“ An analytical study of fluctuating oil prices and its impact on OPEC Economies and top Oil and Gas Companies”

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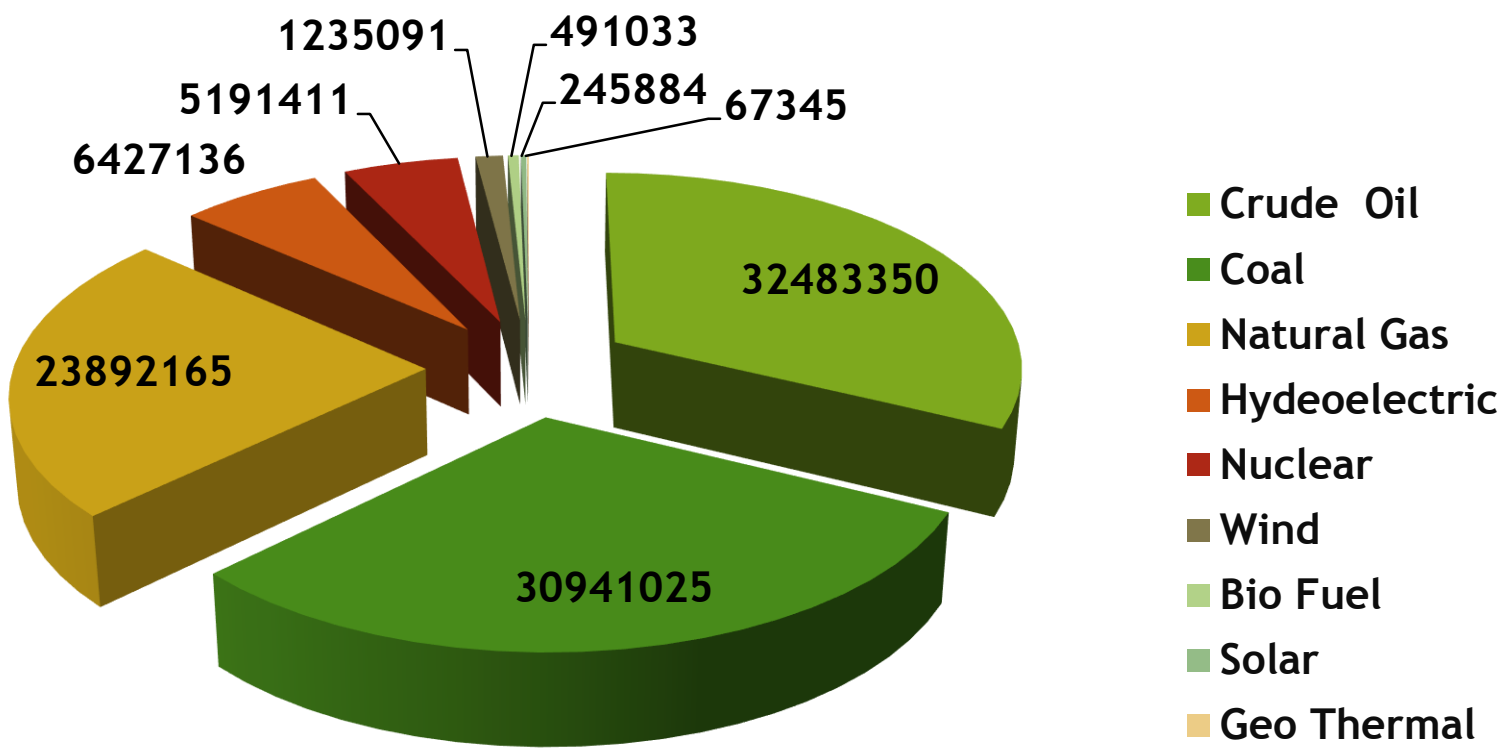
- **Oil is an important factor impacting economic development, social equality, environment and peace**

- **Oil price shocks have been held responsible for changes in monetary policy, for far-reaching labor market adjustments, and for changes in energy technologies.**

- **Insatiable need for oil has brought global warming and environmental changes**

World Energy production figures 2015 in BTU (British Thermal Unit)



Fluctuations in oil prices

- **Like prices of other commodities the price of crude oil experiences wide fluctuations in times of shortage or oversupply**

- **According to Professor Lutz Kilian and Daniel P Murphy *unexpected fluctuations* in *global real economic activity* *or unexpected declining oil supplies* are the main reasons behind recent oil price fluctuations**

- **Global Real Economic Activity - Actions that involve the production, distribution and consumption of goods and services at all levels within a society. Gross domestic product or GDP is one way of assessing economic activity, and can significantly impact business activity and profits, as well as inflation and interest rates.**

- **In the second half of 2014 oil prices fell sharply bringing to an end a four year period of stability and the fluctuations are presumed to be linked with *global real economic activity***

- **Significant impact of the independent variables like**

  -world proven crude oil reserves

  - world crude oil production,

  - world oil demand and consumption

  - exports of crude oil and

  - world consumption of refined products

  in determining the crude oil prices

- **Recent developments in global oil market have occurred against a long trend of greater than anticipated supply and less than anticipated**

- **Though the spot and future price of oil moves in tandem, the future and spot market for crude oil are two distinct markets and are linked by arbitrage conditions**

- **The spot price of oil can be traded in the future market where the oil price is determined by trading based on information of buying and selling inventories of oil and not by past data on oil prices, world oil production, or global real activity**
- **As it is possible to store oil, changes in oil inventories are possibly a third driver behind oil price fluctuations.**
- **The oil price shocks of the 1970s are associated with global macroeconomic conditions**

- **Kilian (2009) broke with the tradition of assuming most oil price changes reflect exogenous supply shocks**
- **Using a structural vector auto regression (SVAR), he showed that global flow supply shocks have actually contributed very little to oil price movements when compared to global flow demand shocks, especially in the last decade**
- **If the short-run price elasticity of gasoline demand is zero, speculation may drive up the real price of oil without affecting crude oil inventories.**
- **According to Kilian the real oil price innovation can be expressed as a linear combination of oil demand and oil supply shocks**

History of crude oil prices

- **Crude oil markets are subject to shocks and highly volatile**
- **Demand and supply cause large movements in oil prices**
- **Most oil price movements between 1948-1985 had an *increasing trend*.**
- **The pattern changed in 1986 when there were larger price increases and decreases that reflected a substantial rise in the volatility of real oil price**
- **The crude oil price cycle may extend over several years responding to changes in demand as well as OPEC and non-OPEC supply, impact of geopolitical events, supply, demand and crude oil reserves or inventories and worldwide crude oil production**

- **Recent findings by John Baffes, Ayhan Kose, Franziska Ohnsorge and Marc Stocker and including Derek Chen, Damir Cosic, Xinghao, Gong, Raju Huidrom, Ekaterine Vashakmadze, Jiayi Zhang and Tianli Zhao (Global Economic Prospects; January 2015) identifies the short term and long term drivers of oil price decline.**

- **The causes of the recent sharp drop in oil prices are the trends in supply and demand, Changes in OPEC objectives, receding geopolitical concerns about supply disruptions and US dollar appreciation.**

- According to The Impact of Oil Demand and Oil Supply Shocks on the Real Price of Oil and on the Economy by Lutz Kilian (2012) the three policy implications are:

- **Increased regulation of oil traders will not keep the real price of oil down.**

- **Increased domestic oil production in the U.S. will not lower the real price of oil materially**

- **Efforts to revive the world economy will cause the real price of oil to recover, creating a policy dilemma**

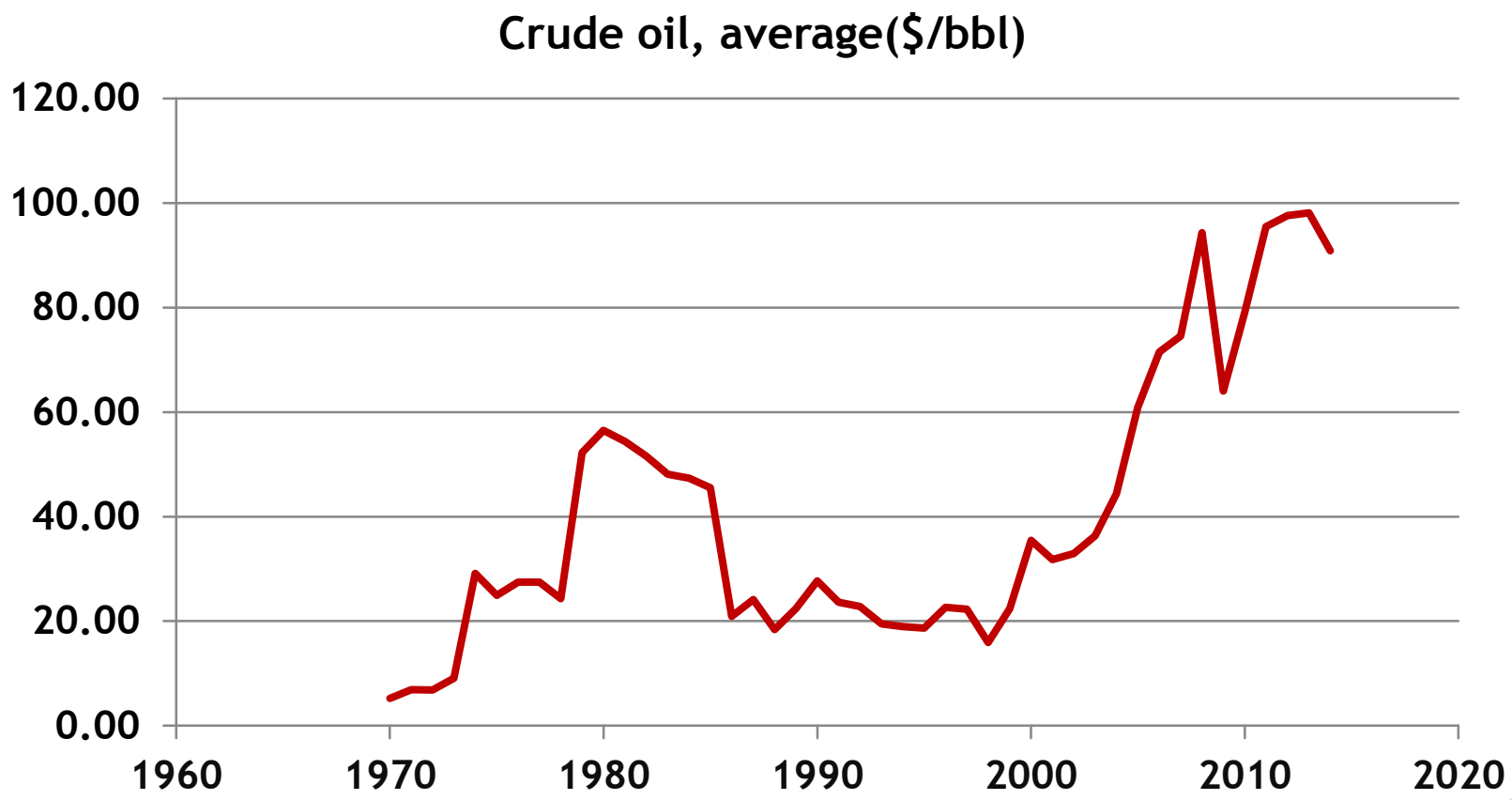
- **Alternative sources of energy is another factor for the recent plunge in oil prices**

