OPEC at 50:
Evolution, Issues and Lessons

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Structure of Presentation

- Brief and selected events from history
- Main intellectual contributions about OPEC behaviour
- Two relevant key features of OPEC that need to be emphasised
  - Pricing system
  - Market structure
- Need for new perspectives
- Lessons from the 2004-2009 cycle
- Conclusions

The Evolution of International Oil Pricing Regime: The Early Stages

- Until early 1970s international oil industry outside North America, USSR China characterized by dominant position of large multinationals

- Seven sisters vertically and horizontally integrated
  - Control both of upstream operations & to lesser extent of downstream operations (transportation, refining and marketing)
  - Controlled rate of supply of crude oil through joint ownership of concessions

- Industrial structure under concession session system meant that oil trading became to large extent question of inter-company exchange with no free market operating outside these companies' control

- Oil pricing regime associated with concession system centred on concept of 'posted' price
  - A fiscal parameter did not reflect oil market conditions.

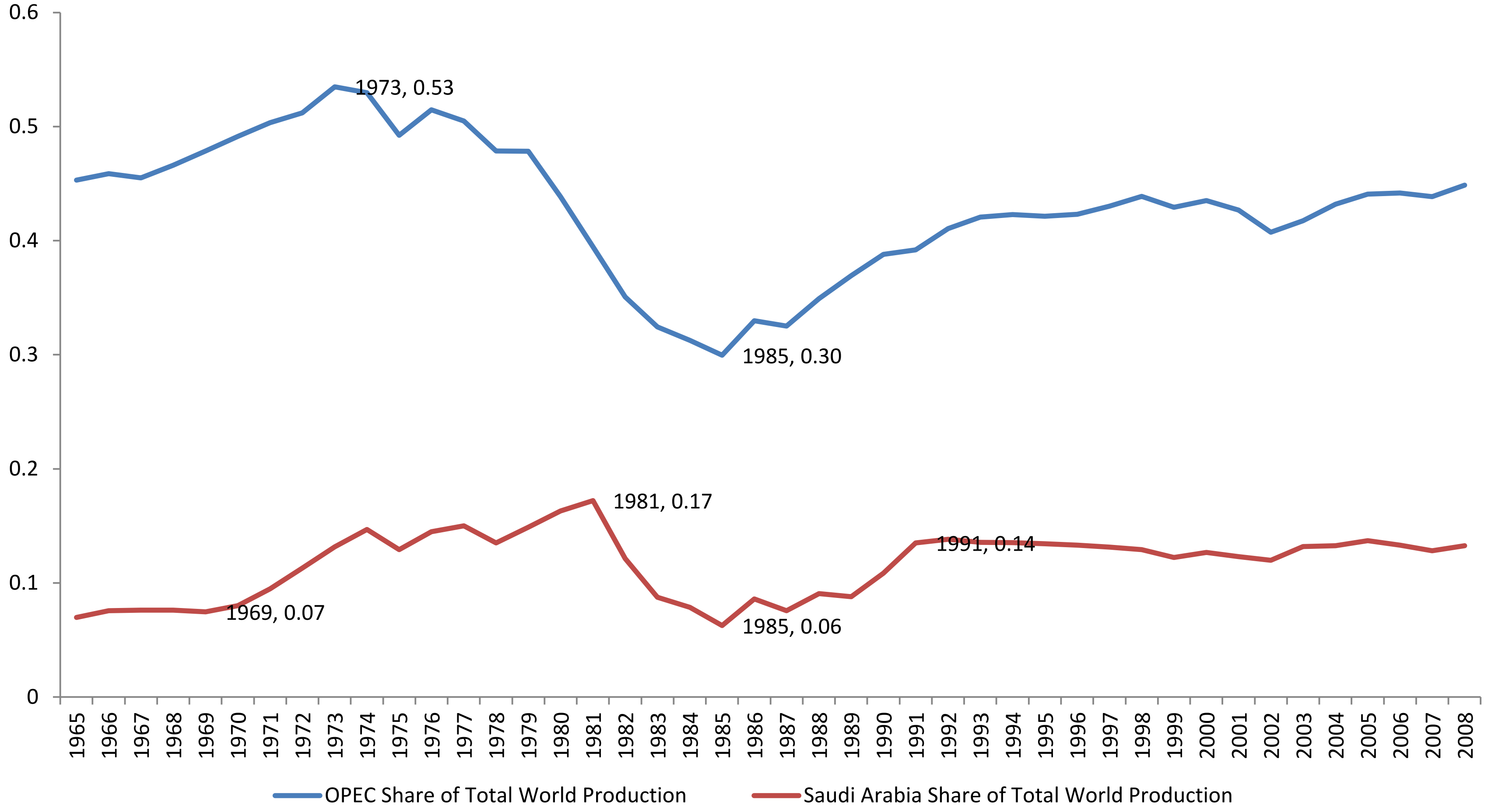
Origins of OPEC and Shifts in Power Balance

- Main objective of OPEC
  - Enhance cooperation amongst major oil exporting countries and improving the bargaining position of member countries *vis a vis the 'seven sisters'*
  - *Immediate aim* was to resist unilateral decisions by the oil companies to reduce posted prices
  - In a sense OPEC acted as a trade union
  - Different from IEA's origins: Created in response to Arab Oil Embargo
- First decade: 1960-1970
  - Succeeded in preventing posted prices from declining & OPEC managed to keep posted prices constant at $1.8
  - Change taxation rules to its favour & increase government revenues
- 1970-1973: Gradual shift in balance of power in favor of OPEC
  - Main driver: Tightening oil market conditions & OPEC providing marginal barrel
- Main consequences:
  - Break of vertically-horizontally integrated structure as result of change of ownership of assets
  - Collapse of posted pricing system
  - OPEC assume responsibility of setting oil price for first time in history in 1973
    - Price fixing type agreements but Did not hold during all periods

