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Oil Exporters' Dilemma: How Much to Save and How Much to Invest

REDA CHERIF
International Monetary Fund, USA

and

FUAD HASANOV *
International Monetary Fund, USA
Georgetown University, USA

Summary. — Policymakers in oil-exporting countries confront the question of how to allocate oil revenues among consumption, saving, and investment in the face of high income volatility. We study this allocation problem in a precautionary saving and investment model under uncertainty. Consistent with data in the 2000s, precautionary saving is sizable and the marginal propensity to consume out of permanent shocks is below one, in stark contrast to the predictions of the perfect foresight model. The optimal investment rate is high if productivity in the tradable sector is high enough.

Key words — oil exporters, fiscal policy, volatility, investment, precautionary saving, buffer-stock

1. INTRODUCTION

Policymakers in many commodity-exporting countries confront the question of how much to consume, save, and invest out of revenues from commodity exports. In the face of highly volatile commodity (especially, oil) revenues, governments have to balance several objectives at the same time. These include smoothing consumption, ensuring intergenerational equity if a natural resource is exhaustible, managing volatility by building buffer-stock/precautionary savings, [1] and investing in capital to promote economic development. This paper studies how oil exporters should allocate their volatile tradable income among safe liquid assets, domestic investment, and consumption, over a long horizon.

Large oil exporters face high income volatility and have sizable saving but relatively low investment (Figures 1 and 2). [2] It seems intuitive that oil exporters should save a great deal because they are often hit by adverse income shocks. However, it is not obvious how large their savings should be and how savings should relate to the level of income uncertainty. Most oil exporters also have low investment despite their high saving rates (Figure 2). [3] Should they not invest more to grow faster, promote development, and have alternative industries when oil runs out? As we discuss below, the returns to investment are also uncertain, and as a consequence, there is a tradeoff between saving in safe liquid assets and undertaking risky domestic investment. In the late 1970s when the real oil price was high, oil exporters on average invested about 30% of GDP. In contrast, in the 2000s when the oil price was at a comparable level, investment fell to about 20% of GDP (Figure 3). [4] Moreover, oil-producing countries' current accounts and their buildup of foreign reserves fluctuated significantly over time, with broadly balanced current account positions in the 1990s and large surpluses in the 2000s.

We present a stylized model of optimal buffer-stock/precautionary saving and investment under uncertainty to study the allocation dilemma of oil exporters. The model is based on the "silo" model of Cherif and Hasanov (2012) in which we incorporate nontradable goods. [5] It features permanent and temporary shocks to income and has two assets: a safe asset (e.g., in the form of a sovereign wealth fund) and risky capital. Assuming that investment is a constant share of income, we compute the "golden rule" of investment, that is, the optimal share of income invested. Based on the optimal share of investment, optimal consumption and saving policies are obtained. The model could also be interpreted as a stochastic model of the current account. [6]

We compute the marginal propensity to consume (MPC) out of wealth (including revenue windfalls) and out of permanent shocks. [7] The model's results are compared to the predictions of the standard perfect foresight model and the data on government revenue and spending in the last decade. We simulate average time paths and confidence bands of income, consumption, and buffer-stock savings, to help gauge risks to the dynamics of these variables over the finite planning horizon.

We find that precautionary saving of oil exporters is sizable (30% of income), whereas investment is relatively low (15% of income) given high volatility of permanent shocks to oil revenues and relatively low productivity of the tradable sector.

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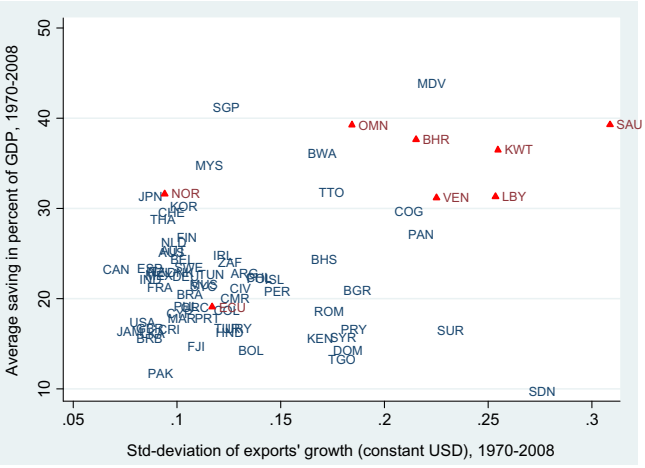

Figure 1. *Volatility and saving (1970–2008 averages, oil exporters highlighted).*

