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policy brief

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South African crude oil import portfolio risks: Which way out?

Context

A major consequence of South Africa's strong economic growth since the democratic dispensation of 1994 is the rapid increase in domestic demand for oil energy. Growth in total oil consumption has averaged almost 2 per cent per annum due to expansions in the transportation and mining sectors. With small amounts of proven oil reserves (DME 1998), the rise in oil demand as an energy source has resulted in South Africa's growing dependence on external sources for its domestic crude oil needs, amidst substantial increases in world oil prices. Besides impacting on economic growth and welfare, high oil prices are likely to lower consumption in favour of other sources of energy – such as coal – which are known to be more damaging to the environment.

The oil market is the most imbalanced of all energy markets. Asia-Pacific, Europe and North America consume approximately 80%, while controlling only 10% of the world's oil reserves. At the same time, Africa, Russia, the Middle East and South America consume 20%, while controlling 90% of the world's remaining oil reserves (BP 2008). For South Africa, 64% of the demand for liquid fuels is met through crude oil imports. Eighty-five per cent of these imports currently come from the Middle East, while the remaining 15% is mostly from the African region. These are two regions highly prone to geopolitical instability. Excessive dependence on imported oil from high-risk regions makes South Africa more vulnerable to both economic and national security problems. Reducing this vulnerability requires a different approach to energy security.

This policy brief explores the nature of South Africa's oil-import risks and the impact on oil prices; potential government diversification strategies to mitigate against such risks; and the impact of such strategies on South Africa's oil-import diversification policy.

South Africa's crude oil imports strategy and oil prices

Crude oil is imported into South Africa by private players linked to the major locally based energy multinationals, PetroSA and SASOL, that engage in petroleum refining, storage and marketing. The petrol price in South Africa is linked to the price of crude oil in international markets. With any increase in crude oil prices – as has been the case over the past three years – the petrol price has to increase so that crude oil refineries are able to cover their own costs. Rising oil prices and price volatility stifle economic activity and reduce asset values. For example, in their 2002 paper on oil-price volatility, Yang, Hwang and Huang state that 'higher [oil] prices [yield] subsequent recessions in oil-consuming nations, as oil prices are negatively correlated to economic activities'. For energy-importing countries like South Africa, oil is the key to the country's energy security (Stringer 2008). High oil prices are a major threat to the country's overall energy security and lead to high direct costs to consumers.

In shaping a portfolio of measures to reduce South Africa's oil-import vulnerability, policy-makers should consider the risks associated with imports from each of the supply sources. High risk-weight implies high costs and potential insecurity of supply, a situation that can imply higher prices on oil-related products. Decision-makers should also consider the effects of different oil-import strategies and the need to foster bilateral relations with less risky oil suppliers.

Oil-import diversification

Diversification of oil-import sources refers to the mix of country or state providers of oil. It is a policy designed to secure stable oil supply by reducing the risks that may arise from excessive dependence on a single import source (Koyama 2004). Having multiple suppliers provides security and reduces vulnerability in

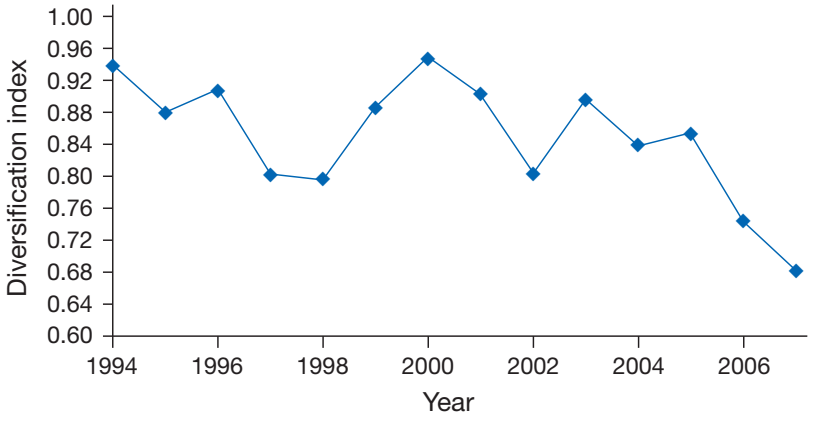
cases of temporary or permanent disruption of supply. Should one supplier fall victim to natural disasters, terrorism, war, regime change, or other export-damaging events, importers will experience only minor disruptions to their total supply (Leiby 2007).

South Africa has increased oil-import diversification

Diversification index is an indicator that measures the extent to which crude oil imports are diversified. The indicator ranges from 0 to 1. A low index indicates more import diversification or multiple suppliers.

In the period 1994–2007, South Africa sourced its crude imports from six supply sources: Africa (Nigeria, Libya, Gabon), Europe, Middle East (Iraq, United Arab Emirates, Yemen, Oman), North America, Russia and South America (Venezuela). There has been a gradual decrease in South Africa's oil-import diversification index, reaching its lowest value of 0.68 in 2007 (Figure 1). Because lower values are equated with greater diversity, the 0.68 index indicates that South Africa has, over time, increased the number of crude oil supply sources.

