

Additional intermediate results for Benefits of Customs, 30 August 2016

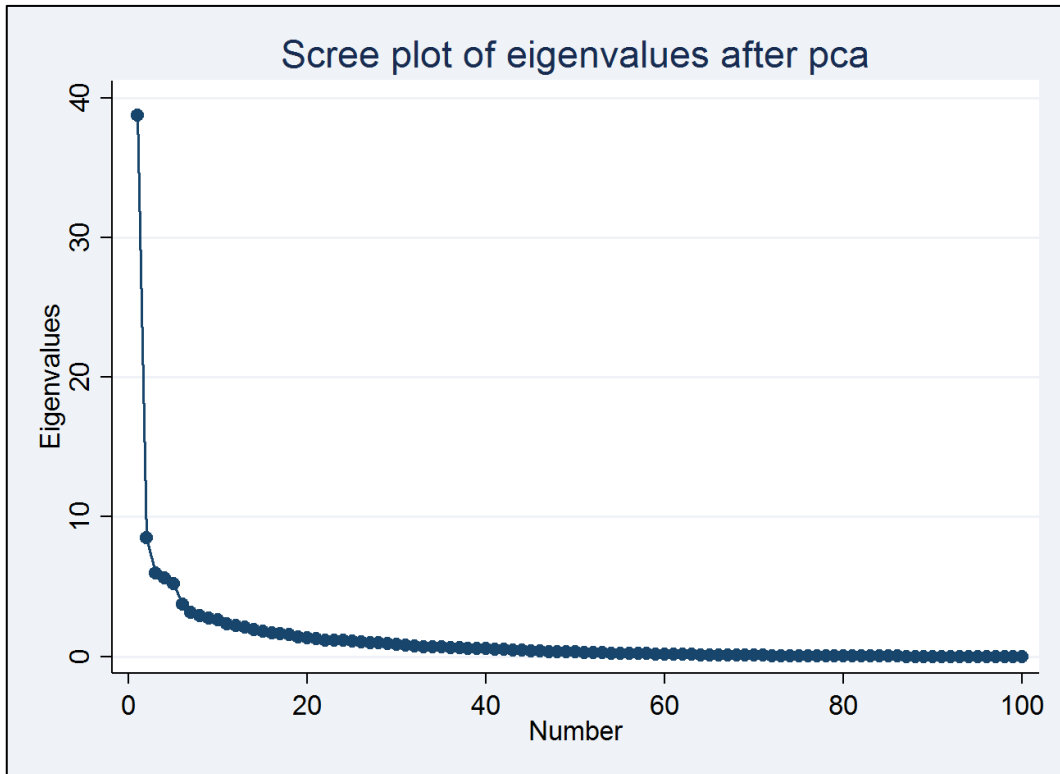
This note provides an update on the status of the project “The economic benefits of customs”. Since our last meeting before the summer, we have worked on the ‘cross-section analysis’ stage of the project. This stage stands in contrast with the already finished time-series analysis, as the number of indicators is much larger (282 in total) if we focus on a single year. We have worked on two different approaches; the first includes a principal component analysis, the second is applying gravity analysis of the cross-section data in the form of a famous economist saying: “I just ran four million regressions”. We will elaborate on the preliminary findings of both approaches below.

Principal component analysis

The **principal component analysis** is an econometric technique that examines the interrelations among a set of variables. These interrelations are exploited to determine the underlying structure of those variables, to emphasize variation. In short, it is a data reduction method that can be used to reduce the number of relevant variables, so as to facilitate regression analyses. The output of a PCA is a certain number of components, that capture most of the variation that can be found in the indicators (hence the name, principal components).

The principal component analysis (PCA) requires a complete dataset, in which case any missing observations are not allowed. We therefore had to reduce the number of variables down from 282 to 123, and the number of countries from 195 to 92.

One method to identify the principal components within the reduced dataset is by looking at the scree plot (see figure below). Any point before a ‘kink’ in the line is deemed to be a relevant component.

