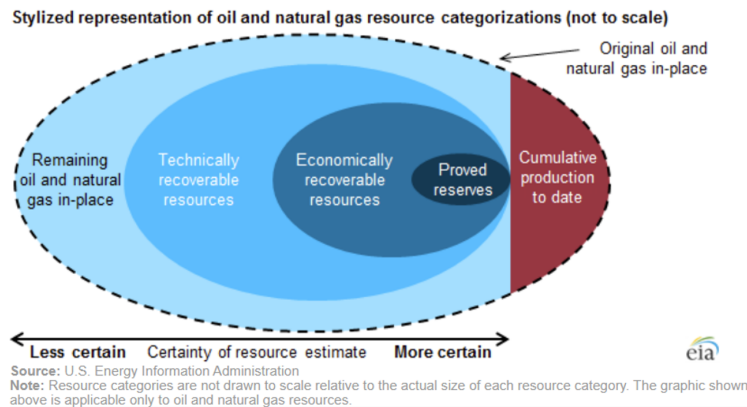


1 Data appendix

1.1 Estimations controlling for oil reserves

As documented by [Hamann, Mendoza, and Restrepo-Echavarría \(2020\)](#), the dynamics of proved oil reserves have a significant impact on the evolution of credit worthiness of emerging economies who are oil exporters. In order to understand my findings in light of their results it is important to note a conceptual distinction between proved oil reserves and URR. There is a range of categories to measure oil reserves. Figure 1 shows a conceptual diagram from the U.S. Energy Information Administration that illustrates the differences between these categories.

Figure 1: Oil and natural gas resource categories



Each category implies a different level of uncertainty, where the most certain measure is proved reserves and the most uncertain is remaining oil and natural gas in-place. Oil and gas in-place refers to the total amount of resources within a geological formation. Technically recoverable resources includes oil and gas that can be produced based on current technology.¹ This is the estimate of URR that [Arezki, Ramey, and Sheng \(2017\)](#) use to construct the NPV of oil fields, which can be interpreted as the amount of oil in a field that is physically feasible to extract. Economically recoverable resources (ERR) are all URR that can be profitably produced given economic conditions (like the price of oil and variable costs of production) at the time of measurement. Finally, proved oil reserves require a higher standard of certainty to be considered profitably and physically recov-

¹Geophysical characteristics of rocks, as well as physical properties of hydrocarbons (such as viscosity) prevent technology from producing the entirety of the ultimately recoverable reserves.

erable. As ERR, proved reserves shrink and grow as the prices of oil and extraction inputs vary, URR do not.

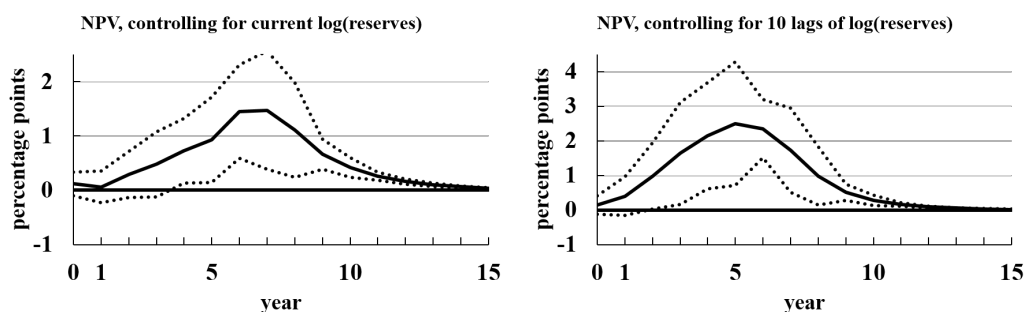
It is crucial to note that, by definition, the resources contained in giant oil field discoveries are not included in the measure of proved oil reserves at the time of the discovery. Instead, the oil in a field is gradually added to proved reserves once drilling starts and new information is collected about its feasibility and profitability.

