

# Agency theory and behavioural finance

## Insights for oil company investment behaviour

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# Agency theory and behavioural finance

## Insights for oil company investment behaviour

- Introduction/backdrop
- The benchmark model
- Selected frictions
  - Agency theory
  - Managerial bias
- Three peculiarities
  - Investment and cash flows
  - Dividends and debt
  - Investment and share prices
- A note on the outlook

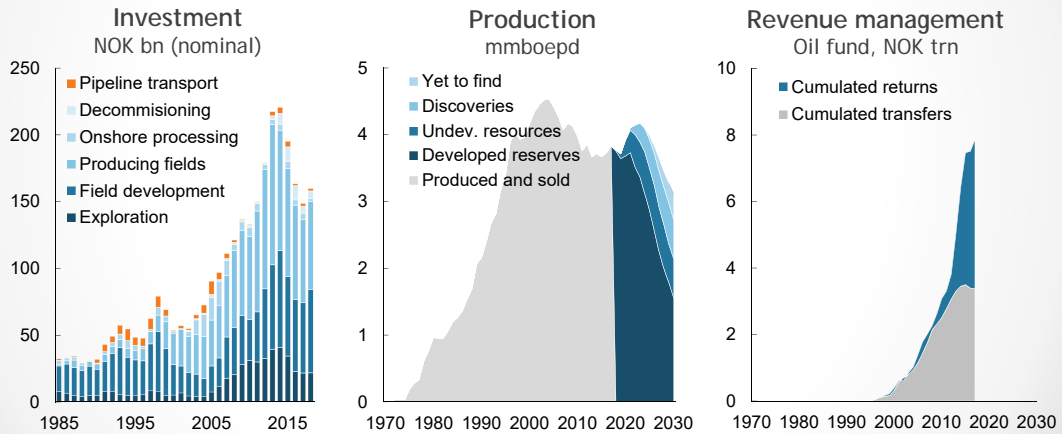


Source: Behm, Marit og Klaus Mohn (2017). Agentteori, atferdsfinans og oljeinvesteringer. *Samfunnsøkonomen* 6/2017.

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# Investments: Where it all starts

Key to resource revenue management



Source: Statistics Norway (investment) and the Norwegian Petroleum Directorate (production).

# The benchmark model

NPV in a world without frictions

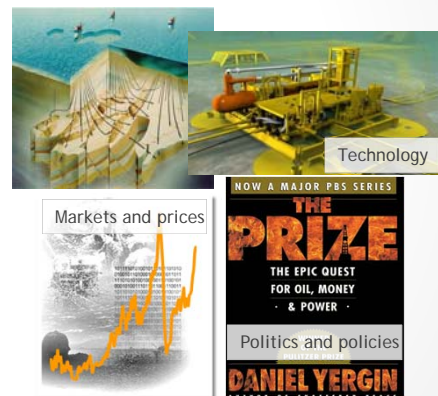
- Net present value

$$NPV_i = -I + \sum_{t=1}^T \frac{CF_{it}}{(1+r)^t}$$

- Cost of capital (CAPM)
  - Required rate of return

$$E(r_i) = r_f + \beta_i(E(r_m) - r_f)$$

Drivers of value and risk



Source: Behm, Marit og Klaus Mohn (2017). Agentteori, atferdsfinans og oljeinvesteringer. Samfunnsøkonomen 6/2017.

## The benchmark model

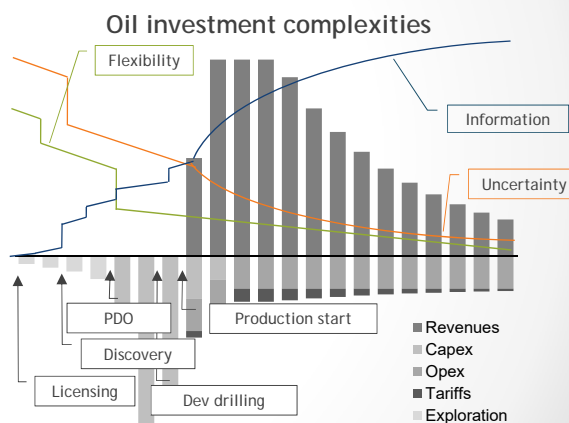
NPV in a world without frictions

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## The benchmark model

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$$E(r_i) = r_f + \beta_i(E(r_m) - r_f)$$

