

Numerical Exercise 1: Determinants of Food Demand

After graduation, you are hired by Cargill, a giant grain marketing company. Your first assignment is to estimate likely annual growth in demand for key products in two big countries, Indonesia and Nigeria, over the next few years. The main question is whether consumption will grow faster for cereal grains in the form of human food, or in the form of feed for poultry.

This is a tough question but luckily you took AGECE 340, and recall that in Week 3 of the semester (and on pages 54-55 of the background text), the key determinants of demand growth were shown to be population growth, income growth, and the income elasticity of demand. From these you can calculate growth in consumption demand (“ d ”) by the formula $d = p + gn$, where “ p ” is the percentage growth in population, “ g ” is the percentage growth in income per person, and “ n ” is the income elasticity of demand.

To compute a real-world answer, you need numerical estimates of these variables. Estimates of income elasticities for cereals and poultry in these countries are in your course slides (week 3, page 4 and also p. 47 of the textbook). For future economic growth, the most authoritative source is the IMF *World Economic Outlook*. To get their data, go to www.imf.org/weo and click on “[World Economic Outlook Databases](#)”, choose the most recent version (Oct. 2009), then select “[By Countries](#)” and choose “[All countries](#)”, click **Clear All** and select **Indonesia** and **Nigeria** then click **Continue>**, select both “**Gross domestic product based on purchasing-power-parity (PPP) per capita GDP**” and “**Population**”, then click **Continue>** again. You can keep all defaults, to show data from 2007 to 2014, and click **Prepare Report>**. Check to make sure the numbers look right (in 2007, Indonesia had about 225 million people earning about \$3,700 per person in PPP terms, while Nigeria had just about 144 million people earning about \$2,050 per person in PPP terms), then scroll down to **Download** and click on **Your WEO report**. This will give you a file you can open in Excel or any spreadsheet software. (If you have never used a spreadsheet before, please call me!)

These are raw numbers, so using your spreadsheet you need to compute percentage changes from year to year. For any variable X from year 1 to year 2, the percentage change x can be calculated easily as $x = (X_2 - X_1) / X_1$. You need to compute these percentage changes for both population (p) and per-capita income (g), then apply the income elasticity (n) using the formula above to obtain each year’s percentage changes in consumer demand (d). When calculating, be careful to keep all percentage changes in decimal form (that is, 1% = 0.01). The result should be four sets of percentage changes in consumer demand (two products, in each of two countries), for seven years (from 2007-08 through 2013-14).

Using this spreadsheet, what do you tell your bosses? Answer using the following questions:

- (a) In Indonesia, for which product (cereals or poultry) will consumption grow faster? _____
- (b) In Nigeria, for which product (cereals or poultry) will consumption grow faster? _____
- (c) For cereals, in which country (Indonesia or Nigeria) will consumption grow faster? _____
- (d) For poultry, in which country (Indonesia or Nigeria) will consumption grow faster? _____

Now, think about the sources of your data. The income elasticity estimates may be out of date, so redo your calculations with more “average” numbers of 1.2 for poultry and 0.2 for cereals.

- (e) For which question(s) above (a, b, c, d, or “none”) does this change your answer? _____

What if the Nigerian government improves? With the new elasticities (1.2 and 0.2), redo the calculations if Nigeria were to attain the same projected income growth as Indonesia.

- (f) For which question(s) above (a, b, c, d, or “none”) does this change your answer? _____

Finally, please print out your spreadsheet, put your name and staple it to this page.