The Creation of the Market

- Equity participation and nationalization of oil assets profoundly affected oil industry structure
  - Pushed companies to diversify their sources of oil supply by gaining access and developing reserves outside OPEC
- New discoveries in non-OPEC countries responding to higher oil prices & taking advantage of new technologies
  - New suppliers of oil outside OPEC had more crude oil than required by contract buyers secured
  - Secured sale of all their production by undercutting OPEC prices in spot market
- Diversity of Consumers
  - Buyers who became more diverse attracted by competitive prices on offer which were below the long-term contract prices
- Creation of an oil market outside OPEC & continuous decline in OPEC share

OPEC Market Share



Collapse of OPEC Administered System

- OPEC introduces quota system in 1983
  - Share burden of the output cuts
  - An overall oil production ceiling and individual production quotas
  - OPEC never adopted a published, explicit formula for allocating quotas
- Collapse of OPEC administered system in 1986
  - Saudi Arabia's attempts to defend marker price resulted in a dramatic reduction in its oil exports and loss of market share
  - First price war: S.A. Increase market share & collapse of oil price
  - OPEC abandons its fixed price target
  - S.A. returns to quota system with the understanding that it would not tolerate its output share falling below certain levels
- Two lessons
  - Oil pricing system incompatible with oil market conditions can't survive
  - Change in market structure will most certainly lead to change in pricing system

Main Intellectual Contributions

- 1970s and 1980s golden period of research on oil markets and OPEC behaviour
- Key insights and issues that still highly relevant
  - Do OPEC's actions maximise its wealth?
  - Property right models
    - Do oil exporters have higher or lower discount rates than international oil companies? Do different oil exporters have different discount rates?
  - Does OPEC behave competitively or colludes?
    - Different competitive and collusive models
  - Target revenue model & backward bending supply curve
    - Production decisions based on national budget requirements
    - Function of their *absorptive capacities*: ability to use oil revenues (profits) and capital productively
    - Shortcoming: capacity function of oil revenues