- CAPM assumptions

- Fully rational, perfect markets
- Investors optimise risk/return
- No taxes or transaction costs
- Endless divisibility of assets
- Homogeneous expectations
- Individuals are risk averse
- Fully diversified investors

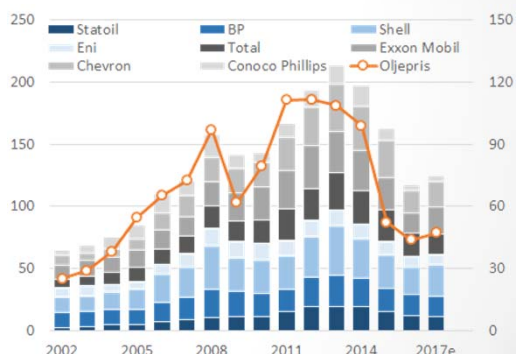
- No great empirical success

# Irregularities of oil company investment

Real world behaviour disagrees with benchmark model

- Why does investment respond to temporary cash flow fluctuations?
- Why are oil companies so concerned with debt and dividends?
- Why doesn't the share price respond positively to investment plans?

Capital expenditure  
Eight major oil companies (USD bn)

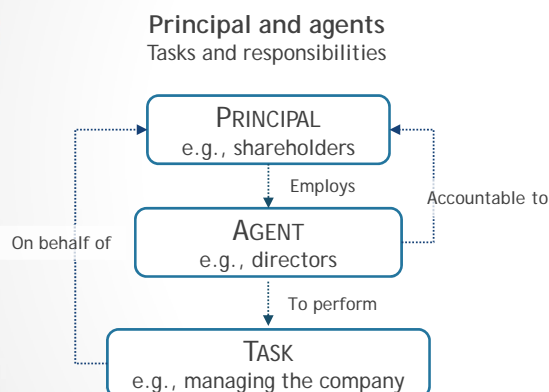


Source: Behm, Marit and Klaus Mohn (2017). Agentteori, atferdsfinans og oljeinvesteringer. *Samfunnsøkonomen* 6/2017.

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# Investment in modern theory of finance

Introducing frictions: Agency theory



- Potential conflicting interests
- Asymmetric information
  - Adverse selection
  - Moral hazard
- Company valuations
- Dividend decisions
- Issuance aversion
- Capital rationing



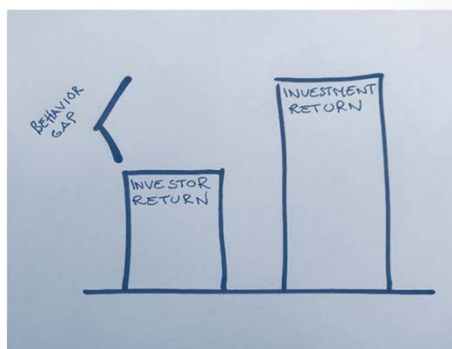
Asquith, Paul and David W. Mullins (1986). Equity issues and offering dilution. *Journal of Financial Economics* 15, 61-89.  
 Jensen, Michael C. (1986). Agency cost of free cash flow, corporate finance, and takeovers. *American Economic Review* 76 (2), 323-329.  
 Myers, Stewart C. and Nicholas S. Majluf (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13, 187-221.  
 Rozeff, Michael S. (1982). Growth, beta and agency costs as determinants of dividend payout ratios. *Journal of Financial Research* 5 (3), 249-259.  
 Reiss, Peter (1990). Economic and financial determinants of oil and gas exploration activity. In Hubbard, R. Glenn (ed.) *Asymmetric information, corporate finance, and investment*. University of Chicago Press.  
 Stein, Jeremy (2003). Agency, information, and corporate investment. In Constantinides, George M., Harris, Milton and René Stulz (eds) *Handbook of the Economics of Finance*, utgave 1A (ch 2), Elsevier.  
 Stiglitz, Joseph E. and Andrew Weiss (1981). Credit Rationing in Markets with Imperfect Information. *American Economic Review* 71 (3), 393-410.

