



Review of the PhD thesis “Growth and Diversification Trajectories of Natural Resource Exporters”, authored by Zuzanna Helena Zarachn and supervised by Aleksandra Parteka and Aleksandra Kordalska.

In my view, the manuscript is clearly of sufficient quality to be defended. Please find my comments to back up this opinion below, structured along the lines of the main criteria for quality of the manuscript:

Assessment of the research issues undertaken, the aim(s) of the dissertation, including the research methodology used.

The manuscript deals with long-standing questions about the economic performances of countries that are rich in natural resources and export these in large quantities. Over time, different outcomes have been observed. Some countries like these prospered, others did not. The present manuscript mainly deals with questions about the extent to which countries that are natural resources-rich manage to attain technology-based economic growth and to diversify their export bundle.

The dissertation consists of an introduction in which questions like these are put in a broad context, also stressing their policy relevance. It then continues with a very extensive overview of the literature, which is concluded by the identification of some research gaps. These are threefold. First, the empirical literature on the relationship between dependence on resources and economic growth of countries remains highly inconclusive, the evidence is very mixed. Hence, more insights are needed to find meaningful empirical “laws” regarding the specific circumstances (the context) under which this this relationship is positive or negative. Second, the implications of high dependence on natural resources for technological progress have not often been addressed. This is important, because some previous contributions to the literature argue that resource-dependent countries tend to perform poorly when it comes to producing innovations. Third, and finally, important questions regarding the relationship between natural resources dependence and diversification of economic activities remained unexplored. Generally speaking, previous studies did not do much more than arguing that resources-rich countries have relatively one-sided export bundles, being overly specialized in exporting these natural resources.

In order to fill these research gaps, a high-quality panel database for the period 1996-2021 is constructed, merging data from various sources. The well-known BACI database constructed by the CEPII institute in Paris is the most important database. It provides detailed data on bilateral exports, at a fine-grained level of detail. These data



were combined with data from the Penn World Tables, various databases maintained by the World Bank, the Harvard Center for International Development and the Colonial Dates Database also maintained by Harvard University.

The resulting database is used in two empirical chapters with state-of-the-art econometric analyses. The first one (Chapter 4) focuses on the growth performance of countries that mainly export natural resources, while the second one (Chapter 5) deals with the extent to which these countries diversify their export bundles. Both chapters are rich in detail and contain several robustness analyses. The final chapter contains the conclusions, which can be summarized as “good news for exporters of natural resources”: Such countries can enjoy long-run economic growth (also technology-driven, not just by exporting more of their resources) and they can also become less dependent on exporting resources. The generation and adoption of new technologies should be promoted and institutional quality should be enhanced to maximize the chances for such opportunities to materialize.

Assessment and justification of whether the doctoral dissertation is an original solution to a research problem, an original solution in the application of the results of one's own scientific research in the economic or social sphere.

In my view, the thesis adds original insights to the existing literature. What I appreciate in this respect is that the author has put a lot of effort into distinguishing between several categories of natural resources (forestry products, fuels, metals and minerals, with a further subdivision of fuels into coal, natural gas and petroleum oils). The empirical results also show that the relationships analyzed are not homogeneous across these categories of natural resources.

Another aspect of the manuscript I like very much is the introduction of the (modified) Theil index to measure export diversification. A major improvement, however, could be attained by constructing a variable expressing the share of exports of national resources in total exports, but expressed in *constant* prices. In the empirical specifications, an economywide price index is included, but this does not capture changes in relative prices. It is well-known that prices of crude oil tend to be much more volatile than those of e.g. forestry products. Consequently, changes in the composition of export bundles could be caused by changes in relative prices, even if these bundles remained completely unchanged in quantity terms. I would be interested in knowing whether the relationships as unveiled by the thesis would survive if such a quantity-based approach would be pursued. At the same time, I am aware of the difficulties in obtaining harmonized data on prices, especially for products that are not homogeneous in terms of quality. Still, I think it would have been good if



the problems associated with analyses in terms of current prices would have been discussed explicitly.

