Calculating the income counterfactual for oil producing countries of the MENA region

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ABSTRACT

How much richer would the oil producing countries, in the Middle East, be if they invested all their natural resource rent? This study tries to answer this question by calculating the counterfactuals of capital stock and income under two major scenarios. Combining several data sets, including a unique one on sovereign wealth funds, it finds that the oil producing economies of the MENA region could have had on average about 0.4 percentage point higher growth rate if they had used their natural resource rents efficiently. This difference in growth rate translates to about 17% higher income over a 40 year period. These numbers are calculated for each country separately and their important policy implications are discussed.

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Introduction

Many have argued for the positive and negative consequences of having natural resources. Some countries, however, are endowed with these resources anyway and their policy question is how to make the best use of them. This is especially important for the oil and gas producing countries in the Middle East and North Africa (MENA) region that have very large resource endowments. Middle East, with only 2% of the world's producing wells, generates over 30% of the world's crude oil.[1] The region has close to half of the proven world oil reserves (BP, 2013). In addition, it holds 43% of the world's conventional gas reserves (BP, 2013; 41% according to OPEC (2013)). Sustainable management of these resources and their revenues is arguably the biggest challenge facing the governments of this region, especially as oil production is in the hands of national oil companies (NOCs) all across MENA.[2]

Despite the importance of these challenges and the size of these reserves, little has been done to study what could have been the economic outcome in these countries if they had followed more sustainable policies, such as the *Hartwick rule*. Hartwick (1977) argued that if resource rich countries want to make the best use of their resource and maintain high income levels even after the resource is depleted, they need to invest all profits from their resource instead of consuming it (*Hartwick rule*). This study is trying to calculate how much richer and wealthier would the oil producing countries, in MENA, be if they followed this simple but highly beneficial policy: investing all profits from their natural resources.

To illustrate the purpose of this paper, consider the fact that oil and gas rent—the difference between the market prices of oil and gas and the marginal costs of producing them (Hotelling, 1931)—is large.[3] For instance, in some oil producing countries, such as Saudi Arabia, Kuwait, Iraq, and Iran, it costs less than $10 (in 2005 prices) to produce one more barrel of oil while the market price can be several times larger. This stark difference between price and costs, multiplied

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[1] BP Statistical Review of World Energy 2013; Oil and Gas Journal (December 2, 2013).
[2] The National Oil Companies in MENA are Sonatrach in Algeria; Bahrain Petroleum Company; Vegas Oil Company in Egypt; National Iranian Oil Company; Iraq National Oil Company with four regional companies: North Oil Company, South Oil Company, Midland Oil Company, and Missan Oil Company; National Oil Corporation in Libya; Kuwait Oil Company; Oman Oil Company; Qatar Petroleum

(*footnote continued*)
Company; Saudi Aramco in Saudi Arabia; Emirates National Oil Company in United Arab Emirates; and Yemen Petroleum Company.
[3] The concept of oil and gas rent is multi-dimensional and may entail various meanings in various disciplines and approaches to natural resource accounting (for example, see Agalliu (2011)). This study uses the standard definition of rents in economics, which is discussed by Hotelling (1931) and also used by the World Bank Changing Wealth of Nations Data set, the data set employed in this study.

by large production volumes, generates sizable profits (rents) that are volatile over time (and usually unknown to the public). Across the MENA region, national oil companies are in charge of production and export of crude oil as well as refinement for domestic use.[4] Their profits from all activities are collected and managed by their governments. They are used to fund government expenditure, such as day-to-day operations as well as investments in physical and human capital (mostly infra-structure and development projects). These expenditures which highly depend on the volatile profits (rents) of oil business are not necessarily socially optimal.[5] As a result, oil and gas rents may have numerous positive and potentially negative consequences on the structure of the economy, politics, and some even argue culture.[6] In this context, one of the major policy questions is how we can improve the performance of the resource-rich economies. In other words, is there any optimal policy to deal with the natural resource rent and how much do incomes increase if resource rich countries adopt this policy?

