



South Africa Crude Oil Import Portfolio Risks

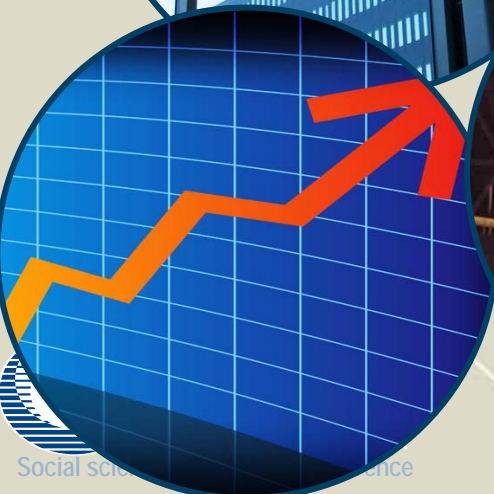
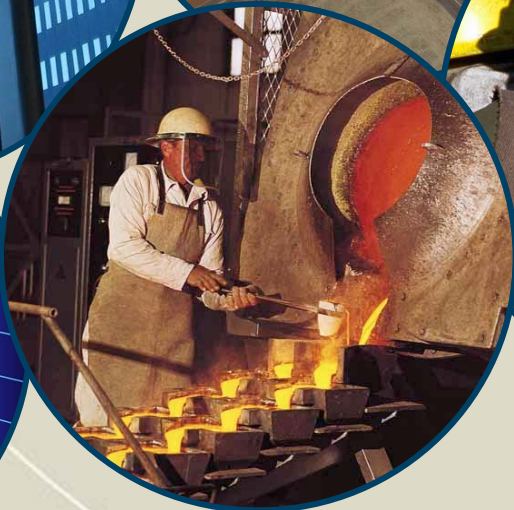
Which Way Out?



Introduction

- * Context/Current
- * Modeling/Results
- * Conclusion
- * Recommendations





SA-Oil Consumption/Reserves

- Since 1994, growth in total oil consumption has averaged 2% per annum-Expansions in transport and mining sector
- Africa's largest consumer of primary energy, accounts for a quarter of total oil consumed in the continent
- Small proven oil reserves, Western and Southern coastlines (estimated at 15 million barrels, January 2010*)
- Production of natural gas and crude oil is limited
- Domestic demand for liquid fuels from two sources
 - Imported crude Oil
 - Highly developed domestic synthetic fuels industry

Global Oil Market- Imbalance

- Asia-Pacific, Europe, North America
 - Consume approximately 80%;
 - Control 10% of world's oil reserves
- Africa, Russia, Middle East, South America
 - Consume 20%,
 - Control 90% of world's remaining oil reserves.
- South Africa???????

Liquid fuels in South Africa

- 36 Percent demand for liquid fuels-Synthetic fuels
 - Petroleum Oil and Gas Corporation of South Africa (PetroSA)- Natural gas-to-liquids synthetic fuels
 - South African Coal and Oil (SASOL)-Coal-to-liquids synthetic fuels
- 64 Percent demand for liquid fuels- Crude oil Imports
 - 85% of imports come from Middle East region (Iran, Saudi Arabia)
 - 10% is mostly from the African region (Nigeria, Angola)
 - 5% other regions (Russia)

Risks and Growing Concerns

- Excessive dependence on imports from high-risk regions;
- Increased international competition in securing crude oil
- Increased demand for oil in India and China
- Overconsumption of a depleting resource- Depletions in oil stocks of the United States and Europe
- Potential disruptions to oil drilling operations in Nigeria's volatile Niger–Delta region



Questions

- What do trends in South Africa's oil imports imply in terms of country's oil energy security risks?
- How can the relationship between international crude oil prices and South Africa crude imports be analyzed?
- What is the nature of South Africa's oil import risks?
- Can the government adopt a diversification strategy to mitigate against such risks?
- What impact can a diversification strategy have on South Africa's oil import risks?

