ERF Policy Brief

Are Financial Markets the Last Resort to Save the Environment?

Mouez Fodha, Djamel Kirat and Chahir Zaki

About the authors

Mouez Fodha is a Professor at Paris School of Economics and University Paris 1 Pantheon Sorbonne.

Djamel Kirat is an Assistant Professor at University of Orléans.

Chahir Zaki is an Associate Professor, Faculty of Economics and Political Science, Cairo University

In a nutshell

- *The objective of this brief is to examine how financial markets are affected by climate and energy transition risks. We show that fossil fuels are associated to a higher risk premium on public debt.*
- *Moreover, this risk premium increases with a higher level of CO2 emissions per capita. We also show that the quality of institutions plays an important role in counterbalancing the effects of climate-related variables on the risk premium.*
- *Finally, we conclude that financial markets could foster energy transition and encourage the implementation of effective environmental policies.*

On the Link between Macroeconomic Risk and Environmental Risk

A few years ago, the concept of "stranded assets" was considered as a hypothetical and abstract concept and a far-off concern of climate advocates and progressive investors. In fact, climate change could obliterate trillions of dollars of corporate and countries' value and turn assets into liabilities. Yet, today this hypothetical concept is rapidly turning into a hypercritical issue given that fossil fuels production and use are inconsistent with neither economics nor survival.

A stranded asset can be defined as a piece of equipment or a resource that once had value or produced income but no longer does, usually due to some kind of external change, including changes in technology, markets and societal preferences. Moreover, it is important to note that such assets have suffered from unanticipated or premature write-downs, devaluation, or conversion to liabilities. In recent years, the issue of stranded assets caused by environmental factors, such as climate change and society's attitudes towards it, has become increasingly important. This is why, currently, the term "stranded assets" is most commonly used to describe oil and gas resources that have not yet been extracted, but which appear as assets on companies' ledgers and a few countries' balance sheets.[1]

Several economies rely on fossil fuel production and exports, especially the Middle East and North Africa (MENA) region. However, with the low-carbon technology diffusion, the advancement in renewable energy and the boom in environmental agreements, the demand for fossil fuel is likely to decline, leading to an increase in stranded assets. This reflects the **energy-transition risk** for countries whose engine of growth is based on the exploitation of fossil resources, such countries in the MENA region. According to the Carbon Tracker, stranded fossil assets are very likely to cost oil producers over 28 trillion in revenues in the next 10 to 20 years with the Arab Gulf producers being, most likely, the major losers (Caldecott et al. 2016). In addition, these countries are also subject to **climate risk**. While the latter is measured by the cost a country must bear to repair the physical damage caused by climate change, in our study, we proxy this using various environmental quality indicators such as CO2 emissions per capita, carbon intensity as share to Gross Domestic Product (GDP), Greenhouse Gas (GHG) emissions and an environmental performance index (EPI). The latter reflects the stringency of the environmental policy that should encourage mitigation and adaptation investments. Indeed, many phenomena such as natural disasters induced by extreme climatic and/or weather events, rise in ocean level, desertification, increase in pollution, decrease in the productivity of labor and natural (agricultural) resources, climate migration, are consequences of climate change that entail repair and adaptation costs. While these trends are closely related to climate change and environmental degradation, financial markets are not spared and can both affect and be affected by climate and energy-transition risks. These consequences on financial markets and economic actors, although highlighted for several years notably after the M. Carney[2] speech in 2015, have had an even greater echo since the interventions of L. Fink, especially in his letter to CEOs sent in January 2021.[3]

Against this background, this policy brief tries to analyze how financial markets are affected by climate and energy-transition risks. More particularly, we ask whether these risks affect the cost of public borrowing, with a specific focus on countries of the MENA region. The question is interesting because financial markets are forward looking and are supposed to anticipate future shocks. Thus, if climate and energy-transition risks are correctly anticipated by the financial markets, the most exposed countries would face a risk premium, and therefore a higher cost of borrowing. Our insight is that financial market reactions to these risks may in turn encourage the most exposed countries to take more stringent environmental measures.

Why the MENA Region?

