

The Revenge of the Old 'Political' Economy



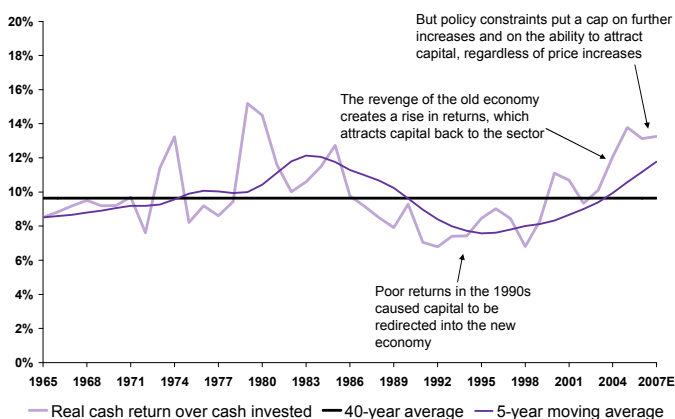
The sustainability of higher long-term commodity prices, Part III

The seeming paradox of rising commodity prices in the midst of an economic slowdown has been a source of concern for many, suggesting that commodity prices have diverged from the economic fundamentals of the underlying physical commodities markets. In our view, however, the current recent rise in commodity prices is simply the extension of the structural bull rally in commodities that is now in its ninth year, and the fact that the rally continues in the midst of an economic slowdown simply serves to highlight the fact that this bull rally is structural, not cyclical.

The revenge of the old economy has evolved into the "revenge of the old 'political' economy", where significant policy constraints on the free flow of capital, labor and technology are substantially constraining supply growth, regardless of the price or expected return. These restrictions, in turn, cause capital not to flow to the most efficient commodity investment but rather to the most freely accessible one that is usually inefficient, extremely high cost/tax with poor rates of return, which puts upward pressure on prices, or in some cases the capital does not flow at all, creating physical shortages. This will likely support the ongoing structural bull market in commodities until these policy-driven investment constraints are removed and/or demand is adjusted.

Returns have improved, but not significantly as costs have also risen

Average cash return among oil integrated companies



Source: Goldman Sachs Equities Research.

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Executive Summary

The structural rise in commodity prices is driven by the need to grow capacity

It is important to distinguish between the supply and demand of the fungible commodity and the supply and demand of the investment capital that is used to create the productive commodity capacity. In the current context, it is the capital markets for commodity investment that are severely imbalanced, not the markets for the commodity itself. This is critical, as the structural rise in commodity prices has been driven by the need to motivate long-term investment in the next generation of commodity production capacity and infrastructure against a backdrop of stronger trend demand growth from the BRICs.

Revenge of the old economy evolves into revenge of the old *'political'* economy

Decades of poor returns in the oil, gas, metals and mining industries (the old economy) caused capital to be re-directed into the new economy, starving the commodity industries of the capital they needed to expand capacity. By 2000, the market had exhausted all the remaining spare production capacity that was mostly from investment in the 1970s, which triggered the current rise in commodity prices. The resulting structural rise in commodity prices can be divided into three parts:

Part I (2000-2003): The "revenge of the old economy," as we termed it in 2002, was accompanied by a sharp rise in both prices and commodity company returns. Although this stimulated significant investment, this investment hit bottlenecks on access to both inputs and technology that caused a significant rise in costs that slowed capacity expansion, leaving the market extremely short capacity as growth reaccelerated.

Part II (2004-2006): As the industries started spending, all they did was drive up costs, as resources, such as labor, steel and other inputs were in scarce supply. Further, rising costs squeezed margins and started to put substantial upward pressure on long-term prices until they reached \$70/bbl. In 2006, fourth quartile oil producers were earning only a 9.5% return on capital employed as costs had been the primary driver. The question now that we are at \$100/bbl and record highs across the commodity complex, is why after nine years of increased investment in the industry have we not seen a significant supply or demand response that would have otherwise created a new long-run equilibrium price?

Part III (2007- present): The revenge of the old economy has evolved into the "revenge of the old *'political'* economy", where significant policy constraints on the free flow of capital, labor and technology are substantially constraining supply growth, regardless of the price or expected return. A large part of the cost run up in the previous phase was due to increased taxes by sovereign entities that have now grown more aggressive. In fact, the world's natural resources have not been controlled by so many individual political entities pursuing their own self interested protectionist policies since the 17th century, when mercantilism was the dominant political economy. The irony of this is that it is the revenge of the same old political economy that Adam Smith discouraged that has now prevented his "invisible hand" to work in creating an adequate long-term supply response.

Adjusting demand to a supply-constrained world

As policy-driven investment constraints are likely to continue to hinder, if not preclude, a supply-side solution to the structural issues in the commodities markets, the demand-side of the market will likely be required to adjust to an increasingly supply-constrained world. The supply constraints in some commodity markets are much more binding than in others. In oil, wheat and sugar, the supply constraints have actually led to a decline in trend demand growth while in some of the other markets such as base metals and softs, a rapid rise in trend demand growth due to strong demand from the BRICs has actually outpaced the productive capacity of the system.

The more supply constrained markets like oil are clearly less vulnerable to a global economic slowdown. However, a global economic slowdown would be cyclical and would not represent a longer-term structural demand response unless the economic slowdown was associated with slower trend growth.

Innovation and/or stagnation are the main demand adjustments remaining

Focusing only on potential structural demand-side adjustments to commodity demand, we have identified four types of adjustments: conservation, substitution, innovation and stagnation. Up to this point in the current investment phase, the demand-side adjustments have been largely of the first two types: conservation and substitution. These types of adjustments are relatively easy to make, are relatively low cost and have likely been exhausted. In the absence of a long-term technological solution on either the supply or the demand side, the last remaining type of demand adjustment remaining is economic stagnation, in which economic growth is shackled by supply constraints. This is a much greater risk for the G7 countries than the BRICs.

View a cyclical pull back as a structural buying opportunity

We would view a pull back in prices this spring as a buying opportunity, as the long-term outlook for commodity prices remains positive. Solving the politically driven supply constraints will be a very difficult and protracted process which will likely lead to explosive prices in the next couple of years, with oil prices potentially spiking toward \$175/bbl, particularly should growth in the G7 re-accelerate in 2009 and beyond. This oil price upside risk represents the price level required to maintain trend economic growth against our anemic supply growth forecasts, assuming growth in the United States re-accelerates early next year.

Commodity prices cannot rise forever: there will be an end for better or for worse

Until new production capacity is added across the commodity complex or significant demand adjustments are made, the risks remain skewed to the upside. There is however, a price level that does trigger an adjustment to a new equilibrium, where that point is, is unknown. While in the long-run, price increases can likely create adequate adjustments on the demand side, price increases are unlikely to create adequate adjustments on the supply side given the political nature of the capacity constraints.

This suggests that to get change on the policy side, these markets will likely have to experience significant physical disruptions that significantly inconvenience people such that they are motivated to take action. But again how serious such disruptions will need to be is unknown. As we like to point out, nations all around the world, OECD and emerging markets alike, have already experienced rolling black-outs, no heating, no cooling, queues at the pump, and food price demonstrations, but no policy actions or changes have been enacted to date. Consequently, we expect the structural bull market rally in commodities to continue until these issues are addressed via price or political action.

The Revenge of the Old *Political* Economy

The sustainability of higher long-term commodity prices, Part III

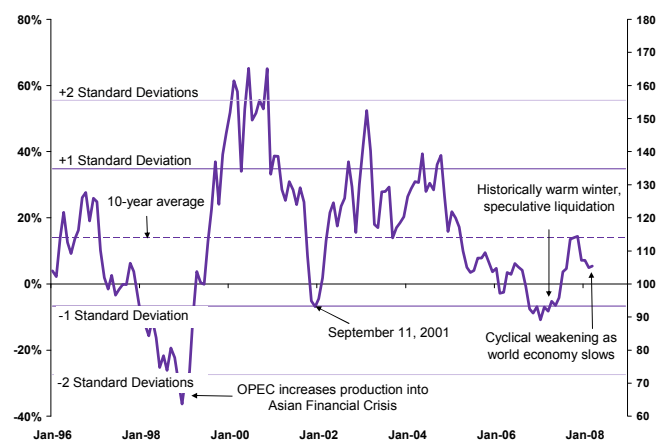
The revenge of the old economy has evolved into the revenge of the old ‘political’ economy, as policy-driven investment constraints hinder long-term supply growth against a backdrop of stronger trend demand growth from the BRICs. The combination of these dynamics will likely support the ongoing structural bull market in commodities, generating further upward price pressures until these policy-driven investment constraints are removed and/or demand is adjusted.

The seeming paradox of rising commodity prices in the midst of an economic slowdown has been a source of concern for many, suggesting that commodity prices have diverged from the economic fundamentals of the underlying physical commodities markets. In our view, however, the most recent rise in commodity prices is simply the extension of the structural bull rally in commodities that is now in its ninth year, and the fact that the rally continues in the midst of an economic slowdown simply serves to highlight the fact that this bull rally is structural, not cyclical.

We have long argued that it is critical to decompose commodity price movements into their cyclical and structural components (see Exhibits 1 and 2)¹. In doing so, we find that the cyclical movements in commodity prices, which are driven largely by inventory movements induced by near-term supply-demand imbalances, are highly correlated with the economic cycle and have behaved normally, pricing in an economic slowdown. In sharp contrast, the structural component of prices has been steadily rising over the past nine years and has actually accelerated in the past several months. Further, the rise in prices has now become more wide-spread, encompassing not only oil, gas and metals, but also agriculture and even coal.