[Hamann, Mendoza, and Restrepo-Echavarria \(2020\)](#) document how marginal changes in proved oil reserves impact the credit worthiness of oil exporting countries, identifying both long and short-run effects. The shocks these authors identify are driven by international economic conditions (like oil prices) and by endogenous extraction decisions, both of which are the main source of variation in proved oil reserves. There are three important differences between [Hamann, Mendoza, and Restrepo-Echavarria \(2020\)](#) and the work presented in the remainder of this section. The first has to do with the magnitude of the shocks at hand. By definition, the size of year-to-year changes in proved reserves is dwarfed by the size of giant oil discoveries. The second has to do with the fact that newly discovered giant oil fields cannot be immediately exploited; instead, they require a substantial amount of investment through several years in order to become productive. In contrast, proven reserves can be more easily exploited within shorter periods of time. Both the size of discoveries, and the investment and time they require to become productive have important implications for expectations and actual economic activity in other sectors, aggregate investment, and foreign borrowing. These implications impact sovereign interest rate spreads in a way that marginal changes in proved reserves do not. Finally, as discussed in the next subsection, the nature of the data on oil discoveries allows for a quasi-natural experiment approach to identify their effect, in contrast to vector autoregressions (VARs) which are less accurate with short time series.²

Figure 2 shows the dynamic response of the spreads following a discovery of median size. The left panel controls for the natural logarithm of contemporaneous proved reserves and the right panel controls for this and ten lags. The results are very similar to the benchmark results that do not control for reserves.

²Additionally, while proved reserves are measured (and vary) periodically, giant oil field discoveries are only measured when they happen, which makes it hard to identify their effect under the VAR assumptions.

Figure 2: Impact of giant oil discoveries on spreads



Impulse response to an oil discovery with net present value equal to 4.5 percent of GDP, which is the median size of discoveries in the sample. The dotted lines indicate 90 percent confidence intervals based on a [Driscoll and Kraay \(1998\)](#) estimation of standard errors, which yields standard error estimates that are robust to general forms of spatial and temporal clustering.

1.2 Investment shares by sector

The data of total investment in manufactures, commodities, and non-traded sectors consider 47 countries for which sectoral investment data for the period 1993–2012 are available.³

The data of investment by sector are from the National Accounts Official Country Data collected by the United Nations following the International Standard Industrial Classification, Revision 3 (ISIC Rev. 3). It considers investment per country for 11 sub-items. Table 1 summarizes the sub-items and how I classify them into non-traded, manufacturing, and commodities.

³These countries are Armenia, Australia, Austria, Azerbaijan, Belarus, Belgium, Botswana, Canada, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kuwait, Latvia, Lithuania, Luxembourg, Malta, Mauritius, Mexico, Namibia, Netherlands, New Zealand, Norway, Oman, Pakistan, Poland, Portugal, Qatar, Saudi Arabia, Slovenia, South Africa, Spain, Sweden, Syrian Arab Republic, Tunisia, Ukraine, United Arab Emirates, United Kingdom, United States, and Uruguay.

Table 1: Industry classification

sub-item	classification
Agriculture, hunting, forestry; fishing (A+B)	commodities
Mining and quarrying (C)	commodities
Manufacturing (D)	manufacturing
Electricity, gas and water supply (E)	non-traded
Construction (F)	non-traded
Wholesale retail; hotels and restaurants (G+H)	non-traded
Transport, storage and communications (I)	non-traded
Financial intermediation; real estate (J+K)	non-traded
Public administration; compulsory social security (L)	non-traded
Education; health and social work; other (M+N+O)	non-traded
Private households with employed persons (P)	non-traded

References

- Arezki, Rabah, Valerie A. Ramey, and Liugang Sheng. 2017. “News Shocks in Open Economies: Evidence From Giant Oil Discoveries.” *Quarterly Journal of Economics* :103–155. [1](#)
- Driscoll, John C. and Aart C. Kraay. 1998. “Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data.” *Review of Economics and Statistics* 80:549–560. [3](#)
- Hamann, Franz, Enrique G. Mendoza, and Paulina Restrepo-Echavarria. 2020. “Resource Curse or Blessing? Sovereign Risk in Resource-Rich Emerging Economies.” 2020 Atlanta Workshop on International Economics. [1](#), [2](#)