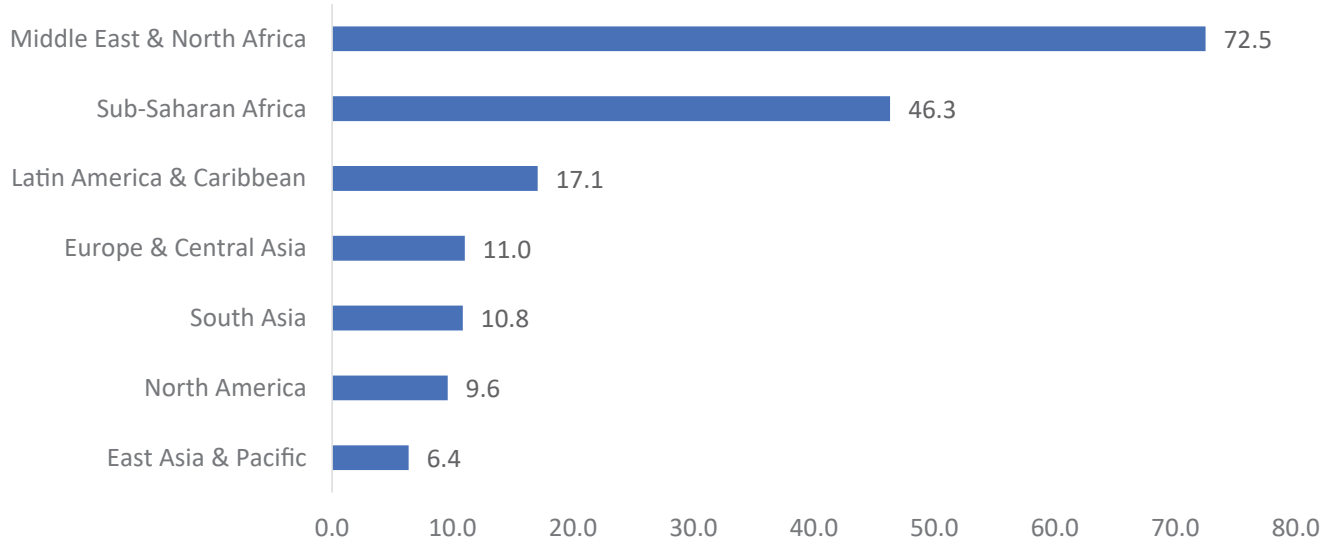
The MENA region is of interest since it is one of the most abundant in natural resources. Figure 1 compares this region to other emerging and advanced ones and shows that fuel exports represent 72.5% of merchandise exports, while this share is significantly lower in Sub-Saharan Africa (46.3%), Latin America (17.1%), and North America (9.1%). Moreover, it holds almost half of global oil reserves and a quarter of natural gas reserves.

[1] See, for example, Caldecott et al. (2016) or Van der Ploeg and Rezai (2020) for an overview of these issues.

[2] Breaking the Tragedy of the Horizon – climate change and financial stability, Speech given by Mark Carney, Governor of the Bank of England, Chairman of the Financial Stability Board, Lloyd's of London, 29 September 2015.

[3] CEO of BlackRock, https://www.blackrock.com/corporate/investor-relations/larry-fink-ceo-letter.

