NYU STERN

The Global Economy
Professor David Backus

Problem Set #3: Macroeconomic Indicators

Revised: November 12, 2014

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. *Cyclical businesses (20 points).* Rate each of the following businesses as not cyclical, cyclical, or very cyclical. Explain your reasoning.
   (a) Home appliance producers and retailers (5 points)
   (b) Grocery stores (5 points)
   (c) Family practice medicine (5 points)
   (d) Plastic surgery (5 points)

   Solution:
   (a) Durable good, very cyclical.
   (b) Nondurable goods, moderately cyclical.
   (c) Service, not very cyclical.
   (d) Luxury, likely to be very cyclical.

2. *Monthly indicators (40 points).* The idea is to apply some of the tools we've developed to establish the 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 (FRED series code INDPRO), nonfarm employment (PAYEMS), the civilian unemployment rate (UNRATE), the money supply (M2SL), and the ISM manufacturing new orders index (NAPMNOI).

   Construct year-on-year growth rates for each series. With them in hand:
   (a) Compute and report the (contemporaneous) correlation of each variable with industrial production. Which variable has the highest correlation? Which correlations are positive? Which negative? (20 points)
   (b) Compute and plot cross-correlation functions for each variable with industrial production. Which variables are leading indicators of industrial production? Which are lagging indicators? (20 points)

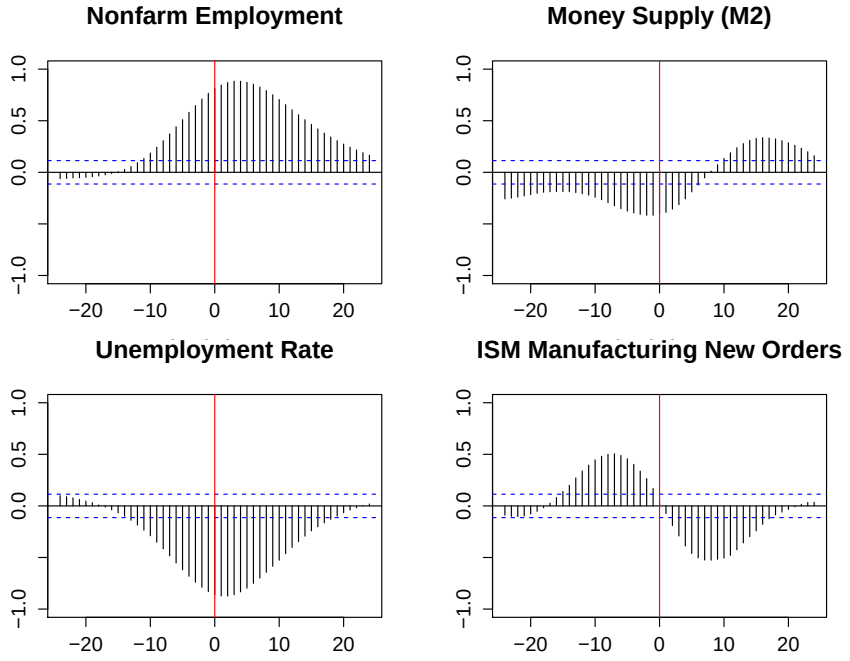
Solution:

(a) See below. These numbers are for continuously-compounded year-on-year growth rates for the period starting January 1990. If you use some other growth rate, or a different sample period, your numbers could differ, but typically not by a lot.

Series	Mean	Std Dev	Corr w/ IP
Industrial production	2.07	4.26	1.00
Nonfarm employment	0.99	1.70	0.81
Unemployment rate	0.76	15.60	–0.86
Money supply	5.25	2.31	–0.41
ISM new orders	0.69	20.60	0.05

The correlations are in the last column. The largest one is for (the growth rate of) the unemployment rate. It's negative, which suggests it's countercyclical.

(b) Cross-correlation functions below. The ones we used in class (and in the book) start in 1960, these start in 1990, so they're a bit different.



Back to the question. From the figure, it seems that employment is a procyclical indicator and lags by three or four months. The unemployment rate is countercyclical and lags by a couple months. The money supply

is a poor indicator all around — all of the correlations are small. In the past, M2 was thought to be a respectable procyclical leading indicator, and it remains part of some leading indicator indexes. Any such claim was destroyed by the financial crisis, when the economy tanked while the money supply grew, leading to the pattern you see here. ISM new orders looks to be both a procyclical leading indicator and a countercyclical lagging indicator. A closer look tells us that the greatest correlation comes with a lag (–0.526 at a lag of 8 months), so our rule tells us the latter applies: countercyclical and lagging.