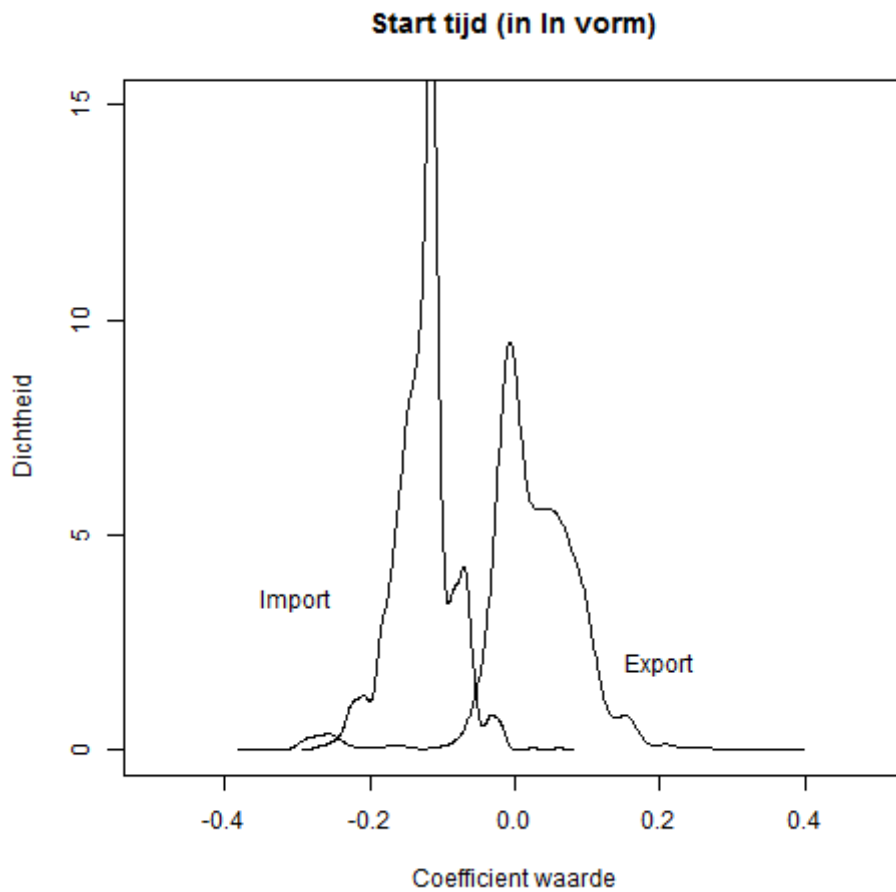


On the basis of the scree plot above, and in line with econometric customs, we can identify 5 components that stand out. Upon closer analysis of these 5 components, we have determined which underlying indicators (or variables) are the main driver of each of these components. The type of indicators that stand out in these components are summarised in the table below.

Principal component	Indicators responsible for large variation
1	<i>Worldbank LPI indicators</i>
2	Advance ruling
3	<i>Worldbank Doing Business</i> ; border compliance Port charges
4	Infrastructure, organisation & transparency
5	Cost to import/export per container Port supply chain

Multiple regression analysis

We have run a large number of regressions, with each time a different set of explanatory/independent variables. For each of these regressions, coefficients for the effect of each variable on the dependent variable (exports) is estimated. The figure below shows the result of this exercise for the variable "start tijd". It should be noted that for econometric reasons, this variable was transformed into log-form, such that the logarithmic value of "start tijd" is inserted into each regression. This will, however, facilitate the interpretation of the coefficients. For the importing nation, "start tijd" tends to have a negative coefficient. The figure below shows that a coefficient value of around -0.16 is most common outcome. Due to the log-transformation, we can claim that a one percent increase in "start tijd" will lead to 0.16 percent less trade. Similarly, the most frequent coefficient for exports is close to zero, such that a one percent change in export "start tijd" has a negligible impact on trade.



In a similar fashion as done for “start tijd”, the number of documents needed at customs can also be easily interpreted from the figure below. Both for the importer and the exporter, the number of documents has a negative influence on trade flows. This makes sense, the more documents you need, the more time and money it costs to make the cross-border transaction. For the importer, the most frequent value is -1, indicating that a one percent increase in the number of documents leads to a one percent reduction in trade flows. For exporters, the effect is even larger, with a negative impact on trade of 1.5 percent for each one percent increase in number of documents required.

Coefficienten aantal documenten (in In vorm)

