Economics 435   Menzie D. Chinn
Fall 2018   Social Sciences 7418
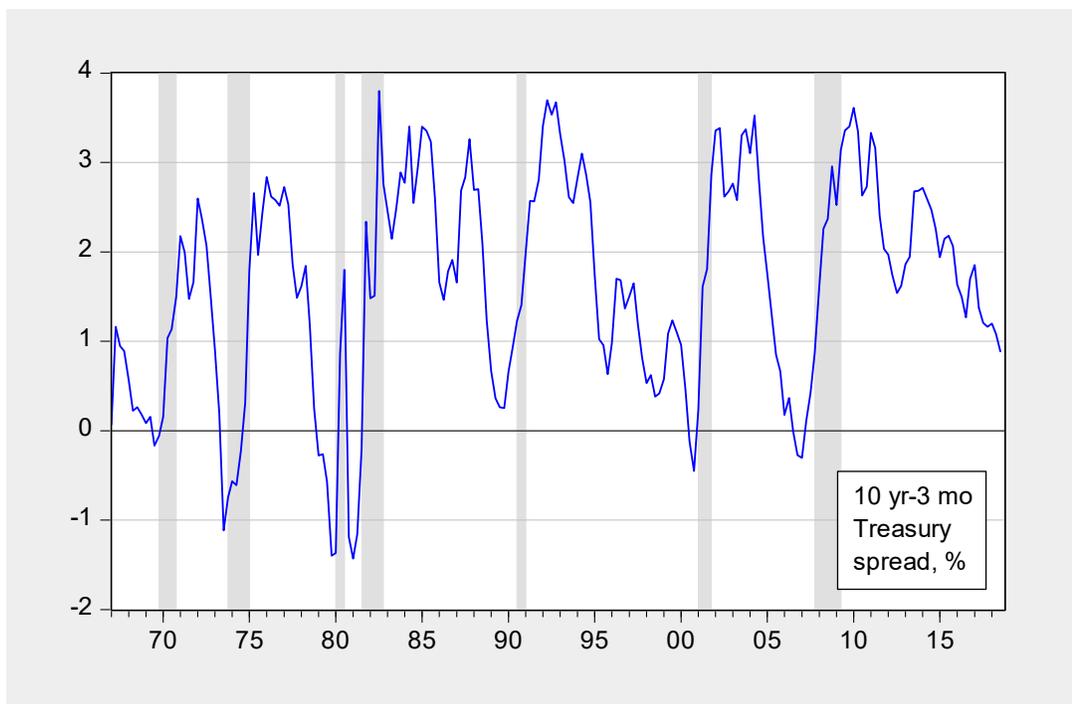University of Wisconsin-Madison
                          Midterm Exam 2

You have 70 minutes to complete this 60 minute exam. Be sure to "box in" your answers. Show your
work (so that partial credit can be granted if the final answer is incorrect).

1. [20 minutes] Consider the following graph of the 10year-3 month term spread for the US:

Ten year-three month Treasury spread (blue) and NBER recession dates.

As of October, the spread is 0.9%; assume the risk premium for 10 year bond is 0.90% (90 basis points).
1.1 (10 minutes) Explain what you think will happen to short term rates over the next ten years. Use math to
help explain your answer.
1.2 (10 minutes) The probit regression is (over 1967Q1-17Q4):

$$P\left(Recession_{t+1,t+12}\right) = \varphi(-0.06 - 0.8 Spread_t) \hspace{2cm} (1)$$

With the slope coefficient statistically significant at the 1% level. Using the regression estimates, do you
believe a recession is likely in the next year. Why or why not? You can use this excerpt from the standard
normal table.

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-0.9	.18406	.18141	.17879	.17619	.17361	.17106	.16853	.16602	.16354	.16109
-0.8	.21186	.20897	.20611	.20327	.20045	.19766	.19489	.19215	.18943	.18673
-0.7	.24196	.23885	.23576	.23270	.22965	.22663	.22363	.22065	.21770	.21476
-0.6	.27425	.27093	.26763	.26435	.26109	.25785	.25463	.25143	.24825	.24510
-0.5	.30854	.30503	.30153	.29806	.29460	.29116	.28774	.28434	.28096	.27760

2. [15 minutes] Suppose the stock price is given by:

$$P_t = \frac{D_{t+1}}{1+rp_t+rf_t} + \frac{E_t P_{t+1}}{1+rp_t+rf_t} \qquad (2)$$

2.1 (5 minutes) Show how to derive the current stock price as a function of stock prices at time t+3.

2.2 (5 minutes) Using your answer to question (2.1) can you tell whether stock prices at time t will go up or down if the economy booms in period t+3? Show why or why not. Note that variables at time t+3 will be discounted by the risk premium and risk free rate in time t+2.

2.3 (5 minutes) Returning to equation (2), assume the log (E(X)) = E(log(X)), and no dividends are paid out. Derive a mathematical expression that describes the evolution of (log) stock prices over time. Describe in words the behavior of log stock prices.

3. [25 minutes] Banking
3.1 (5 minutes) Suppose the bank has the following structure:

Assets		Liabilities	
Reserves	$50M	Checkable Deposits	$230M
Securities	$25M		
Govt Securities	$25M		
Loans	$150M	Bank Capital	$20M

Bank capital is the equity of the owners (shareholders) of the bank. ABS stands for asset backed securities.

Under the Basel II guidelines, government securities and reserves would have zero weight in calculating "risk weighted assets"; calculate the capital ratio for this bank. Show your work.

3.2 (5 minutes) Suppose the government securities are actually as risky as non-government securities. Calculate the true capital ratio; is this ratio lower or greater than in 3.1?

3.3 (5 minutes) Consider two banks, H (high bank capital) and L (low bank capital).

High Bank Capital				Low Bank Capital			
Assets		Liabilities		Assets		Liabilities	
Reserves	$18M	Deposits	$180M	Reserves	$19M	Deposits	$190M
Loans	$142M	Bank Capital	$20M	Loans	$141M	Bank Capital	$10M
ABS	$40M			ABS	$40M		

Bank capital is the equity of the owners (shareholders) of the bank. ABS stands for asset backed securities.

Calculate the return on equity (ROE) for each bank, if the rate of return on loans is 5%, and 10% on ABS, and the interest rate on deposits is 1%.

3.4 (5 minutes) Show what happens to each of the bank balance sheets when the asset backed securities lose 25% of their value.

3.5 (5 minutes) Now consider two banks, one which borrows a nothing short term, and one that borrows a lot on short term money markets.

Bank Deposit Based				Money Market Based			
Assets		Liabilities		Assets		Liabilities	
Reserves	$12M	Deposits	$120M	Reserves	$6M	Deposits	$60M
Loans	$148M	Short term	$60M	Loans borrowing	$154M	Short term borrowing	$120M
ABS	$40M	Bank Capital	$20M	ABS	$40M	Bank Capital	$20M

Calculate the return on equity (ROE) for each bank, if the rate of return on loans is 5%, and 10% on ABS, and the interest rate on deposits is 1%, and the interest rate on short term borrowing is 0.5%.

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