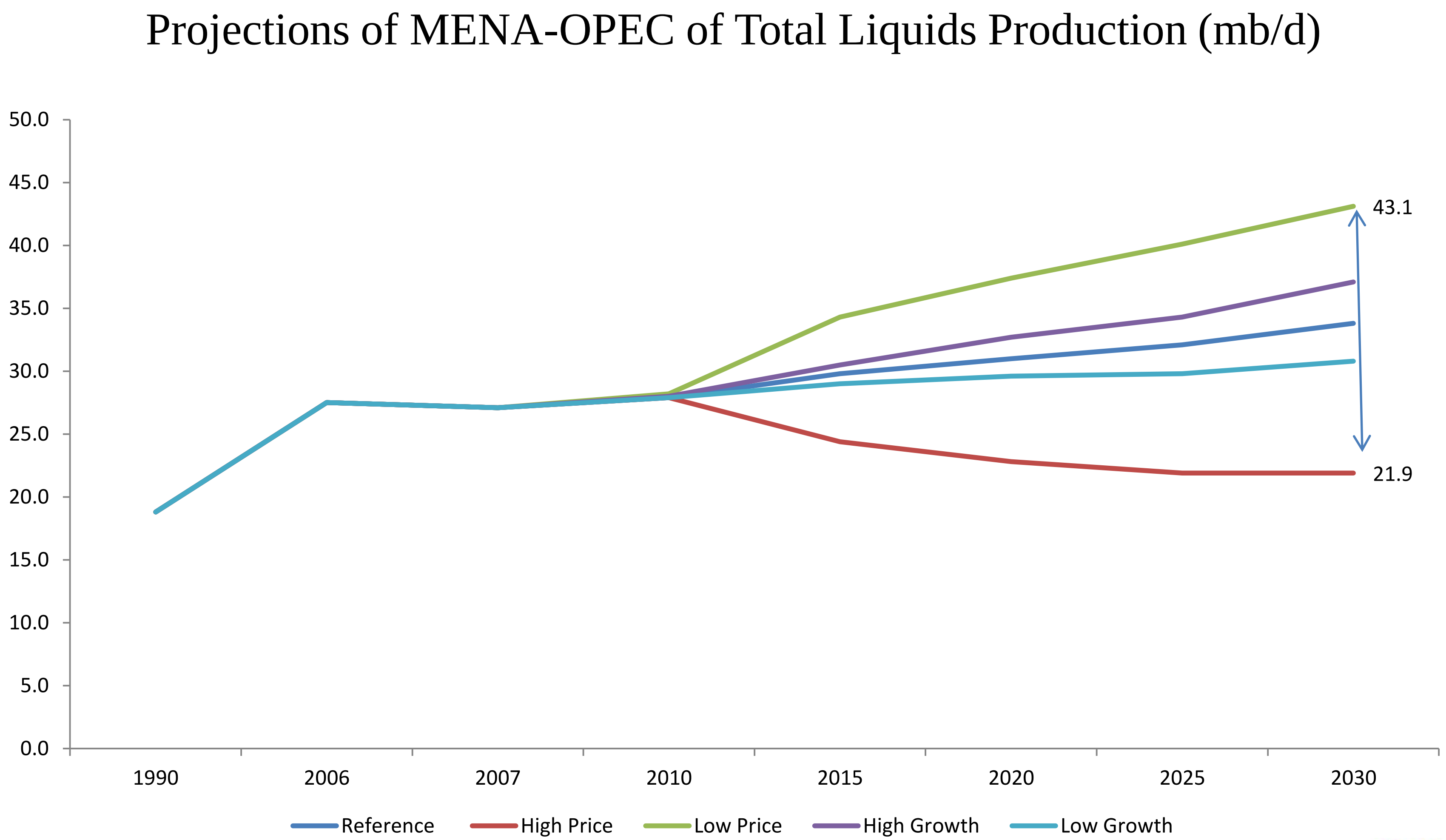
Main Intellectual Contributions

- The issue of scarcity rent and how it evolves over the cycle
- Differentiation within OPEC players
  - Special role of Saudi Arabia
  - Distinguish between “core” (low cost, high compliance) and “non-core” (high cost, low compliance) members of OPEC
  - The price hawks versus price makers
- Challenges facing OPEC
  - Coordination
    - Any given set of quotas determines not only overall profit of OPEC, but also the individual revenues that accrue to each member
    - Limited means by which to redistribute earnings among members
  - Cheating
    - Free Rider Problem: Individual members tempted to produce beyond their assigned quotas
  - Entry
- Empirical literature did not succeed in resolving some of these key issues
  - Different types of models can have similar prediction
  - Behaviour of OPEC is highly dynamic
- OPEC behaviour: In need of new dimensions

Key Feature I: OPEC No longer Sets the Price

- Emergence and expansion of market for crude oil outside OPEC allowed development of market-referencing pricing
  - Price of certain variety of crude oil is set as a differential to a certain marker or reference price
  - Identification of benchmark price
- Doubts about ability of benchmarks to generate price reflect accurately the price at the margin of physical barrel of oil
    - Markets have become very thin and illiquid
- Creation of financial layers around these benchmarks to manage risk
- Some Implications
  - Laid foundations of entry of new players into oil market (financial)
  - Futures market not used only for risk hedging and speculation; its relevant market where oil price level is set
  - Links to physical markets through highly liquid financial market (swaps, EFPs, contract for differences)
  - How did these financial players interact in the market

Projections of OPEC-MENA Oil Production



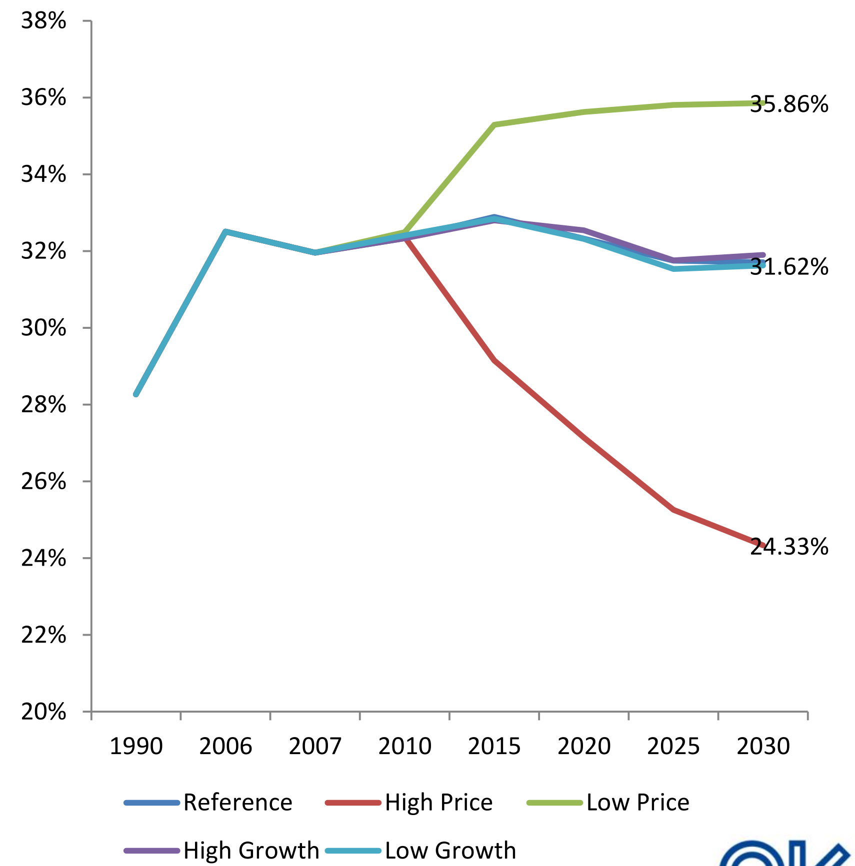
EIA: International Energy Outlook, 2009

OPEC-MENA: Iran, Iraq, Kuwait, Qatar, Saudi Arabia, UAE, Algeria, Libya

Underlying Assumptions

- Estimates based on "call on OPEC"
  - OPEC adjust market share and fills gap between world demand and non-OPEC supplies
  - OPEC output treated as residual
- Underlying key assumptions:
  - Producers in OPEC are passive players
  - Symmetric behaviour
    - Passive both in a rising market and declining market