Figure 1: Diversification index of South Africa's crude oil imports, 1994–2007



The extent to which import risk is reduced by diversification is dependent on the nature and extent of market and political relationships between supply sources. We define the risk weighting for a particular supply region as a function of geopolitical factors, foreign direct investments in the country's oil sector, and the country's membership of OPEC. Imports from the Middle East carry the highest risk-weight (34.7%), followed by Africa (19.2%), South America (14.7%), Russia (10.3%), North America (10%) and Europe (5.4%). High risk-weight implies high costs and lack of consistency, a situation that can imply higher prices on oil-related products and hence high direct costs to consumers. In general we should aim for supply sources with low risk-weights.

South Africa's crude oil import risks and import-adjustment strategies

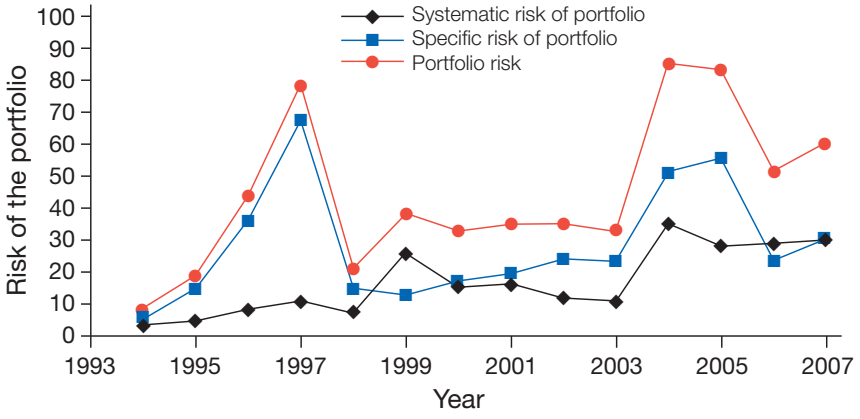
Systematic risk of oil imports is risk affecting relatively large numbers of suppliers and, by extension, a large segment of the global crude oil market. This is caused by events such as an unanticipated surge in global demand for crude oil, or the collective action of major oil-producing nations seeking to use oil supply as a strategic weapon. Such events make it difficult for oil importers to formulate strategies to ameliorate their effects, and the result is higher import prices.

To examine South Africa's crude-import risks, we apply the modern portfolio theory developed to assist investors in optimising their portfolios and pricing risky assets in financial markets. This serves two crucial functions: (i) it is a valuable tool for analysing choices between more or less risky sources of imported crude supplies, and (ii) it may assist policy- and other key decision-makers in their deliberations on the relationship between diversification and crude oil import risks.

The two types of risk associated with disruptions to crude oil markets are systematic risk and specific risk (Wabiri & Amusa 2010). The increase in specific risks (Figure 2) can be attributed to South Africa's obtaining its crude oil imports from only two sources, the Middle East (82.2%) and African (17.5%) regions, both of which experienced oil-supply disruptions in 2004.

Specific risk of oil imports is risk associated with events or conditions specific to individual or small groups of suppliers, rather than general events in the international crude oil market. For example, internal political strife or accidents that hinder productive capacity and limit the export quantity generated by a particular oil-producing nation would have implications for the oil-energy security of countries relying on that nation for their crude oil imports.

Figure 2: Systematic risk, specific risk and the portfolio risk for South Africa's crude oil imports, 1994–2007



Diversification of supply sources could bring about a 74% reduction in specific risk and an 8% reduction in systematic risk of South Africa's oil-imports portfolio.

Adjusting crude oil imports to maintain constant imports from each of the six main supply regions, while holding total imports constant in each year for the period 1994 to 2007, would have reduced South Africa's specific risk index by a range of 63% to 74%. This is a significant reduction in the overall oil portfolio risk. Reduction in the systematic risk index ranges from 0.2% to 8%. The net effect of reducing dependence on high-risk regions and increasing supply regions is the lowering of South Africa's crude oil import portfolio risk. The lower reduction in systematic risk, approximately 8%, demonstrates the effect of high international oil prices (an increase in systematic risk) and thus the high import portfolio risk in South Africa.

A 10% reduction in specific risk could occur if 10% of high-risk imports from the Middle East were transferred to less risky sources.

The largest decrease in specific risk, between 9% and 10%, would occur if 10% of Middle East oil imports were diversified to Europe, the region with the lowest risk-weight (5.4%). Least reduction in specific risks (6%) would occur if 10% of Middle East import supplies were transferred to suppliers in Africa, with a risk-weight of 19.2%. Overall, reductions in the specific risk index would be greatest if 10% of Middle East imports were to be diversified to Europe, North America, Russia, South America and Africa.

Conclusion

Our analyses show that fluctuations in both international oil prices and in South Africa's oil imports result in variability in the systematic risk of South Africa's oil-import portfolio. Results also indicate that while diversification of supply sources contributes to a lowering of the oil-import portfolio risks, a diversification strategy that increases supplies from relatively risky oil-producing regions would only serve to enhance the specific risk of South Africa's oil imports. A reduction in specific risk would be achieved if some of the Middle East supplies were diverted to the less risky regions of Europe, North America, Russia, South America and Africa (in that order).

Finally, while this analysis provides insights into the issue of oil-energy security for South Africa, the rising demand for energy in the country's transport, manufacturing, construction and commercial sectors implies that future assessments of energy security will benefit from the inclusion of all types of energy resource and supply.

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. To ensure low import risks, 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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