Another closely related issue is that one day the marginal cost of extraction increases to a degree that it would not be economical to extract the resource. The question is how the economy can sustain (or grow) its standard of living when the revenues from such resources die out. Trying to answer this question, Hartwick (1977) finds that, under certain conditions, when the resource is still available, the country's capital stock should increase by the size of rents every year, so that maximum per capita consumption is achieved after the resource is depleted. This means that the net investment (investment minus depreciation) should be equal to rents. The country does not consume the rents. But it can consume the returns from rents that are invested. Because of the investments, the capital stock grows over time. As a result, the returns increase which, in turn, translates to more consumption (or income) as time passes. When the resource is depleted and no rent is left, the capital stock is at its highest and will provide the same return as the last period in which resource became depleted (uneconomical to extract). This return stays constant afterwards since the size of capital stock does not change (net invest-ment=rents=zero). This is called "zero net savings" or the "Hartwick rule." A country may be able to do better than this if it invests more than it takes from natural resources, i.e. more than the zero net savings rule. Under certain conditions, the consumption levels grow over time even after the resource is depleted. (Net-) Investing more than the rents is called "genuine savings" rule.

This study calculates the hypothetical income when oil producing countries of the MENA region use their oil and gas rents according to these two rules. These hypothetical incomes are called the *counterfactual* incomes, because they show what could have been possible under a different policy. Hamilton et al. (2006) have calculated the counterfactual capital stocks according to these two rules for 66 countries, but only Algeria and Egypt from the MENA region are in their sample. They also do not try to find counterfactuals of income (only capital). This study differs from Hamilton et al. (2006) on three dimensions: first, it specifically looks at countries that were not included in Hamilton et al. (2006), i.e. oil producing countries in MENA. Second, in calculating counterfactuals it accounts for invest-ments in offshore accounts (Sovereign Wealth Funds) and education which are substantial in these countries. Third, it tries to calculate the counterfactuals of income in addition to capital. Fourth, following the critique of Asheim et al. (2003) on the Hartwick rule,[7] this paper tries to find the counterfactuals of capital and income if there are deviations from the Hartwick and genuine savings rules, i.e. if portions of rents are consumed rather than invested. The elasticity of these calculations with respect to the amount consumed is calculated.

The results show that some countries are doing relatively well. But, for some, the incomes could have been significantly larger than what they are today. Calculating the counterfactual income has an important implication: by showing the difference between the potential and the actual income, it emphasizes the significance of adopting the right policies. For example, if it turns out that the counterfactual income is substantially larger than the actual income, it may warn the policy makers about the consequences of current policies. Some argue that better informed elite, however, do not necessarily make better policies as the elite's interest may contradict these policies. But, a new model by Rodrik (2013) argues that new and better ideas on policy may be able to affect the outcomes even if the political structure does not change for better. Hence, the result of this study could be more than just an information source for the policy makers and leads to actual changes in policies.

The rest of this paper is organized as follows: first, the methodol-ogy, by which the counterfactuals of income are calculated, is explained. Then the data and some calculations are discussed. This follows by the description of the results using two major counter-factuals of capital. At the end, the policy implications are explained.

Methodology

In what is known as the *Hartwick rule*, Hartwick (1977) suggested that countries with natural resources should have a net investment equal to their natural resource rent, so that future generations enjoy a maximized sustainable stream of consumption levels when the natural resources are depleted. Of course, if the economy invests more than the Hartwick rule, consumption grows over time. When a country invests more than the Hartwick rule, it is referred to as the *genuine savings rule.* Hartwick rule has its origin in the seminal work by Harold Hotelling, "The Economics of Exhaustible Resources," in which he tries to find how much of a non-renewable resource should be extracted today and how much should be left to be extracted in the future when the resource becomes scarcer and more valuable (Hotelling, 1931).

This study first calculates the actual and two hypothetical (or counterfactual) capital stocks (when net-investment is equal to and more than the rate suggested by the Hartwick rule) in the natural resource rich economies of MENA region. It, then, calculates counter-factuals of incomes using these counterfactual capital stocks.

There are different ways to calculate initial capital stock. Since the countries in MENA region have been developing countries on the

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