Exhibit 1: Cyclically, the commodity markets have behaved normally, pricing an economic slowdown...

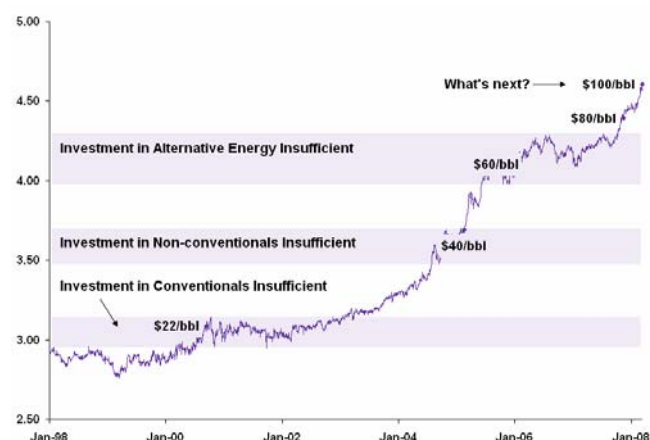
%, 1-60 month WTI crude oil timespread (left axis); \$/bbl, WTI crude oil price at \$100/bbl back-end (right axis)



Source: NYMEX and Goldman Sachs Commodities Research.

Exhibit 2: ...while the structural component of prices has continued to rise, reflecting need for long-term capacity

ln (\$/bbl), ln (5-year forward WTI crude oil price)



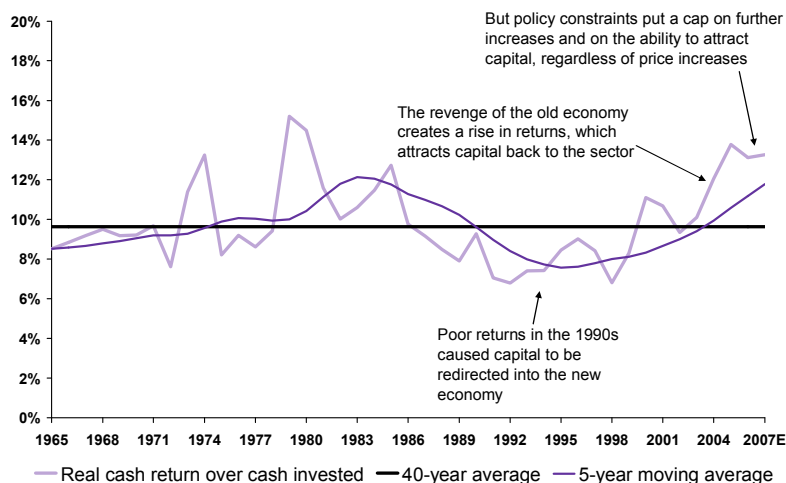
Source: Goldman Sachs Commodities Research.

¹ See appendix A for a detailed description on the decomposition of commodity prices into their cyclical and structural components.

This structural rise in commodity prices has been driven by the need to motivate long-term investment in the next generation of commodity production capacity and infrastructure. Decades of poor returns in the oil, gas, metals and mining industries (the old economy) caused capital to be re-directed into the new economy, starving the commodity industries of the capital they needed to expand capacity in the 1990s (see Exhibit 3).

Exhibit 3: Returns have improved, but not significantly, as costs have also risen along with prices

Average cash return among oil integrated companies



Source: Goldman Sachs Equities Research.

By 2000, the oil market had exhausted all the remaining spare production capacity that was mainly the result of investment in the 1970s, which triggered the current rise in commodity prices. The resulting structural rise in commodity prices can be divided into three parts:

- **Part I (2000-2003):** The “revenge of the old economy,” as we termed it in 2002², was accompanied by a sharp rise in both commodity prices and commodity company returns. Although this stimulated significant investment, this investment hit bottlenecks on access to both inputs and technology that caused a significant rise in costs that slowed capacity expansion, leaving the market extremely short capacity as growth reaccelerated.
- **Part II (2004-2006):** As the industries started investing, all they did was drive up costs, as resources, such as labor, steel and other inputs were in scarce supply. Further, rising costs squeezed margins and started to put substantial upward pressure on long-term prices until they reached \$70/bbl³. In 2006, fourth-quartile oil producers were earning only a 9.5% return on capital employed as costs had been the primary driver of the commodity price increases. It is important to note that had an “investor premium” been the primary driver of the rise in prices, then the commodity producers would have likely been earning substantially higher returns, near 50%, but they were not.

² See *Commodity Watch*, “Underinvestment raises prospects for an early and sustained commodity rally,” February 4, 2002.

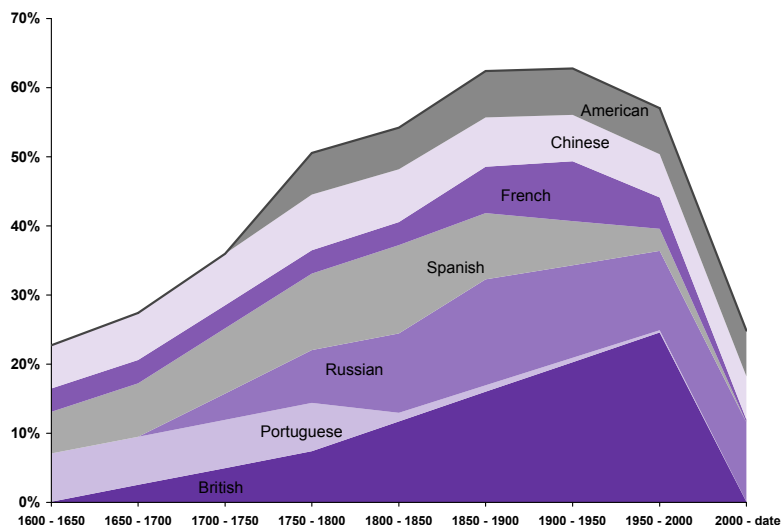
³ See “The sustainability of higher long-term oil prices: The revenge of the old economy, Part II,” June 2004; and “Reassessing long-term oil prices: Finding a new equilibrium,” August 2005.

The question now that we are at \$100/bbl crude oil and record highs across the commodities complex, is why after nine years of increased investment in the industry have we not seen a significant supply or demand response that would have otherwise created a new long-run equilibrium price?

Part III (2007 to present): The revenge of the old ‘political’ economy

The short answer is that the revenge of the old economy has evolved into the revenge of the old ‘political’ economy, where significant policy constraints on the free flow of capital, labor and technology are substantially constraining supply growth, *regardless of the price or expected return*. In fact, the world’s natural resources have not been controlled by so many individual political entities pursuing their own self-interested protectionist policies since the 17th century, when mercantilism⁴ was the dominant political economy (see Exhibit 4). The irony of this is that it is the revenge of the same old political economy that Adam Smith discouraged that has now prevented his “invisible hand” to work in creating an adequate long-term supply response.

Exhibit 4: Terra-concentration ratio* is the lowest since 1650 under mercantilism
 Percentage of total global terrain controlled by superpower



* The ratio of total global terrain controlled by the top 7 largest historical political empires per above at a given point in time.

Source: Goldman Sachs Commodities Research.

As this protectionism restricts the ability to freely make investments in commodity-related infrastructure regardless of the price or expected return (see Exhibit 5), capital flows not to the most efficient commodity investment but rather to the most freely accessible one that is usually inefficient, extremely high cost/tax with poor rates of return. This in turn puts upward pressure on prices or, in some cases, prevents capital flowing at all, creating physical shortages.

⁴ Mercantilism was the predominant political economic thought and organization from the 16th to the 18th centuries. The philosophy can be summarized as the world is a zero-sum game without the ability to grow, so the goal for a nation was to obtain as much of the world’s gold as possible through exports and erecting enormous trade barriers and protectionist policies to protect its own industries. Over the past decade most commodity producers have erected similar protectionist policies (see Exhibit 5).

Exhibit 5: Current policy constraints on capital, labor and technology by country

Country	Capital controls	Labor controls	Technology controls
North America			
USA	Restrictions on farmland ownership by foreigners are maintained at the state level for varying degrees, with currently 28 states having such measures.	Tight quota of work visas given to immigrants, including skilled workers.	Some US states still restrict the construction of nuclear power plants.
Canada	Restriction of foreign ownership of land takes place at the provincial level.	There is a freeze on the number of visas given to foreigners every year after a certain quota is reached, for both economic and non-economic class of immigrants.	Nuclear power to provide energy for steam generation has not been approved. Export controls on nuclear energy materials and technology.
Mexico	It remains completely closed to foreign investment. All segments of the industry are monopolized by the State. Mexico has strict restrictions on land ownership by foreigners and has an outright ban on land ownership by foreigners close to the border or the sea coast.		
South America			
Argentina	Foreign investment restricted in nuclear energy. Investment in the rest of the energy sector disincentivized by heavy regulation of domestic energy prices.		
Bolivia	The 2005 hydrocarbons law, enforced since 2006 by Bolivia's president, Evo Morales, nationalized Bolivia's oil and gas industry, increasing exploration risk and reducing returns to foreign investors.		
Ecuador	Energy industry still largely dominated by the State. President Correa Delgado recently announced that windfall profits taxes were to increase to 99% from 50%.		
Venezuela	President Chavez changed Venezuela's energy policies in that all foreign companies have had to convert their contracts into joint ventures with the State's company, Petroleos de Venezuela SA (PDVSA), giving PDVSA at least 50% participation interest. All production is acquired by PDVSA.		
Brazil	Foreign investment is restricted in nuclear energy, border property, fishing, aviation and aerospace.		
Peru	Peru adopted a tax requiring payment of up to 3% of mineral sales.		
Chile	Chile adopted a tax law which requires mining companies to pay up to 5% of operating income.		
Europe			
Norway	The government restricts investments in sectors in which it has a monopoly, such as mining and hydropower.		
EU	Foreigners can acquire land, but are not entitled to the agricultural subsidies given to domestic farmers.	There is an annual quota on the number of non-EU work permits distributed.	
Russia	Foreign investment in the oil and gas sectors is subject to changes in the Government's willingness to allow foreign capital to be invested in Russian oil and gas reserves, which was the case for the Shtokman field and the Yamal peninsula. Foreign ownership of land is prohibited after land sales were liberated in 2002; foreigners can only lease land for 49 years.	Russia has announced it will decrease the 2007 quota for labor immigrants by two-thirds in 2008.	
Kazakhstan	Foreign companies increasingly have to use local firms in commercial operations. Unclear legal code and legislative favoritism to domestic companies.	There are quotas limiting the number of foreign workers engaged in labor activities in Kazakhstan to less than 1% of the economically active population of the country.	