Assessment of whether the doctoral dissertation presents general theoretical knowledge in the discipline or disciplines, and demonstrates the ability to independently conduct research work.

The second chapter of the dissertation clearly shows that the doctoral candidate has a good overview of the relevant literature on economic growth and export performance of resources-rich countries, when it comes to both theories and findings from empirical studies. What I appreciate in this chapter is that it does not only cover the most recent contributions to these literatures, but that it also discusses insights from several decades ago, when questions like those central to the thesis were also pressing.

Despite her wide coverage of the literature, I think the author neglected one important strand of literature related to the diversification question. In my view, the so-called Evolutionary Economic Geography literature has a lot to say about the rate and direction of diversification of economic activities in general and exports in specific. I think that Frenken, Van Oort and Verburg (2007, *Regional Studies*) and Hidalgo, Klinger, Barabasi and Hausmann (2007, *Science*) can be considered as the seminal papers. This literature argues that diversification of countries tend to be going into directions that are close to the existing set of products, activities or capabilities, rather than into those that are distant from the existing set in product/activity/capability space. By making a distinction between “related variety” and “unrelated variety” (and concepts derived from these), the contributors to this literature explicitly account for path dependence in diversification trajectories.

Assessments, with justification, of whether the doctoral dissertation demonstrates the ability to independently conduct scientific work by the person applying for a doctoral degree.

The analyses presented show that the author is very capable of doing research of a quality that allows for publications in international, refereed journals. The econometrics are of high quality and what I especially like is the clear way in which both the methods and the results are discussed. I also think that the fact that the candidate has published at least three articles in international, refereed journals is a good indication of her capabilities (despite the fact that these articles were co-authored and it is not possible for me as an outsider to assess the contributions of the



candidate to these papers). The thesis itself gives the impression that the author is a mature researcher.

Summary

The main strengths of the thesis are the very comprehensive literature review, the meticulous way in which the database has been compiled (bringing several sources of data together) and the quality of the econometric analyses in the empirical chapters. These also stand out with respect to the scope of the robustness analyses.

Questions

- 1) Shares of specific products in the export bundles of countries are expressed as ratios of nominal values (i.e., in current values). An implication of this is that shares are not only affected by changes in volumes exported, but also by changes in relative prices of natural resource products. Has the candidate considered focusing on volume changes, by using product-level deflators? If so, why did she decide not pursue this approach? If not, does she share my concerns that several of your results will be affected by the high volatility of the price of oil?
- 2) What does the candidate consider to be the main advantages of the “Relative Theil” index of export diversification over a regular Theil index? She refers to paper by Gnidchenko (2021) and Parteka and Tambari (2013), but the main argument behind this choice remains hidden. And did she consider alternative options? If so, which ones?
- 3) To some extent, I am a bit surprised that (in the empirical analysis in Chapter 5) the export diversification of a country in period t is assumed to be unrelated to this export diversification in period $t-1$, also because annual data are used. Since countries do not change regarding their export specializations overnight, I would expect that past diversification plays a role. Why did the candidate decide not to include lagged values of RT , e.g. in Table 5?
- 4) If the candidate would be a policy advisor for two national governments (of Country A and Country B, respectively) that would like to promote productivity growth of their countries and Country A would be a large exporter of forestry products and Country B of mineral products, would she come up with different policy recommendations for the two countries? If so, how would the recommendations differ and why? And if not, why not, given the differences in the results obtained for the two types of countries (e.g. in Table 4.3).



Conclusion

In conclusion, I state that the reviewed doctoral dissertation constitutes an original solution to a scientific problem, and its Author demonstrates general theoretical knowledge in the discipline of management and quality sciences within the field of social sciences, as well as the ability to conduct independent scientific research. Therefore, I request that the Council of the Scientific Discipline of Social Sciences at Gdansk University of Technology admits the Doctoral Candidate to the defense.

A handwritten signature in blue ink, consisting of a stylized 'B' and 'L' followed by a long horizontal stroke.

Bart Los (March 20, 2026)