History of crude oil prices

Year	Price Range in USD per barrel
1948 -1970	$2.5 - $3
1974 -1978	$12.52 - $14.57
1979-1980	$14 - $35.
1981- 1986	$10 -$15
1990 -1991	$20 - $25
1997-1998	$17- $18
2000- 2003	$30
2004 -2008	$41 - $140
2009 -2014	$61- $90

The history of oil prices dates back to 152 years of economic and political events that shaped the price, wars, economy, domestic policy, Organization of the petroleum exporting countries (OPEC) and price controls

Crude Oil Price from 1970-2014



Crude Oil Reserves

- **The long term ability of the oil market to meet demand depends on the magnitude of available reserves.**
- **Oil reserves are the amount of technically and economically recoverable oil.**
- **Oil industries and governments across the globe are investing in unconventional oil sources due to the increasing scarcity of conventional oil reserves**
- **Reserves may be for a well, for a reservoir, for a field, for a nation, or for the world.**
- **Different classifications of reserves are related to their degree of certainty.**

- **The total estimated amount of oil in an oil reservoir, including both producible and non-producible oil, is called oil in place.**

- **Due to limitations in petroleum extraction technologies, only a fraction of this oil can be brought to the surface, and it is only this producible fraction that is considered to be reserves.**

- **Proven reserves are those reserves claimed to have a reasonable certainty (normally at least 90% confidence) of being recoverable under existing economic and political conditions, with existing technology**

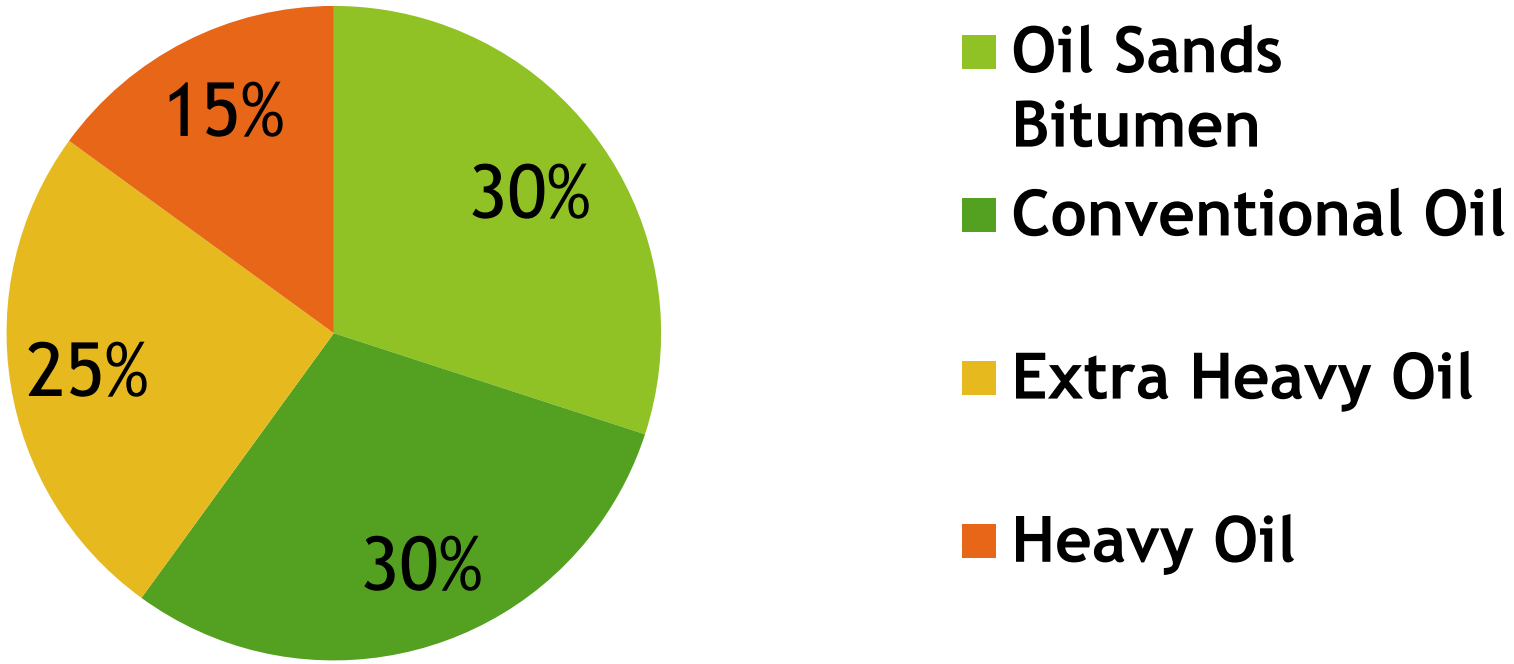
- **Industry specialists refer to this as P90 (i.e., having a 90% certainty of being produced). Proven reserves are also known in the industry as 1P.**

- **Proven reserves are further subdivided into "proven developed" and "proven undeveloped"**

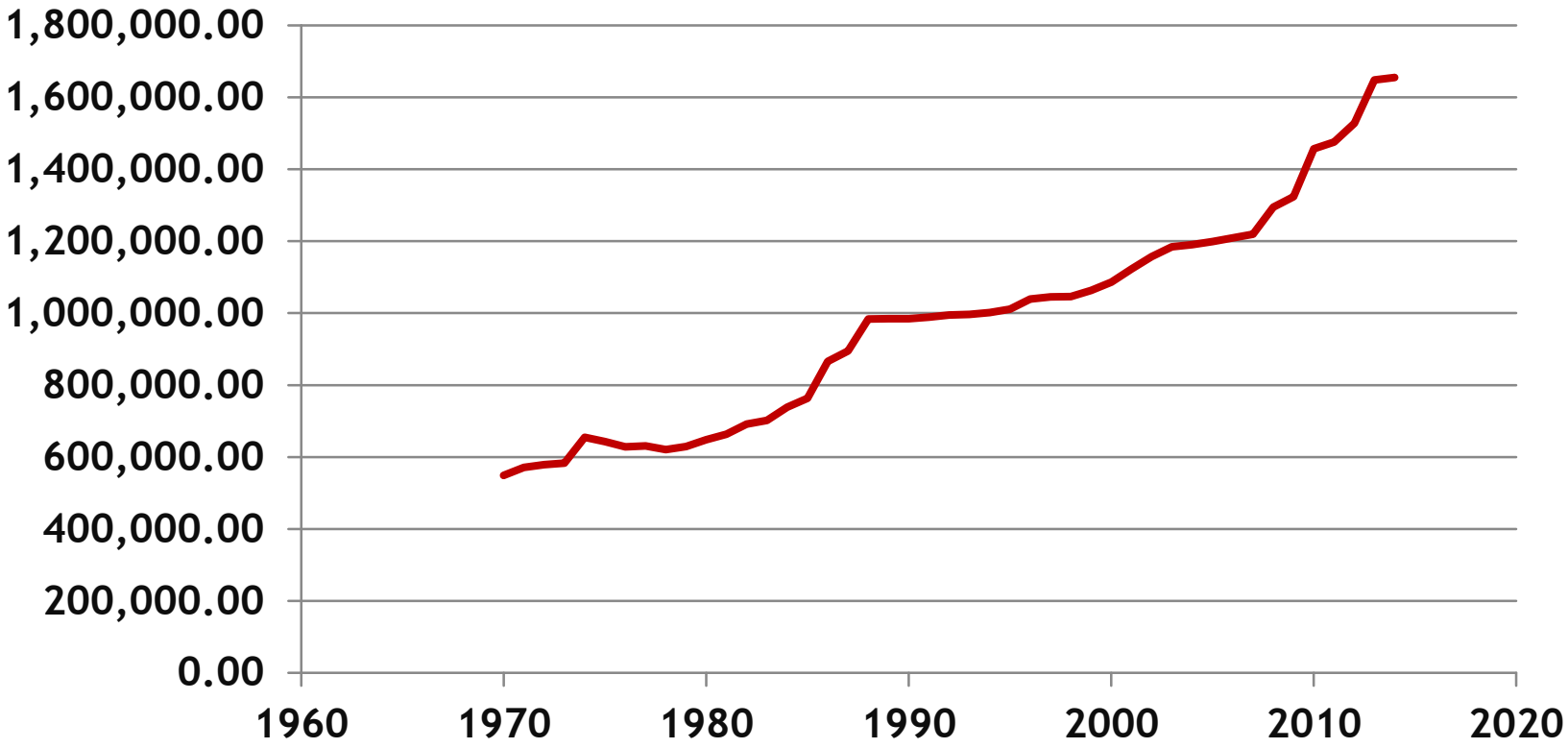
- **Proven developed reserves are reserves that can be produced with existing wells and perforations, or from additional reservoirs where minimal additional investment**

- **Proven undeveloped reserves require additional capital investment (e.g., drilling new wells) to bring the oil to the surface**

