

Why Can't We Predict Recessions*?

Adrian Pagan
University of Technology, Sydney
Queensland University of Technology
* Based on D. Harding and A. Pagan
"Predicting Recessions"

Commentary on Predicting Recessions

- If a recession were imminent, would economist[s] be able to forecast it? The answer, based on recent experience, is a resounding no (Daniel Gross, Economic View, New York Times)
- "I don't think we, as a profession, ever had an ability to forecast recessions," said Jeffrey A. Frankel .. (NBER Dating Committee)
- "The complexity, dynamism and diversity of the United States economy also make forecasting recessions difficult" (Frankel)
- The very infrequency of recessions in the United States may make it more challenging to detect their imminent arrival. It's like asking people who spend their time in Alaska to start forecasting tropical storms. (Gross)
- "Macroeconomists have successfully predicted nine of the last five recessions." Yoram K. Bauman [University of Washington](#) (and stand-up comedian)

Comments on Commentary

- Many things are complex but have decent forecasting records (weather, inflation?)
- Far more observations on bull/bear markets but do we predict stock market crashes?
- Last comment suggests we forecast a lot of recessions, others we forecast very few. So no agreement even on that
- Despite pessimism many papers coming out in journals (and on internet) claiming ability to forecast recessions

This Talk

- Highly unlikely we can predict recessions
- Problem lies in how we recognize one
- Demonstrate that claims to be able to forecast recessions is illusory and mostly arises because focus on something else that is more predictable but refer to it as a recession
- Suggests we turn attention to things we can do

Defining a Recession

- Recession starts after a peak in economic activity and ends after a trough in economic activity
- Peaks and troughs involve turning points
- Economic activity will be taken to be GDP but just for illustration.
- Work with quarterly data

Turning Points

- A peak occurs at time t if activity is smaller for two quarters before t and 2 quarters after
- y_t is log of GDP so peak if y_t greater than $y_{t-1}, y_{t-2}, y_{t+1}, y_{t+2}$
- Why choose two periods. Based on NBER idea that recessions and expansions have a minimum length
- Automate this rule in a program – BBQ (WYSIWYG program)



Recessions

- Recession starts with a one quarter decline in activity. Hence when measured in logs growth is negative
- So to predict a recession in $t+1$ must be able to predict negative growth in $t+1$ with information available at t .
- More is actually needed since we need to be able to predict a decline in activity in six months after t but will just focus on first event

What Factors Stop Us Predicting Negative Growth?

- High Average Growth and /or low volatility means small chance negative growth
- Momentum in growth. In Turkey GDP growth has a correlation of .7 with past growth and in US it is .4
- Some countries momentum close to zero (Australia and UK)
- If momentum then unlikely to predict negative growth since it will still be positive before the peak.
- May not even know whether we are in time t due to lags in computing GDP and other indicators

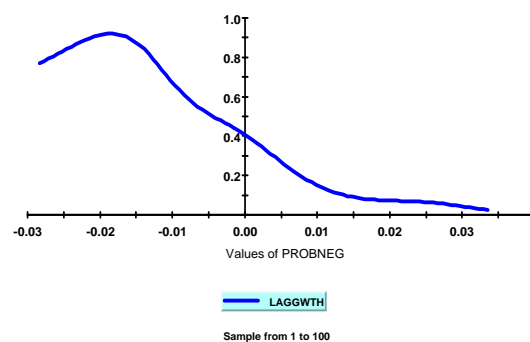


Table 1 : Probabilities of Predicting
the Turkish 2001 Recession

Prediction At/For			S_t
2000:4/2001:1	.06		0
2001:1/2001:2	.55		0
2001:2/2001:3	.94		0
2001:3/2001:3	.82		0
2001:4/2002:1	.94		1

Typical pattern

1st period of recession predicted with
very low probability

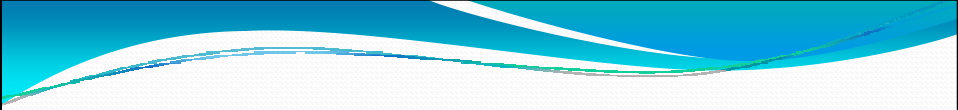
Rises as recession gets underway.

First period probs of negative growth for
Turkish recessions

.25 (1988:3), .05 (1990:4), .16 (1994:1),
.25 (1998:3), .06 (2000:4).

Use critical value of .5 (fairly common
choice)

No recession predicted

- 
- This occurs in Turkish case since high average growth and momentum makes it hard to predict negative one if previous was positive
 - Missing the peak (failing to predict recession) is true of many countries
 - Often one misses this fact because the eye is drawn to the high probabilities in later periods of the recession
 - But by then one has seen a negative growth rate
 - It's too late!

In computing probs above have assumed
knew current GDP growth

If don't then would get much lower Probs

So even worse record

See that knowing current GDP growth
helps a lot by looking at prob of negative
growth for second period in recession

{know current growth, know only past
growth}

{.77,.26},{.51,.12},{.97,.20},{.51,.25},{.55,.13}

Clearly now-casting GDP growth is
crucial

What Has Been Done About This Failure in Literature?

