

“Nuclear Diplomacy” -

State of the Art of Nuclear Power Plants Exports and some Econometric Analysis

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Overview

Nuclear power is currently discussed in many countries around the world, both in those who already have deployed it, and those who have not installed it but are preparing plants to do so, i.e. go “go nuclear”, and sometimes called nuclear newbies. In times of growing geopolitical tensions, nuclear power has re-emerged as an important source of electricity and military strength in some countries and regions. Thus, notwithstanding the economic decline of nuclear power and the loss of its competitiveness, e.g. in the United States, there seem to be strong drivers to push countries to install new nuclear power plants, be they economic or not. Some more prominent cases of newbies are Turkey, Saudi Arabia, and Bangladesh, but other countries with (still) less obvious motivation are also pursuing ambitious targets, such as Uganda, Sudan, and the People’s Democratic Republic of Lao. Overall, we count about 25 countries with established plans to go nuclear, i.e. to install (imported) nuclear power plants: Albania, Algeria, Bangladesh, Belarus, Bolivia, Cambodia, Ecuador, Egypt, Indonesia, Jordan, Kazakhstan, Kenya, Dem. People’s Rep. of Korea, Kuwait, Lao PDR, Malaysia, Poland, Saudi Arabia, Sri Lanka, Sudan, Thailand, Turkey, Uganda, and Vietnam.

The push on the demand side is accompanied by a concentration of suppliers, and increasing competition between the nuclear vendors. As “The Economist” (2018, 21) observed, “one country now dominates the market for design and export of nuclear plants, Russia”, yet one also observes two other exporters, China and the United States, in this competition, whereas other traditional vendors, such as France and South Korea, have largely disappeared from global competition. In fact, a kind of “nuclear diplomacy” has emerged between the big three nuclear powers (Russia, China, United States), in the wake of increasing geopolitical tensions. In this context, nuclear diplomacy also includes a race to the bottom, at least in terms of the sales prices, If not in terms of quality and security of the big three vendor countries, providing nuclear power plants to newbies at very favorable conditions, or - in extreme cases - for free, such as in Sudan. The Economist, and other academic and political observers, have argued, therefore, that geopolitical competition is a major driving force behind many countries’ strive to go nuclear, and that the distribution of nuclear power plants at favorable conditions is mainly done in exchange for political gratitude and other, material and immaterial compensations (such as land, resources, etc.), see Thomas (2018, 2019) and other case studies.

Methods

In this paper, we identify economic and political characteristics of countries that choose to go nuclear. Since the decision to go nuclear is never purely economic, but also affected by strategic considerations and the nuclear diplomacy of the supplier countries, traditional economic competition analysis (or energy system modeling) is less likely to explain current trends than a political economy analysis of the drivers behind the nuclear programs. To that end, we compare the characteristics of the newbies in terms of political and economic indicators with those of other countries, either long-standing nuclear countries or those who have not installed nuclear power and are not planning to do so. Due to the unordered nature of our outcome variable, we utilize a multinomial logistic regression approach to analyze if a countries' choice to go nuclear is significantly influenced by political and economic variables. Among the explanatory variables are two different measures of political freedom and democratic development, per capita GDP and GDP growth, and CO2 emissions.

Our cross-sectional analysis covers 217 economies grouped according to their nuclear energy strategy based on information from the year 2017 to identify economic and political characteristics of countries that chose to go nucle-

ar. We first specify three categories which distinctively define a countries' nuclear energy strategy, based on information from the Power Reactor Information System (PRIS, 2018) database, and analysis of the nuclear industry: "Newbies", "no nuclear", and "potential nuclear countries" (the group of countries that we are particularly interested in).

Results

The paper includes quantitative and qualitative results:

~ The qualitative results include a full-fledged analysis of the "nuclear diplomacy", i.e. all nuclear projects of the exporting countries towards the 24 potential newbies. This information contains technical detail at the country level, and also an assessment of the subsidy element of the exports.

~ The quantitative results include regressions of the main explanatory variables that distinguish potential newbie countries. We find an inverse relationship between the ambitions to go nuclear, and the degree of political freedom. Potential nuclear entrants are characterized by higher per capita GDP and higher CO₂-emissions than the "non-nuclear" countries.

Conclusion

The paper helps to understand current trends of nuclear diplomacy, and the characteristics of potential nuclear entrants. Based on qualitative and quantitative analysis, we find that those economically weak and/or politically unstable countries are more likely to select into the group of newbies than other, e.g. richer, more democratic countries. We suggest to extend the research to young newbies, and to look at a longer period of experience, here limited to the year 2017.

References

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