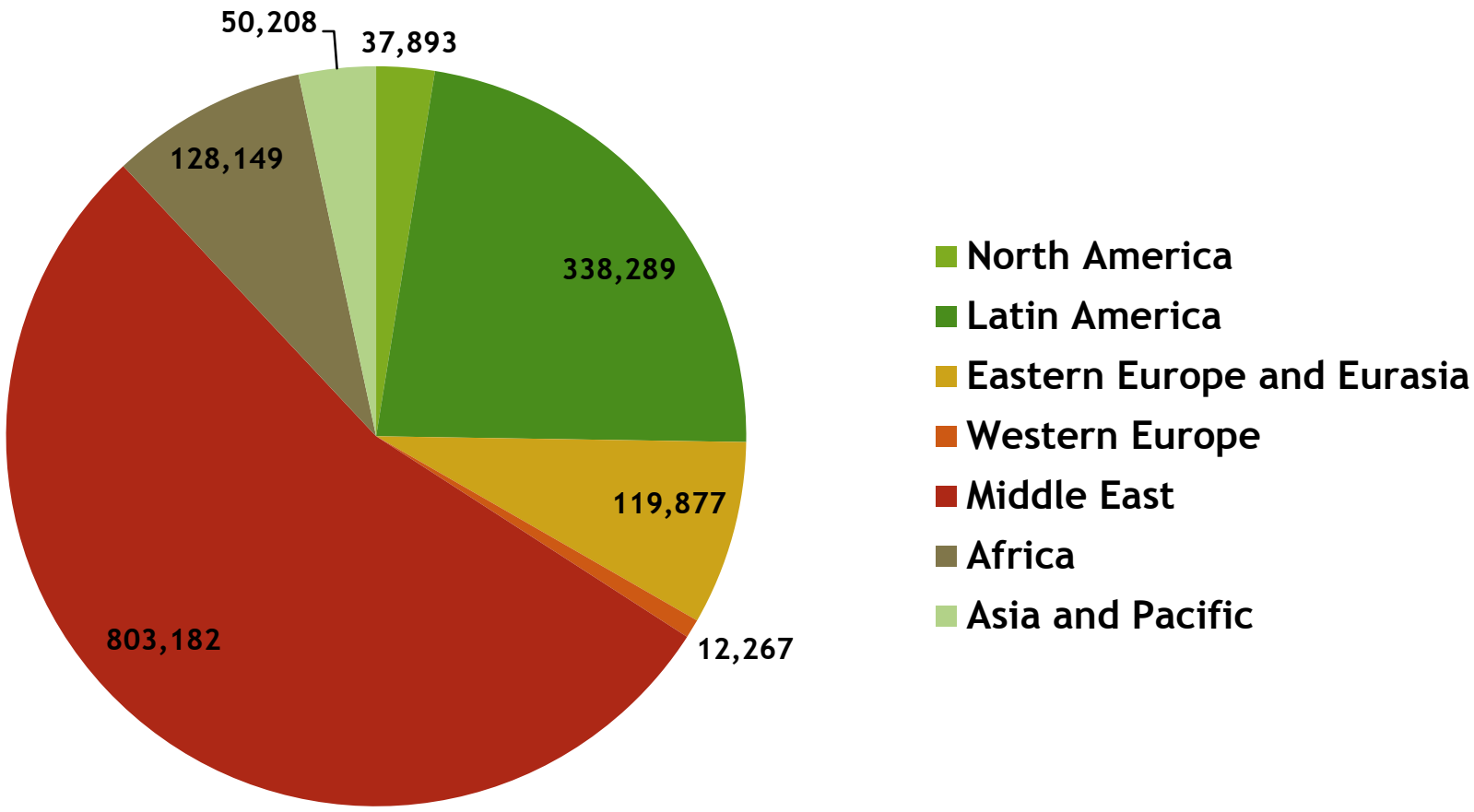
Total World Oil Reserves in Percentage



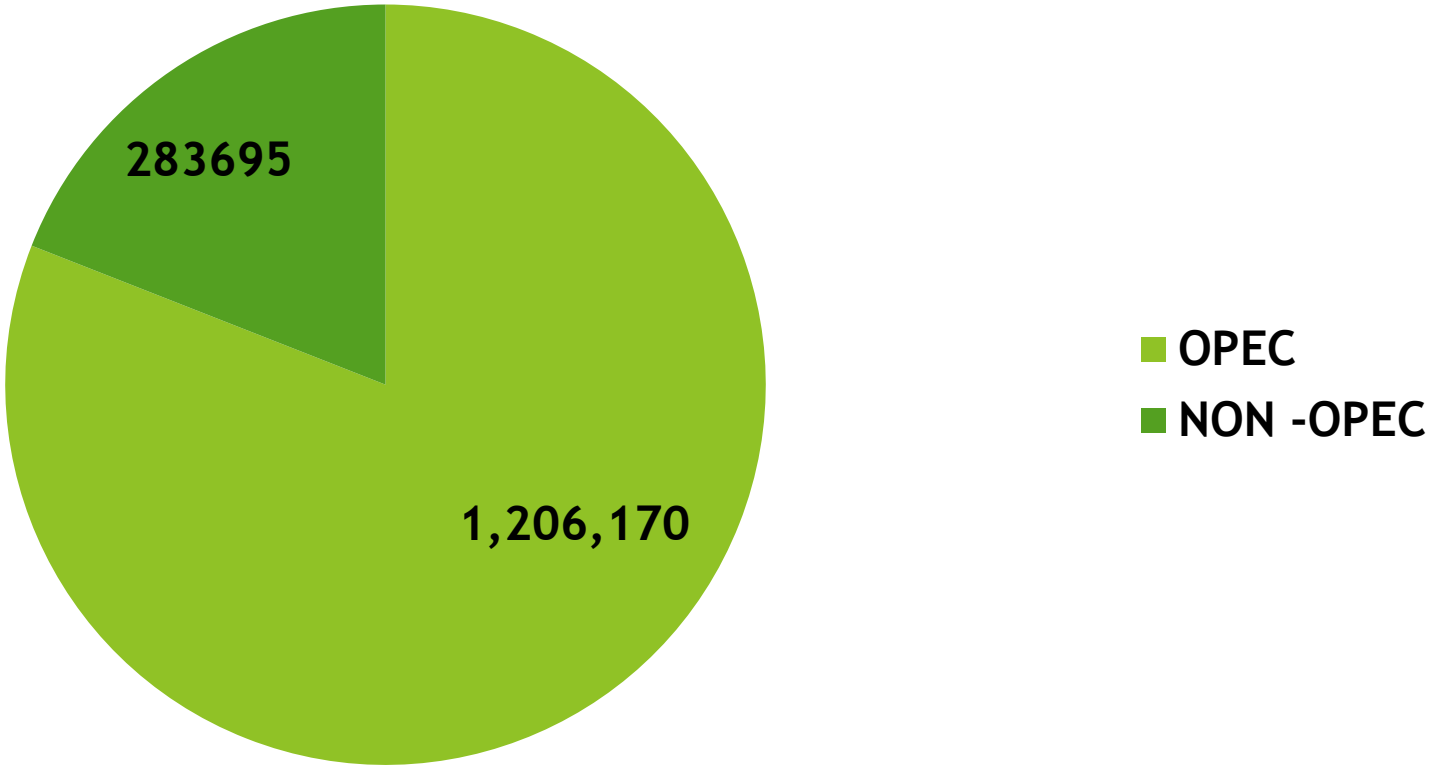
World Proven Crude Oil Reserves in Million barrels from 1970-2014



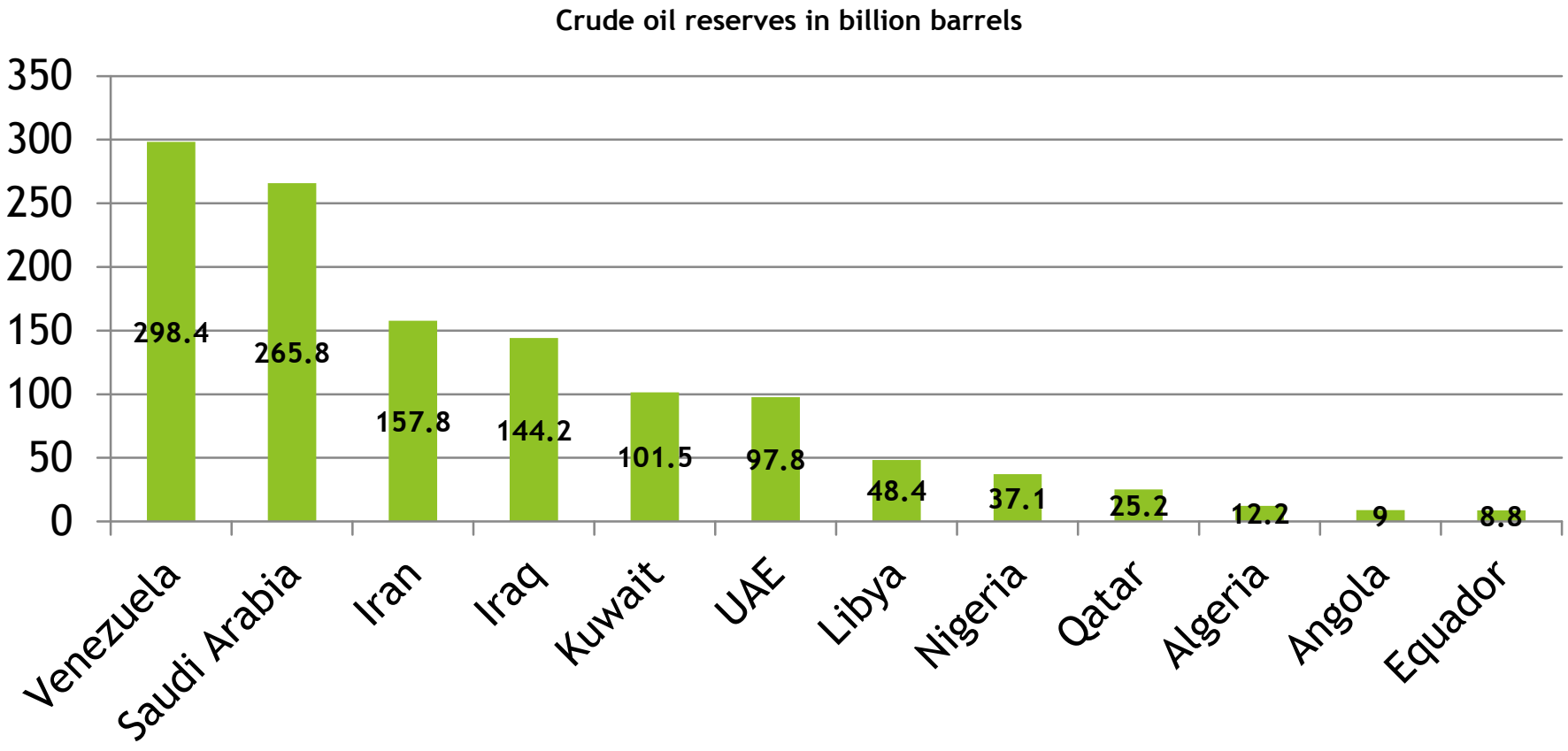
World Proven Crude Oil Reserves by region in Million barrels in 2013