OPEC-MENA Market Share

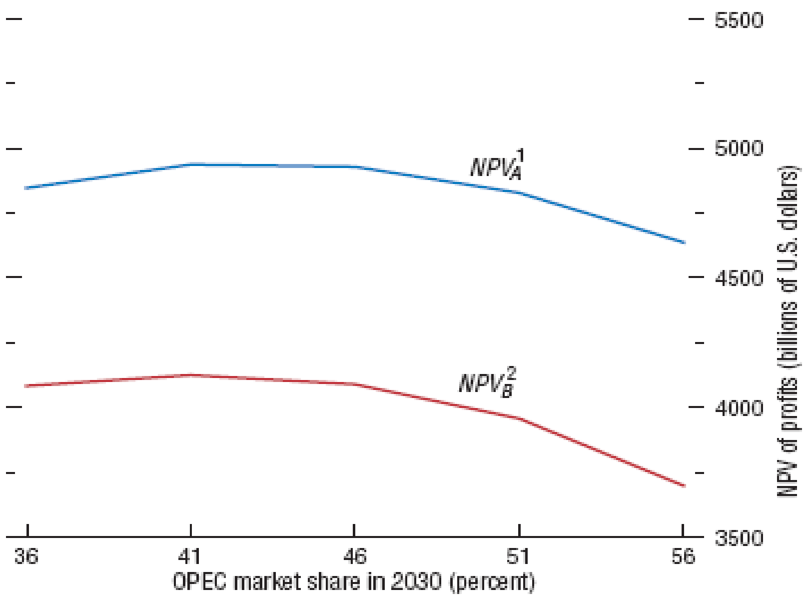


Alternative Framework

- Simplifying assumptions
  - Based only on fact that bulk of world’s proven reserves concentrate in region
  - No attempt to model behaviour of key producers
- OPEC behaviour is far from passive
  - Dominance of oil in economy & heart of industrialisation and diversification strategy
- Key questions
  - In a falling market
    - How tolerant is OPEC and its key player to a decline in its market share?
  - In a rising market
    - Willingness: Does OPEC has incentive to increase market share?
    - Capability: Can OPEC –MENA increase production capacity to fill gap?

Issue 1: Does OPEC have Incentive to Increase Market Share?

Profitability of Various OPEC Market Strategies



Source: Gately (2005).
[1] NPV_A corresponds to the NPV of discounted profits in the baseline scenario, with the International Energy Agency non-OPEC supply path.
[2] NPV_B corresponds to the NPV of discounted profits in the baseline scenario, with the U.S. Department of Energy non-OPEC supply path.

Source: IMF (2005)

- ❑ The more OPEC increases its market share the lower the payoff
  - Higher output offset by lower prices
- ❑ Does not have incentive to let market share rise rapidly
  - High oil prices compensate for the lower market share

2. Does OPEC has Capability to increase Production?

- OPEC is not an organisation to decide or coordinate investment plans among member countries
  - Decision left completely to individual countries
  - Affected by general market conditions and local factors
- Determinants of investment in OPEC
  - Call on OPEC
    - 'Security of demand' vs 'security of supply'
  - Above ground constraints
    - *Wars and conflict*
    - *Sanctions*
    - *Organisation of the oil sector & capability of National Oil Company*
    - *Relationship between government and NOC & flow of funds back into industry*
    - *Fiscal system and openness to foreign investment*
  - Inter-generational considerations and optimisation of the reserve base

Investment in OPEC Spare Capacity

Spare capacity not outcome of 'rational' investment decision

Spare capacity outcome of historical developments in 1970s & 1980s

Few players today able or willing to invest in new spare capacity

(Saudi Arabia: 2 mb/d)

International Oil Companies will not hold spare capacity

Who should bare the costs of spare capacity?

Any increase in spare capacity in the coming years will arise mainly due to sharp slowdown in demand rather than increase in production capacity

Key Middle East Players and Supply Potential

Limited Growth Potential

- Qatar
- Algeria
- Abu Dhabi
- Kuwait

Marginal Players
Predictable pattern of supply growth

Medium Growth Potential

- Iran
- Libya

Unpredictable pattern of supply growth but likely to be marginal

High Growth Potential

- Saudi Arabia
- Iraq

Game Changers

Key Features II: OPEC & Market Structure

- Keeping a floor on oil price shifts burden of production and investment towards high cost producers in non-OPEC countries, unconventional oil & substitutes
  - Ali Naimi, justified $75 target price as “price that marginal producers need to maintain investments sufficient to provide adequate supplies for future oil consumption needs”
- Implications:
  - Squeezed both on supply and demand side
    - Decline in demand will affect call on OPEC
    - Increase in non-OPEC supply will affect call on OPEC
    - Shocks within OPEC (Iran, Iraq, Kuwait, Libya, Nigeria)
  - OPEC as a residual producer but.....
    - Unlike dominant model does not set price that maximise profits by equating MR with MC
    - Switch in residual producer status possible & endogenous to market mechanisms
  - Oil price, marginal cost and price indeterminacy
    - Very low cost floor for crude oil production in OPEC and a very high price ceiling set by production in non-OPEC and substitutes & futures market participants’ expectations
    - Market can clear at any price within a wide range depending on market conditions and interaction among market participants
    - Important implications on short term and long term price behaviour

New Perspectives on OPEC

- New Dimensions
  - Is OPEC simply a price taker?
    - Characterization not accurate
    - By altering production plans OPEC send signals
    - Influence on oil prices however not straightforward
  - How to account for entry & consolidation of the role of financial players in price formation
  - Role of expectations
  - Role of inventories and spreads
- New approaches that can provide insights
  - Signalling literature
  - Game theory
  - Behavioural finance

Signalling in Different Oil Market Conditions

- Decisions of OPEC cuts can be viewed as signals to market about OPEC's preferred range of prices
- Signalling mechanism may or may not succeed depending on how financial market participants interpret these signals
- Important to emphasise:
  - When OPEC takes no action it is also signalling to the market

Weak Market Conditions

- In a falling market
  - Non-OPEC suppliers continue to produce at their maximum potential
  - OPEC in attempt to defend a target price would announce production cuts
- Credible signals?? What does the market think??
- OPEC's announcement of production cuts in face of fall of global demand and excess capacity not have intended effect as market may not attach any weight to this signal straightaway
  - Market participants doubt the effectiveness and credibility of OPEC's policy and may ignore the signal
  - OPEC signals are some sort of cheap talk
- It will take OPEC a series of cuts to convince the market