For experts only: The figure and numbers were computed in R, a popular open-source statistics program. If you'd like to give it a try, save this pdf file, open it, and click on the pushpin:

3. *Near-term economic conditions (40 points).* You are delighted to have a summer internship at Morgan Stanley. Your first rotation: Equity Research. On your first day, the Managing Director gives you a small project to get your feet wet. Noting that equity markets are driven partly 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 and download 6-8 of your favorite economic indicators. (If you're short of ideas, look at the Bloomberg economic calendar.) After collecting the data, you:

   (a) Explain (briefly) why you chose each indicator. Comment also, if you like, on why you used the indicator, its growth rate, or some other "transformation." (There's no simple rule for this: experts use what works best.) (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. (10 points)

   (d) Overall, do your indicators suggest 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 over the next 3-6 months? (10 points)

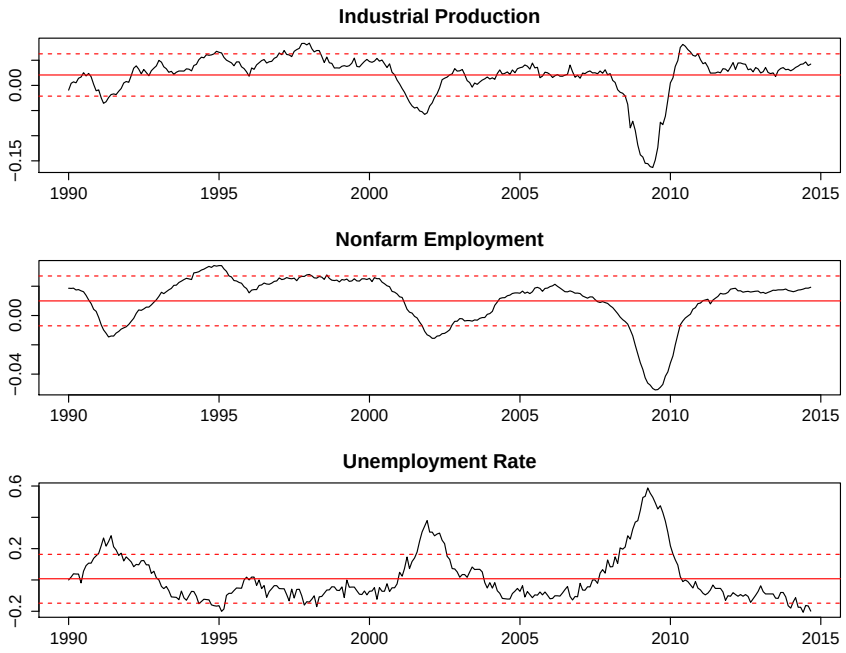
Solution:

(a) 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 strongly correlated with those of the economy. Another part is whether to use levels or growth rates. Generally you want to use whatever works best; unfortunately, there's no mechanical method to determine that. With housing starts, for example, the growth rate looks pretty good right now, but the level still looks bad. Which is more informative? Hard to say, we haven't been in this situation before.

(b) Generally a long sample period has the advantage of giving us more data: as a rule, the more data we have, the more precisely we can estimate patterns. But if the world changes, then the risk with a long sample period is that the old data does not represent current patterns. So there's a tradeoff. In the previous question we started in 1990, which seems like a reasonable compromise. We'll do the same here.

The plot below includes three of the series we looked at above with the requested lines added. All are growth rates. This is a judgement call, you can do what you think is best.



(c) In the figure above, the first two indicators show up as weak positive: above the mean, but below the mean plus one standard deviation. The unemployment rate shows up as strong positive — remember, it's countercyclical, so the bottom of the figure is positive. In fact, the unemployment rate is now

That gives us a business cycle scorecard like this:

Indicator	Strong Negative	Weak Negative	Weak Positive	Strong Positive
Industrial production			x	
Employment			x	
Unemployment				x
Summary	0	0	2	1

(d) The overall indication is positive. You're likely to find something similar.