Source: 2008 Index of Economic Freedom, by the Heritage Foundation, US Department of Energy (DOE) and Goldman Sachs Commodities Research.

Exhibit 5 cont'd: Current policy constraints on capital, labor and technology by country

Country	Capital controls	Labor controls	Technology controls
Middle East			
UAE	Outside the Free Zones, a foreign company cannot own more than 49% of an operation in the UAE.		
Iran	Foreign investment restricted in several sectors and banned in defense, oil and gas.		
Iraq	Part of the oil fields are under the control of the central government and are not open for foreign investment. Where foreign investment is allowed, scope and method of the investment and revenue distribution are regulated.		
Saudi Arabia	Foreign investment projects require a license from the government and most are joint ventures.		
Africa			
Nigeria	Complete foreign ownership of enterprises is not allowed in oil projects. Investment in mining and gas is subject to additional regulation.		
Algeria	The government mandates that the state energy company, Sonatrach, controls at least 51% of most hydrocarbon projects.		
Zambia	Zambia is planning to raise taxes and royalties from mining companies effective April 1, 2008.		
South Africa	Currently foreign ownership of South African land is under review. The review panel calls for the outright prohibition on foreign ownership in classified and protected areas.		
Asia/Oceania			
China	Foreign ownership of land is not allowed.		
India	A foreign national of non-Indian origin, residing outside of India, cannot acquire any immovable property in India by way of purchase without the Reserve Bank of India's approval.		
Mongolia	In May 2006 Mongolia placed a 68% tax on profits that accrue to miners from selling gold whenever the precious metal sells above \$500 a troy ounce and on copper concentrate sales when the price of copper metal moves above \$2,600 a metric ton.		
Thailand	In Thailand, foreigners buying vacant land must invest \$1million (excluding the purchase price) for a minimum of five years in Thai government-authorized investments (such as government bonds).		
Indonesia	Non-residents may not purchase real estate and several investments require domestic partners.	Contradictory regulation and labor issues represent a risk to foreign investment.	
New Zealand	Foreign purchase of land requires approval from the Land Valuation Tribunal. Approval criteria include whether the investment makes a significant contribution to rural development.		
Australia	Foreign purchase of land requires approval from the government.		While Australia holds 40% of the world's uranium reserves it has no commercial nuclear power plants and strictly limits uranium mining.

Source: 2008 Index of Economic Freedom, by the Heritage Foundation, DOE and Goldman Sachs Commodities Research.

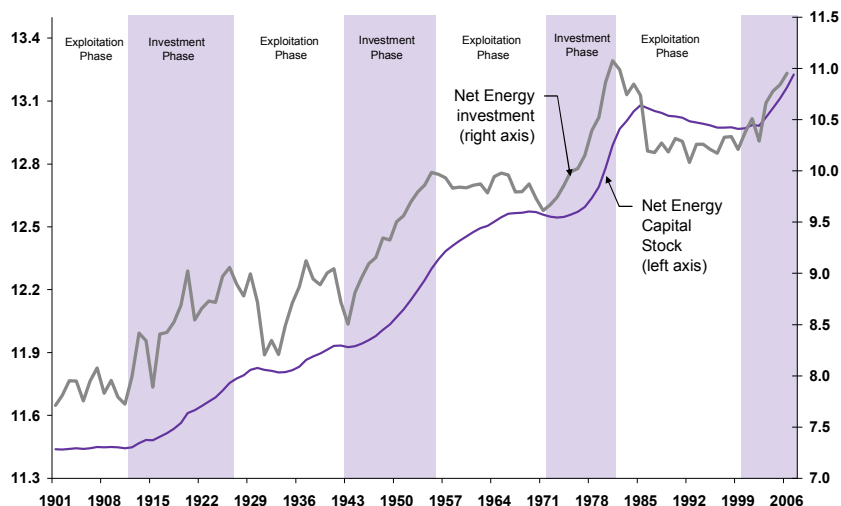
Defining the long-term supply problem

It is about the supply of capital, not the supply of the commodity

It is important to distinguish between the supply and demand of the fungible commodity and the supply and demand of the investment capital that is used to create the productive commodity capacity. In the current context, the capital markets for commodity investment are severely imbalanced, not the markets for the commodities themselves. This is critical as in the commodity markets there is a long-term investment cycle that tends to recur every 20-25 years and last 10-15 years (see Exhibit 6). The recent rise in protectionism has substantially slowed the current investment cycle, creating a bottleneck on investment that is likely to lead to physical shortages and explosive prices unless policy makers around the globe take action to remove these barriers to capital flows.

Exhibit 6: Commodity markets have historically transitioned between investment phases and exploitation phases defined by spare capacity

US data in real 2000 log \$

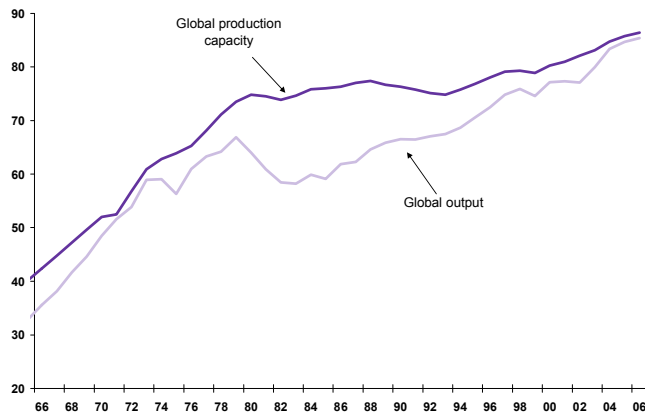


Source: US Bureau of Economic Analysis and Goldman Sachs Commodities Research.

The exploitation phase: weak commodity prices and returns

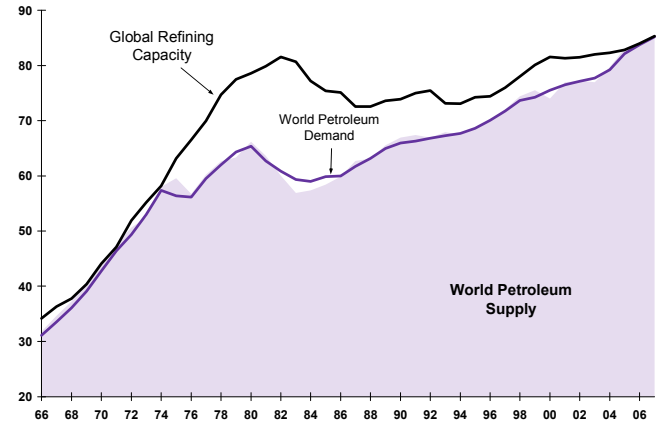
The first phase of the investment cycle is characterized by long periods of excess supply capacity during which long-term commodity prices are set by the marginal cost of operating existing infrastructure. For example, in the 1990s this anchored long-dated WTI crude oil prices near \$20/bbl. We refer to these periods of excess capacity as “exploitation” phases, where commodities were supplied by simply increasing utilization rates or exploiting the existing capacity. As in energy, these phases end when the spare productive capacity is exhausted (see Exhibits 7 and 8). In base metals, the markets followed a similar path to energy, but with the excess capacity exhausted later into this decade.

Exhibit 7: Spare oil production capacity has been virtually eliminated
Million b/d



Source: International Energy Agency (IEA), DOE and Goldman Sachs Commodities Research.