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# Investment and behavioural finance

Psychology-based explanations of investment behaviour

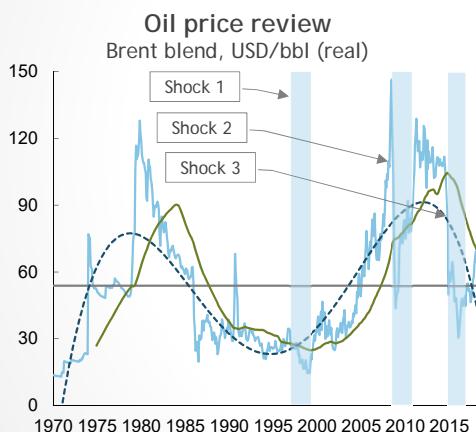
- Focus on managerial bias
  - Markets might be efficient
- Cognitive biases
  - Over-confidence
  - Miscalibration
- Cognitive constraints
  - Simple decision rules
  - Bounded rationality



Baker, M. and J. Wurgler (2013). Behavioral Corporate Finance: An updated survey. In Constantinides, George M., Harris, Milton and René Stultz (eds). *Handbook of the Economics of Finance*, ed 2A (ch 5), Elsevier.  
 Ben-David, Itzhak (2010). Dividend policy decisions. In Baker, H. Kent and John R. Nofsinger (eds.) *Behavioral Finance*. John Wiley & sons, New Jersey.  
 Ben-David, Itzhak, Graham John R. and Campbell R. Harvey (2013). Managerial Miscalibration. *Quarterly Journal of Economics* 128 (4), 1547-1594.  
 Böhm, Marit F. (2017). Oil and gas investments: Agency problems and managerial bias in investment decisions. MSc thesis. University of Stavanger Business School, June 2017.  
 Graham, J. R. and C. R. Harvey (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics* 60, 187-243.  
 Krüger, Philipp, Landler, Augustin and David Thesmar (2015). The WACC fallacy: The real effects of using a unique discount rate. *Journal of Finance* 70 (3), 1253-1285.  
 Malmendier, Ulrike and Geoffrey Tate (2005). CEO overconfidence and corporate investment. *The Journal of Finance* 60 (6), 2661-2700.  
 Malmendier, Ulrike and Geoffrey Tate (2015). Behavioral CEOs: The role of managerial overconfidence. *Journal of Economic Perspectives* 29 (4), 37-60.  
 Osmundsen, Petter and Thore Johnsen (2013). Petroleumsbeskatning. Teori og virkelighet. *Samfunnsøkonomen* 5/2013, 13-21.

# The great oil price plunge

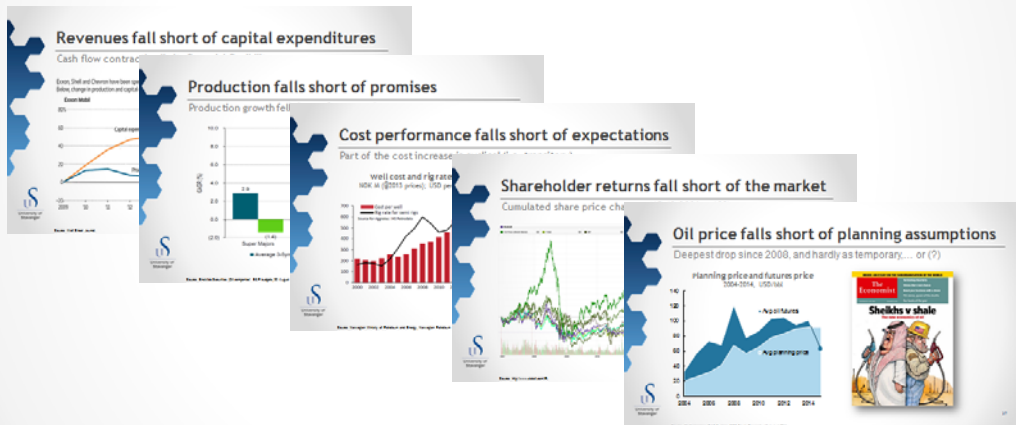
Cyclical retreat or structural shift?



Source: ThomsonReuters (oil price).