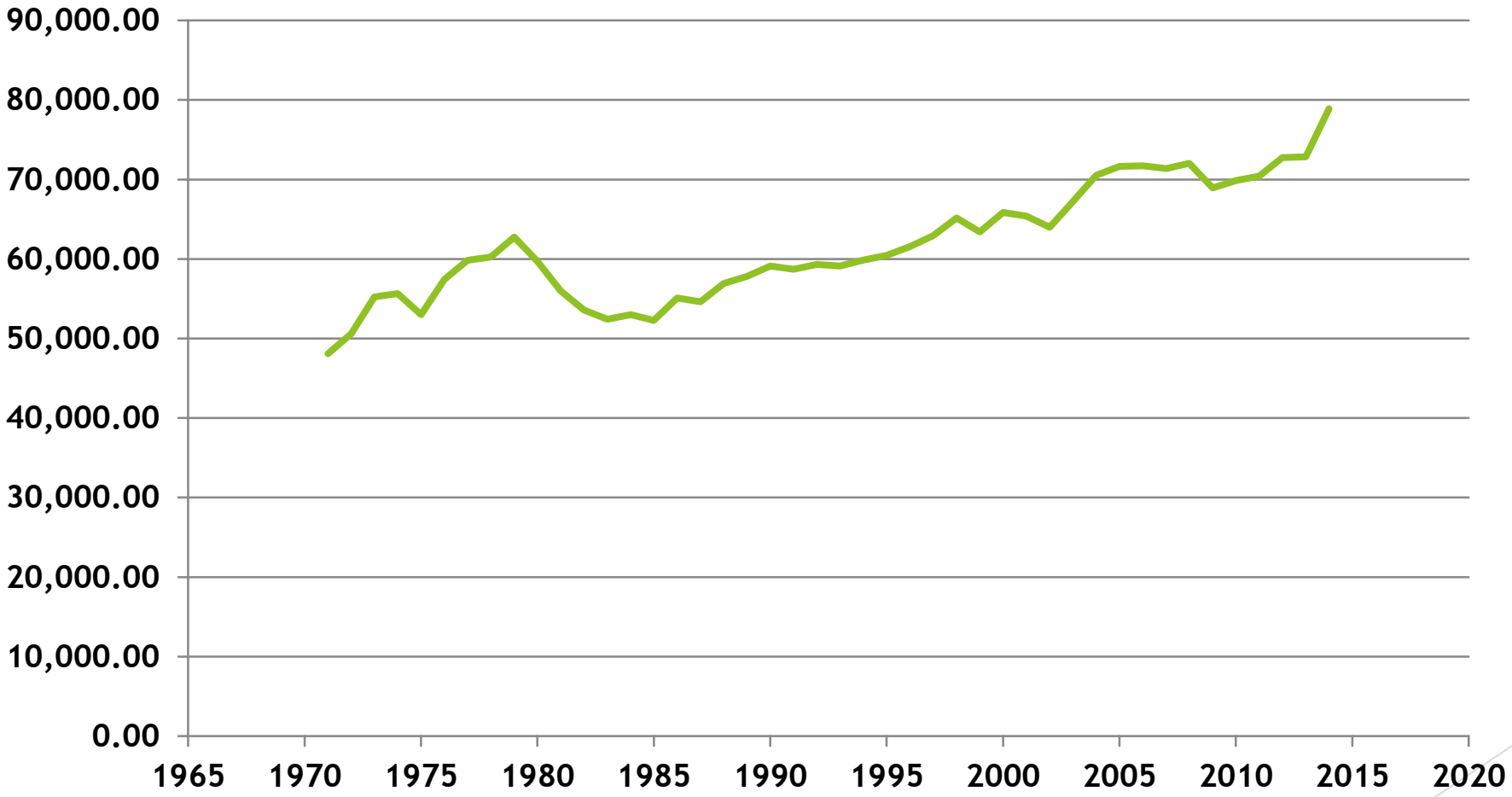
World Proven Crude Oil Reserves in OPEC and NON OPEC Countries as on 2013 in mb



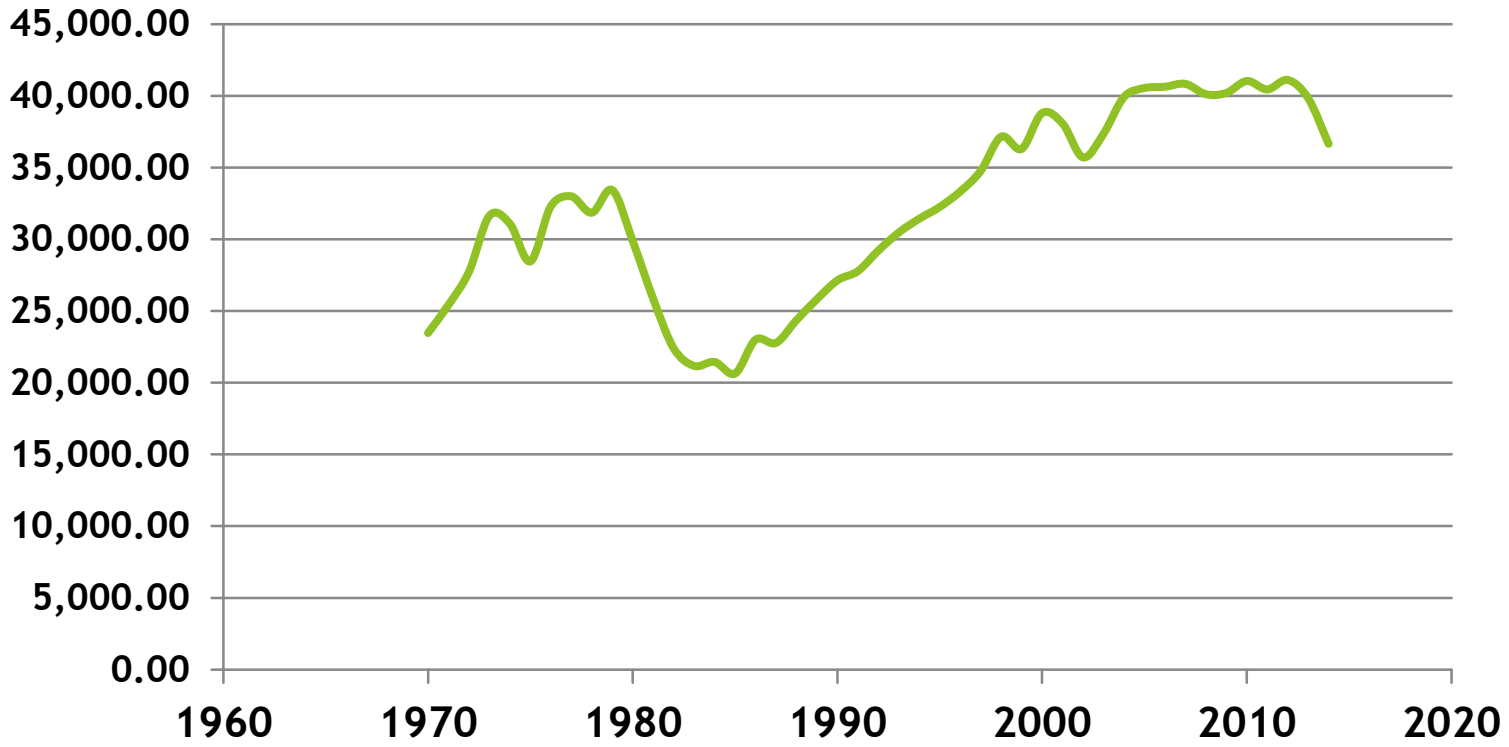
Crude oil reserves in OPEC Member Countries in billion barrels as on 2013