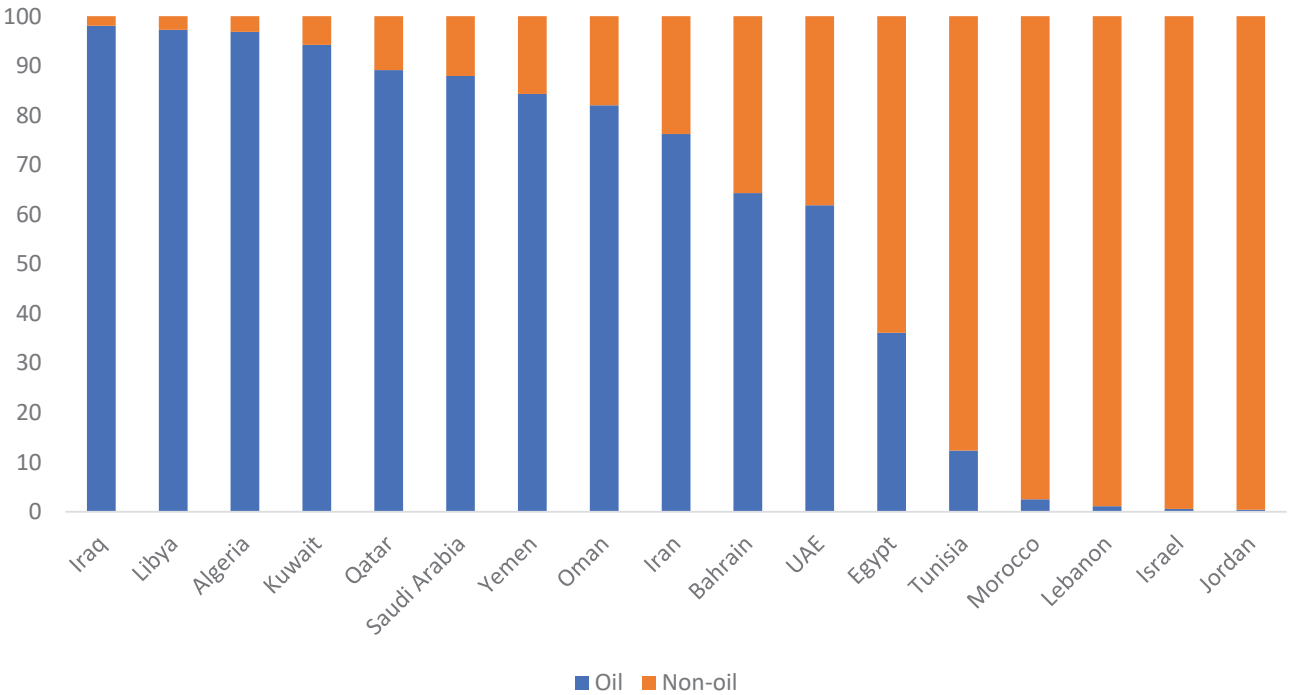
Figure 1: Fuel exports (% of merchandise exports)



Source: Authors' elaboration using the World Development Indicator dataset.
Note: Figures are average over the period 1995-2019.

Yet, within the region, there is an important heterogeneity. Indeed, MENA countries can be classified depending on their dependency to oil into two groups: those that are more dependent on fossil fuels (and therefore less diversified economies) and those that are less dependent (presumably more diversified economies). Figure 2 shows that the former group is chiefly dominated by the Gulf Cooperation Countries (GCC), Algeria, Libya, Yemen, and Iran.

Figure 2: Oil vs. non-oil exports (by country)



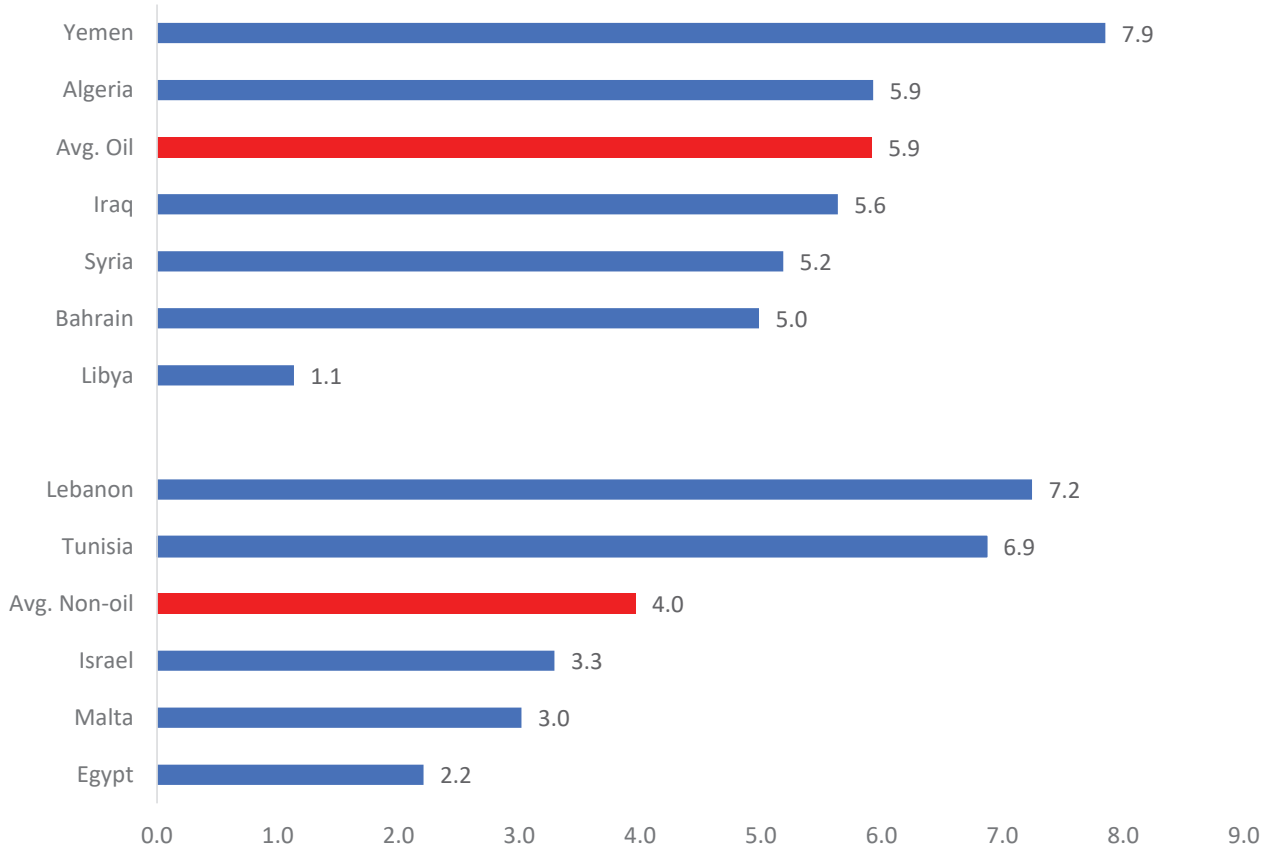
Source: Authors' elaboration using the World Development Indicator dataset.
Note: Figures are average over the period 1995-2019.