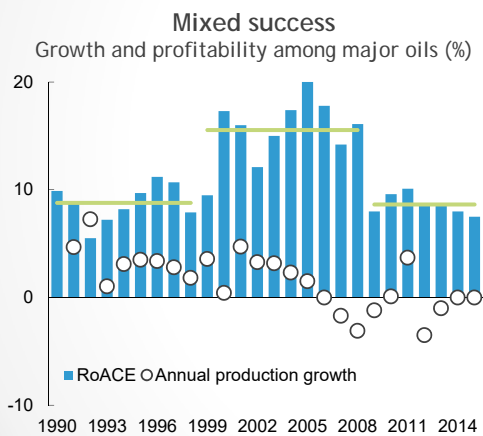
# Headwinds for oil industry and investors

Oil companies have disappointed their shareholders



# Short-term challenge: Profitability

Returns are eroded by escalating costs and falling oil price

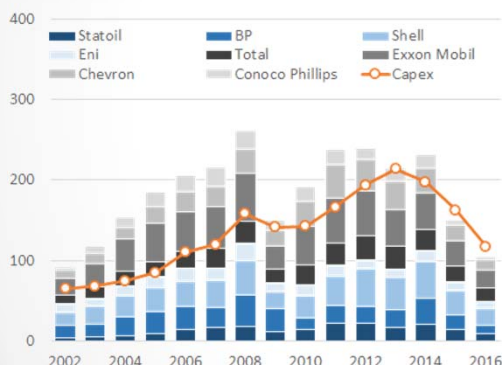


- Disappointed shareholders
- Diverging market views
- Disputed business model

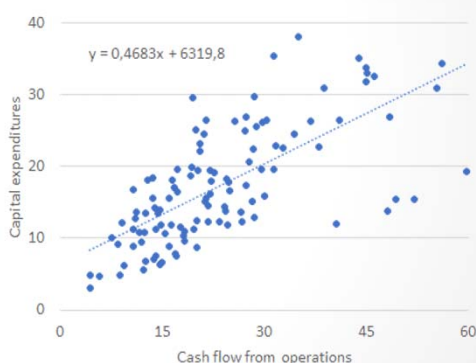
# Cash flows matter for investment activity

Oil companies adjust capex plans to oil price fluctuations

Cash flow by company and aggregate capex (USD bn)



Cash flow and investment Cross plot (2002-2016)



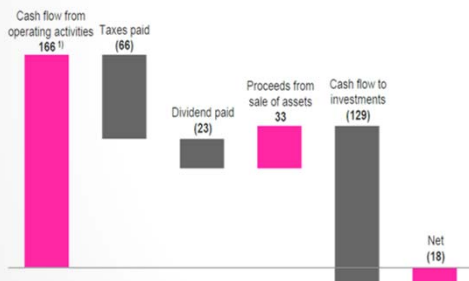
R. Glenn Hubbard, 1998. "Capital-Market Imperfections and Investment," *Journal of Economic Literature*, American Economic Association, vol. 36(1), pages 193-225, March.  
 Mohn, Klaus (2008). Investment behavior in the international oil and gas industry. *PhD Thesis* 51. University of Stavanger.  
 Mohn, K. and B. Misund 2009. Investment and uncertainty in the international oil and gas industry. *Energy Economics* 31 (2), 240-248.  
 Mohn, K. and B. Misund. 2011. Shifting sentiments in oil and gas investments: an application to the oil industry. *Applied Financial Economics* 21 (7), 469-479.

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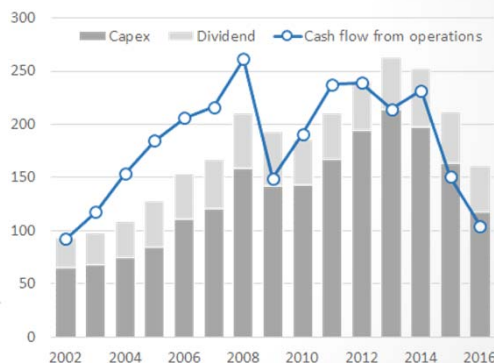
# Oil company cash flow disposition

Separation of accrual and spending of oil and gas revenues

Statoil cash flow statement For the calendar year 2015 (NOK bn)



Eight major oils: Cash flow disposition Cash flow, capex, and dividend (USD bn)



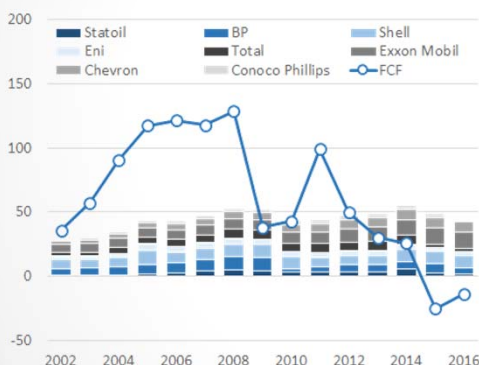
Sources: Statoil, ThomsonReuters.

