

## Problem Set #1: Macroeconomic Data

Revised: October 5, 2013

*You may do this assignment in a group. Whatever you hand in should be the work of your group and include the names of all of the contributors.*

1. *National accounts in Margaritaville (40 points).* Jimmy Buffett has decided to apply for membership in the European Union on behalf of his newly sovereign nation, Margaritaville. As part of his application, he must provide the EU technocrats with a complete set of national accounts. You have been hired as the Chief National Accountant. Your first day on the job, you receive an official Coral Reefer Crew™ t-shirt and the following information about local economic activity:
  - Local Cheeseburger in Paradise™ cafes sold \$63,000 worth of cheeseburgers to local consumers. Their expenses were: imported beef and sesame seeds (\$10,000), locally produced catsup (\$12,000), wages and benefits (\$22,000), and rent (\$3,000). Hint: you will need to compute the profit earned by the cafes.
  - Local tomato growers sold \$8,000 worth of tomatoes to domestic catsup producers and exported another \$3,000 to the US. They paid land rent (\$1,000) and wages (\$9,000).
  - Local producers of the Margaritaville Frozen Concoction Maker™ sold \$100,000 worth of blenders; 40% were exported to Europe, the remainder to local consumers. Their expenses were \$15,000 worth of imported metal, \$20,000 for a new CNC machine imported from Germany, and \$70,000 in wages.
  - The domestic catsup industry sold \$12,000 worth of product to local cafes. They purchased \$8,000 worth of tomatoes from domestic growers and paid \$4,000 in wages.
  - The newly-formed government collected \$10,000 in taxes from its citizens and paid \$10,000 to government regulators, who oversee food and beverage safety.

Your mission is to use this raw data to construct national income and product accounts for Margaritaville. Specifically:

- (a) Compute the value-added of each production unit. What is GDP? (10 points)
- (b) Compute GDP and its expenditure components (consumption, investment, government purchases of goods and services, exports, and imports). (10 points)
- (c) What are saving and investment? Why are they different? Where does the difference go? (10 points)
- (d) Jimmy looks over your calculation in (a) and is worried that you made a mistake. Over a couple Land Shark Lagers™ you explain to him that GDP can be computed three different ways: the sum of value-added across production units (Gross Domestic Product), the sum of expenditure components (Gross Domestic Expenditure), and the sum of payments to labor and capital (Gross Domestic Income). You do the remaining one, payments to labor and capital, and show him that you get the same answer. He buys you a margarita to show his appreciation. (10 points)

2. *Inputs and outputs (20 points)*. Specify the most likely direct impact of each of the following on the components of the production function. Don't make this more complicated than it is: we're concerned only with the impact on the components of the production function.
- (a) A "ghost city" in China, complete with new office and apartment buildings, but with no people. (5 points)
  - (b) A reduction in the employer tax on workers that leads firms to hire more people. (5 points)
  - (c) An improvement in education that increases the skill and effectiveness of workers. (5 points)
  - (d) A reduction in tariffs in Brazil on imported computer equipment. (5 points)
3. *The stock of residential property in the US (40 points)*. Estimating the stock of capital is more art than science. Let's try our hand at applying the perpetual inventory method to estimate the stock of real residential capital (i.e., houses) in the United States.
- The first thing we'll need is a starting point, which we will assume is 8 trillion (2009 dollars) at the beginning of 1999. You can download annual real private residential real investment for the years 1999 to 2012 from FRED (series PRFICA). Also, don't forget to account for the fact that houses depreciate at a rate of 3.5 percent per annum.
- (a) Is "private residential real investment" a measure of value added, income or expenditure? How big was it relative to real GDP in 2012? (10 points)
  - (b) Using the law of motion for capital that we discussed in class, what is our estimate of the real stock of residential property at the end of 2012? (15 points)
  - (c) Now try the same calculation using the nominal values for private residential investment (series PRFI, converted to annual frequency). How does the estimate compare to when we used real investment? What does this tell us about house prices over this period? (15 points)