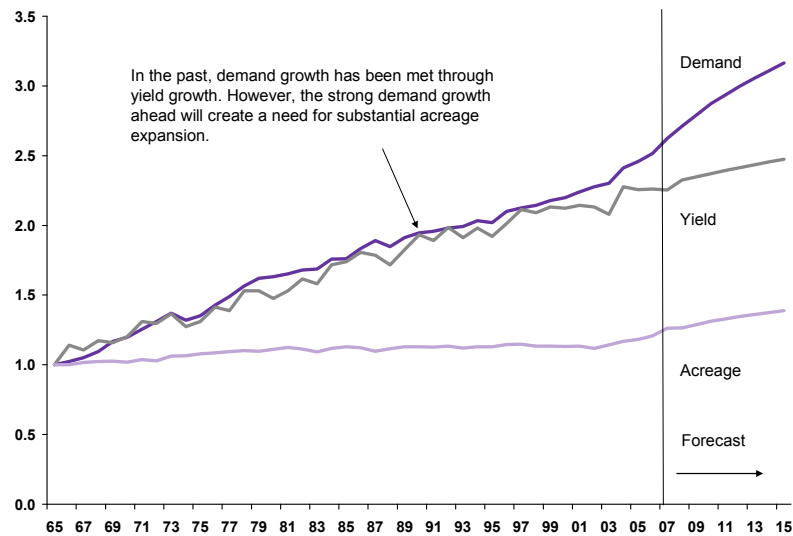
Exhibit 8: The global refining sector operates at unreasonably high utilization rates
Million b/d



Source: IEA, DOE and Goldman Sachs Commodities Research.

In agriculture, the dynamic was similar but the exploitation phase lasted much longer due to substantial subsidies in the United States and Europe that created significant overcapacity. However, the subsidies also made investments elsewhere in the world unprofitable, driving out investment in Africa, Latin America and the Caribbean, leaving virtually no immediately available spare capacity outside of the United States and Europe. Much like in the energy markets where supply was increased through increased utilization rates, supply in the agriculture markets was increased through improving yields, not by adding new arable acreage (see Exhibit 9). The market did not need new capacity, so rates of return were below the cost of capital.

Exhibit 9: Tweaking of agriculture yields is no longer meeting demand growth, acreage must now be expanded
Percent growth



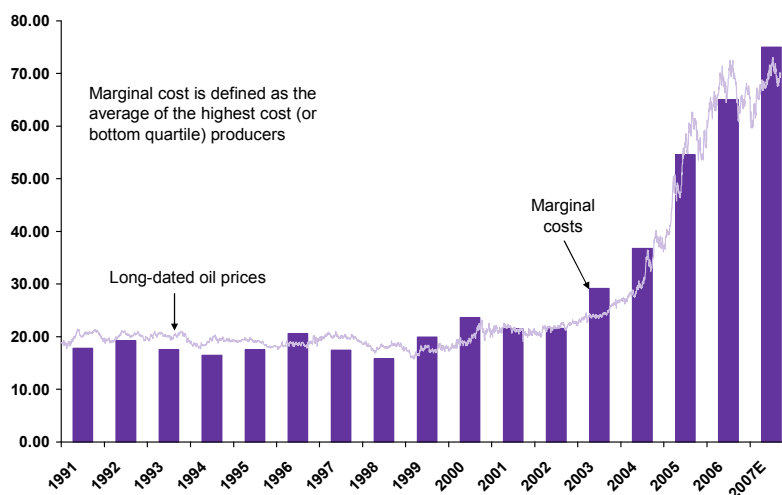
Source: US Department of Agriculture (USDA) and Goldman Sachs Commodities Research.

The investment phase: Rising costs and higher prices

In agriculture, improving yields are no longer meeting demand growth, while in energy, utilization rates are near 100%, leaving no option but to expand production capacity and arable acreage. The market must now meet supply through investment, forcing the market to move into an “investment” phase, during which long-term commodity prices are set by the “break-even” price required to motivate investment in the marginal infrastructure projects. Growing supply through investment in production capacity or increasing arable acreage is substantially more expensive than simply increasing utilization rates or tweaking agriculture yields.

As capital expenditures initially increased during the investment phase, they did so at first against limited resources such as labor, equipment, technology and even access to the natural resource. This caused costs to rise, as it had been 20-25 years since the last investment phase and much of the upstream side of the industry was unprepared for such a rise in capital expenditures. As costs rose, so did long-dated commodity prices, particularly for oil (see Exhibit 10).

Exhibit 10: Rising costs have driven the sharp increase in long-dated prices
\$/bbl



Source: NYMEX and Goldman Sachs Equities Research.

However, we are now nearly a decade into the current investment phase and we have not seen an increase in spare production capacity. What we have seen instead is the inability to scale new technologies at stable prices and rampant cost inflation. Further, at this point in oil, there are no longer technologies on the shelf to point to as the next price point.

Specifically, the US Department of Energy (DOE) estimates that current spare production capacity in the world oil market is 2.0 million b/d, while at the beginning of this decade the estimate of global spare production capacity was 6.3 million b/d. Total production capacity has only grown by 1.06% per year on average during the current investment phase while demand has grown by 1.40% per year. Furthermore, this lack of increase in spare production capacity cannot be blamed on acceleration in trend demand growth, as 10-year trend demand growth has actually slowed over the past decade from 1.7% per year to 1.4% per year.

The revenge of the old 'political' economy has stymied the investment phase

This lack of a supply response is mostly due to the rise of protectionism that has changed the economic incentives from higher prices to build new production capacity. In many cases, the natural resource is easily accessible geologically; however, the capital to exploit it is restricted, while the holder of the resource in many cases does not have the capital to exploit it themselves. The capital starved ore body in Africa that goes unexploited or the recent nationalization of oil producing assets in Venezuela are well publicized, but it is much more wide-spread than that.

In the United States, while not new, foreigners and corporations are in many cases restricted from buying land and farming for commercial purposes; however, the small family-owned farms that represent 86% of US output are in many cases under-capitalized and capital constrained, particularly in the current credit environment that has reduced their access to fertilizers, farm equipment and other yield enhancing inputs. As the credit markets have cut their access to capital, the resulting high prices have cut their access to farm subsidies, creating a viscous cycle.

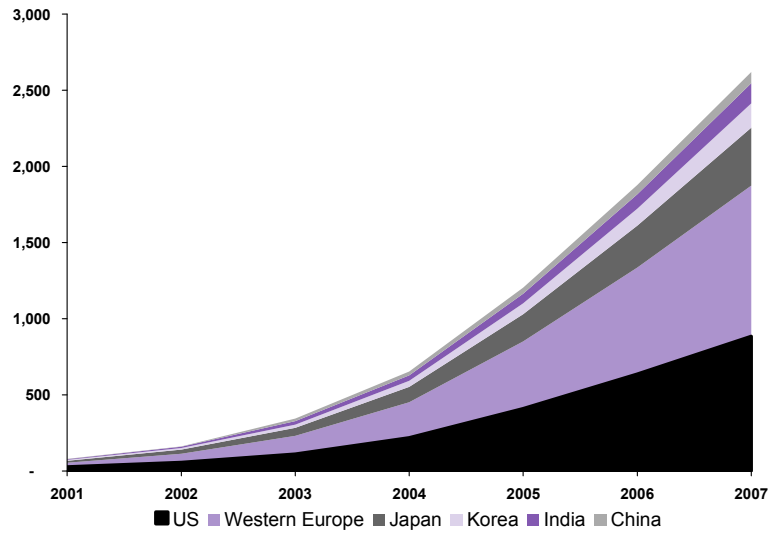
It is important to emphasize that this protectionism exists in both producing and consuming countries with producing countries aiming to protect natural resources and consuming countries to assure security of supply. With these goals, commodity producers are reluctant to allow foreign capital to invest in their country's resources and consuming country governments are quick to strike down overtures from producers to buy or make large scale investments in their commodity production, transportation, or even distribution companies. This creates very large constraints on the free flow of capital, labor and technology.

And these political constraints are far reaching. In the producing countries, sharp increases in taxes and a high level of uncertainty over property rights discourage direct investment even when it is allowed. In the consuming countries, efficient investment in alternative energy is constrained due to restraints on nuclear energy, which could be used to produce oil where energy is extremely scarce. Immigration constraints prevent the free flow of engineers on a global basis, particularly from China and India. Protectionist farm policy motivates agricultural import tariffs which prevent the free flow of biofuels and ultimately slow investment in the extremely efficient Brazilian ethanol industry. That is, biofuel subsidies in the consuming countries discourage lower cost, equally environmentally friendly investments elsewhere in the world.

The capital that should be used to solve the commodity supply problem is being redirected

The resulting shortage of efficient and productive infrastructure investment in the commodity sectors has resulted in a recent and large amount of capital accumulation in many of the oil and commodity producing nations around the world. We estimate that since 2001, due to the surge in oil and gas prices, energy importing countries have transferred an additional \$3.0 trillion to energy producers more than they otherwise would have, had energy investment been adequate and oil prices stayed at \$20/bbl (see Exhibit 11). This is likely the largest and quickest wealth transfer on record.

Exhibit 11: The energy consumers have transferred \$3.0 trillion to the energy producers
 Billion US dollars



Source: Goldman Sachs Commodities Research.

Importantly, this is not simply a transfer of wealth from the industrialized to the emerging world as it is commonly portrayed. In fact, the commodity consuming nations are a very small group of seven nations that are drawn from both the OECD and emerging markets: EU-27, USA, Japan, Korea, China, Taiwan and India, and the commodity producing nations are also a mix of both emerging markets and OECD countries, including Canada, Norway, Mexico and Australia, with Brazil, Russia and the Gulf Cooperation Council (GCC)⁵ countries being the dominant exporters (see Exhibit 12).

⁵ GCC is the Gulf Cooperation Council which includes Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. Although Iran and Iraq are not official GCC countries, we have included them in the analysis.

