

## Problem Set #3: Macroeconomic Indicators

Revised: April 13, 2013

*You may do this assignment in a group of up to five people. Whatever you hand in should be the work of your group.*

1. Cyclical businesses (20 points). Rate each of the following businesses as not cyclical, cyclical, or very cyclical. Explain your reasoning.
  - (a) Machine tools (5 points)
  - (b) Grocery stores (5 points)
  - (c) Family practice medicine (5 points)
  - (d) Mercedes S-class sedans (5 points)

### Solution:

- (a) Durable good, very cyclical.
- (b) Nondurable good, slightly cyclical.
- (c) Service, not cyclical (or not very cyclical).
- (d) Luxury good, very cyclical.

2. Monthly indicators (40 points). The idea is to review some of the tools we've developed to establish cyclical patterns of various economic indicators.

We'll use data from the St Louis Fed's [FRED](#). Download monthly data from 1990 to the present for industrial production (series INDPRO), nonfarm employment (PAYEMS), housing starts (HOUST), retail sales (RRSFS, starts in 1992), and the S&P 500 stock market index (SP500).

Construct year-on-year growth rates for each series. With them in hand:

- (a) Compute and report the standard deviation of each one. (10 points)
- (b) Compute and report the correlation of each variable with industrial production. Which variable has the highest correlation? Are any of them counter-cyclical? (10 points)
- (c) Compute cross-correlation functions for each variable with industrial production. Which variables are leading indicators? Which are lagging indicators? (20 points)

**Solution:**

- (a) See below. These numbers are for growth rates computed in FRED, what they call “percent change from a year ago.” If you use continuously-compounded growth rates, the numbers will be a little different.

Series	mean	std dev	corr w/ IP
Industrial production	2.03	4.34	1.00
Nonfarm employment	0.91	1.78	0.81
Housing starts	-1.68	17.67	0.52
Retail sales	2.06	3.53	0.80
S&P 500 index	7.92	17.19	0.65

- (b) See last column above. All the correlations are positive in this case. The largest one with with employment, with retail sales a close second.
- (c) Cross-correlation functions below. The ones we used in class start in 1960, these start in 1990.



PS: These were computed in R, a popular open-source statistics program. If you think you'd like to try it, let me know and I'll send you the program.

3. Near-term economic conditions (40 points) You are delighted to have a summer internship in JP Morgan's capital markets group. Your first rotation: Fixed Income Research. On your first day, the Managing Director gives you a small

project to get your feet wet. Noting that bond markets are driven largely by macroeconomic news, she asks you to write a report summarizing the near-term prospects for the US economy, specifically the next two quarters.

You go (again) to FRED or other source and download 8-10 of your favorite economic indicators. (If you're short of ideas, look at the Bloomberg [economic calendar](#) and the macroeconomic [resource page](#).) After transforming them as needed, you:

- (a) Explain (briefly) why you chose each of your indicators, and whether you think it's better to use the indicator, its growth rate, or some other "transformation." (10 points)
- (b) Graph each indicator (suitably transformed) over some sensible sample period. What are the advantages of a long sample period? Disadvantages? Include on the graph lines representing the sample mean and plus/minus one standard deviation. (10 points)
- (c) Summarize your findings in a business cycle scorecard, as outlined in the notes. (10 points)
- (d) Overall, do they indicate above-average, below-average, or average growth of the US economy? What judgemental factors would you add to your analysis? Where do you think the US economy is headed? (10 points)

**Solution:** You'll have to use your own judgement here. Part of the judgement involves which series to use. Generally you want to use series whose ups and downs are highly correlated with those of the economy. Another part is whether to use levels or growth rates. Generally you want to use whatever works best, but there's no mechanical method to determine that. With housing starts, for example, the growth rate looks pretty good, but the level still looks bad. Which is it? Hard to say, we haven't been in this situation before.

The plot below includes four of the series (their growth rates) we looked at above with the requested lines added.