Tight Market Conditions

- The erosion of spare capacity
  - Without enough surplus capacity, OPEC's ability to influence oil prices weakens considerably
  - In absence of spare capacity OPEC becomes a price taker like any other producer
- In 2004 doubts about the ability of Saudi Arabia to supply the market with additional supplies of the required quality of crude
  - Rendered any announcements of production increases ineffective

OPEC Pricing Power

- OPEC pricing power is not constant
  - OPEC can lose its influence on oil prices in the short term
- OPEC influence on oil price behaviour depends on interaction with other players
  - Game theoretic approach
- OPEC can engage in excessive cuts or ‘over-produce’ to give credibility to its signal about its preferred oil price
  - Can create volatility and sharpen swings

Asymmetry in OPEC Response

- The conventional wisdom
- OPEC puts a floor on oil price
  - Prevent prices from falling below levels undesired by member countries
- OPEC puts a ceiling on oil price
  - Avoid demand destruction for its oil in long term
  - Limit entry of substitutes
- Reinforced by OPEC price band $22-$28 price band
- Reinforced by OPEC's official position
  - "extreme price levels, either too high or too low, are damaging for both producers and consumers"
- Implications
  - Establishes a feedback mechanism on the supply side
  - Influence short term expectations and behaviour (governments and financial investors)
  - Stabilise long term expectations

Asymmetry in OPEC response

- OPEC was not created to bring prices down

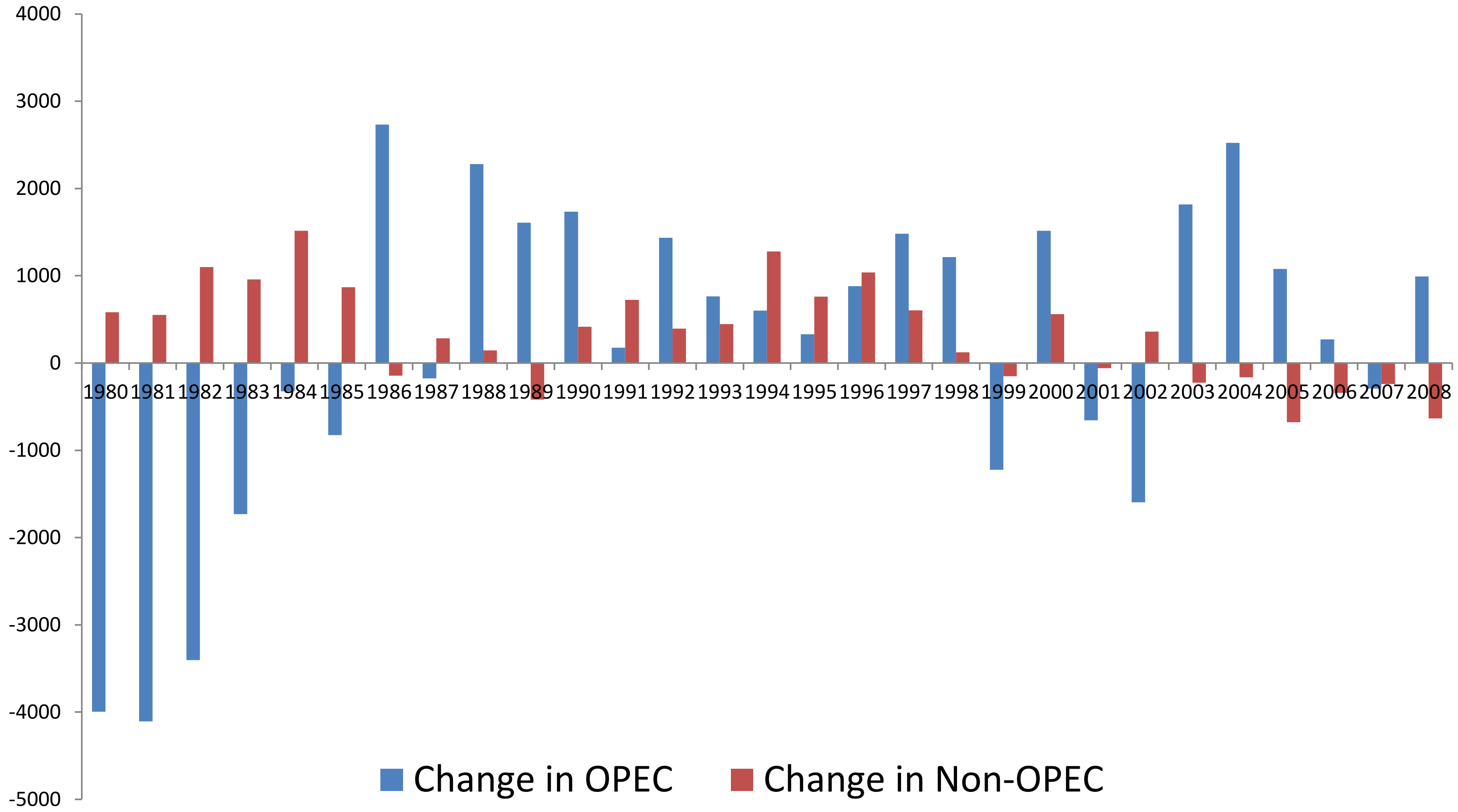
- In a rising market OPEC's role is to satisfy incremental demand at market determined prices
  - Learning process about the impact of oil shocks on growth
    - Global economy can grow with persistent rise in oil price
  - OPEC does not have the tools to bring prices down
  - Political constraints

- Implication: Feedback mechanism from OPEC absent
  - Affected market's long term expectations
  - Contributed to the parallel shift in the back end of the curve