Data

- Monthly Crude oil imports from Customs Statistics Division of the South African Revenue Service (SARS); Period 1994-2007
- Monthly price data of Brent crude oil (International Financial Statistics (IFS) of the (IMF))
- Derive three key measures

Diversification Index

- South Africa Increased oil-import Diversification

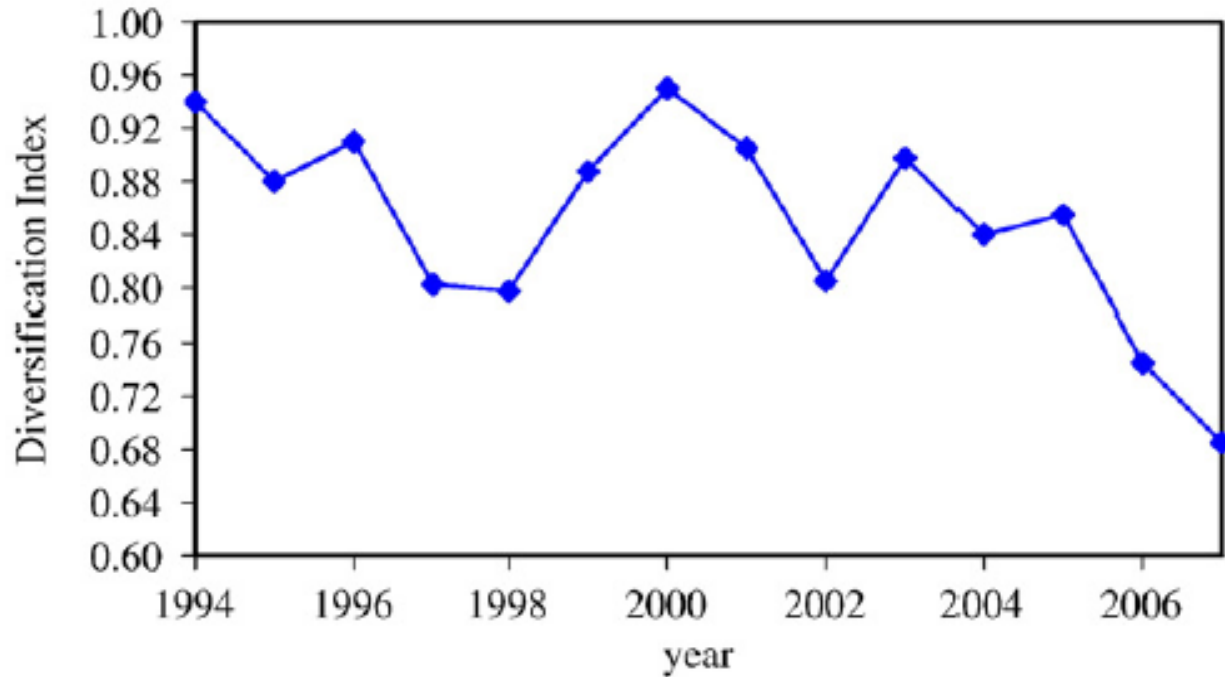


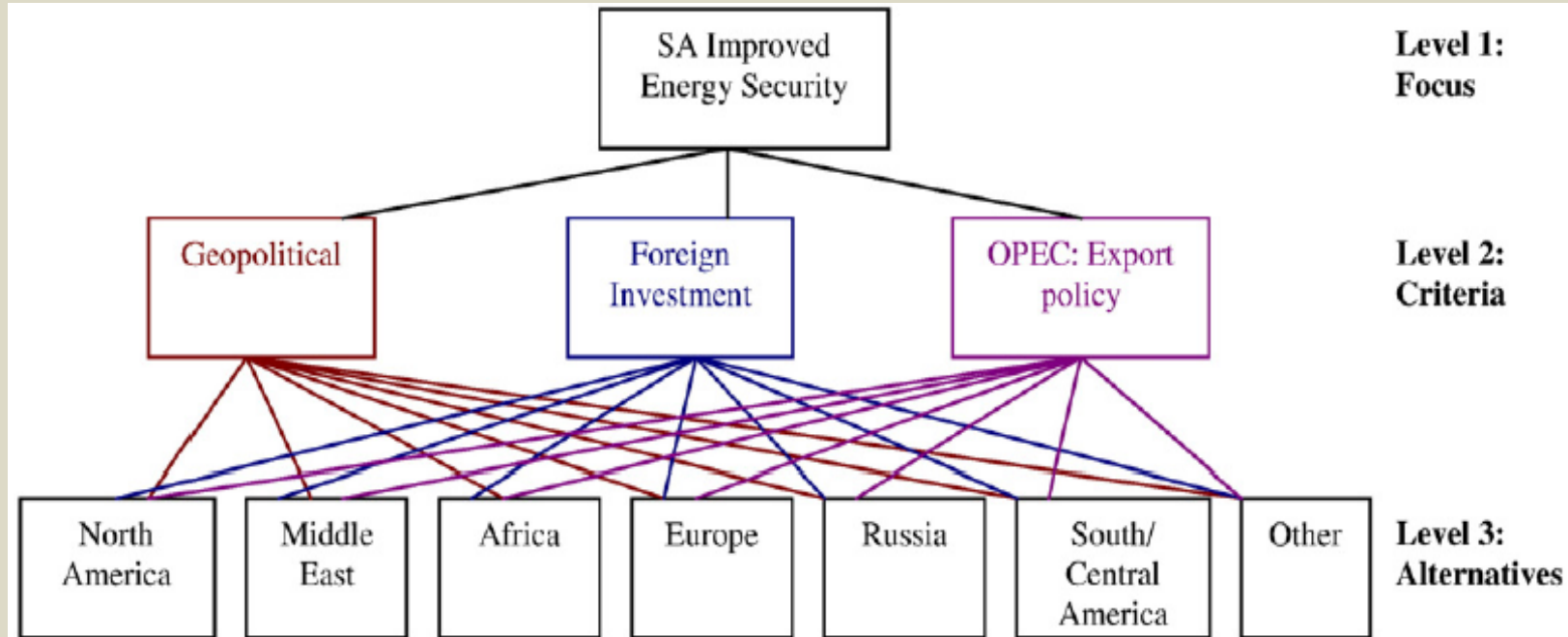
Fig. 1. Diversification index of South Africa's crude oil imports: 1994–2007.