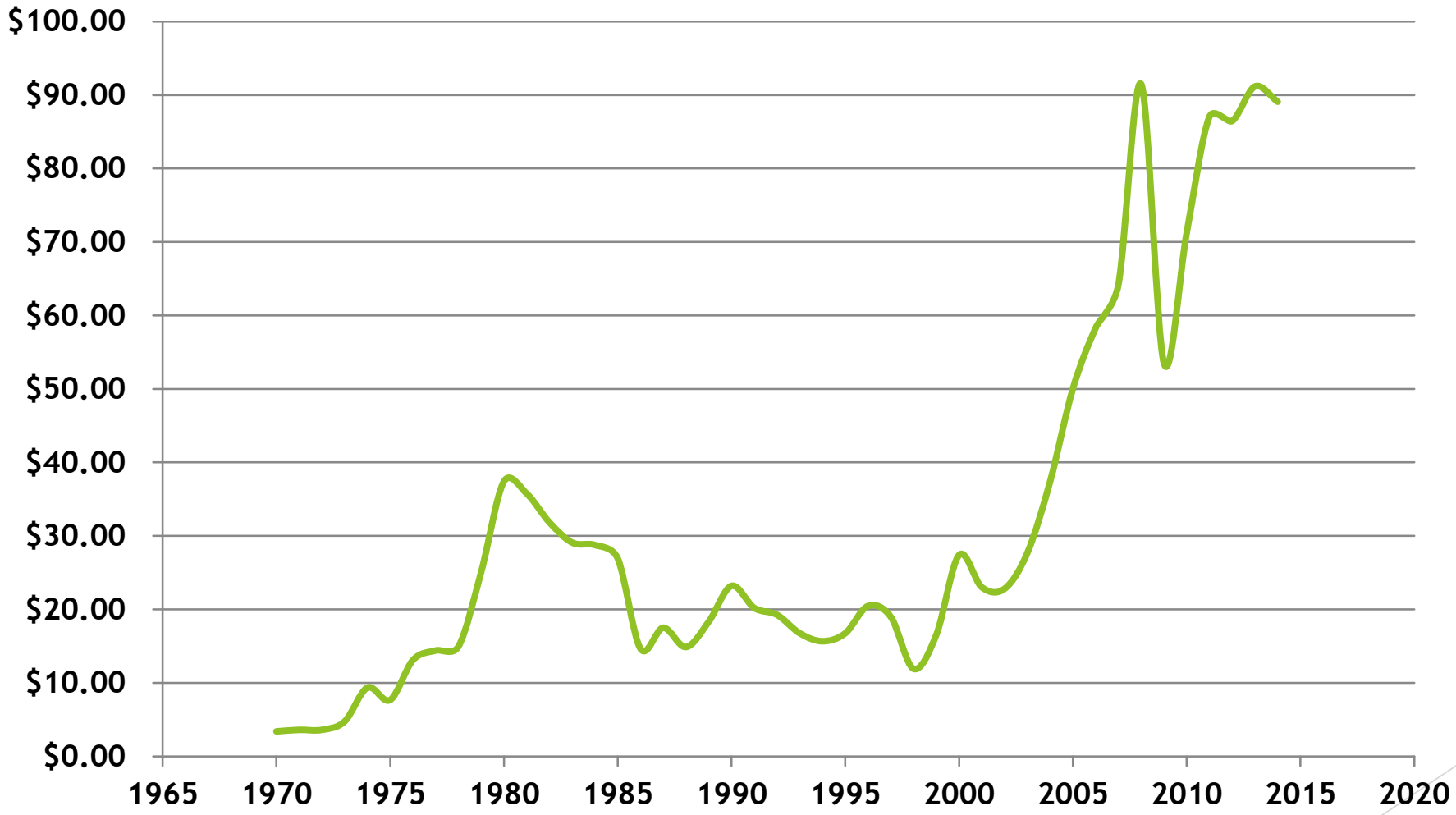
World crude oil production in (1,000 b/d) from 1970-2014



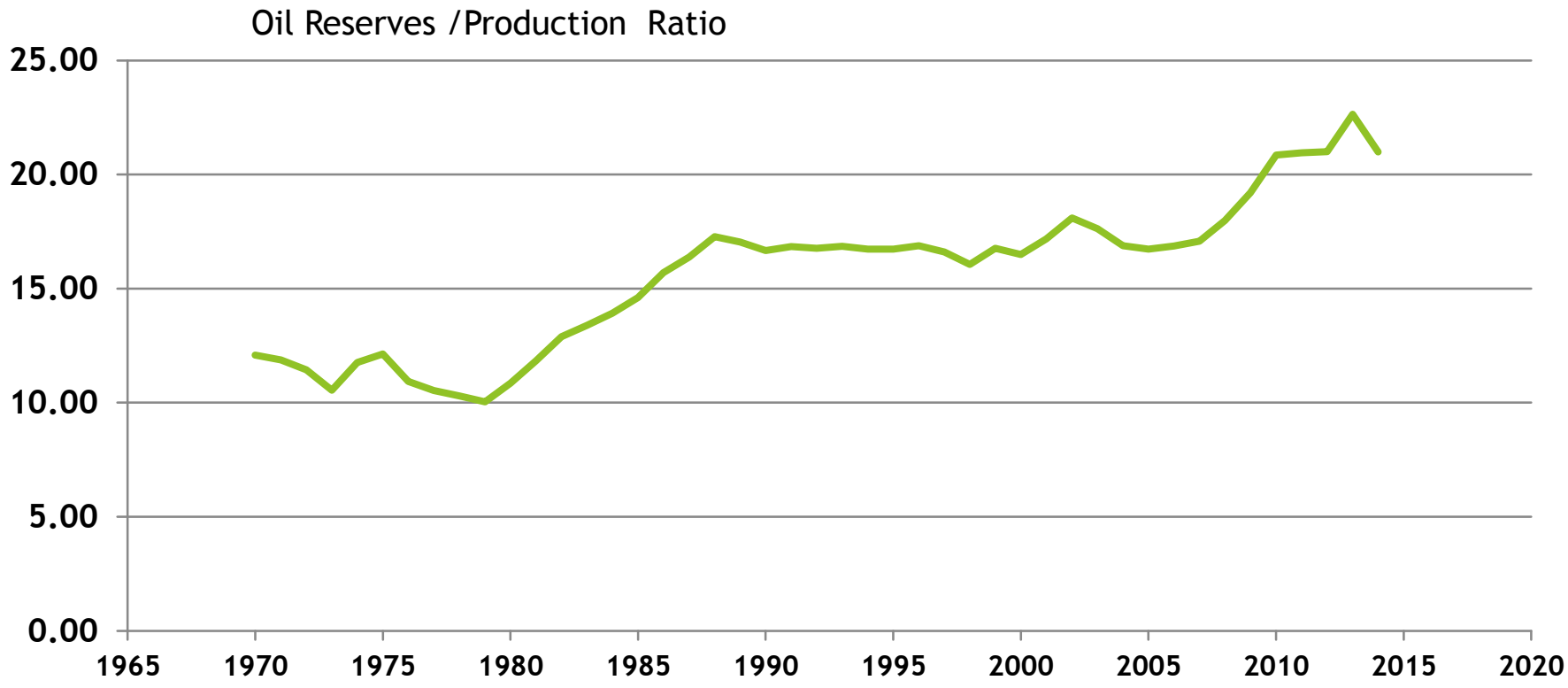
World exports of crude oil (1,000 b/d) 1970-2014



World consumption of refined products 1970-2014 (1,000 b/d)



World Oil Reserves Production Ratio 1970-2014



Research Questions

- **Whether world proven crude oil reserves, production, consumption of crude oil and refined products and exports impact crude oil prices.**
- **Which of the independent variables has a high impact on crude oil prices**
- **Whether there is any significant correlation between the independent variables**
- **Whether there is any relation between the world proven crude oil reserves production ratio and crude oil price**

Data Analysis

- **The secondary data is analyzed with Multiple Regression Analysis in Data Analysis- Add In in Excel**
- **In this study crude oil price is the dependent variable which is regressed against five independent variables – World proven Crude Oil Reserves, World Crude Oil Production, Consumption, Exports and World consumption of refined products. It is assumed that the error μ is independent with constant variance. The regression model is =**
- $y = \beta_0 + \beta_1 WCOR + \beta_2 WCOP + \beta_3 WCOC + \beta_4 WCOE + \beta_5 WCOCRP + \mu$

Correlation Coefficient between dependent variable crude oil and independent variables

Independent Variables	Crude Oil Price
World Proven Crude Oil Reserves	0.7
World crude oil production	0.7
World crude oil consumption	0.7
World exports of crude oil	0.6
World Consumption of refined products	0.8
World Oil Reserves Production Ratio	0.6

Correlation Coefficient between dependent variables

Description	World Proven Crude Oil Reserves	World crude oil production	World crude oil consumption	World exports of crude oil	World Consumption of refined products	World Oil Reserves Production Ratio
World Proven Crude Oil Reserves	1	0.87	0.26	0.71	0.94	0.95
World crude oil production	0.87	1	0.31	0.89	0.96	0.71
World crude oil consumption	0.26	0.31	1	0.27	0.29	0.19
World exports of crude oil	0.71	0.89	0.27	1	0.84	0.53
World Consumption of refined products	0.94	0.96	0.29	0.84	1	0.83
World Oil Reserves Production Ratio	0.95	0.71	0.19	0.53	0.89	1

Regression output

Independent variable	Crude Oil Price P values at (95% Confidence Interval)
WCOR (World Crude Oil Reserves)	0.3
WCOP (World Crude Oil Production)	0.04
WCOC (World Crude Oil Consumption)	0.02
WCOE (World Crude Oil Exports)	0.02
WCOCRP (World Consumption of Refined Products)	0.9
Number of Observation	44
R Squared	0.744
Adjusted R Square	0.71
F - Statistics	22.12

- **World proven crude oil reserves, production, export do not significantly impact the crude oil prices like oil demand or consumption.**
- **Oil prices are linked, like those of other commodities, to the levels of economic activity in the industrial nations.**
- **Oil prices tend to be volatile partly due to variations in the business cycle.**
- **Long term developments in supply and demand have also played important roles in the recent decline in oil prices but global oil markets have occurred against a long term trend of greater than anticipated supply and less than anticipated demand.**

- **The impact of changing oil prices on macroeconomic factors of OPEC economy which constitutes *eighty one percent* of the world proven crude oil reserves and has *forty percent market share***

- **OPEC was established in 1960 with five founding members: Iran, Iraq, Kuwait, Saudi Arabia and Venezuela and presently stands with twelve member countries**

- **Because of this market share OPEC's actions can and do influence international oil prices**

- **Brent Crude Oil Spot Price FOB (Dollars per barrel) is the independent variable which is regressed against the dependent variables: GDP at current market price, exports, current account and exchange rate from 2007 to 2014**

- **According to 2013 estimates, almost 81% of the world's proven oil reserves are located in OPEC Member Countries, with the bulk of OPEC oil reserves in the Middle East, amounting to 66% of the OPEC total**
- **ROLE OF OPEC**
- **To coordinate and unify the petroleum policies of its member countries**
- **Ensure the stabilization of oil markets**
- **Secure an efficient, economic and regular supply of petroleum to consumers**
- **Provide a steady income to producers**
- **Provide a fair return on capital for those investing in the petroleum industry**
- **Actively manage oil production in its member countries by setting production targets.**

- **The existence of a negative relationship between oil prices and macroeconomic activity has become widely accepted since Hamilton's (1983 work) indicating that oil price increase reduced US output growth from 1948-1980**

- **Mork (1989) shows an even stronger negative correlation between oil price increase and output growth than Hamilton.**