Exhibit 12: Commodity producers are not all from the emerging markets and consumers are not all OECD (Million US dollars)

Total commodities ¹						
Rank	Top producers		Top exporters		Top importers	
1	GCC	774,043	GCC	502,330	EU-27 + Switzerland	(518,357)
2	United States	603,550	Russia	197,882	United States	(327,392)
3	Russia	417,679	Norway	99,228	Japan	(164,136)
4	China	318,857	Canada	84,736	Korea	(93,489)
5	EU-27 + Switzerland	309,181	Algeria	60,576	China	(53,171)
6	Canada	172,803	Nigeria	58,560	Taiwan	(50,521)
7	Mexico	128,593	Mexico	49,548	Total Eastern	(31,028)
8	Brazil	124,457	Total Caspian	48,338	Turkey	(29,886)
9	India	109,228	Venezuela	47,615	India	(28,775)
10	Norway	107,181	Libya	41,617	Thailand	(15,060)
11	Total Caspian	97,498	Australia	36,381	Pakistan	(7,126)
12	Venezuela	90,892	Angola/Cabinda	36,251	Croatia	(5,319)
13	Indonesia	85,707	Brazil	29,712	Cuba	(4,074)
14	Algeria	82,245	Indonesia	29,065	Morocco	(4,036)
15	Nigeria	79,040	Chile	28,101	Bangladesh	(3,424)
16	Australia	67,023	Malaysia	17,480	South Africa	(2,898)
17	Argentina	57,587	Argentina	15,140	Hong Kong	(2,741)
18	Libya	53,660	Colombia	12,866	Singapore	(1,195)
19	Malaysia	48,971	Vietnam	12,815	Ghana	(799)
20	Egypt	39,577	Ecuador	10,168	Mongolia	(35)

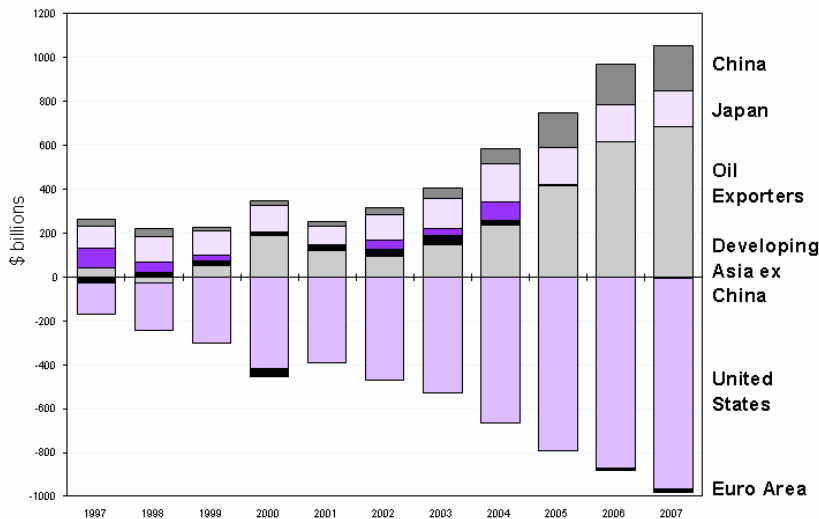
¹ Petroleum, natural gas, coal, aluminum, copper, nickel, zinc, lead, cotton, sugar, coffee, cocoa, corn, wheat, soybeans, palm oil, barley, oats, sorghum, rice and meat.

Source: Goldman Sachs Commodities Research.

Ultimately, this capital held by the producers needs to be redirected back into the industry, but it is not, as this capital is also constrained in what it can and cannot invest in. This has led to a "savings surplus" that has had knock-on effects throughout the global financial markets (see Exhibit 13). Making matters worse, instead of going back into commodity infrastructure or production capacity investments, it is being redirected into the financial sector to deal with liquidity problems.

Exhibit 13: Much of the commodity wealth transfer has been trapped in the producing countries and labeled a "savings surplus"

Global net savings by region



Source: IMF WEO data and Goldman Sachs Credit Strategy Research.

Canada, Russia, Argentina and Brazil have it all: oil, gas, metals and agriculture

Despite all of their oil wealth, the GCC countries are in some cases short gas and in all cases short agriculture and metals. It is important to emphasize that only a small handful of countries are endowed with all commodities – oil, gas, metals and agriculture – and can function without trade: Canada, Russia, Argentina and Brazil are the most important, but the list also includes the Caspian countries and Colombia (see Exhibit 14). This wealth of natural resources will make these countries more immune to the commodity supply constraints that are becoming increasingly more binding.

Exhibit 14: Canada, Russia, Argentina and Brazil have it all

Million US dollars

Top 20 exporters								
Rank	Petroleum		Natural gas		Metals		Grains	
1	GCC	493,711	Norway	23,782	Chile	35,302	United States	22,057
2	Russia	143,135	Russia	23,359	Russia	28,709	Brazil	8,120
3	Norway	64,903	Canada	22,820	Canada	25,642	Malaysia	8,055
4	Mexico	57,415	Algeria	16,667	Australia	12,431	Argentina	7,429
5	Nigeria	55,054	GCC	13,420	Norway	11,202	Indonesia	7,391
6	Venezuela	46,695	Indonesia	8,571	Caspian region	7,715	Canada	3,629
7	Algeria	46,313	Malaysia	7,429	Peru	6,810	Russia	2,210
8	Libya	39,781	Nigeria	4,757	Zambia	6,395	Australia	1,933
9	Angola/Cabinda	36,251	Egypt	4,573	GCC	2,663	Caspian	1,740
10	Total Caspian	31,171	Total Caspian	4,468	Philippines	2,103	Thailand	1,561
11	Canada	30,628	Australia	3,954	India	1,802	Eastern Europe	750
12	Ecuador	9,947	Libya	2,276	Iceland	1,631	Vietnam	424
13	Equatorial Guinea	9,451	Argentina	766	Mozambique	1,461	Cambodia	98
14	Vietnam	8,829	Mozambique	54	New Zealand	1,369	Uganda	7
15	Brazil	7,555			Venezuela	1,105	New Caledonia	0
16	Colombia	7,211			Brazil	978		
17	Malaysia	6,857			Cuba	961		
18	Congo	6,003			Colombia	859		
19	Sudan	5,953			Mexico	539		
20	Argentina	5,889			Eastern Europe	441		

Source: Goldman Sachs Commodities Research.

Few nations are endowed with adequate natural resources

The small number of self-sufficient countries underscores the need for the rest of the world to trade; however, trade in the fungible commodity will not solve the problems. What is required is trade in capital given the large scale capital requirements and the need for diversification. It would not be prudent for Arab oil producers to invest everything they have into the oil sector, and even if they wanted to, in many cases they would not have enough capital to go to optimal operating levels. For example, should Iraq operate closer to an optimal reserve-production ratio, it should bring its production to at least 10 million b/d from the current 2.3 million b/d. The capital required to undertake the necessary investments would exceed \$100 billion a year, which is not only much higher than its GDP, but over 150% of the total annual revenue from oil exports even at current record high prices. This means that foreign capital is still needed.

From a diversification perspective, the GCC needs to invest in agriculture, but just as the Middle East has constraints on foreign capital investments in its oil sector, the United States and Europe have similar foreign capital constraints on investment in their agriculture industries (see Exhibit 5). In an optimal world, the US would open up its agriculture industry in the form of large scale farms which would allow the GCC countries to place large amounts of capital at work in an industry they lack; while the GCC countries would open up their oil and gas companies to resource substantially larger amounts of capital required to optimally develop their resource base while maintaining some diversification.

These problems are most apparent in Iraq. Despite its need for immediate capital, Iraq continues to maintain capital controls on foreign direct investment in its oil and gas sector. It doesn't have the capital to exploit its own industry to its fullest capability and even if it did, it is not clear from a diversification perspective that it would make sense. Despite all of this, one of the most resource-endowed nations continues to pursue policies that substantially curtail its own economic development.

In the extreme, the world could drift toward an autarkic state where trade ceases and each country uses its own endowed resources to meet all of its commodity needs, i.e., the oil producers use their vast oil reserves to desalinate water and their natural gas reserves to create fertilizers and plant wheat, corn and beans in the desert at an absurdly high cost while the agriculture producers use their vast agriculture output to create bio-fuel energy at costs that are already well above \$200/bbl in some cases and likely to go to \$300/bbl given the sharp rise in agriculture prices.

These policy constraints will likely lead to increasing physical shortages

The world cannot solve these commodity investment problems if the current policy constraints on both capital and other inputs remain in place, as the capital and labor requirements are extremely large, particularly in Russia, the Middle East and Africa. In the meantime, however, as the physical commodity markets are likely to get tighter and the supply problems exacerbated, these policy constraints are likely to become more apparent and these long-term structural problems more severe.

Adjusting demand to a supply constrained world

As policy-driven investment constraints are likely to continue to hinder, if not preclude, a supply-side solution to the structural issues in the commodities markets, the demand-side of the market will likely be required to adjust to an increasingly supply-constrained world. The supply constraints in some commodity markets are much more binding than in others. In oil, wheat and sugar, the supply constraints have actually led to a decline in trend demand growth while in some of the other markets such as base metals and softs, a rapid rise in trend demand growth due to strong demand from the BRICs has actually outpaced the productive capacity of the system (see Exhibit 15).