Diversification and Import Risks

- Does increasing suppliers automatically reduce import risks?
- Depends on the nature/extent of market and political relationships between the supply sources
- Define a model framework that captures the role of
 - Suppliers' export policy
 - International oil prices
 - Suppliers' exposure to Geopolitical factors

Supplier's Risk Weight

Analytical Hierarchical Process (AHP)



A decision hierarchy model for selecting South Africa's crude oil imports supply sources in enhancing oil import energy security risk

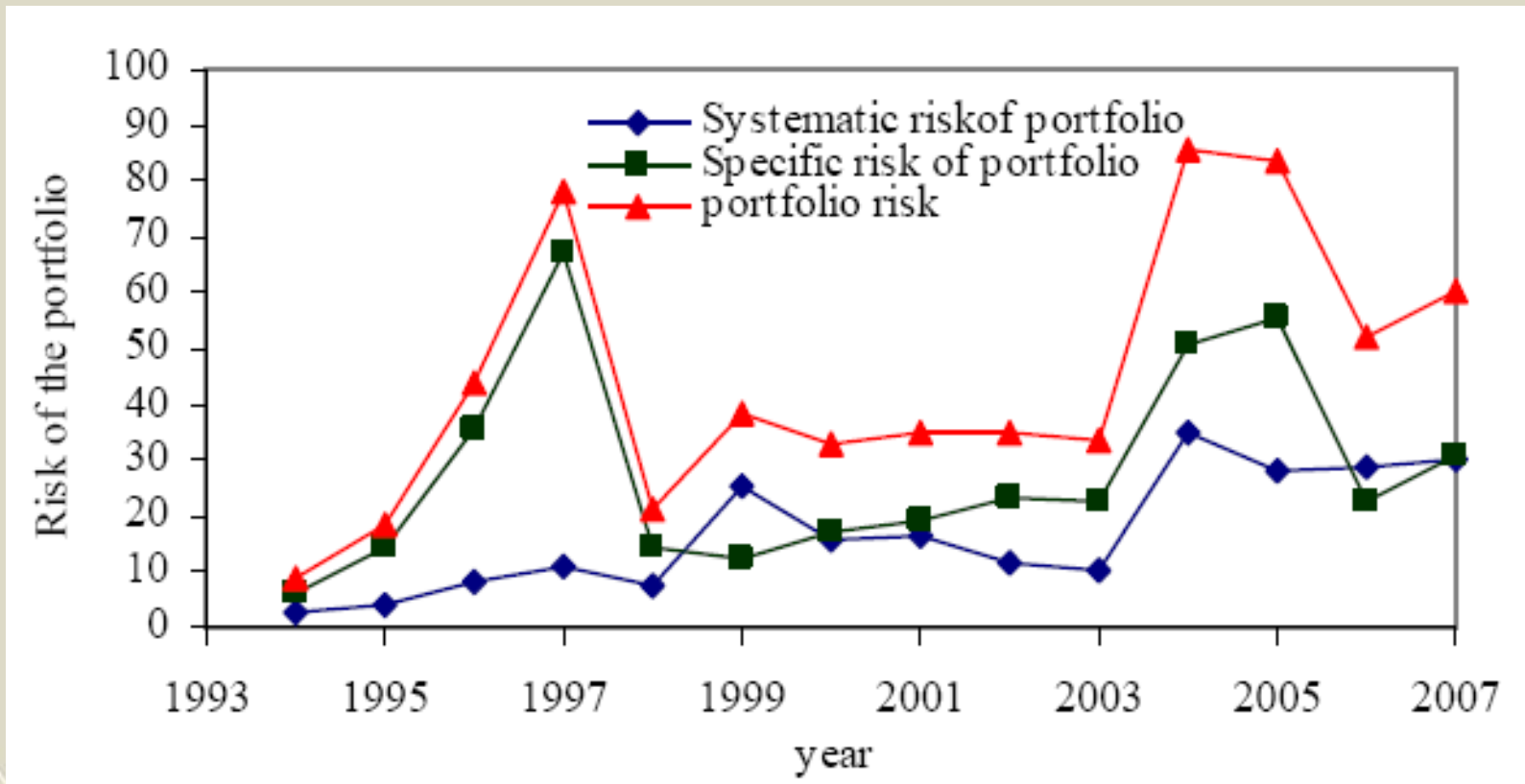
Suppliers Risk Weights

- Middle East (34.7%)
- Africa (19.2%)
- South America (14.7%)
- Russia (10.3%)
- North America (10.0%)
- Europe (5.4%)
- High risk-weight implies high costs and lack of consistency
 - Higher prices on oil-related products, hence high direct costs to consumers
- SA should aim for supply sources with low risk-weights.

Risk Portfolio Model

- Apply Modern Portfolio Theory (CAPM in financial markets)
 - Oil is a globally traded commodity and SA is a price taker
 - South Africa Monthly Import Prices = f^n (Brent crude Monthly Prices)
 - Correlation of 0.97
 - Periods of supply/production disruptions, the country's import price will track changes in international oil prices
- Derive Imports risk measures
 - Systematic Risk of Oil imports
 - Specific Risks of Oil imports
 - Total Portfolio Risk of Imports