Obviously, the two groups have different debt levels, and consequently defaulting risk problems. Figure 3 compares the risk premium, being the difference between the lending rate and the Treasury bill rate (risk free) for the two groups of countries. First, the average risk premium of oil exporting countries is higher than that of oil importing ones (5.9 vs. 4), confirming our main hypothesis. Second, with the exception of Lebanon and Tunisia (because of their economic and political transition), all oil exporting countries have a higher risk premium compared to other MENA countries. For instance, Yemen's premium is 7.9, Algeria's one 5.9, whereas Israel's one is 3.3 and Egypt's one is 2.2.

Figure 4 confirms another interesting fact as it shows the correlation between different types of natural resources and the risk premium in the MENA region. First, except the correlation coefficient of coal, all the other coefficients are statistically significant at 1%. Second, the correlation of the risk premium with oil and with natural gas is positive showing how resource rich countries endowed with stranded assets are more likely to have a higher risk. Second, when fossil fuels are compared to mineral ones, the former is positively and the latter is negatively associated to the risk premium. This result is of particular interest since fossils result from the decomposition of formerly living organisms buried for millions of years. In contrast, minerals are inorganic substances that occur naturally and form an exact crystalline structure. In fact, the energy transition will involve a slowdown, or even a break, in the need for fossil resources. The energy mix will be composed mainly of renewable energies, whose infrastructures (especially wind and photovoltaic) contain large quantities of mineral resources. Thus, the fall in demand for fossil resources should lead to an increase in demand for mineral resources (Fabre et al., 2020).