Exhibit 15: Supply constraints have slowed trend demand growth in some cases while in others strong demand growth has outpaced supply growth

World trend demand growth in percent

	World consumption growth		Change in trend growth
	1998-2007	1988-1997	
Sugar	2.2%	3.1%	-0.9%
Oil	1.4%	1.7%	-0.3%
Wheat	0.7%	0.9%	-0.2%
Gas	2.7%	2.4%	0.3%
Corn	3.0%	2.3%	0.7%
Copper	3.4%	2.3%	1.1%
Soybeans	5.0%	3.8%	1.2%
Nickel	3.7%	1.9%	1.8%
Coal	3.3%	0.7%	2.6%
Aluminum	5.6%	2.6%	3.0%
Zinc	4.2%	1.0%	3.2%
Cotton	3.6%	0.2%	3.4%

Source: IEA, DOE, USDA, WBMS and Goldman Sachs Commodities Research.

The more supply-constrained markets like oil are clearly less vulnerable to a global economic slowdown. However, a global economic slowdown would be cyclical and would not represent a longer-term structural demand response unless the economic slowdown was associated with slower trend growth. Focusing only on potential structural long-term adjustments to commodity demand, we have identified four types of adjustments:

- 1. Conservation:** A sustained reduction in the rate of demand growth relative to the rate of economic growth due to a sustained rise in prices that forces behaviour changes, like turning the thermostat down.
- 2. Substitution:** A sustained reduction in the rate of demand growth relative to the rate of economic growth due to substitution into alternative commodities, like using ethanol in lieu of gasoline.
- 3. Innovation:** A sharp reduction in demand due to demand-side technology that increases energy efficiency, like improved efficiency of current jet engines for aircraft.
- 4. Stagnation:** A sustained reduction in the rate of economic growth as supply constraints become binding on overall economic growth.

Up to this point in the current investment phase, the demand-side adjustments have been largely of the first two types: conservation and substitution. These types of adjustments are relatively easy to do and are relatively low cost. We believe that the market has likely exhausted many of these types of opportunities and will likely have to move to the last two

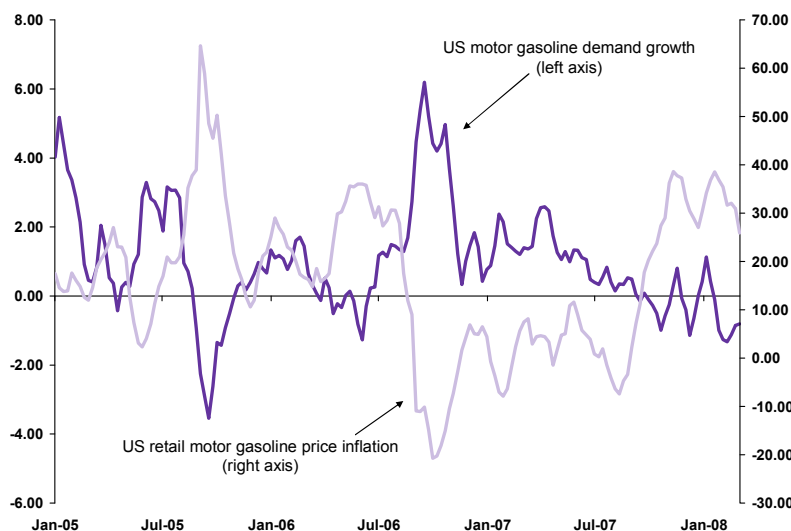
which will likely require substantially higher prices than witnessed over the past several years.

Conservation has been more prevalent in the OECD countries

Over the past several years rising oil prices have incentivized conservation and significantly slowed the rate of oil demand growth relative the rate of economic growth, particularly in the OECD countries where oil demand has fallen since 2004 as WTI crude oil prices have risen by 130%. It is also important to note that conservation has its limits. The adjustments are often easy to make at first, but eventually hit technological constraints that prevent further reductions in use.

Although the higher price level leads consumers to decrease their oil demand relative to their income level, it is a one time adjustment. As their income continues to grow with the overall economy, so will their oil demand – unless oil prices also continue to rise to create longer-term adjustments. This dynamic has been evident in the US motor gasoline market since 2005, where US motor gasoline demand growth has been an almost mirror-image of the changes in US retail motor gasoline prices (see Exhibit 16).

Exhibit 16: US gasoline consumers adjust to prices by conservation via less discretionary driving
Percent



Source: DOE, NYMEX and Goldman Sachs Commodities Research.

Substitution creates Btu, bushel, and barrel convergence

In addition to conservation, the recent investment phase has also seen the demand-side of the commodity markets adjusting by substituting alternative commodities. In this new environment, it is useful to view these markets not from a supply perspective, as we have traditionally done – drilling, mining, farming and ranching – but rather from a demand perspective, as supply constraints are forcing demand substitution. The demand for commodities can be divided into four distinct categories: transportation, generation (creating power and heating), materials (metals, pulp and plastics), and food (see Exhibit 17).

Exhibit 17: Robbing Peter to pay Paul – commodity markets are becoming increasingly connected via demand substitution and joint production relationships

Transportation	Generation	Materials	Food	Externalities
The Core Markets				
WTI USGC Fuel Oil 3% NYHB RBOB NYHB Diesel Dated Brent ICE Brent Rotterdam Unleaded Rotterdam Fuel Oil 3.5% Dubai Singapore Gasoil	Henry Hub Natural Gas Chicago City Gate AECO Canada Rockies Basin San Juan Basin Social City Gate Appalachia Coal US Nuclear US Hydro UK NBP Rotterdam Coal European Nuclear European Hydro New Castle Coal	Aluminum Copper Zinc Nickel Gold Platinum Paladium Polyethylene Polypropylene	Wheat KC Wheat Corn Soybeans Soy Oil Soy Meal Coffee Cocoa Cotton Sugar Palm Oil	Carbon ETS Nitrogen NOx Sulfur SOx
The Arbitrated Markets				
USGC Gasoline Rotterdam ULSD USGC ULSD NYHB Fuel Oil 1% Rotterdam Gasoil Rotterdam Fuel Oil 1% Singapore 180cst Butane Naphtha	European LNG Houston Ship Channel New York City Gate Zeebrugge Belgium Zeebrugge Belgium Asian LNG Ethane Propane Uranium Rotterdam Coal	Ethylene Propylene Copper Ore	Fuel Ethanol Biodiesel	EU-ETS EU-ETS

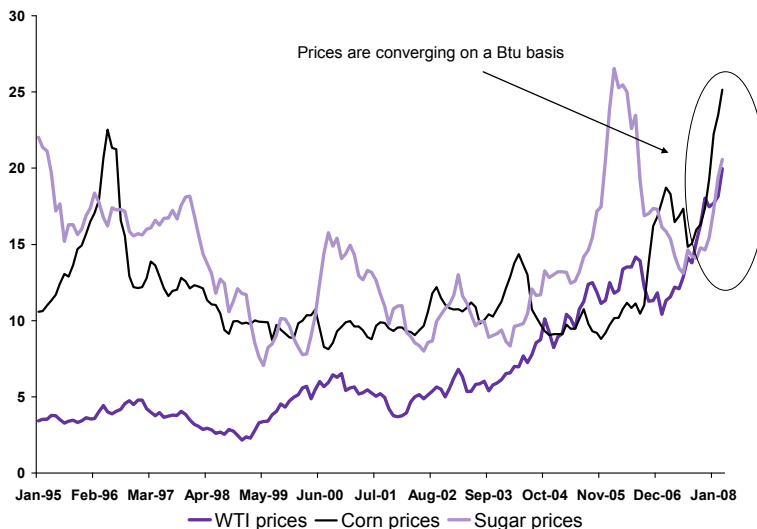
Source: Goldman Sachs Commodities Research.

This is a much more useful delineation as commodities such as corn can be used to meet all of these demands, as it creates ethanol for transportation, can be burnt to generate power, can be used to create cardboard and plastics, and of course can be eaten. Even oil can be used to create transportation, power and plastics, meeting three out of the four demand needs. There is a fifth category of commodity demand, the demand for clean air and water, which can be viewed as the externality market. This market too ultimately ties all of them together through the cost of emissions.

Clearly, the technology to use different commodities for non-traditional uses has always been around. What has changed is the relative pricing of these commodities. Historically, on an energy-content basis, natural gas was the cheapest, followed by oil, metals and finally agriculture. As natural gas prices moved higher in 2000/01, followed by oil prices in 2003/04, and metals prices in 2005/06, eventually the entire complex moved in line with agriculture in 2006/07, creating global convergence in commodity prices on an energy-content basis.

The strong biofuel-related demand for food crops has created an arbitrage between agriculture and oil markets, with sugar, corn and motor gasoline prices converging on an energy-content basis (see Exhibit 18). This arbitrage to the oil market alone reinforces expectations of higher long-dated agriculture prices. Conversely, it also implies that it will be difficult to push energy prices below agriculture prices, which are rising, particularly as the oil market becomes increasingly more dependent upon biofuels. This dynamic of increased connectivity, however, is nothing other than robbing Peter to pay Paul, as each of the commodity markets are facing their own supply problems, particularly agriculture.

Exhibit 18: Btu, bushel and barrel convergence started last year
\$/mmBtu



Source: NYMEX, ICE and Goldman Sachs Commodities Research.

But substitution is becoming increasingly limited

The limits to sourcing energy from other markets in the current investment phase stand in sharp contrast to the last investment phase. In the 1970s, US power generation shifted its fuel mix substantially from petroleum to coal, natural gas, and nuclear. As a result, the demand for power could continue to grow with the economy, without straining available oil supply infrastructure. However, as those adjustments were largely made in the 1970s, much of the potential for fuel substitution in power generation, as well as manufacturing, particularly in the United States is limited. However, the continuing increase in the price of coal suggests that fuel switching into coal outside the United States has not completely run its course.