Crude Import Portfolio Risks

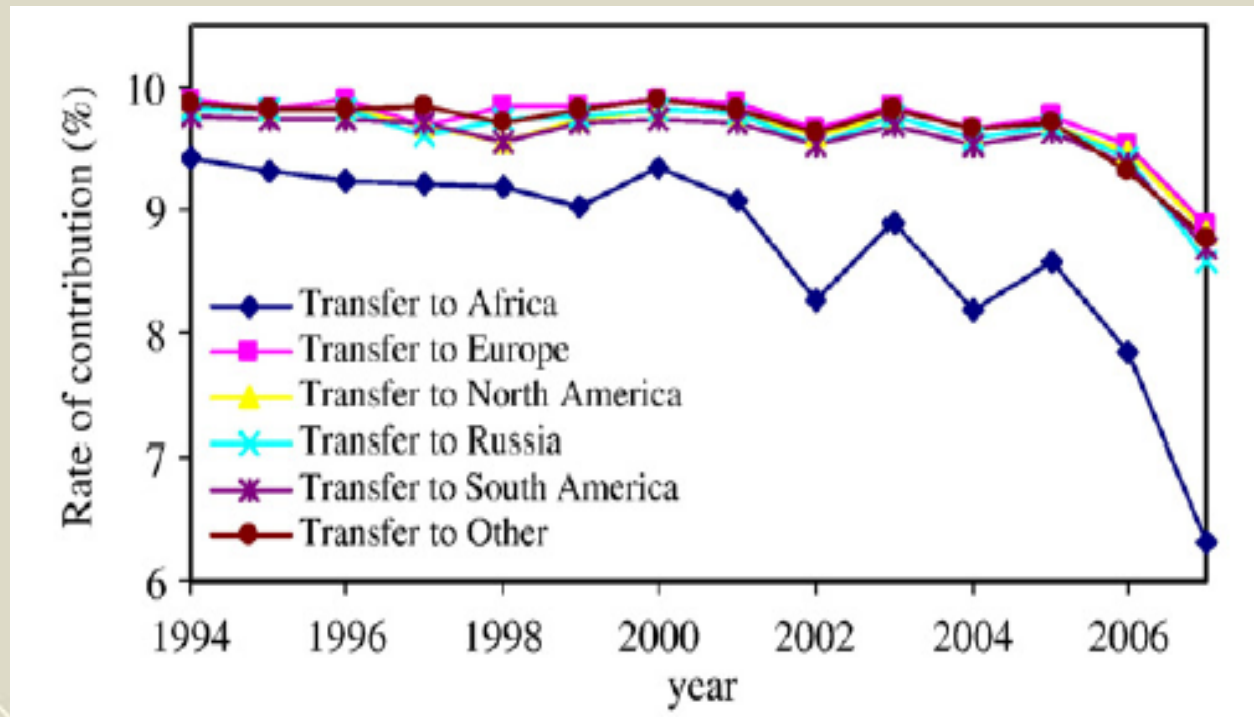


Import Adjustment strategy –Scenario 1

- Maintain constant monthly imports from each of the six main supply regions, while holding total imports constant in each year for the period 1994 to 2007
 - Reduction in specific risk index ranges from 63% to 74%.
 - Reduction in the systematic risk index ranges from 0.2% to 8%. Effect of high international crude oil prices
 - By reducing dependence on high-risk regions and increasing supply regions, low South Africa's crude oil import portfolio risk.

Import Adjustment strategy –Scenario 2

- Middle East - 83% of South Africa's imports over the period 1994 to 2007
- Effect a transfer of 10% of middle east import to other supply sources



Recommendations

1. South Africa should diversify imports from risky regions (mainly the Middle East) to the relatively less risky regions of Europe and North America in order to achieve a significant reduction in specific risk of oil imports.
2. South Africa needs to advance strategic partnerships and cooperation between subsidiaries of the government-owned Central Energy Fund (CEF) and private firms in the sourcing of crude oil, and also needs to establish specific bilateral relations with less risky oil suppliers (such as Russia, Europe and North America), while at the same time taking other cost factors into careful consideration.

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Flashback to 2008

Opened with food riots which gathered momentum in the first half of the year. Riots in India, Burkina Faso, Cameroon, Senegal, Mauritania, Cote d'Ivoire, Egypt, Yemen, Morocco, Haiti, Senegal and Somalia.

Varying levels of unrest were also reported in Mexico, Bolivia, Uzbekistan, Bangladesh, Pakistan, Sri Lanka and South Africa.

Oil began the year on a high, crossing the psychological \$100 barrier, with projected rise in global oil demand
Falling stocks, cold weather and tight fundamentals.
Tensions in Nigeria and the Middle East

