |
| Kazakhstan | 1,295 | 1.6% | 192 | 0.2% |
| Russian Federation | 9,285 | 11.6% | 2,574 | 3.2% |
| **Total Europe and Eurasia** | **17,583** | **21.9%** | **20,017** | **24.8%** |
| | | 0.0% | | 0.0% |
| Iran | 4,081 | 5.1% | 1,551 | 1.9% |
| Iraq | 2,027 | 2.5% | n.a. | n.a. |
| Kuwait | 2,424 | 3.0% | 266 | 0.3% |
| Qatar | 990 | 1.2% | 84 | 0.1% |
| Saudi Arabia | 10,584 | 13.2% | 1,728 | 2.1% |
| UAE | 2,667 | 3.3% | 306 | 0.4% |
| **Total Middle East** | **24,571** | **30.6%** | **5,289** | **6.5%** |
| | | | | 0.0% |
| Algeria | 1,933 | 2.4% | 242 | 0.3% |
| Libya | 1,607 | 2.0% | n.a. | n.a. |
| Nigeria | 2,508 | 3.1% | n.a. | n.a. |
| **Total Africa** | **9,264** | **11.5%** | **2,647** | **3.3%** |
| | | | | 0.0% |
| China | 3,490 | 4.3% | 6,684 | 8.3% |
| India | 819 | 1.0% | 2,555 | 3.2% |
| Malaysia | 912 | 1.1% | 504 | 0.6% |
| **Total Asia Pacific** | **7,928** | **9.9%** | **23,446** | **29.0%** |
| | | | | |
| **Total Global** | **80,260** | **100.0%** | **80,757** | **100.0%** |
| o/w OECD | 20,732 | 25.8% | 48,777 | 60.4% |
| OPEC | 32,927 | 41.0% | n.a. | n.a. |
| Non-OPEC (ex-FSU) | 35,916 | 44.7% | n.a. | n.a. |
| Former Soviet Union | 11,417 | 14.2% | 3,729 | 4.6% |

Source: BP

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## Table A2: Most oil reserves are in countries with geopolitical risks

Proved reserves at year-end (billion barrels unless stated otherwise)

| | | | | 2004 | |
|---|---|---|---|---|---|
| | 1984 | 1994 | 2004 | % of total | R/P ratio* |
| USA | 36.1 | 29.6 | 29.4 | 2.5% | 11.1 |
| Canada | 9.4 | 10.4 | 16.8 | 1.4% | 14.9 |
| Mexico | 56.4 | 49.8 | 14.8 | 1.2% | 10.6 |
| **Total North America** | **101.9** | **89.8** | **61** | **5.1%** | **11.8** |
| Argentina | 2.3 | 2.3 | 2.7 | 0.2% | 9.7 |
| Brazil | 2.0 | 5.4 | 11.2 | 0.9% | 19.9 |
| Colombia | 1.1 | 3.1 | 1.5 | 0.1% | 7.6 |
| Ecuador | 1.1 | 3.5 | 5.1 | 0.4% | 25.8 |
| Venezuela | 28.0 | 64.9 | 77.2 | 6.5% | 70.8 |
| **Total So. and Central America** | **36.3** | **81.5** | **101.2** | **8.5%** | **40.9** |
| Norway | 4.9 | 9.6 | 9.7 | 0.8% | 8.3 |
| Kazakhstan | n.a | n.a | 39.6 | 3.3% | 83.6 |
| Russian Federation | n.a | n.a | 72.3 | 6.1% | 21.3 |
| **Total Europe and Eurasia** | **96.7** | **80.3** | **139.2** | **11.7%** | **21.6** |
| Iran | 58.9 | 94.3 | 132.5 | 11.1% | 88.7 |
| Iraq | 65.0 | 100.0 | 115.0 | 9.7% | ** |
| Kuwait | 92.7 | 96.5 | 99 | 8.3% | ** |
| Qatar | 4.5 | 3.5 | 15.2 | 1.3% | 42.0 |
| Saudi Arabia | 171.7 | 261.4 | 262.7 | 22.1% | 67.8 |
| UAE | 32.5 | 98.1 | 97.8 | 8.2% | ** |
| **Total Middle East** | **430.8** | **661.7** | **733.9** | **61.7%** | **81.6** |
| Algeria | 9.0 | 10.0 | 11.8 | 1.0% | 16.7 |
| Libya | 21.4 | 22.8 | 39.1 | 3.3% | 66.5 |
| Nigeria | 16.7 | 21 | 35.3 | 3.0% | 38.4 |
| **Total Africa** | **57.8** | **65** | **112.2** | **9.4%** | **33.1** |
| China | 16.3 | 16.2 | 17.1 | 1.4% | 13.4 |
| India | 3.8 | 5.8 | 5.6 | 0.5% | 18.6 |
| Malaysia | 2.9 | 5.2 | 4.3 | 0.4% | 12.9 |
| **Total Asia Pacific** | **38.1** | **39.2** | **41.1** | **3.5%** | **14.2** |
| **Total Global** | **761.6** | **1017.5** | **1188.6** | **100.0%** | **40.5** |
| o/w OECD | 118.7 | 110.6 | 82.9 | 7.0% | 10.9 |
| OPEC | 510 | 777.4 | 890.3 | 74.9% | 73.9 |
| Non-OPEC (ex-FSU) | 170.6 | 177.7 | 177.4 | 14.9% | 13.5 |
| Former Soviet Union | 81.0 | 62.4 | 120.8 | 10.2% | 28.9 |

* Reserves-to-production ratio: number of years to exhaust reserves if production remains at current level.
** Over 100 years
Source: BP