OPEC Behaviour: Lessons from the 2004-2009 Cycle

- Residual player in the early period of the boom
  - Increase output in response to customers' demand at market determined prices
- OPEC's residual role interrupted in 2007
  - Concerns about the rapid accumulation of inventories
  - OPEC responded by cutting supplies & importers tap into their oil stocks to satisfy demand reducing the level of crude oil inventories
  - Spot price rose and shape of futures curve changed from partial contango into backwardation
- OPEC resumed residual role supplying market upon demand at oil prices 'determined by the market'
  - No attempt to bring down prices by putting additional barrels in the market
  - Despite decline in oil demand excess supplies did not appear because OPEC adjusted its output in line with reduction in oil demand
- The Jeddah meeting: A change in a key player's behaviour
  - Saudi Arabia as a signaller to the market
- Post-Lehman Brothers crisis
  - Implement cuts; OPEC strongest when it is perceived to be weakest
- In 2009
  - Signalling game, focal points, & stabilise oil price

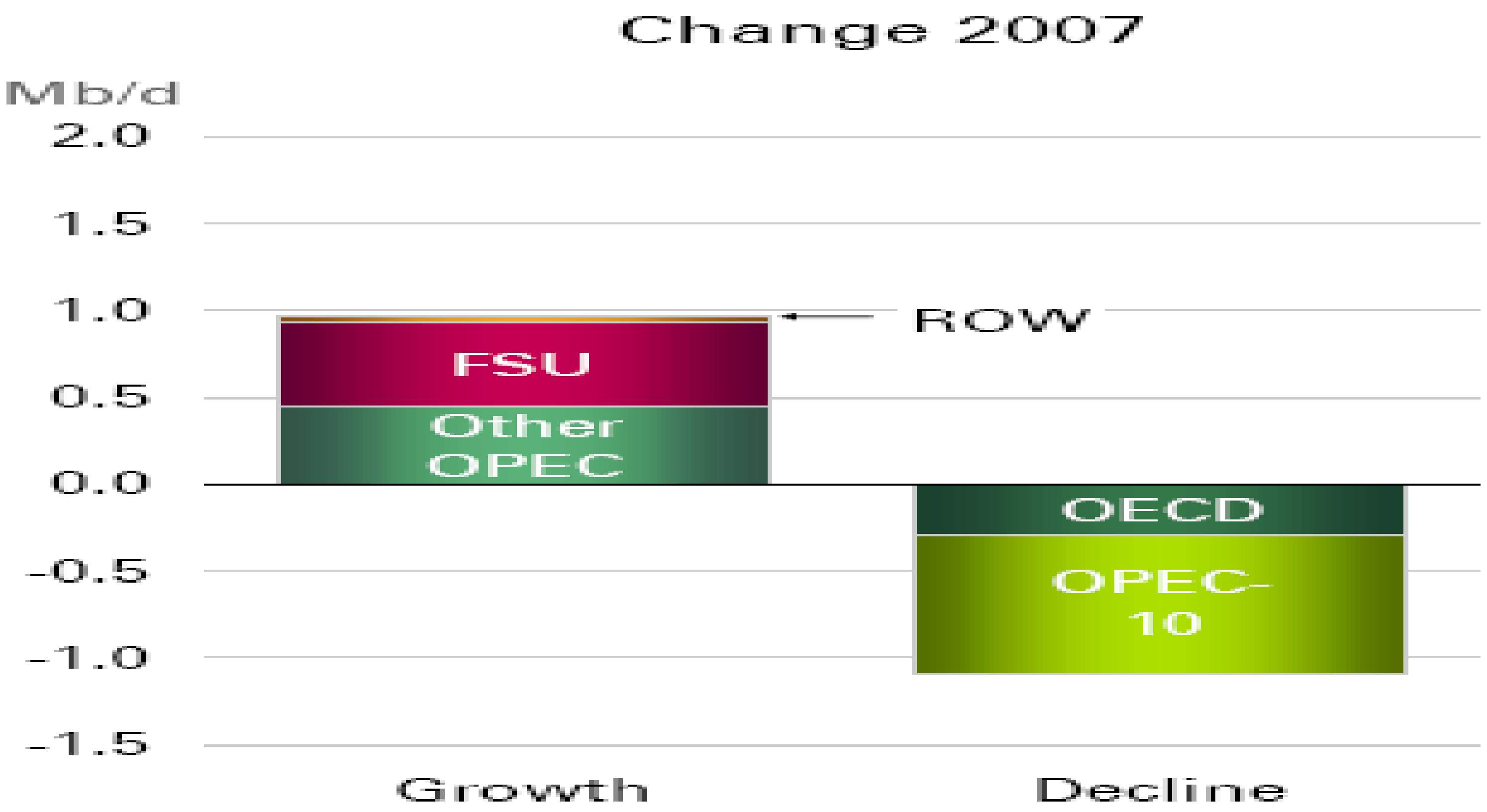
Residual Supplier



US Crude Oil Stocks 2007

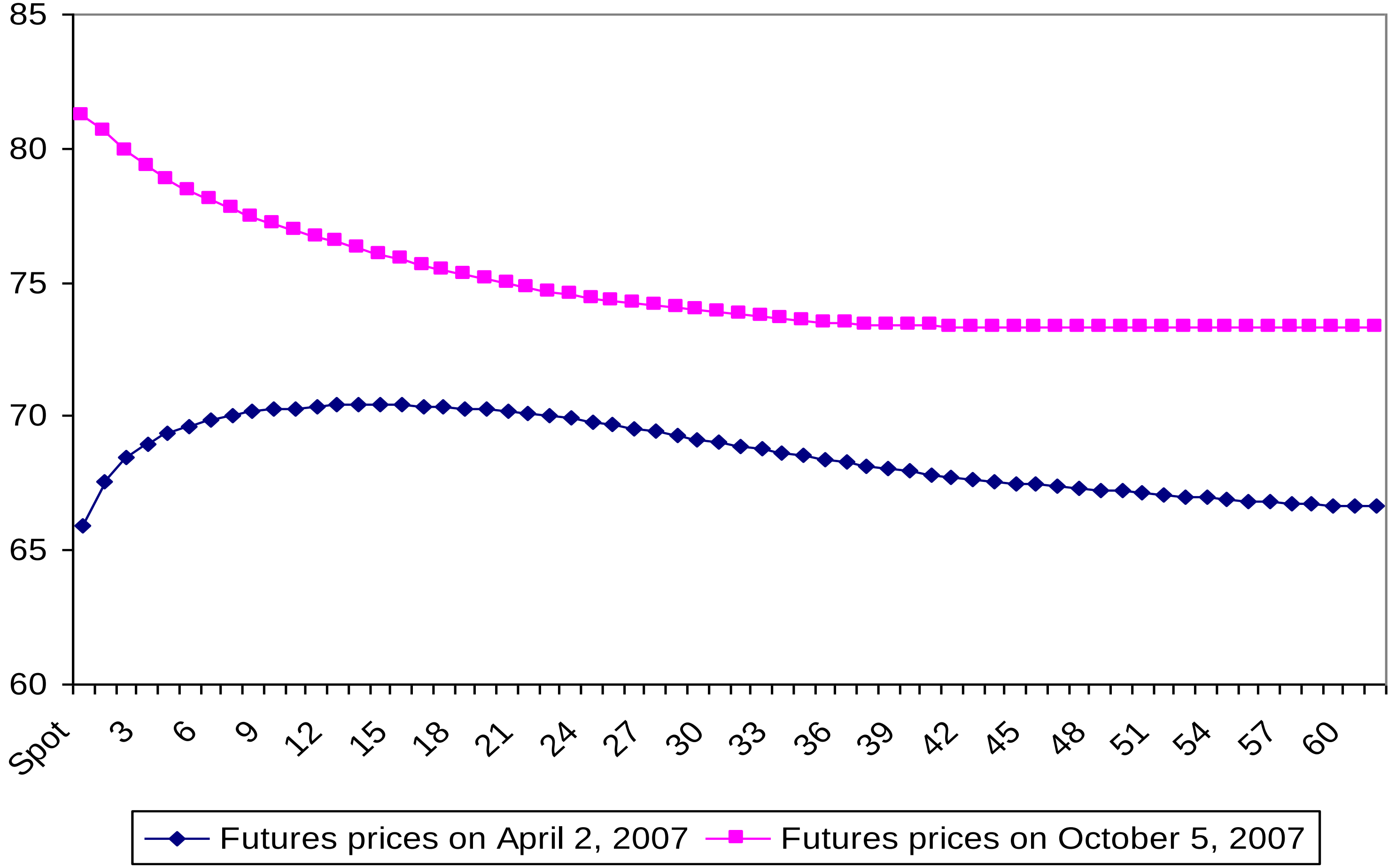
Source: EIA

OPEC Cuts Supplies in 2007



Source: BP

Change in Shape of Curve



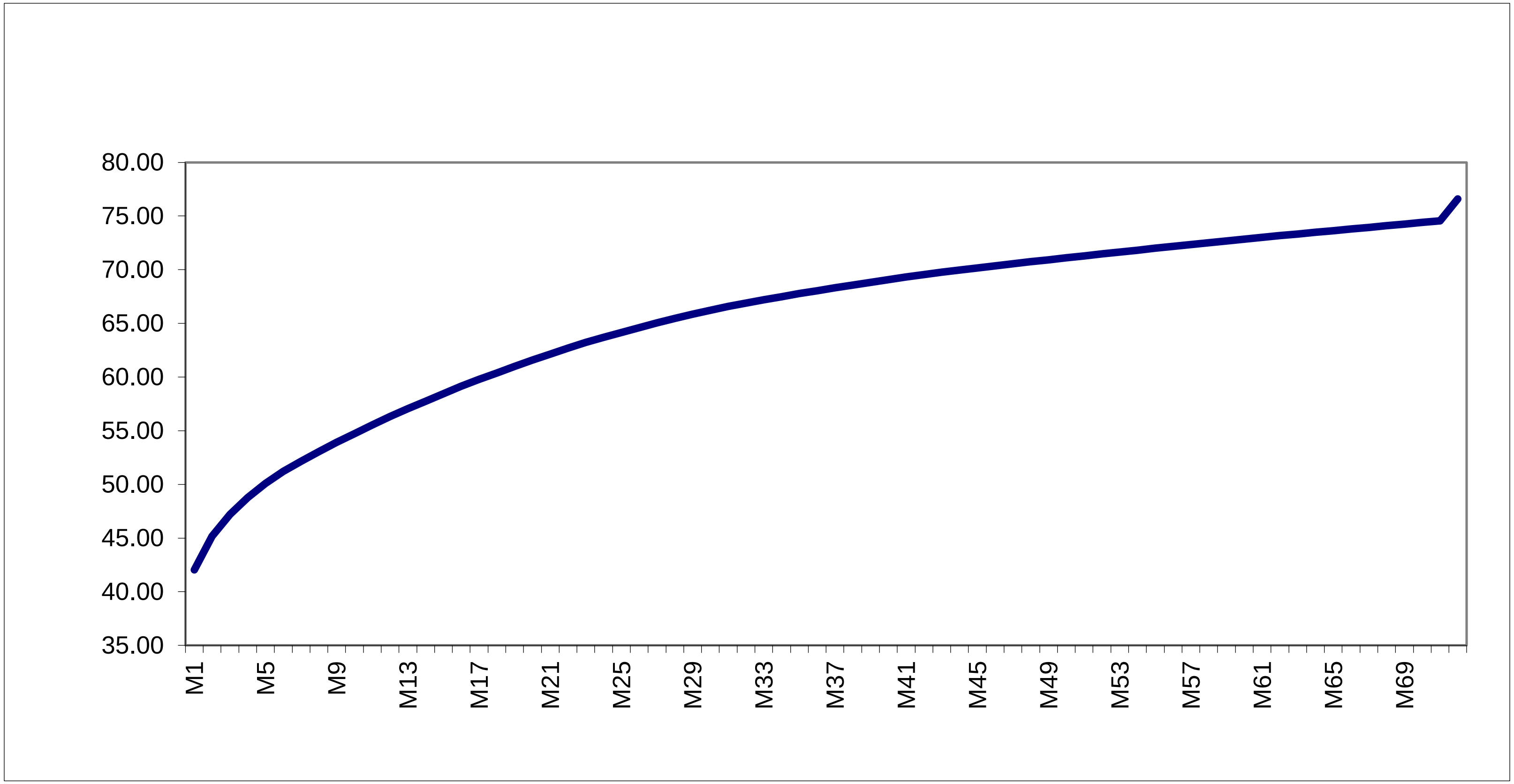
Source: IMF, World Economic Outlook: Globalization and Inequality, October 2007, Figure 1.9