- Change the model for GDP Growth. If linear then will tend to produce momentum so not much use. Most macro models would predict such momentum
- What about non-linear models? Fitted a Markov Switching model to Turkey and Prob (negative growth given lagged growth) smaller than for linear model
- Use a multivariate linear or non-linear model.
- Use variables with information about future shocks that can affect future growth – leading indicators, stock market outcomes, spreads between long and short interest rates.
- Change the event being forecast

Linear Multivariate Model

- Fitted a standard New Keynesian (NK) model to US data on output gap, inflation and short-run interest rate (Cho-Moreno model, J of Macro)
- Simulated 1000 observations
- Regression of $1(\Delta y_{t+1} < 0)$ against $E_{NK}\Delta y_{t+1}$ from NK model
- $1(\Delta y_{t+1} < 0) = .32 - .27^* E_{NK}\Delta y_{t+1}$
- So if $E_{NK}\Delta y_{t+1}$ close to zero, *Prob* (neg future growth) = .32
- Very low. But worse still $E_{NK}\Delta y_{t+1}$ has mean .8 and std deviation of .18 so little chance negative value for $E_{NK}\Delta y_{t+1}$.

External Determinants

- In small economies once could expect that poor growth overseas meant poor growth in small economy some quarters later
- Meant one might predict recession using external negative growth
- Changed with globalization of financial markets and recessions now often stem from financial factors
- “Confidence” around globe now tends to be highly integrated

Multivariate Non-Linear Models

- Often have flavour of following news item
- EU Says Supercomputing Key To Predicting Future Recessions
- Traditional economics failed to predict the credit crunch - but supercomputers might stand a better chance, according to the EU
- The European Union has announced the finalisation of a project designed to use supercomputing technology to create advanced financial models to help predict and prevent future financial crises.
- The EURACE project has been in development for three years and is based on agent technology - one of the applications of which is computer generated effects in the film industry - known as Flexible Large-scale Agent Modelling Environment (FLAME). According to the EU, the software effectively *simulates the interactions between "different economic actors" such as households and companies, banks and borrowers or employers and job-seekers.*

Forward-looking Information (Spreads)

US: claimed predictive efficiency of spreads between long and short rate

Can spreads predict first period negative growth?

Information used *current growth* and spread lagged one period (best according to Estrella and Mishkin)

Ten recessions between 1953:4 and 2008:4

Probs are .30, .4, .32, .38, .59, .55, .40, .22, .25, .25.

Prob(neg growth)= .307 when spread=0,
=.48 when spread= -100 basis points.

Latter very rare:

1973:3 and "Volcker experiment" over
1979-1982

Comparing role of information

pseudo- R^2 for Probit model

.076 (with GDP growth)

.163 (growth + spread)

.178 (growth, spread, S_{t-2})

.28 (growth, spread, S_t).

S_t not really available but used a lot in
"prediction" models

Raises "explanation" quite a lot

Changing The Event Defining Recessions and Turning Points

1. Could use other series than GDP (NBER)

Need to predict many turning points

So even harder

2. Predict a different thing

"recession-derived indicators", RDI

Example: Wright (1996)

$RDI = 1$ if NBER defined recession happens in the next four quarters

Example:

$S_t = \{1, 1, 1, 1, 1, 0, 0, 0, 1, 1, 1, 1\}$ (NBER)

$R_t = \{0, 1, 1, 1, 1, 1, 1, 0, ?, ?, ?, ?\}$

? indicates decision can't be made as not enough future information available

Note: R_t does not treat recessions and expansions symmetrically

$$S_t = \{1, 1, 1, 1, 1, 0, 0, 0, 1, 1, 1, 1\}$$

$$R_t = \{0, 1, 1, 1, 1, 1, 1, 0, ?, ?, ?, ?\}$$

e.g. $t = 7$ $S_8 = 0, S_9 = 1, S_{10} = 1, S_{11} = 1$

Why call $R_7 = 1$ (as mostly expansions in next four quarters)?

If did treat that way then would get back $(1 - S_t)$

In US mean $(1 - S_t) = .17$ = prob recession

mean of $R_t = .31$ = prob "recession event"

Shouldn't take $\Pr(R_t|F_t)$ as if it is $\Pr(S_t|F_t)$

Will look much more impressive

Also timing is changed as R_t is like S_{t+4}

Will look as if one can predict S_t well ahead



Conclusions

- Models unlikely to predict recessions no matter how complicated they are since based on current and past information.
- Models are useful for understanding what might happen if certain shocks come in over future but not for prediction as don't know which shock will happen.
- Models can suggest indices of *vulnerability* e.g. if leverage ratios get past a critical value then potential for a crash rises. Can't predict *when* it will happen though.

Conclusions

- Need to use forward looking variables to capture future shocks but hard to find such variables. Possibly some success with survey type data but mixed at the moment.
- There are some things we can be more successful at – predicting duration of a recession once it has started e.g. know recessions last around twice as long on average given a financial crisis. Better to focus on these.
- Like earthquake prediction where largely given up attempt to predict and instead focussed on making buildings etc robust to them. Would be better doing that for recessions