# Homework III

**MAS-961-API-309**
**Due May 10 or before (in class)**
*Instructor: César A. Hidalgo*

**170 points in total** (-10 points for each day after the due date)

I.- Economic Complexity and The Product Space

      People in Fantasy World have begun to trade. After 1 year of activity the exports of Fantasy World have been compiled by the Fantasy World Union and are given by the following matrix. The units are monopoly money, although fantasy world is not necessarily a monopoly ☺:

**EXPORTS MATRIX**

| Countries/Products | $\alpha$ | $\beta$ | $\gamma$ | $\delta$ | $\varepsilon$ | $\eta$ | $\rho$ | $\omega$ | $\theta$ | $\zeta$ | $\chi$ | $\mu$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PatoLandia | 0 | 10 | 1000 | 50 | 1350 | 0 | 0 | 120 | 0 | 0 | 0 | 12 |
| Mordor | 0 | 0 | 5000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NeverNeverLand | 0 | 0 | 2000 | 0 | 0 | 0 | 0 | 0 | 50 | 150 | 12 | 10 |
| TheMatrix | 345 | 123 | 700 | 654 | 356 | 12 | 0 | 500 | 120 | 89 | 12 | 50 |
| Lilliput | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 4 | 0 | 0 | 0 | 5 |
| Narnia | 23 | 3 | 10000 | 300 | 500 | 0 | 1 | 20 | 5000 | 1000 | 0 | 100 |
| Pandora | 0 | 5000 | 600 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Xanadu | 0 | 234 | 900 | 1 | 5 | 7 | 0 | 8 | 9 | 12 | 0 | 5 |
| Warcraft | 0 | 200 | 1250 | 0 | 100 | 0 | 0 | 0 | 20 | 70 | 0 | 0 |

      In this homework we will walk you through a simple Analysis of the Productive Structure of Fantasy World and the options faced by each of these countries and industries.

      All of this homework can be done using MS. Excel (I just did it myself and it took about 2 hours). An important function to know here is "sumproduct". Look for it in excel's help menu, it will really make your life, or at least this assignment, much easier if you learn how to use it. Also you might want to look at the functions "if" and "sum", if you are not familiar with them.

      For the following questions you need to provide printed proof that you completed each of the steps. **Please provide this in an orderly manner.**

1.-Calculate the Total Exports by Country and by Product (5 points)
2.-Calculate the share of each product in Fantasy World's total trade (5 points)
3.-Calculate the share of exports that each product represents in the export basket of each country (10 points).
4.-Calculate the RCA Matrix of Fantasy World (20 points)
5.-Use an RCA threshold of 1 to create $M_{cp}$, a simple graph connecting countries to the products they export (10 points).

6.- Calculate the diversity of each country and the ubiquity of each product (10 points)

7.- Calculate the average diversity of each product's producer and the average ubiquity of each country's products. Use this to plot the diagrams for the first two variables of the Method of Reflections (for both countries and products) ($k_{c,0}$-$k_{c,1}$ and $k_{p,0}$-$k_{p,1}$). Label the countries and products in the plot. Comment: which are the most "sophisticated" countries and products of Fantasy World? (30 points).

8.- Use $M_{cp}$ to count the number of times each product is produced with other products (10 points).

9.- Use the proximity formula we saw in class to calculate the proximity between products, this will be our estimate of Fantasy World's Product Space (20 points)

10.- Use the matrices you created above to calculate the "Density" matrix. (30 points)

11.- For each country, list its closest product. Comment (10 points)

12.- For each product, list the countries closest to it. Comment: do you see any bias towards a certain type of country? (10 points)

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