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## Dividends and debt as control devices

Constraint on management flexibility reduces agency costs

Dividend payments and free cash flow (USD bn)



- Predictable and stable dividends
  - Implicit contract
- Erosion of trust
  - Over-confidence
  - Accelerating expenditures
  - Poor returns
- Devices of shareholder pressure
  - Reign in management flexibility
  - Directors forced to focus

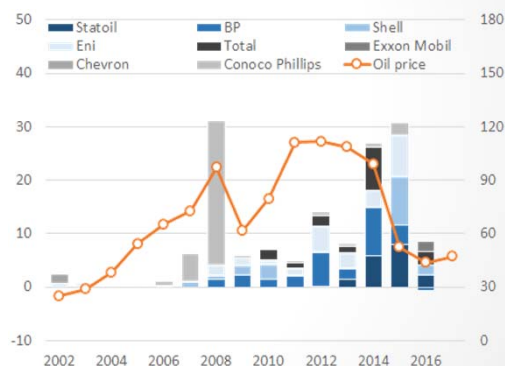
Ben-David, Itzhak (2010). Dividend policy decisions. I Baker, H. Kent and John R. Nofsinger (red.) Behavioral Finance, John Wiley & sons, New Jersey.  
 Deshmukh, Sanjay, Goel, Anand M. and Keith M. Howe (2013). CEO overconfidence and dividend policy. Journal of Financial Intermediation 22, 440-463.  
 Jensen, Michael C. (1986). Agency cost of free cash flow, corporate finance, and takeovers. American Economic Review 76 (2), 323-329.  
 Modigliani, Franco and Merton Miller (1958). "The cost of capital, corporation finance and the theory of investment". American Economic Review 48 (3), 261-297.  
 Santamaría, Sylvain, Martín, Iván and Esben Hegnholt (2016). Big Oil's Road to Reinvention. Report, Boston Consulting Group, February 2016.

## Investment plans and investor response

Share price should be lifted by announcement of investment plans

- NPV decision rule
  - Apply CAPM to estimate cost of capital
  - Discount all cash flows
  - Accept if NPV > 0
- Investment will add value to company,...
  - ... and to shareholders
  - Share price will increase

Eight major oils: Annual impairment and the oil price (USD bn/USD per bbl)



Source: ThomsonReuters.

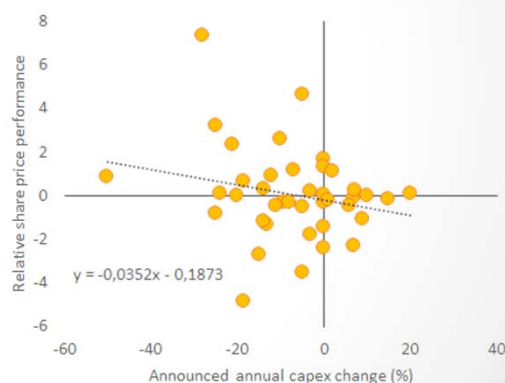


## Investment plans and investor response

Shareholders reward capital discipline and cost restraint

- Capex cuts have been rewarded
  - Esp among European companies
- Diverging views on valuation
  - Partly due to track record
  - Partly due to market outlook
- Variation in agency costs
  - Over time
  - Across companies

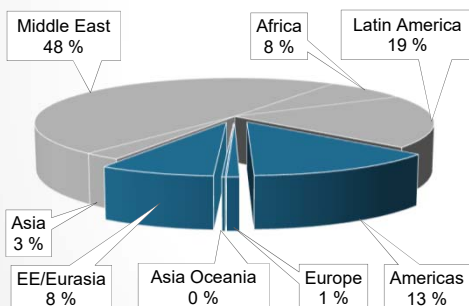
Announcement of capex plans and share price response (2013-2017, per cent)



