

ERF Policy Brief

Oil Rents, Tax Revenues and the Shadow Economy: New Insights

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About the authors

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In a nutshell

- It is often discussed that negative oil revenues may increase pressure for democratization via fiscal channels.
- A declining oil rents may increase the willingness of the state to collect more taxes, leading to more political economic participation of the people.
- We revise this argument in the resource curse literature by taking the shadow economy into account.
- Using a panel data covering 124 countries for the period 1991-2015, we show that a declining oil income may not increase tax efforts of the state under a sizable shadow economy.
- Democratization in oil-based economics as a result of dropping oil income through the channel of taxes may not realize under a high share of informal economy.

New insights for the resource curse: the forgotten role of the shadow economy

In our recent study (Ishak and Farzanegan, 2020), we particularly explore the fiscal transmission channel of resource curse, which stipulates the negative effects of resource rents' dependency on the taxation capacity of the state and the willingness to reform the tax system.¹ However, most of this literature relates to positive oil rent

changes and usually reports a negative relationship between tax revenues and resource rents (James, 2015 for case of US; Crivelli and Gupta, 2014 for a sample oil rich economies), neglecting the existence of contextual conditional effects. We extend this literature by analyzing the impact of negative changes in oil rents on government

¹For a review of other channels of resource curse, see Bjorvatn et al., 2012; Farzanegan, 2014; Bjorvatn and Farzanegan, 2015; and Farzanegan and Thum, 2020.

taxation performance. An important missing factor in the resource curse literature is the shadow economy (SE). We examine the conditional role of the SE in the final effect of negative changes of oil rents on government tax efforts, showing its relevance for better understanding of effects of oil rents shocks in government performance. The addition of the shadow economy into our calculation also can alter the earlier predictions on democratization response of government when they face negative oil rents. For example, Ross (2001, 2012) use the fiscal channel to explain democracy deficits in oil-rich economies. The negative effect of rents on political institutions is due to the response of tax revenues to positive changes in oil rents. Higher oil rents may reduce the willingness of the state to tax citizens and cause the postponement of tax reforms. The lower fiscal dependency of the state on citizens may reduce the demand for accountability of the state to the people, as well as the political participation of the people. In a panel of 30 hydrocarbon-producing countries, Bornhorst et al. (2009) empirically examine whether there is evidence of an offset between government revenues from oil and gas-related activities and revenues from other domestic sources. They show that countries that receive large revenues from the exploitation of natural resource endowments reduce their domestic tax effort. In the field of political science, some also suggest that democratization of oil based economies can be manifested by declining their oil revenues. For example, Thomas L. Friedman (2005) in his Op-Ed on “The Geo-Green Alternative” in the New York Time argues *“You give me \$18-a-barrel oil and I will give you political and economic reform from Algeria to Iran. All these regimes have huge population bubbles and too few jobs. They make up the gap with oil revenues. Shrink the oil revenue and they will have to open up their economies and their schools and liberate their women so that their people can compete. It is that simple.”* Our results implicitly show that democratization in oil rich economies by cutting their oil income is not as straightforward as Friedman supposed. Existence of a sizable SE significantly reduces the ability of state to increase its tax efforts (a possible driver of political engagement and power sharing) in response to falling oil income. At least, the expected political openness following drop of oil revenues is less likely to happen through the channel of taxation.

Our data and model

We propose two testable hypotheses in this study:

Hypothesis 1: An exogenous decline in international oil price increases tax revenues, *ceteris paribus*.

Hypothesis 2: An exogenous decline in international oil

price has a smaller impact on tax revenues, where the initial size of the SE is higher, *ceteris paribus*.

We use a panel dataset covering 124 countries over the period 1991–2015. Our main specification uses three-year averages of our measures of tax revenues, oil price shocks, SE, and per capita income. This allows us to overcome instances of missing data for some countries, especially tax revenues, and have a more balanced dataset. Nevertheless, our results do not depend on the use of three-year averages.