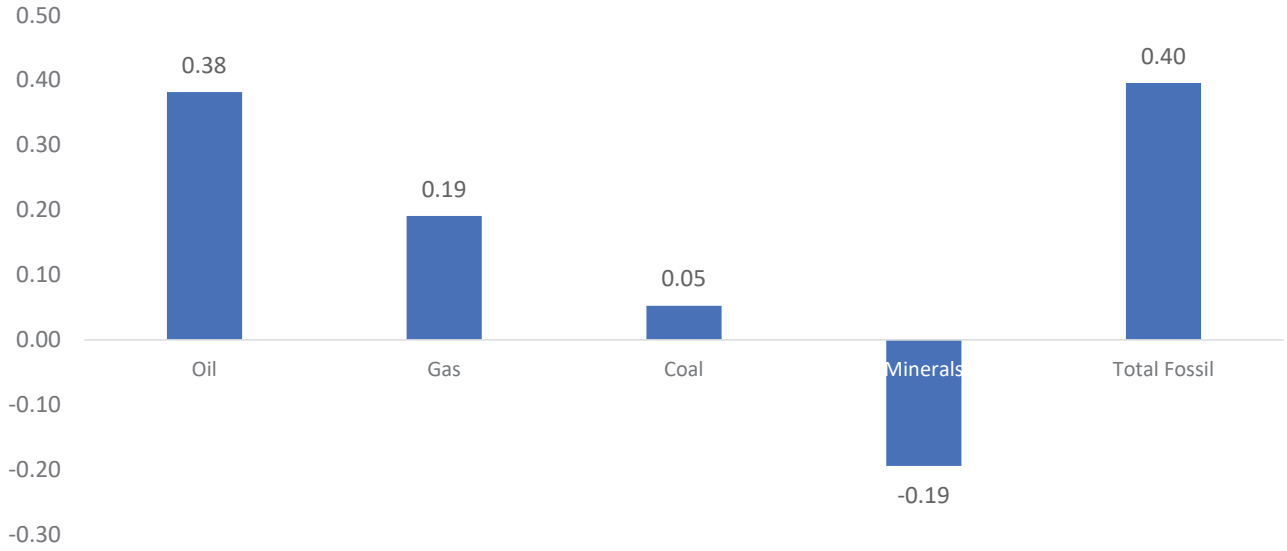
It is important to note that the quality of institutions is an important determinant of country's risk premium. In fact, Figure 5 shows the negative correlation between the World Governance Indicator and the risk premium. Indeed, better institutions will lead to better enforcement of contract and hence lower risk premium. It is also important to highlight that the quality of institutions is associated to the impact

Figure 3: Risk premium (oil exporters vs. oil importers)



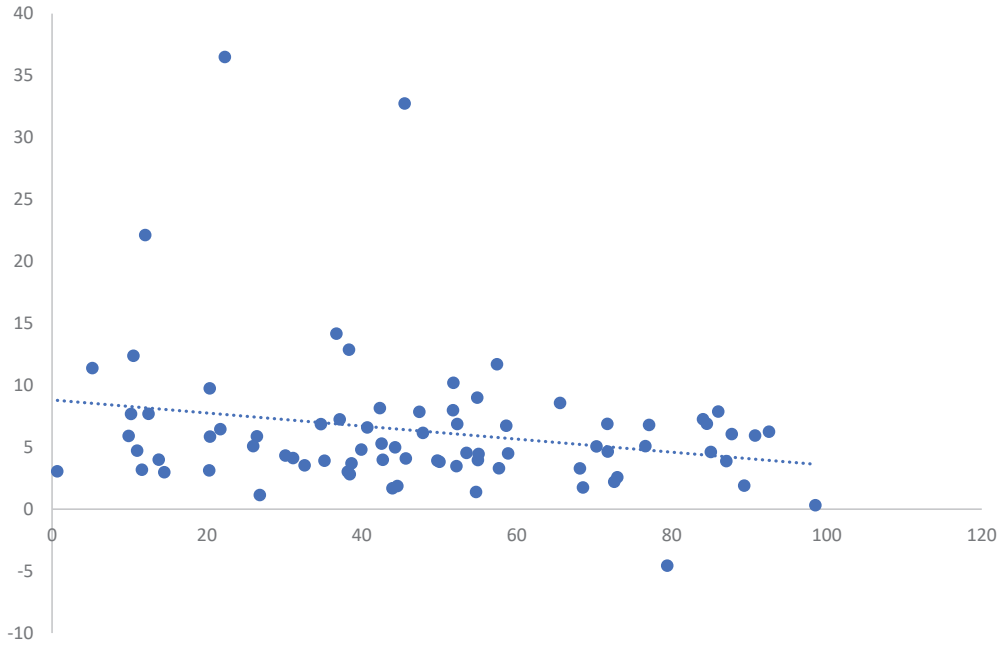
Source: Authors' elaboration using the World Development Indicator dataset.
Note: Figures are average over the period 1995-2019.

Figure 4: Correlation between natural resources and risk premium



Source: Authors' elaboration.
Note: Figures are average over the period 1995-2019.

Figure 5: Correlation between quality of institutions and risk premium



Source: Authors' elaboration using the World Development Indicator and World Governance Indicators dataset.
Note: Figures are average over the period 1995-2019.

of natural resources on growth (and vice versa). Indeed, this is in line with the findings of Selim and Zaki (2016) who argue that, in the MENA region, when political institutions interact with natural resources, they reduce the negative effect of natural resources on growth but do not offset it. This is why the resource curse in the Arab world is primarily an "institutional curse".

