



German Economic Team Belarus

IPM Research Center

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Methodological issues in predicting potential comparative advantages of Belarus

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Executive Summary

The future comparative advantage of a country is based on some strength that are already present in the country. Current export performance is an indicator for these strengths (e.g., if a country exports textiles it is likely to feature competitive labour cost). Hence, we endeavour to predict the potential future comparative advantages of Belarus based on its export basket.

We try numerous specifications in terms of data sample, data transformation and econometric model. We describe these in this Technical Note. None of them leads to convincing results.

The same approach leads much better results for other countries (both in terms of in-sample predictive power and in terms of intuitive outcomes). Hence, we conclude that apart of methodological and data issues, the non-convincing results for Belarus are also due to the 'artificial' export structure of the country. That is, Belarus is exporting many products, not because it is particularly competitive in their production, but because politics implicitly encourages/subsidizes these exports. This, however, invalidates our presumption that current exports reveal the comparative advantage of a country.

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1. Introduction

Specialising in producing and exporting the goods and services a country has comparative advantages in is a key challenge on the path of economic development. In the past twenty years, Belarus main exports have largely remained the same – mineral fuels, fertilizers, transport services and vehicles. And Belarus' exports are highly exposed to the CIS market. The limited diversification in terms of destinations and sectors is becoming an increasing issue – especially as the prices of the exported commodities are falling and the CIS-market is shrinking. Increasing the income level of Belarus will hence depend developing new strengths. Export strength should be built on comparative advantages.

Comparative advantages originate in a multitude of aspects, including natural conditions and resources as well as skills and human capital gained in the production of the present basket of goods and services. Identifying potential for new specialisation should therefore not be restricted to the extension of present strengths but should draw on the experience of other countries with similar conditions and starting points. This is what we attempt in this paper.

The export-specialisation of a country is not eternally fixed, but it can evolve over time. Particularly a developing economy will gradually climb up the ladder of value added of the goods it produces, developing from simpler commodities to more specialised products. Vietnam, for example, reduced the share of exports of agricultural goods and raw materials from more than 70% in 1985 to less than 30% in 2010 (Vixathep, 2013). In the same time, it developed a comparative advantage, not only in textiles, but also in low-range mechanical manufacturing (e.g., motorcycles).

Thereby, the goods and services in which a country tends to develop a new comparative advantage are not random. Being better than others in exporting a certain product requires the availability of a certain combination of factors, as diverse as labour cost, legal system, climate or resource availability. This combination differs across products: Textile exports require particularly low labour cost, financial services exports require a strong legal system, banana exports require a warm climate and oil exports require oil resources. More often than not, a combination of two or more factors is essential for being competitive in a certain product. So textile exports are primarily to be found in countries with, both, low transport cost to final markets and low labour cost.

Interestingly, what a country is good at exporting today, gives a good indication of the presence (and absence) of these underlying factors. If a country is currently specialised in exporting textiles, it is probable that this country indeed has comparatively low labour and transport cost (while it might not have other advantages as it would otherwise specialise in higher-value added products than textiles). We measure specialisation in terms of 'revealed comparative advantage'.

We base our analysis on a large, international dataset of 180 countries and their specialisation in more than 1,000 goods and services. To analyse the economic specialisation of a country, we use "revealed comparative advantage" (RCA), which is commonly used for this purpose. The RCA measures the relative importance of exports of a good or service among the total exports of one country in comparison with the average export share of this good in other countries. A RCA larger than one implies a specialisation of the country in the production of a good, measured through exports of the respective good.

Consequently, the potential strength of a country in exporting a certain product can be deduced from the countries' current exports. For example, countries currently specialising in 'unwrought aluminium' are more likely to develop a competitive edge in say 'aluminium bars' than in 'semiconductors'.

In the following, we quantitatively establish regularities of specialisation correspondences and employ these to predict what products Belarus might competitively export in the future.

To establish what products Belarus might develop a competitive advantage in given its current specialisation, we proceed in two steps: First, we analyse in which other products countries that currently specialise in a particular product were typically specialised in in the past. We find, for example, that most countries that are now specialised in exporting 'aluminium bars', were in the past specialising in 'unwrought aluminium', 'electrical energy' and 'aluminium plates'. In a second step we use the regularities we have established for each product to predict Belarus' future potential. If, for example, competitive strength in a certain product (C) was found to be contingent on past strength in two other products (A&B), and Belarus currently features a comparative advantage in these two products (A&B), we predict that Belarus might have a potential in developing a comparative advantage in the first product (C). The data used for this analysis is UN COMTRADE and Services Trade data for ca. 1350 varieties goods and 11 kinds of services.¹

2. Initial approach

To implement the above outlined research-approach different econometric models and parameters can be selected. In the initial set-up we use the average RCA of the years 2004 to 2006 to predict the average RCA of the years 2010 to 2012. In order to prevent this overfitting we remove Belarus from the data set (out of sample predictions).

Another issue was the transformation of the original RCA's. RCA's are not well distributed. Many of them are zero, they are non-negative, many cluster around one and above one they start grow fast with some extreme outliers. To obtain sensible results we tried different transformations of the original RCA value: no transformation, remove outliers, logs, binary with threshold at 1.

Finally we had to decide on the econometric model. We apply variable selection techniques to learn best predictive model: Lasso regression, Bayesian Spike and Slab regression (on standard linear model, and on a Poisson regression model for the non-transformed data).