Our main specification is as follow:

$$\begin{aligned} \ln TaxRev_{it} = & \alpha_i + \gamma_t \\ & + \beta_1 NegPriceShock_{it} + \beta_2 SE_{it-1} + \beta_3 NegPriceShock_{it} \times SE_{it-1} \\ & + \beta_4 \ln GDP_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

where α_i is country-fixed effects (e.g., country specific characteristic such as geography, culture, religion, etc) and γ_t is year-fixed effects (e.g., time specific shocks such as global financial crisis). $\ln TaxRev_{it}$ is (log) tax revenues (% of GDP) in country i and year t ; $NegPriceShock$ measures negative oil rent shock; $\ln GDP_{it}$ is (log) GDP per capita and ε_{it} is a disturbance term. SE_{it-1} is the initial size of the SE (% of GDP) lagged by one period to address reverse feedback concerns, since it is less likely that tax revenues and price shocks at year t will affect the size of the SE in year $t-1$. In this specification, β_1 captures the linear effect of negative oil price shocks on tax revenues in countries more dependent on oil, and β_3 measures the effect of negative oil price shocks on tax revenues conditional on the initial size of the SE. According to our theoretical prediction, the sign of the linear effect should be positive ($\beta_1 > 0$) and the sign of the interaction effect should be negative ($\beta_3 < 0$). Hence, the higher the initial size of the SE, the lower the effect of oil price shocks on tax revenues.

Our measure for oil price shock for country i at time t takes the following form (Eq. 2):

$$OilPriceShock_{it} = \delta_i (\ln OilPrice_t - \ln OilPrice_{t-3}) \quad (2)$$

where δ_i represents the whole-period average of the country's i share of oil exports to GDP multiplied by the three-year change in (log) international real oil prices ($\ln OilPrice_t$). The construction of the measure captures that oil price shocks will have a greater impact in countries with higher oil dependency.

The oil export data are from the United Nations' Comtrade dataset, reported according to the Standard International Trade Classification 1 system (UN Comtrade,



2018). Data on international real oil prices are taken from the British Petroleum database (BP, 2018). To differentiate negative oil price shocks from positive shocks, we construct a variable that takes the value of three-year growth of logarithm oil price if the generated growth rate value is strictly negative and zero otherwise (see Farzanegan and Markwardt, 2009 for a similar approach). Negative oil price shocks are first calculated per year for each country and then collapsed to the three-year average. Formally,

$$NegPriceShock_{it} = \min(0, OilPriceShock_{it}) \quad (3)$$

Tax revenues are measured by the ratio of tax revenues to GDP, taken from the World Bank's World Development Indicators (WDI, 2018). As we show in the next section, controlling for GDP per capita captures any variations in tax base, so that what remains in this measure is only the variation in tax rate, which is our variable of interest. GDP per capita is taken from the World Development Indicators (WDI, 2018). The share of SE to GDP is taken from Medina and Schneider (2018). We follow the definition of an SE presented by Schneider (2005). The SE (i.e., an informal economy) covers the production and transactions of "legal" goods and services that are not reported for tax purposes. This definition excludes illegal activities, such as the drug trade and human trafficking. According to Schneider, there are four reasons for economic agents moving from the formal to the SE: (1) evading income-, value-added, and other tax payments; (2) evading payment of social contributions; (3) evading implementation of special labor standards, such as minimum wages and safety and environmental standards in the production process; (4) evading compliance with standard administrative processes, such as completing statistical questionnaires.