With power generation and manufacturing far less reliant on oil after the adjustments of the 1970s, oil demand growth is now largely centered in transportation, in which the fuel substitution possibilities are far more limited, as evident in the recent experience with bio-fuels. Because the scope for further energy substitution is limited following the achievement of “Btu-convergence” across commodities, it is likely that prices will need to continue to rise in order to slow the rate of oil demand growth relative to the rate of economic growth until a price point is reached at which either the third or fourth type of demand adjustment take place, i.e., technological innovation or economic stagnation.

Innovation is very uncertain and the price point is unknown

With demand-side technological innovation, a price point is reached at which a technology allowing for a radical increase in energy efficiency becomes economically viable. The wide adoption of this technology generates a sharp reduction in oil demand levels and opens up a substantial gap of spare production capacity similar to what the market enjoyed in the 1990s. Unfortunately, such a technology does not appear sufficiently scaleable in the near-term and would likely require a sufficiently higher price from today’s levels.

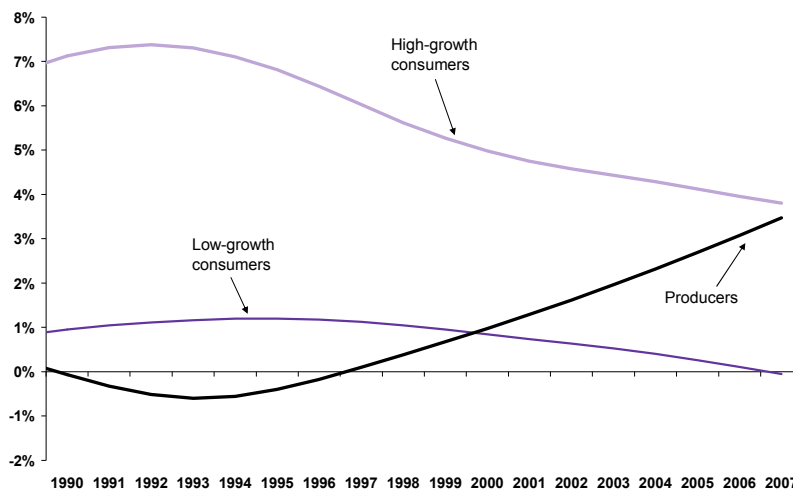
Stagnation risk for G7 as BRICs collide with the old 'political' economy

In the absence of a long-term technological solution on either the supply or the demand side, the last remaining type of demand adjustment remaining is economic stagnation, in which economic growth is shackled by supply constraints. This is a much greater risk for the G7 countries than the BRICs. Although supply constraints have caused global trend demand growth for many of the commodities such as oil to actually decline, strong economic growth from the emerging markets has caused BRICs trend demand growth for commodities to increase. In addition, a combination of price subsidies and strong growth from the commodity producing countries themselves has further supported demand outside of the G7 countries, mitigating the demand price response and effectively creating a commodity supply shock for the G7 countries.

There is already evidence of the traditional oil consuming countries accommodating the increased oil demand from the rest of the world. Specifically, oil demand growth in the commodity consuming countries has slowed significantly – including China – with oil demand in the United States, European Union and Japan exhibiting outright declines. In sharp contrast, oil demand growth from the commodity producing countries has actually accelerated in the past several years (see Exhibit 19), as evidenced by a booming GCC.

Exhibit 19: Producer country demand has squeezed the consumer countries' access to resources

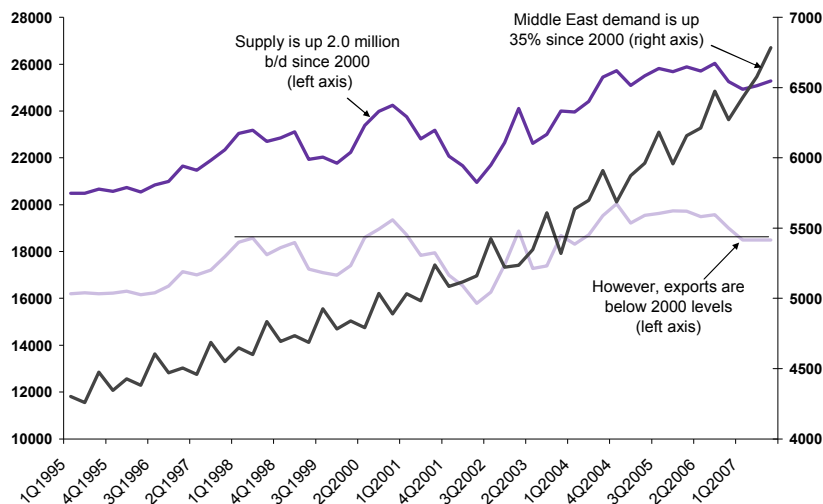
Trend demand growth



Source: BP Statistical Book and Goldman Sachs Commodities Research.

In fact, last year oil demand from the commodity consumers grew at a meager 0.4% year over year (including China) while oil demand from the commodity producers grew at an impressive 4.2% year over year. Moreover, oil demand growth from the GCC has been so strong that the region is exporting the same volume of oil that it did in 2000, despite a 34% rise in domestic production, as higher domestic demand has absorbed all the incremental oil production increases (Exhibit 20).

Exhibit 20: Middle East oil exports have not increased substantially since 2000
 Thousand b/d (both axis)



Source: IEA and Goldman Sachs Commodities Research.

Commodity producing countries have been driving demand growth via subsidies

This sharp rise in oil demand growth from the producing countries is not only a function of the strong economic growth that they are experiencing during this commodity investment phase that was absent during the commodity boom of the 1970s, but also due to larger populations and significant subsidies, specifically on the commodity prices themselves. It is important to emphasize that this distinction between commodity producer and commodity consumer is critical when evaluating the impact that a price subsidy will have on commodity demand.

In the producer countries, subsidies are a means to distribute the country's oil wealth in the form of lower priced oil to its citizens. These subsidies shield demand from a rising global price environment without a significant impact on domestic supply, particularly as most of the domestic suppliers are national oil companies. In contrast, in the consumer countries, subsidies are often implemented through price caps, which actually tend to curb domestic demand rather than foster it. This dynamic was very evident in China in 2005 when the run up in international oil prices went far above the price caps, motivating Chinese refiners to source less crude and sell product, not on the domestic market, but on the international market at substantially higher prices. This created significant shortages in China which reduced the observed demand growth.

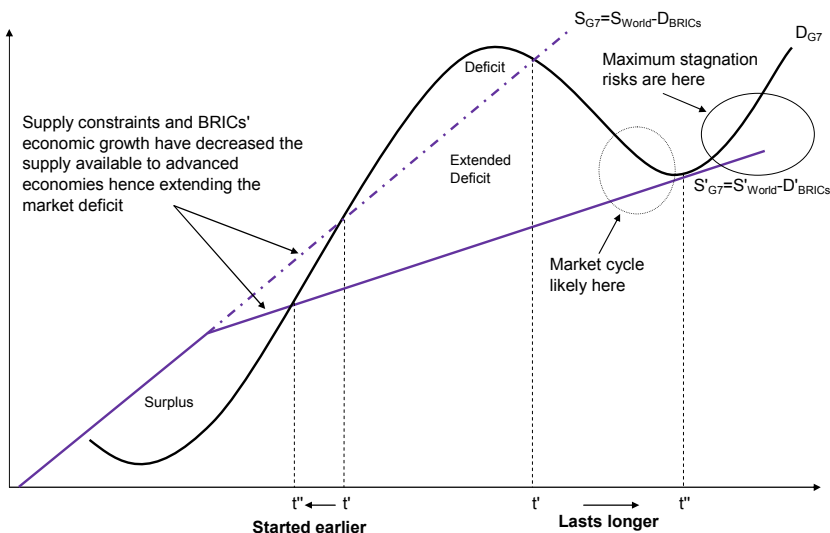
Without technological innovation, the stagnation risk increases

While we have already observed oil demand growth in the developed countries slowing to accommodate the faster pace of oil demand growth in the developing countries, this has been accomplished by increased energy conservation, and substitution in the developed countries as prices have continued to rise higher. Over the long-term, however, we still believe that prices will eventually stabilize. This could be accomplished by hitting a price point at which technological innovation on the supply or demand side keeps the market in long-term balance. This could also be accomplished by hitting a price point at which the

economic hardship caused by rising commodity prices forces action on the policy-driven investment constraints which continue to hinder a supply-side solution. In the interim, however, the risk of stagnation in which the developed countries' economic growth slows to accommodate the stronger economic growth of the developing countries begins to loom larger.

With their domestic resources limited and their access to external resources restricted by protectionism, the G7 countries will be forced to increasingly compete against the BRICs for the remaining accessible resources. Already, this has caused commodity prices to rise earlier into the G7 business cycle and stay stronger for longer into the close of the cycle (see Exhibit 21). Although we expect that we will likely observe a significant pull back in commodity prices between now and the second half of this year, the window of opportunity for a "G7-cyclical" pull back in commodity prices is beginning to close, and a cyclical downturn in the commodities market will likely have to wait for an economic slowdown in the BRICs, which is not expected in the near-term.

Exhibit 21: The G7 cycle is no longer driving commodity price cycles
G7 supply and demand of commodities



Source: Goldman Sachs Commodities Research.