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## Table A3: Key Risks In Major Oil Producing Countries

| Country | Oil Production* (Exports) | Socio-Political Risks | Financial Risk and Receptiveness to Foreign Investment in Energy |
|---|---|---|---|
| **Saudi Arabia** | 10.58 (8.86) | Succession issue deferred since smooth transition from King Fahd to Abdullah.Inverted demographics make unemployment a concern. Government spending alleviates social strain. | State Aramco controls Saudi upstream. Foreign investment in the oil industry is prohibited and there are no plans to open this sector. Some foreign investment in the natural gas industry is permitted as of 2003. |
| **Iran** | 4.08 (2.53) | Strained relations with the West, particularly with respect to nuclear capabilities, haunts oil market. Fundamentalist elements in government and role and influence in the region also raise concerns. | Foreign companies operate in Iran under 'buyback 'or 'build-operate-transfer' contracts with state NIOC. Under these agreements foreign companies fund E&P costs, receive a portion of profits from field operation, then transfer the field to NIOC at the end of the contract. In 2004 negotiations extended contract lengths to a max of 25 years. |
| **UAE** | 2.67 (2.36) | A financial center of the Mideast Gulf, the UAE is among the most stable countries in the region but could be vulnerable to regional unrest. | State ADNOC controls 60% of upstream; foreign equity investors hold the remaining 40%. |
| **Kuwait** | 2.42 (2.15) | Among the most stable regimes in the Gulf, Kuwait has maintained a close relationship with the US though would be vulnerable to regional unrest. Economic and political reforms have been on the agenda but implementation has been slowed by entrenched interests. | Kuwait opened its upstream to foreign investment in Jun'05, albeit in a limited way.The controversial opening allows foreign companies to provide technical assistance for the development of four fields. Additional opening is not expected at this time. |
| **Iraq** | 2.03 (1.73) | Severe domestic lawlessness and specter of civil war between ethnic factions threaten to derail democratization process and prohibit economic reconstruction. | Lack of institutional infrastructure, bureaucratic process, rule of law, and definition of property rights preclude foreign investment at this time. |
| **Venezuela** | 2.98 (2.40) | While a regime change now looks unlikely in the medium run, the Chavez administration continues to send mixed signals to foreign investors. Strained relations with the US. | In 2005 Caracas moved to retroactively apply the 2001 Hydrocarbons Law, forcing a migration of existing contracts with foreign investors operating in marginal fields to 49% JVs with state PDVSA holding, which will have the controlling share. Tax and royalty rates were increased significantly. |
| **Mexico** | 3.82 (1.92) | The outcome of next year's presidential election is still in the air. Lopez Obrador (AMLO, former governor of Mexico city) supposedly has the upper hand in the runup. In case he wins, his populist platform has little room to run without Congress' support. Still, the key risk is another 6-year period without progress on the reform agenda. | The reform to allow private investment into the energy sector and boost Mexico's output in this key sector has been delayed as has been the case of other key structural reforms (fiscal, labor). Pemex's new fiscal regime (to be approved soon) is a first step to restore the oil giant's deteriorating capital structure and boost energy reserves. |
| **Nigeria** | 2.51 (2.26) | Ethnic/religious tensions and labor unrest underpin oil sector risks.Violence, labor actions, and accidents resulting from siphoning frequently interrupt oil industry operations and damage infrastructure. Corruption improved since Abacha regime, lawlessness observed in early stages of transition to democracy gradually improving. | State NNPC retains a controlling stake in joint ventures with foreign companies. Nigeria has historically taxed foreign investors in the oil sector at 85% for shallow-water development and 50% for deepwater production. Last year, Abuja considered raising deepwater rates to match shallow-water rates, but has not done so yet. |
| **Algeria** | 1.93 (1.69) | President Bouteflika has pursued an economic and social reform agenda. National reconciliation, following years of civil war, has also been a priority. Critics, however, say that his autocratic tendencies are stunting democratic developments. | As of 2005, state Sonatrach competes with IOCs for contracts; PSA requirement eliminated.Clear and consistent tax structure exists for IOCs. |
| **Libya** | 1.61 (1.35) | After economic isolation for much of the 1990s, Qadhafi has moved Libya back into the community of nations with the listing of UN and US sanctions. While a sharp policy shift is unlikely, Qadhafi remains unpredictable. At some stage, uncertainty could follow Qadhafi's departure from the political scene. | Lifting of US/European sanctions began in 2004 and has opened the energy sector to more foreign investment. Libya has auctioned a series of Exploration & Production Sharing Agreements since. State LNOC currently retains 81-85% shares in all projects, but this structure may come under fire as foreign investment ramps up. |
| **Russia** | 9.29 (6.12) | Near-term political stability is likely given Putin's firm grip on power. That said, the growing concentration of power in the executive office poses long-term risks. Security risks persist with ongoing fighting between Russian forces and Chechen separatists. | Lack of clarity and consistency in the state's policy toward investment, notably in its energy sector, is a key risk. |
| **Indonesia** | 1.13 (-0.02) | The latest bombing in Bali last month highlights ongoing security risks posed by terrorist group Jemaah Islamiah (JI). The group, which is linked to al Qaeda, is blamed for the Bali bombing in Oct'02 that killed 202 and attacks in Jakarta Separately, reduction of fuel subsidies have sparked massive protests historically in Indonesia (one of which even helped topple Suharto in the late 1990s). The latest cut implemented by the Yudhoyono administration in October 2005 was no exception. | IMF negotiations ended state run monopolies but oil company Pertamina is among the last to be privatized.Pertamina has recently become a liability to investment in the sector; protracted negotiations with ExxonMobil for stakes in fields scared potential investors. A 2001 law allowing local taxation of oil companies also increased the effective tax rate and introduced uncertainty. |

* 2004 average in'000 b/d
Source: JPMorgan

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