End 2007 \$77.13

\$105 per barrel by early March, \$110 in April, \$126 in May, around \$140 in June

Comment by Israeli that an attack on Iranian nuclear facilities was 'inevitable'

Tight supply background with no clear sign of the usual second-quarter crude oil stock build

Early July peak just above \$145 per barrel.

Recessionary fall from \$147 a barrel in July to \$32 in December. Back up to \$85 within five months.

Fast Forward to 2011

UN announcing that food prices peaked in January, for the seventh consecutive month
Further price increases could trigger upheaval and riots in developing countries.

Protests over food prices in Niger, Guinea, Burkina Faso, Mexico, Tunisia and Yemen this year.

Brent crude reaching the psychological \$100 barrier

Increasing demand for crude oil

Continued turmoil and revolution across the Middle East might likely affect Suez Canal, hence Saudi Arabia, largest crude in import source for South Africa

Oil, Natural Gas and Coal Overview

Proven Oil Reserves (January 1, 2010)	15 million barrels
Oil Production (2008)	195,000 barrels per day (bbl/d), About 160,000 bbl/d was synthetic liquids
Oil Consumption (2008)	575,000 bbl/d
Crude Oil Refining Capacity (2008)	692,000 bbl/d (SAPIA*)
Proven Natural Gas Reserves (Cedigaz 2009)	0.318 billion cubic feet
Natural Gas Production (2008)	115 billion cubic feet
Natural Gas Consumption (2008)	228 billion cubic feet
Recoverable Coal Reserves (2007)	34 billion short tons (World Energy Council)
Coal Production (2008)	260 million short tons
Coal Consumption (2008)	194 million short tons

Environmental Overview

Energy-Related Carbon Dioxide Emissions (2008)	451 million metric tons
Per-Capita, Energy-Related Carbon Dioxide Emissions (2008)	9.25 metric tons

Oil and Gas Industry

Major Refineries (capacity, bbl/d)(2006) (SAPIA Annual Report 2006)	Sapref (180,000), Enref (125,000), Calref (100,000), Natref (108,000) Synthetic Fuel Refineries, Sasol (150,000), PetroSA (45,000)
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