- **Clarida and Gali (1994), considers the long-run nexus between oil price and real exchange rate using a monthly panel data for G7 countries**

FINDINGS

Country	GDP	Exports	Current Account	Exchange Rate
Algeria	0.4	0.8	0.4	-0.4
Angola	0.2	0.6	0.4	-0.06
Ecuador	0.19	0.6	0.02	NA
Iran	0.33	0.5	0.3	-0.3
Iraq	0.19	0.4	0.7	-0.19
Kuwait	0.4	0.9	0.5	-0.6
Libya	0.18	-0.07	0.3	-0.4
Nigeria	0.07	0.2	0.4	-0.3
Qatar	0.2	0.2	0.2	NA
Saudi	0.2	0.6	0.5	NA
UAE	0.2	0.14	0.2	NA
Venezuela	0.13	0.7	0.5	0.05

Regression Output: Macroeconomic factors and crude oil prices

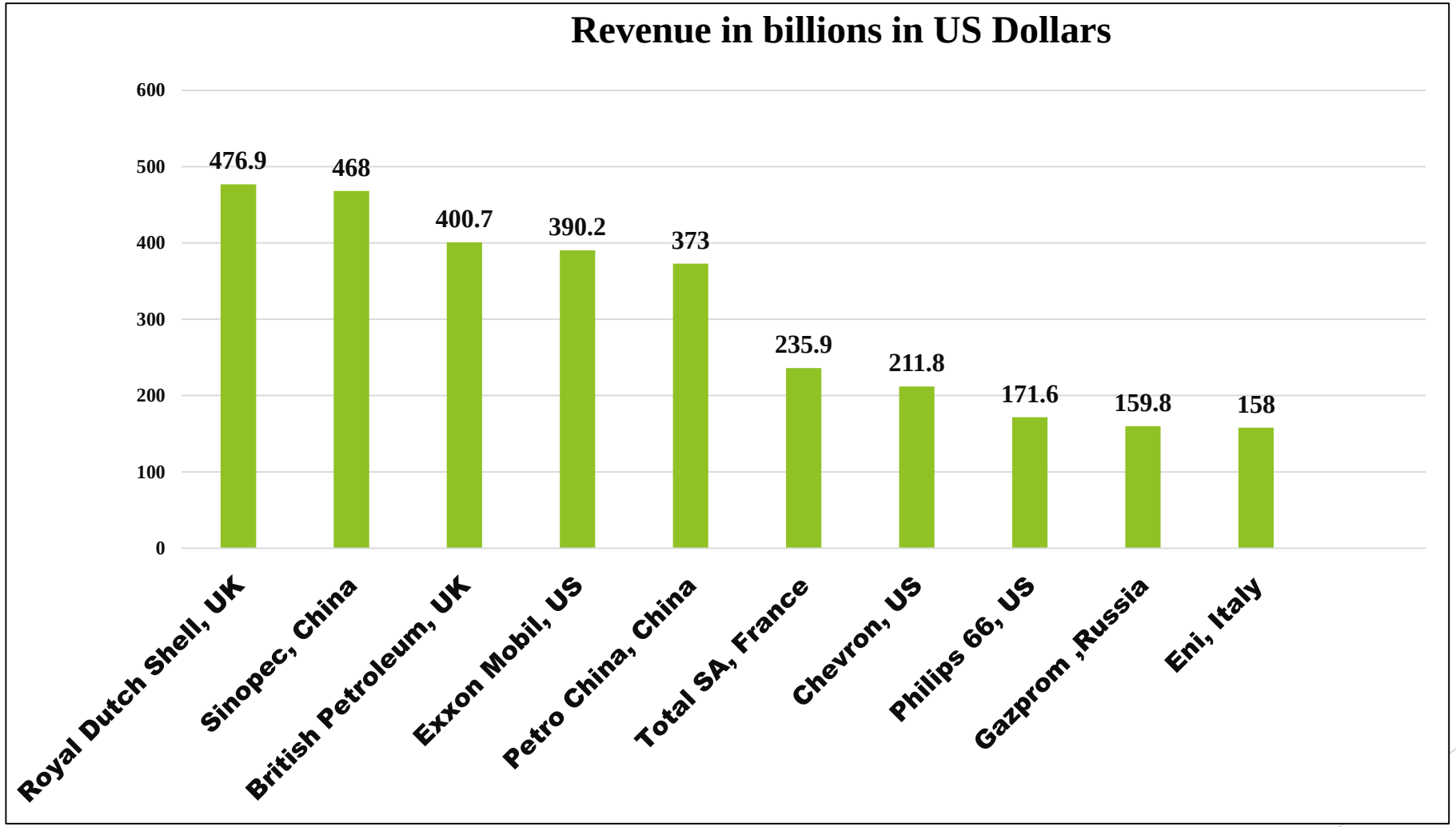
Countries	GDP at current market Prices		Exports		Current Account balance		Exchange Rate	
OPEC	R^2	F	R^2	F	R^2	F	R^2	F
Algeria	0.12	0.44	0.6	0.02	0.4	0.10	0.19	0.31
Angola	0.009	0.83	0.4	0.12	0.2	0.2	0.04	0.6
Ecuador	0.008	0.84	0.3	0.14	0.09	0.5	1	NA
Iran	0.06	0.5	0.3	0.17	0.17	0.3	0.17	0.3
Iraq	0.01	0.79	0.13	0.4	0.6	0.03	0.02	0.7
Kuwait	0.15	0.3	0.8	0.005	0.26	0.24	0.3	0.12
Libya	0.02	0.73	0.005	0.8	0.25	0.24	0.18	0.3
Nigeria	0.0001	0.97	0.05	0.6	0.4	0.12	0.3	0.2
Qatar	0.02	0.7	0.012	0.8	0.04	0.6	NA	NA
Saudi	0.03	0.6	0.3	0.17	0.3	0.16	NA	NA
UAE	0.02	0.7	0.003	0.9	0.03	0.6	NA	NA
Venezuela	0.01	0.8	0.5	0.06	0.3	0.19	0.001	0.9

- **Historic GDP decreased by around 2% after 10 % increase in oil price.**
- **When oil price increases there is a clear negative impact on economic growth while oil price declines don't affect economic activity significantly.**
- **But the most important findings according to the present study is fluctuating oil prices do not impact significantly the macroeconomic indicators of OPEC economies with 81% of the world's proven reserves, producing 40% of world's crude oil and OPEC's oil exports represents 60% of the total petroleum traded internationally.**
- **Abrupt changes in oil prices do not affect the GDP of OPEC economy, rather impact of changes in an oil economy occurs through cost and demand**