## Long-term challenge: Growth

Opportunity constrained by access to reserves and demand outlook

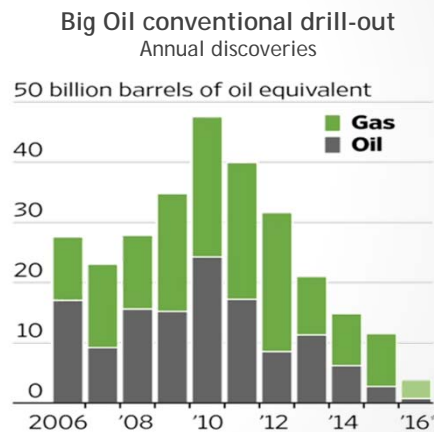
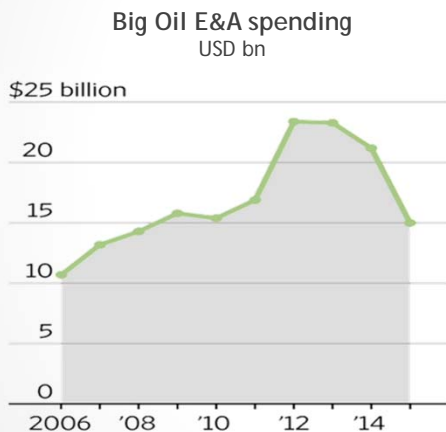
Constraints on access and supply  
Proven oil and gas reserves by global region



- Energy and climate policies
- Lost ground in transport
- Shale gale globalisation
- Markets shift eastward
- Emerging technologies
- Shifting OPEC behaviour
- Access, returns, and risk

## Access, returns and risks

Scarcity bites: Exploration yields in decline

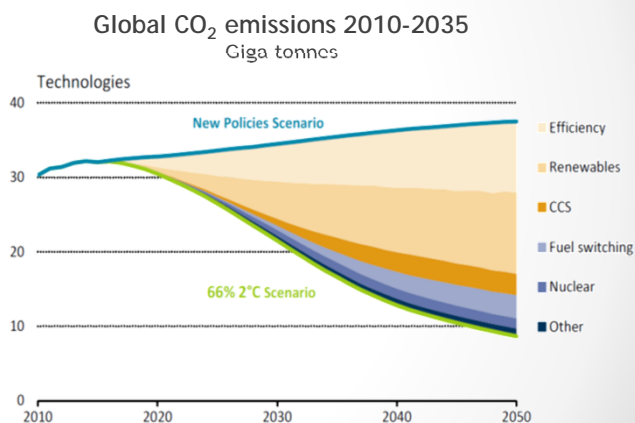


## Energy and climate policies

Values and volumes at risk due to rising cost of CO<sub>2</sub> emissions



COP21-CMP11  
**PARIS2015**  
UN CLIMATE CHANGE CONFERENCE



## Oil industry response

Short-term reaction: Speed up production, push policies, buy time

- Front-load production
  - More myopic investment behavior
  - Aversion to long-term projects
  - Focus on oil, and esp shale oil
- Bend the business framework
  - Community outreach
  - Energy analysis and dialogue
  - Stakeholder engagement

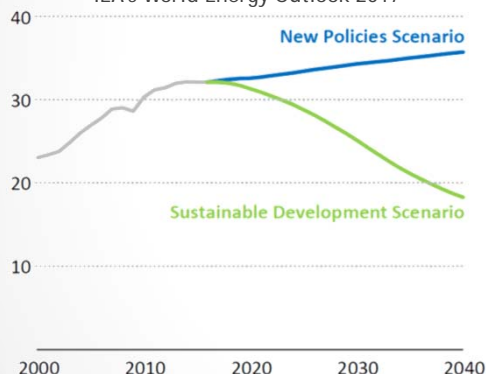
The emergence of energy scenarios  
Major Oil companies engage



## Oil companies and climate risk

Repositioning, readjustment, diversification

The emergence of energy scenarios  
IEA's World Energy Outlook 2017



- Repositioning
  - Fossil fuel portfolio
- Readjustment
  - Focus on CO<sub>2</sub> intensity
  - Energy efficiency
  - Cost efficiency
  - New KPIs
- Diversification
  - Natural gas
  - Power generation
  - New renewable energy

# Agency theory and behavioural finance

Insights for oil company investment behaviour

- Insufficient benchmark model
- Real-world frictions apply
  - Agency costs
  - Managerial biases
- Mind the gap
  - Cash flow
  - Opportunities