Short Management of Market: 2009 Events

- 2009 represents a remarkable year in at least two respects
  - Witnessed the sharpest increase in spot oil prices in decades
  - In second half of 2009 it exhibited a high degree of relative stability despite a very uncertain and volatile global economic environment
- Two distinct phases
  - Recovery phase
    - the WTI spot price rise from a very low base of $30.28 on 23 December 2008 to $79.39 on 31 December 2009, an increase of more than 160%
  - Stabilisation phase
    - Oil price oscillated within a relatively narrow price band between $60 and $70 between the months of July and September and then between $70 and $80 between the months of October and December

Dislocation of Forward Curve

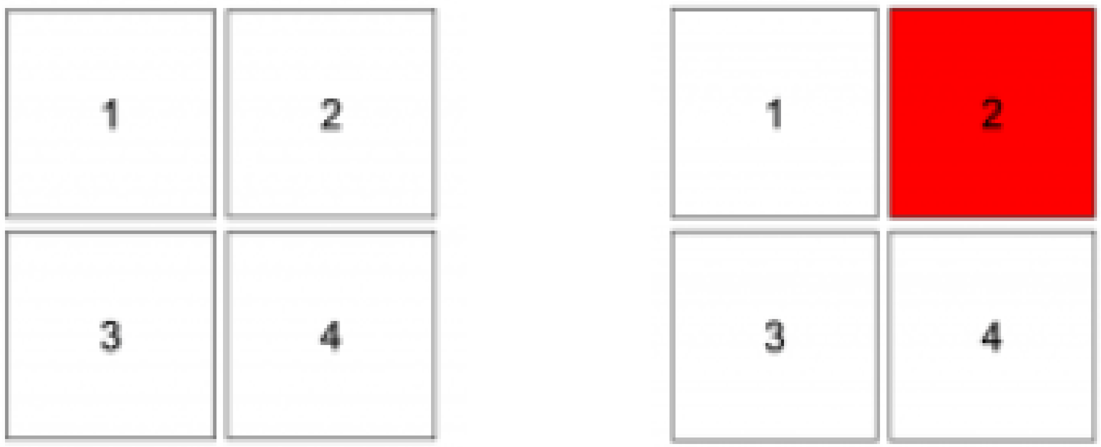
WTI Term Price Structure (December 2008, Monthly Average)



Current Fundamentals, Expectations and The Oil Price

- Underplay the weight of current oil market fundamentals, inventories, size of spare capacity and increase importance of future fundamentals
- Problem: Future fundamentals highly uncertain
  - many unknown variables that can play an important role in shaping anticipations of these future fundamentals, many of which originate from outside the oil market
- But at what level should the price be set?
  - There is a wide range of prices at which the market can clear
- The issue then is how does the market converge to one price and not another

Some signals more visible than others



Market players can coordinate on choosing a box without communicating with each other

There is nothing special about the red box other than the fact that it helps players coordinate their decisions

Such an equilibrium is known as the *focal point*

Why Was OPEC Successful this Time Round?

- Convergence of expectations providing a focal point in oil market
- Expectations that oil market will tighten
    - Limited non-OPEC supply growth (peak oil, over-ground constraints)
    - Limited investment and weak supply growth in OPEC countries (willingness, capability, geopolitical)
    - Rapid growth in global oil demand fuelled by non-OECD countries
    - OPEC will remain in driving seat
- OPEC seems more cohesive
    - – Perceived muted responses to rises in oil prices
    - – Issue of entry
    - – Coordination within OPEC
        - Clear leadership of Saudi Arabia
    - – Cheating
        - Still a problem, but much less under control
- What can change these dynamics?
    - – Entry of Iraq; Climate change & energy security policies; Internal cohesion???

Conclusions

- OPEC's role evolving all time depending on oil market conditions
  - 1960-1970: Trade union
  - 1973-1985: Price setter
  - 1986: Abandons price setting power
  - 1986-2006: Residual producer & spare capacity holder
  - 2007: Inventory manager
  - 2008-2010: Signaller and getting better at it
  - In the next 50 years, what roles will OPEC play?
- In need of new approaches to analyse OPEC behaviour and its role in oil price formation