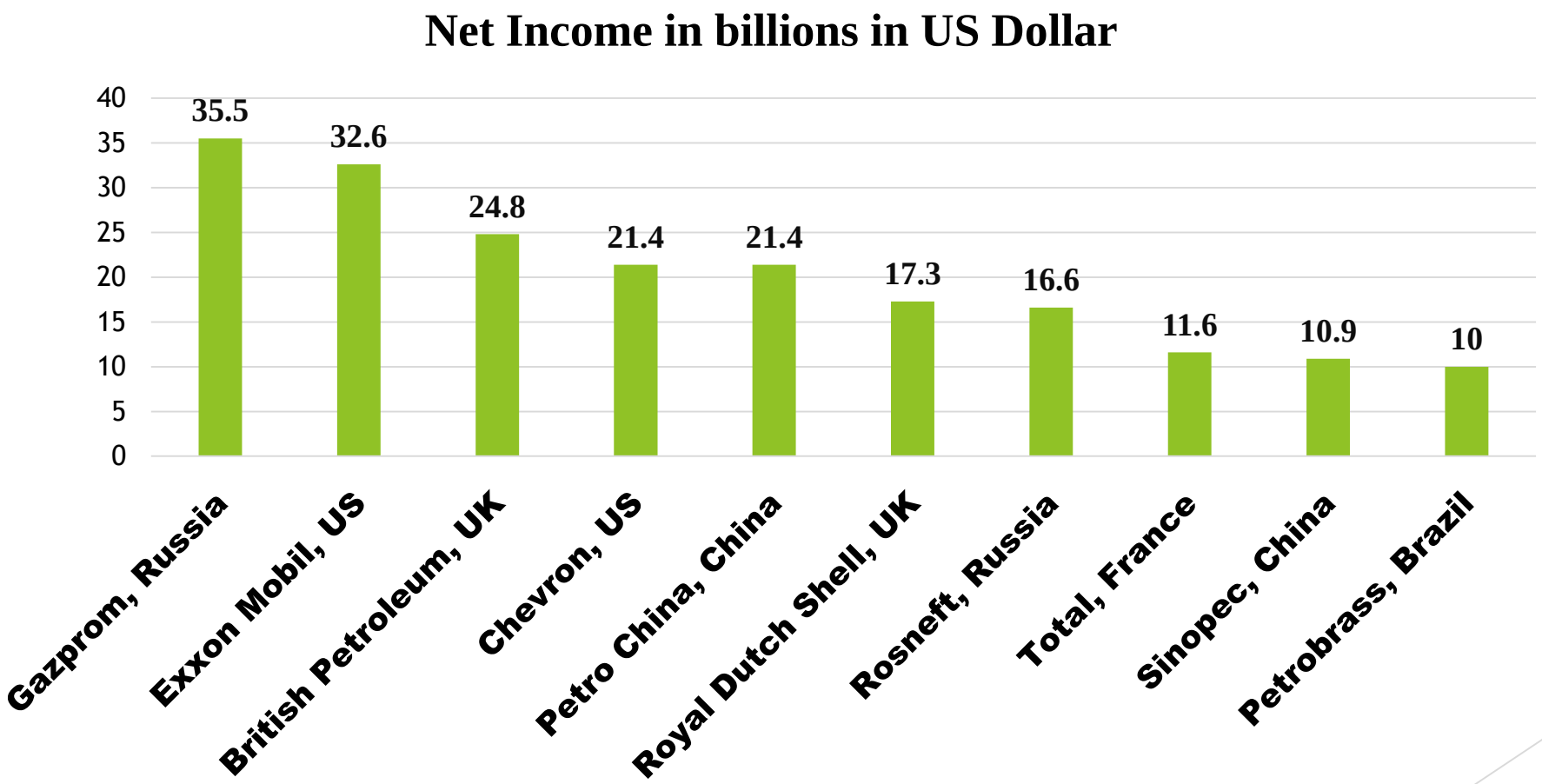
Oil Prices and top oil Companies

PetroChina

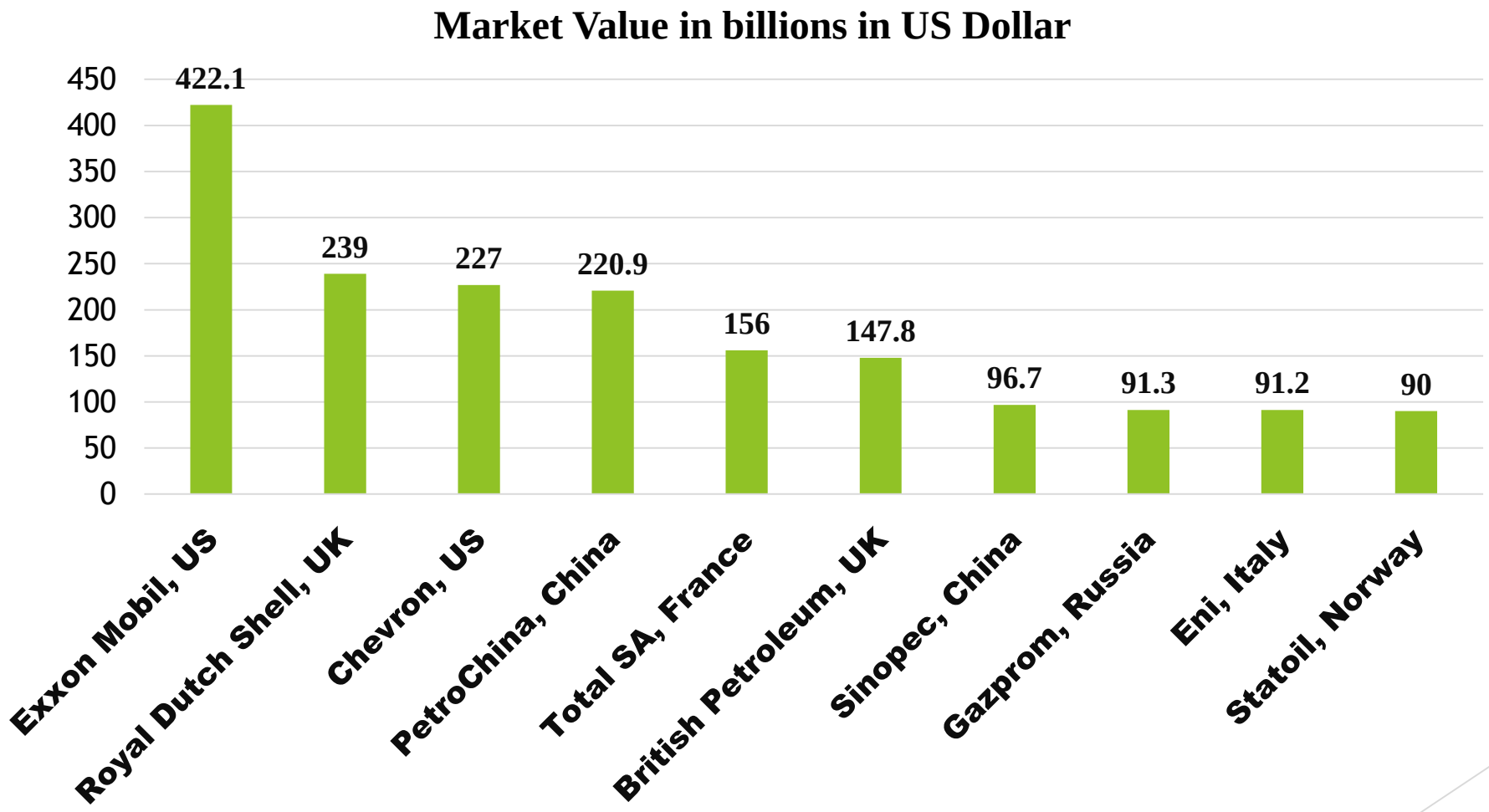
2014 Top 10 Oil and Gas Companies Worldwide based on Revenue



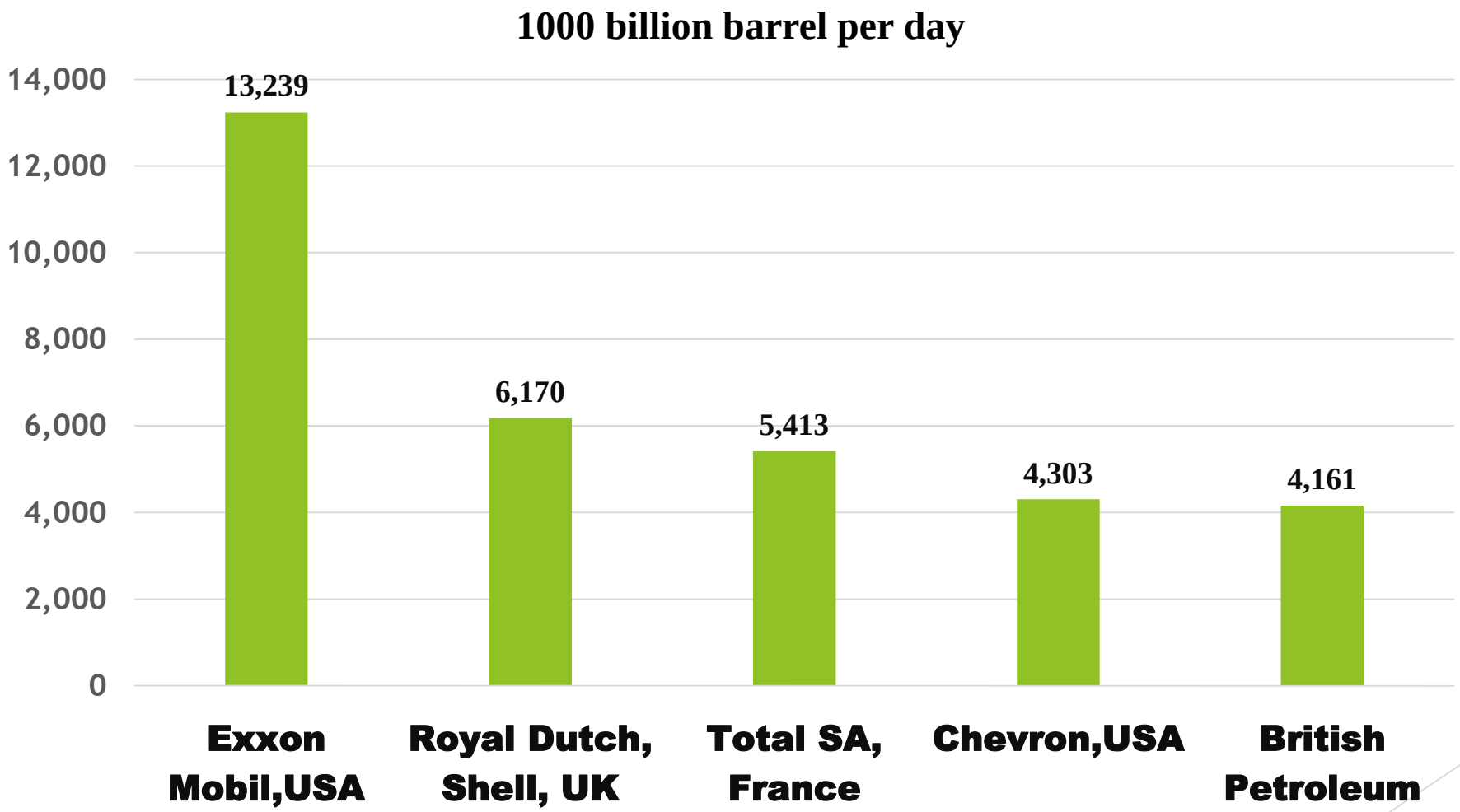
2014 Top 10 Oil and Gas Companies Worldwide based on Net Income



2014 Top 10 Oil and Gas Companies Worldwide based on Market Value



Principal operations of the major oil companies



Financial Performance Indicators

Profitability Ratios: ***A*** **class of financial metrics that are used to assess a business's ability to generate earnings as compared to its expenses and other relevant costs incurred during a specific period of time.**

- ***Return on Assets (ROA)*** **- ROA gives an idea as to how efficient management is at using its assets to generate earning**
- ***Return on Equity (ROE)*** **- ROE measures a corporation's profitability by revealing how much profit a company generates with the money shareholders have invested**
- ***Return on Capital (ROC)*** **- ROC measures the return that an investment generates for capital contributors, i.e. bondholders and stockholders**

- **Efficiency Ratio: Efficiency Ratios are used to analyze how well a company uses its assets and liabilities internally.**
- **Asset Turnover Ratio (ATR): The Asset Turnover ratio is an indicator of the *efficiency* with which a company *is deploying its assets* and a higher ratio is *recommended***
- **Inventory Turnover Ratios (ITR): The inventory turnover ratio is a common measure of the *firm's operational efficiency* in the management of its asset.**
- **Receivables Turnover Ratios (RTR): Accounts receivable turnover ratio is an efficiency measurement that helps management analyze its receivable. A low turnover ratio represents an opportunity to collect excessively old accounts receivable that are unnecessarily tying up working capital**

- **Liquidity Ratio (LR): Liquidity ratios are the ratios that measure the ability of a company to meet its short term debt obligations.**