Results:

The predictive performance was particularly low for Belarus for all variations in the procedure. Other countries were much more easily predictable. Even when we added Belarus to the sample, the predictive performance only changed marginally.

We see three explanations:

As the methodology was much more successful for other countries, there might be a structural issue with Belarus. On the one hand that might be a data issue (we for example observe that some export data from Belarus are not well matched with import data in the corresponding country). More importantly, we argue that the current export structure of Belarus might not reveal Belarus comparative advantages (in a market economy sense). Many of the exports of Belarus are not the result of market developments but of political choices. The export of refined oil is one example, but also the continuing exports of tractors to the CIS countries.

¹ The methodological section draws on Georg Zachmann, David Saha, Michele Peruzzi (2015) Georgia's economic specialisation: Present and future. GET Georgia Policy Paper [PP/01/2015].

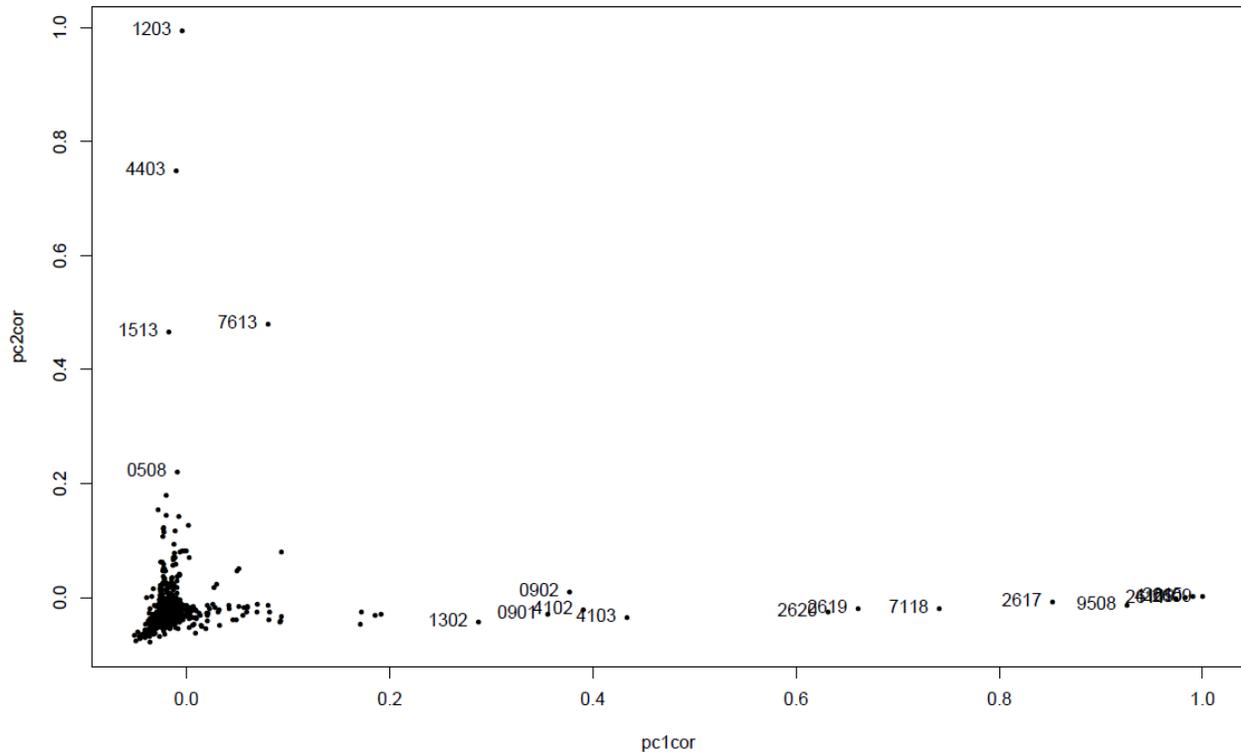
In our approach, a product's RCA is modelled as a function of other products' RCAs, with the countries playing the role of the observations. Thus we obtain an optimal predictive model for every product. We can then look at the error all the optimal models do in trying to predicting the product-RCA of a specific country. Belarus is a country that got bad predictions in a large proportion of products.

A more general problem is the quality of the RCA data and the mismatch between number of observations (countries) and the number of variables (products), which makes it unfeasible to apply more elaborate dynamic models.

3. Alternative Approach

To overcome the issue of highly multicollinear RCA data for many products for a few countries we construct the Principal Components of the RCA data. Actually, the first 10 Principal Components explain 92 % of the variation of the RCA data (and 35% of the binary RCA data).

Figure 1: Correlation of the first (x-axis) and second (y-axis) principal components with the RCAs



Source: own calculations based on UN Comtrade and UN service trade data

Principal components group together products that are structurally similar. This should lead to more stable results and predictions at the cost of some interpretability. Hence, instead of many RCA's, we now reduce the set of features on which we base our predictions, which should help stabilizing the results.

We also tried different transformations (the same as before) of the data in order to see which one allowed the most efficient data summarization through Principal Components.

The results in this case were not improved as compared to the earlier models, and predicting a product's RCA using Principal Components had a similar overall performance as in the previous approach.

4. General issues

The task of predicting future comparative advantage is ambitious. It is not made easier by data problems (e.g., services data has holes). In the particular case of Belarus, the methodology does not provide convincing results – which is, in our view, largely explained by the fact that Belarus' economy is far from the average.

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