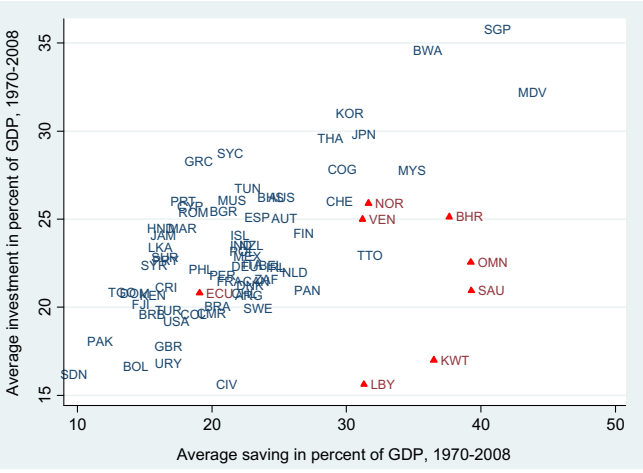

Figure 2. *Investment and saving (1970–2008 averages, oil exporters highlighted).*

This result is in stark contrast to the perfect foresight model, which predicts large borrowing rather than saving. The optimal investment rate in our model depends primarily on the productivity of investment in the tradable sector and directly affects the growth rate of output. In contrast, the productivity of the nontradable sector does not affect the optimal investment rate much. Since investment is risky, the more the country invests, the faster it grows but at the expense of larger buffer-stock savings and lower income volatility. Thus, there is a tradeoff between higher growth/higher volatility and lower growth/lower volatility regimes. Faced with highly volatile income, the government would optimally accumulate substantial buffer-stock savings and invest relatively little if investment productivity in the tradable sector was low, a policy associated with lower growth/lower volatility regime. In contrast, with higher productivity in the tradable sector, investment and growth rates would be high, facilitating a faster recovery in case of negative income shocks and reducing the need for large buffer-stock savings.

The MPC out of permanent shocks obtained from the model, which is below one, is at odds with the perfect foresight model, but it is broadly consistent with the government revenue and consumption data in the recent decade. If we take the model and the implied MPC at face value, oil exporters on average treated most shocks in the 2000s as permanent. The oil-exporting countries accumulated buffer-stock savings from extra oil revenues rather than spending all or borrowing (Figure 3).

The paper is organized as follows. Section 2 discusses the related literature, and Section 3 presents the model and calibration based on a group of oil exporters. Section 4 analyzes results, and Section 5 concludes.

2. RELATED LITERATURE

A few recent papers have analyzed optimal government policies in resource abundant countries.[8] Governments usually spend a large fraction of a windfall of natural resource revenues, and Collier, van der Ploeg, Spence, and Venables (2010) argue against using a perfect foresight permanent income hypothesis model that predicts a very small response to such a windfall. Instead, they suggest that capital-scarce developing countries adopt cautious spending plans and allow for large public investment programs. van der Ploeg and

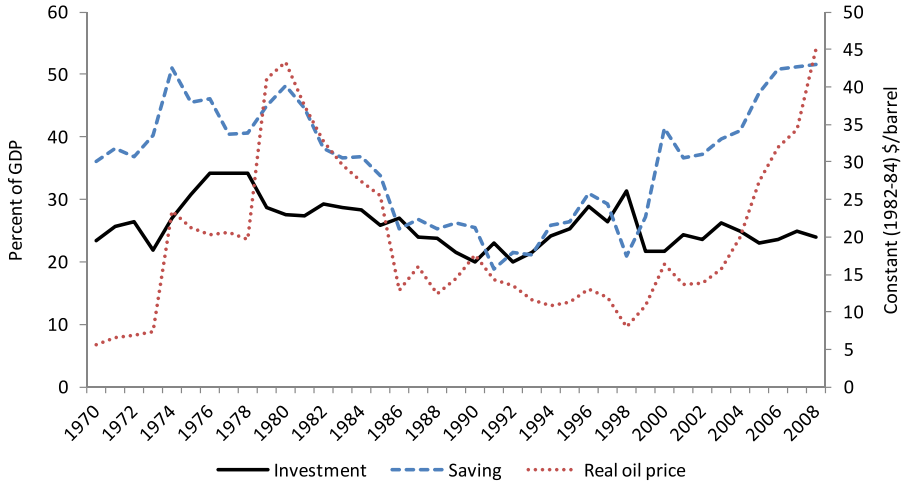

Figure 3. *Investment, saving, and real oil price for a group of oil exporters.*