Against this background, understanding how financial markets account for climate and energy-transition risks in the cost of borrowing of countries of the MENA region is of particular relevance.

How Do Energy-Transition and Climate Risks Affect Countries' Risk Premium?

Methodology

In order to examine the effect of climate variables and stranded assets on the cost of borrowing, we proceed in two steps. First, relying on the overlapping generations' model, we develop a simple theoretical model by taking into account the interplay between the environmental quality and the asset market. We show that when agents are sensitive to the environmental quality, they take decisions about savings and investment in line with the need for higher environmental protection. Second, we empirically test this model by assessing the nature and magnitude of the climatic determinants of the risk premium associated with public debt, with a focus on countries of the MENA region. More specifically, we model the cost of debt as a function of subsoil natural resource wealth which measures the energy-transition risks or environmental quality variables as measures of climate risks.

The model controls for the major macroeconomic determinants of debt costs such as the level of debt, GDP growth, institutional quality, inflation, etc. Three different measures of the cost of borrowing are used: i) the risk premium measured by the difference between the lending rate and the treasure bill rate (risk free); ii) the average cost of debt obtained by dividing the debt service by the stock of debt; and iii) a dummy variable of external sovereign default that takes the value of 1 if the country experienced an external sovereign default and 0 otherwise. We also control for the quality of institutions that is likely to reduce the risk premium. Our independent variables of interest can be classified into two main groups: natural resources one (that includes total natural resources that is further decomposed into minerals and fossil fuels then into oil, coal, and natural gas). The second group encompasses environmental variables that include carbon intensity of GDP, total greenhouse gas emissions, CO2 per capita, and an environmental performance index. We also control for the endogeneity of the CO2 emissions.

Empirical Results

Our main results show a strong and positive association between both the cost of borrowing and energy-transition risks, and the cost of borrowing and climate-related variables (a proxy of climate risks) in the MENA region, which behave not much differently compared to other countries of the sample. More specifically, we find for instance that the average costs of debt increase by 0.012 percentage-points following a 1% increase in oil resources. This result shows how financial markets account for the risk of energy transition as well as climate-related variables and how they could encourage the implementation of effective environmental policies. We also show that the quality of institutions plays an important role in counterbalancing the effects of climate-related variables on the risk premium.

The Way Forward

From a policy perspective, three recommendations are worthy to be mentioned.

First, the study helps understand to what extent financial markets can represent a buffer or a last resort to mitigate the natural risks that the region is currently facing. Indeed, given the high dependence of the MENA region on fossil fuels, it is important to see how macroeconomic policies and the financial market can help mitigate the risks associated to climate change. The results highlight that there is a significant risk premium linked to natural risks. Thus, with the consequences that could be significant for the future of the climate, this financial-market risk premium would replace climate policy through sending a signal to market players. An additional cost of public borrowing, and therefore an increase in the cost of public debt, should encourage countries to take the necessary measures to protect themselves against these risks and thus reassure the financial markets. In the shorter term, these risk premiums would further weaken the public finance of countries already exposed to major risks, which would exacerbate the difficulties of financing investments necessary to protect against environmental degradation.

Second, our study highlights also the role of institutions and how, in some cases, better institutions can reduce the impact of climate or transition risk on the risk premium. This is why deep institutional reforms will have to accompany those related to climate change.

Third, in the case of sovereign bonds, government should better assess and disclose their climatic and transition risks. Only Ghana did it fully when borrowing to face the COVID-19 crisis (Dibley et al, 2021). Yet, countries face many disincentives to do so as they would face higher costs of borrowing. In fact, as countries keep investing in polluting assets and deepen their maladjustment to future needs, they become even more vulnerable to increased bond yields in the event of a change in investor's behavior towards climate risks. Consequently, central banks and financial supervisors have pushed forward the need for standardized metrics to include environmental risks in financial contracts.

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Contact Information

ERF Office
Address: 21 Al-Sad Al-Aaly St. Dokki, Giza, Egypt
PO Box 12311
Tel: 00 202 333 18 600 - 603
Fax: 00 202 333 18 604
Email: erf@erf.org.eg
Website: http://www.erf.org.eg

ERF Dubai
Dubai International Financial Centre (DIFC)
Premises: GV-00-1003-BC-42-0
Gate Village Building 10 - Dubai, UAE
PO Box 125115
Tel: +971 4 4011980

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