Given the continuing bullish long-term structural outlook, we view any near-term pull back in prices this spring as a buying opportunity (see Exhibit 22). Solving the politically driven supply constraints will be a very difficult and protracted process which will likely lead to explosive prices in the next couple of years, with oil prices potentially spiking toward \$175/bbl, particularly should growth in the G7 re-accelerate in 2009 and beyond. This oil price upside risk represents the price level required to maintain trend oil demand growth against our anaemic supply growth forecasts, particularly should growth in the G7 re-accelerate in 2009 and beyond.

Exhibit 22: Our price forecasts lead to a benign inflation forecast, but upside risks remain relative to real prices and potential demand rationing

Commodity	Unit	Current price*	5-year percentage change	12-month GS forecast	Real all-time high (2008 prices)	Date of all-time high	Demand-rationing peak
WTI	\$/bbl	109.92	191%	105.00	109.92	3/12/08	175.00
Gasoline	\$/gal	2.73	145%	2.71	2.83	8/31/05	4.79
Heating Oil	\$/gal	3.02	192%	2.89	3.08	6/4/79	4.79
Natural gas	\$/mmBtu	10.01	71%	10.00	16.49	12/13/05	29.17
Gold	\$/toz	984	184%	800	2272	1/21/80	-
Silver	\$/toz	20	337%	14.2	113	1/21/80	-
Copper	\$/mt	8400	402%	9335	13686	5/6/74	12920
Zinc	\$/mt	2630	220%	2635	4748	11/9/06	4910
Nickel	\$/mt	31875	285%	30500	53052	5/4/07	57575
Aluminum	\$/mt	3124	122%	2670	5763	6/22/88	5760
Wheat	\$/bu	12.83	329%	8.50	28.37	2/15/74	19.30
Soybeans	\$/bu	14.11	150%	14.50	58.23	6/4/73	25.90
Corn	\$/bu	5.57	134%	6.00	16.46	10/3/74	9.30
Cotton	cents/lb	82	40%	75	429	9/5/73	-
Coffee	cents/lb	152	167%	130	1189	4/14/77	-
Cocoa	\$/mt	2768	34%	2000	18764	7/18/77	-
Sugar	cents/lb	13.2	69%	12.0	269.0	11/20/74	-

*As of close on March 12, 2008.

Source: Goldman Sachs Commodities Research.

Making matters worse is that the immediate response by most political entities to such problems will likely be more protectionism which would only exacerbate global commodity supply problems going forward. As the structural bull market in commodities matures, we expect the following three themes that we have emphasized in the past will continue to dominate price action:

- Inadequate infrastructure and production capacity.** In other words, "the revenge of the old economy" continues. Despite a sharp rise in commodity prices since 1999, infrastructure and production capacity still remain severely constrained. Most commodity markets continue to operate at extremely high utilization rates – in energy it is in excess of 95% – which leaves these markets extremely vulnerable to even small supply disruptions and critically exposed to a string of supply disruptions as witnessed since the beginning of the year.
- Accidents will likely become more frequent and more severe.** We have long argued that capacity and infrastructure shortages will not be reflected in a system-wide shutdown that occurs all at once, but will rather likely be characterized by small and isolated local disruptions that will eventually grow into more frequent, widespread, and severe disruptions that will have a deeper and more lasting impact on demand growth. A decade into this current structural commodity bull market, the accidents are becoming more frequent and severe.
- The structural bull market will become broader and more correlated.** As supply constraints plague one market and create shortages, prices will likely adjust to try to source supply from the other markets via supply and demand substitutes. While the first phase of the structural bull market (the revenge of the old economy) was characterized by the movement of the individual commodities to Btu-convergence, the second phase (the revenge of the old 'political' economy) will likely be characterized by broader commodity rallies, driven by the rising common cost of Btus across the commodities complex.

Commodity prices cannot rise forever: There will be an end, for better or for worse

Until new production capacity is added across the commodity complex or significant demand adjustments are made, the risks remain skewed to the upside. There is however, a price level that does trigger an adjustment to a new equilibrium, where that point is, is unknown. While in the long-run, price increases can likely create adequate adjustments on the demand side, price increases are unlikely to create adequate adjustments on the supply side given the political nature of the capacity constraints.

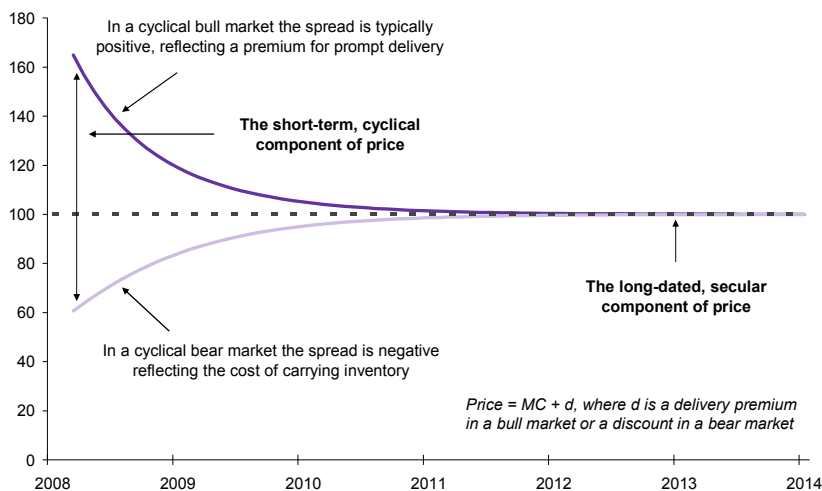
This suggests that to get change on the policy side, these markets will likely have to experience significant physical disruptions that significantly inconvenience people such that they are motivated to take action. But again how serious such disruptions will need to be is unknown. As we like to point out, nations all around the world, OECD and emerging markets alike, have already experienced rolling black-outs, no heating, no cooling, queues at the pump, and food price demonstrations, but no policy actions or changes have been enacted to date. Consequently, we expect the structural bull market rally in commodities to continue until these issues are addressed via price or political action.

Appendix: The cyclical and structural aspects of the oil market

We have argued since 2004, that it is critical to any analysis of oil prices to separate the cyclical from the structural aspects of the oil market. In terms of the oil price itself, this can be done by decomposing the current price into the long-dated WTI timespread (the difference in price between 1 and 60 month forward oil) and the level of long-dated prices (e.g., the price of 60 month forward crude oil), as shown in Exhibit 23.

Exhibit 23: Decomposing the price into timespreads (cyclical component) and the long-dated price (structural component)

\$/bbl



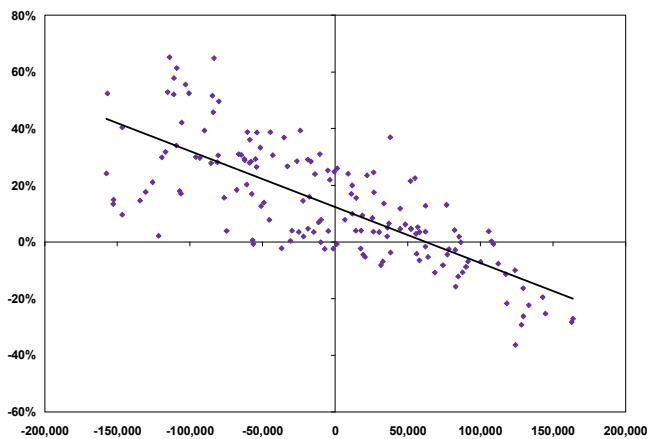
Source: Goldman Sachs Commodities Research.

The long-dated WTI timespread, or the shape of the forward curve, captures the cyclical aspect of the oil market, notably the level of inventories (see Exhibit 24). As inventories move with near-term shifts in the supply-demand balance, the shape of the forward curve captures the near-term fundamentals of the oil market.

While inventories are the main driver of the shape of the forward curve, the marginal cost of bringing new production capacity to the market is the main driver of the level of long-dated oil prices (see Exhibit 25). As we have emphasized in the past, the idea of mean reversion in commodity markets is not a statistical condition, but rather an economic condition. If commodity prices did not mean revert to the highest cost player's cost structure, then that player would drop out of the market. In other words, prices must mean revert to the marginal cost of production, which in the current investment phase has been a moving target, drifting higher and higher.

Exhibit 24: WTI timespreads continue to reflect near-term fundamentals, such as inventory levels...

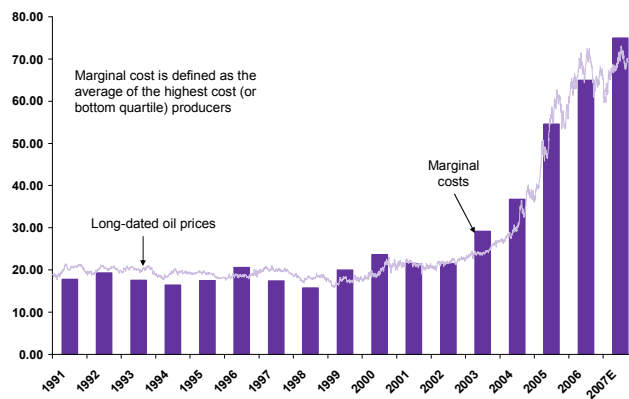
% (vertical axis); Million barrels (horizontal axis)



Source: IEA, NYMEX, and Goldman Sachs Commodities Research.

Exhibit 25: ... while long-dated WTI prices continue to reflect long-term industry costs

\$/bbl



Source: Goldman Sachs Commodities Research.

Reg AC

We, Jeffrey Currie, David Greely, Allison Nathan, Giovanni Serio, Samantha Dart, Ruifang Zhang and Abish Khan, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

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