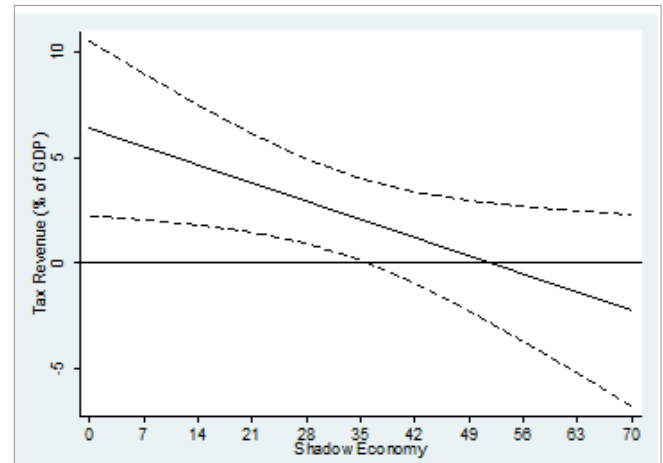
Our findings

Our main results are illustrated in Figure 1, which plots the estimated effect of negative oil price shocks on tax revenues conditional on the initial size of the SE, along with the 90% confidence bands. The plot shows that the increase in tax revenues following negative oil price shocks is lower at higher levels of initial size of SE. With no SE, a one-percentage-point weighted decline in international oil price implies an increase in tax revenues of 6.4%. In a low-SE country (SE around 7% of GDP), the effect of a one-percentage-point weighted decline in international oil price leads to an increase in tax revenues of 5.5%. In a mid-SE country (SE around 32% of GDP), the effect of a one-percentage-point weighted decline in international oil price implies an increase in tax revenues of 2.4%. Negative oil price shocks cease to have any

significant impact on tax revenues in high-SE countries, where an SE represents more than 35% of GDP. In Table 1, we present a list of countries with SE representing more than 35% of GDP.

To put things differently, let us consider Iran, Oman, Kazakhstan, and the Republic of Congo as examples of oil-dependent countries with SEs representing, on average, 18%, 19%, 39%, and 50% of GDP, respectively. A one-percentage-point decline in international oil prices increases tax revenues in Iran and Oman by 4% each, but has no significant impact on tax revenues in Kazakhstan and the Republic of Congo.

Figure 1: Marginal effects of negative oil prices shocks on (log) tax revenues (% of GDP) at different levels of shadow economy (% of GDP). The dashed lines represent the 90% confidence intervals



Conclusion

In our recent study (Ishak and Farzanegan, 2020), we examine how the impact of falling oil rents on tax revenues may be contingent on the size of the SE. We show that declining oil rents are less likely to increase the tax receipts of governments under a sizable SE. To test our main hypothesis on the moderating role of the SE in the final effect of negative oil shocks on tax receipts, we use panel data covering the period 1991–2015 and more than 120 countries. Our main hypothesis is supported by the data. In particular, the positive effects of falling oil rents on tax revenues decrease with higher levels of SE. Our main results hold when we control for the effects of income, agriculture value added to GDP, trade, aid, ethnicity, time-varying common shocks, country-fixed effects, and quality of institutions (corruption, democracy, and political stability). Moreover, our main results, based on country- and year-fixed effect regressions, are robust after addressing endogeneity and using different estimation methods.



Our results contribute to the debate on ambiguity in the role of the SE in oil-dependent countries. On the one hand, the existence of an SE can correct market inefficiencies and allow workers to cope with economic volatility (Ishak and Fritsche, 2020), reducing the risk of political instability (Farzanegan and Badreldin, 2017), but on the other hand, our findings suggest that it may impede government taxation efforts during economic downturns. In this regard, policymakers are well-advised to analyze the SE and its drivers, as well as weigh the benefits and costs for its existence. Allowing for a limited role of the SE can be conditionally beneficial if its size is kept under control. At the same time, the government is recommended to embark on labor market reforms, in terms of increasing labor productivity, reducing obstacles for firm entry, offering a flexible regulatory environment, and employee social protection. This will allow for a reduction in the role of the SE without losing its benefits. Our study has also implications for debates around democratization effects of reducing oil rents in oil based economies. A common wisdom that falling oil rents may increase pressure of sharing political power in autocratic regimes through the channel of taxation is less likely if we consider the size of the shadow economy.

Future research may also investigate how a decline in oil revenues following the negative economic shocks from the coronavirus pandemic in 2020 or economic sanctions may affect the tax efforts of oil-based economies, considering the size of the SE.

Table 1. List of countries with a SE representing more than 35% of GDP

Albania, Algeria, Angola, Armenia, Azerbaijan, Bahamas, Bangladesh, Belarus, Belize, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burundi, Colombia, Congo Rep., Cote d'Ivoire, Croatia, Cyprus, Dominican Republic, Egypt, El Salvador, Ethiopia, Georgia, Ghana, Guatemala, Honduras, Jamaica, Kazakhstan, Madagascar, Malawi, Malaysia, Mali, Mexico, Moldova, Morocco, Myanmar, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Paraguay, Peru, Philippines, Romania, Russia, Rwanda, Senegal, Sri Lanka, Suriname, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Ukraine, Uruguay, Zambia, Zimbabwe

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