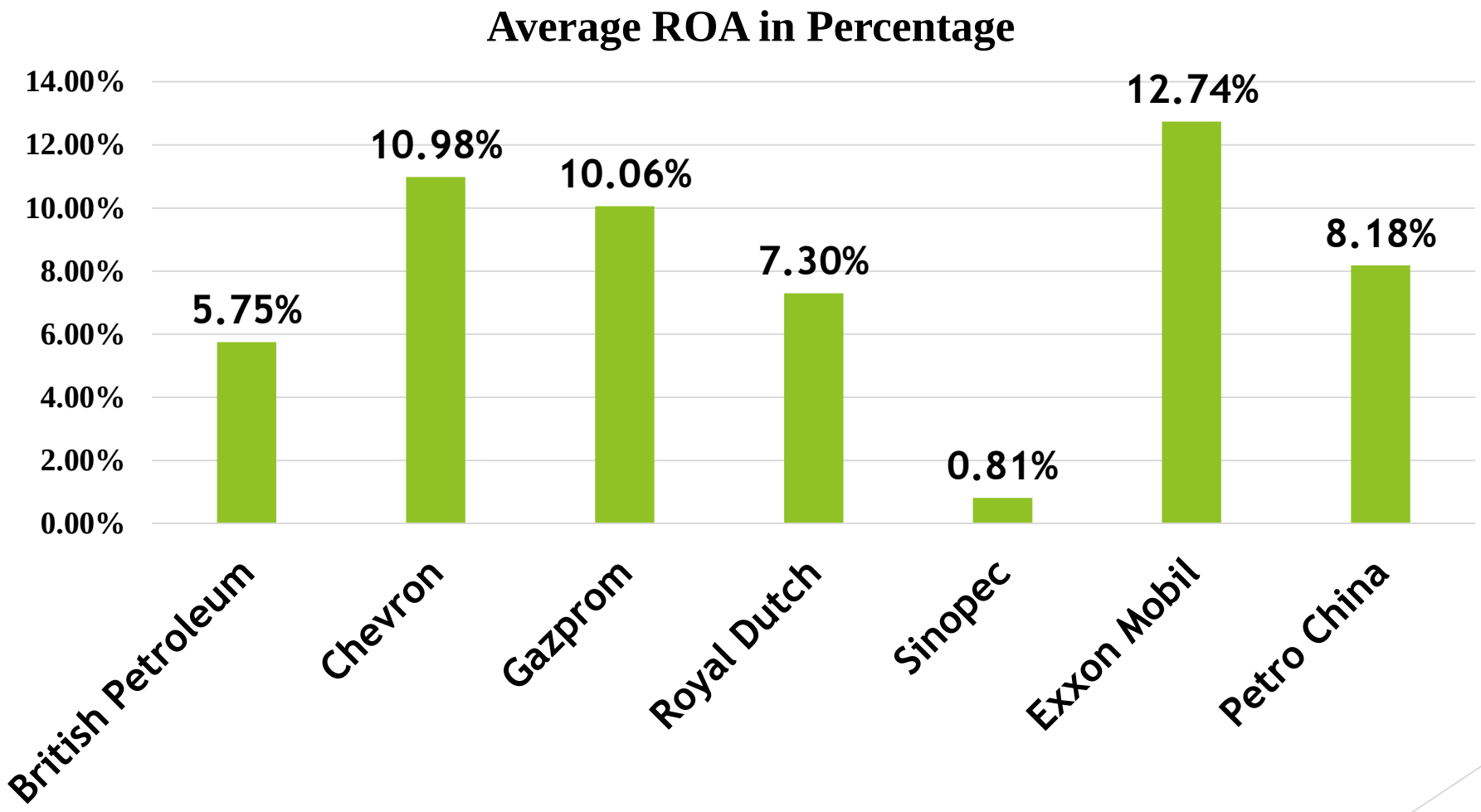
- **Current Ratio (CER)*:* The current ratio is a liquidity and efficiency ratio that measures a firm's ability to pay off its short-term liabilities with its current assets. A current ratio between 1 and 1.5 is considered standard.**

- **Debt Equity Ratio (DER): The debt-to-equity ratio is a financial ratio indicating the relative proportion of shareholders' equity and debt used to finance a company's assets. A ratio of 0.3 or lower is considered healthy by many analysts**

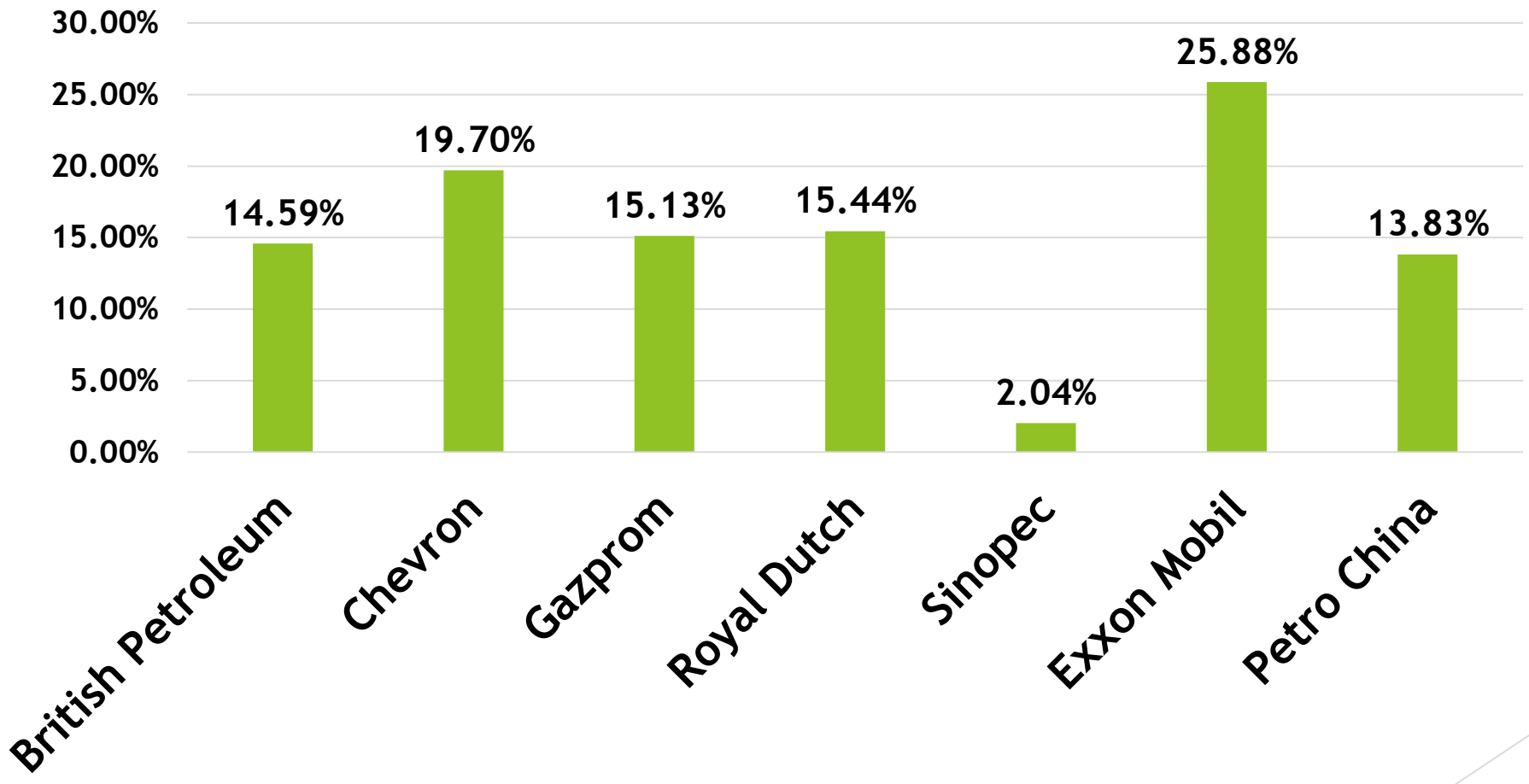
Ranking based on Financial Performance Indicators

Ranks	ROA	ROE	ROC	ATR	CER	DER
I	Exxon Mobil	Exxon Mobil	Exxon Mobil	Sinopec	Gazprom	BP
II	Chevron	Chevron	Chevron	Exxon Mobil	Chevron	Petro China
III	Gazprom	RDS	RDS	RDS	BP	Gazprom
IV	Petro China	Gazprom	Gazprom	BP	RDS	RDS
V	RDS	BP	Petro China	Chevron	Exxon Mobil	Chevron
VI	BP	Petro China	BP	Petro China	Petro China	Exxon Mobil
VII	Sinopec	Sinopec	Sinopec	Gazprom	Sinopec	Sinopec

Average Return on Assets of Top Oil and Gas Companies



Average Return on Equity of Top Oil and Gas Companies



Findings

Oil Company	ATR		ITR		RTR		DER		ROA	
	R^2	p	R^2	p	R^2	P	R^2	p	R^2	p
BP	0.6	*0.03*	0.5	*0.05*	0.4	0.08	0.03	0.6	0.06	0.5
Chevron	0.04	0.63	0.2	0.2	0.27	0.2	0.03	0.68	0.36	0.15
Gazprom	0.33	0.17	NA	NA	0.01	0.8	0.4	0.1	0.002	0.9
Royal Dutch Shell	0.60	*0.03*	0.65	*0.02*	0.53	*0.06*	0.4	0.12	0.23	0.2
Sinopec	0.3	0.13	0.56	*0.04*	0.32	0.18	0.15	0.3	0.17	0.3
Exxon Mobil	0.07	0.5	0.3	0.16	0.08	0.5	0.18	0.3	0.25	0.2
Petro China	0.70	*0.01*	0.63	*0.03*	0.004	0.8	0.03	0.7	0.06	0.5

Regression Output

Oil Company	ATR		ITR		RTR		DER		ROA	
	R^2	p	R^2	p	R^2	P	R^2	p	R^2	p
BP	0.6	*0.03*	0.5	*0.05*	0.4	0.08	0.03	0.6	0.06	0.5
Chevron	0.04	0.63	0.2	0.2	0.27	0.2	0.03	0.68	0.36	0.15
Gazprom	0.33	0.17	NA	NA	0.01	0.8	0.4	0.1	0.002	0.9
Royal Dutch Shell	0.60	*0.03*	0.65	*0.02*	0.53	*0.06*	0.4	0.12	0.23	0.2
Sinopec	0.3	0.13	0.56	*0.04*	0.32	0.18	0.15	0.3	0.17	0.3
Exxon Mobil	0.07	0.5	0.3	0.16	0.08	0.5	0.18	0.3	0.25	0.2
Petro China	0.70	*0.01*	0.63	*0.03*	0.004	0.8	0.03	0.7	0.06	0.5