PROB SET I. C. STOCHASTIC D.E.'S (1)

Problem! (a) We have Wt - mean - zero r.v. Yt = C+ P, Yt-1+P2 Yt-2+Wt (1) Define U = E(y) and assume That E(yt) = E(yt-1) = E(yt-2). (We Provided Basis for This assemption a bit later in The Course.) Taking Expectations of (1) and $E(y_t) = C + \phi$, $E_{y_{t-1}} + \phi_2 E_{y_{t-2}} + E_{\phi_t}$ his gives This gives $(1-\phi,-\phi_2)u=c$ Substitute for c in (1) using (3) and write The Result as $(Y_{t} - u) = \phi_{i}(Y_{t-1} - u) + \phi_{2}(Y_{t-2} - u) + w_{E}(4)$

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$$\frac{3}{5} = F = F = 1 + V_{\pm}$$

where
$$g_{t-1} = \begin{bmatrix} \psi_{t} & \psi_{2} \\ \psi_{t-1} & \psi_{2} \end{bmatrix}$$
 and $V_{t} = \begin{bmatrix} \psi_{t} & \psi_{2} \\ \psi_{2} & \psi_{2} \end{bmatrix}$ and $V_{t} = \begin{bmatrix} \psi_{t} & \psi_{2} \\ \psi_{2} & \psi_{2} \end{bmatrix}$

(b) Consider again The 2rd oxeder DE in (1). To find The Roots of This DE using C+ W's method and notation we examine The homogeneous Part of The DE which in C+ W is Typically Written as

Yt+2 + a, Mt+1 + az Mt = 0 (5) We Then Solve for The Roots of The 2nd order DE in (5), b, and b2, by Solving The

(3)

Characteristes equation

$$[b^2 + a, b + a_2 = 0]$$
 (6)

Now, Re-write (1) as

Comparing The LHS of (1') to (5) it is clear that

$$\left[\alpha_1 = -\phi, \text{ and } \alpha_2 = -\phi_2 \tag{7}\right)$$

The Eigenvalues of F solve DeT(F-MI)=0

or Det
$$\left[\begin{array}{cc} \phi_{1}-\Gamma & \phi_{2} \\ 1 & -\Gamma \end{array}\right] = -\Gamma(\phi_{1}-\Gamma) - \phi_{2} = 0$$
 or

A

$$\Gamma^2 - \phi_1 \Gamma - \phi_2 = 0 \qquad (8)$$
Using (7) This Becomes

$$\left[\Gamma^2 + \alpha_1 \Gamma + \alpha_2 = 0\right] \tag{9}$$

Comparing (9) To (6) we have That The eight values of F, T, and Is, are The Same as The Roots of The 2nd oxeder DE, b, and bs.

PROBLEMAZ: Begin From

$$1-\phi, z - \phi_2 z^2 = 0$$
 (1)

Multiply Through by z^{-2} to get

 $z^{-2}-\phi, z^{-1}-\phi_2=0$ (2)

Define $x=z^{-1}$ and (2) Becomes

 $x=z^{-1}-\phi, x=z^{-1}-\phi_2=0$ (3)

So, if z , and z_2 Solve (1) Then $z=z$,

and $z=z=z$ Solve (3)

- Ct = - Ct+1 + Q. Kt+1 + Q2 Ct Lagran Cpy (1a) K++1 = b, K+ + b2 W++1 + b3 C+ (a) write (1b) as Ct = 63 | Kt - b2 WEH inficor and is equal to Me (4) Los Erivisones of whether the constrained model campot be Dien of the number of surprises that do not cancer mit. As shown in Gibbons et al. 2 Of Frid surpre KF 2009 3 month at me pendent, then the impact on -1 all a has a near Kzero and stunds Hevislon 0.38 times the square root alpha is normally distributed with a mean of zero and standard deviation of cancel put, thus I me me me mumber of surprises in calculating alpha. If [K+12-6, K+1, - 62 W +2] + a, K+1, + a, e+1 ings announcements are independent through time. For 10-year intervals, I we take to match the empirical Baume a normal distribution, on 'Wa (1) blind Duroup ph p of 0.38, which matches the und. I assume that the earnsimulation experiences. I assume a single-factor asset unique model tale.

Kft. 4 p 'Kf 4 p 3 M et mation surprises. I then sumodel. The first information. K++2+ b, K++++ b2 W++2+ b3a, K++++ b3a2e++ ing power of the firm would likely have a large alpha associated with it. M. Co (1854) Medules annually change the market's perception of the mure earnalso likely sociated with a large alpha in short, any announcement K++5 = 1 + playing 1 p 31 K++ Huel play to be associated with a large alpha. And the standard of a large to develop a large anticipated product is likely to be associated with a large alpha. Major earnings surprises would a substantial alpha for an individual security? Corporate restructuring as a model with a high probability. What sort of information events might cause My prizes as the number of securities increases and always reject the asset pricing pany returns, we are likely to esceive a substantial number of large sur-Why de we learn from this discussion? If we are using individual com-6 C + North reall surprises that have much less impact on the numerator and esmerator with little impact on the denominator, rather than a lot of securities

PROBLEM 3: We have



LAGAII VARIABLES IN (4) 2 periode & get Alteration are that are fitted the fortunation of the company of the assemble Age, the manufacture in the particular of the second where in a few enamines: Clearly on and it is securities with alphan is to have un-Encil + pre+ a p 2 s.) will have a few minator. I have a minator of the man the impact of the denominator. in the ratio and the more interior is the preparet. However, the increspacts on the Sigrpe ratio. First, the larger (as supporting the greater the shift The can be really a mate in + a 2 p 3 C FE OF cause the market to be interior. or not. Both of these cause a nonzero alpha on individual securities and tion surprises about unificial companies or missing indexes whether priced CAN Be whether us was set portfolio to be interior are informapected returns for these indexes does not affect the efficiency of the market information surprises that cale realized - arms to be afforent from ex-Tolios that replicate the indexes Likewise, the market portfolio is a mear comb non of the replication is officially and therefore the north efficient Wighter the return on all above is expected return or all above is expected return or all above is expected return or all above. efficient frontier can be constructed from a last combinition or the portstructure of returns and there are no unique leburns on securities, then the We know that if a nothing of First bes one vor and covariance A. Appringuous Surprises and Posts of a Personator Asset Present Most factors. Each is discussed in turn A we see shortly, unanticipated information surprises affect the tests of real manual manual tests for the number of

period be analyzed when its expected value is rero.

is different than expected

= 3. at unantiment announcement that affects an index in ne returned generating process but a not proced, so that If is nonzero mer to

2. an unan Kipared announcement the plects a priped index so that If

aguninticipated firm-specific announcement where the impact

excess return on an unpriced factor i, and c_n is the random error term. There are three ways that information purposes can affect the returns on

of stock I to factor j, If is the excess return on a priced factor j, If is the

rece of and in the riskless rate in period (1) is the sensiti



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(b) Re. write (la,b) as bike+ b3 CE + b2 WELL fied two factors of amost 18 st the explanatory power for a prespecified two-factor model where the When a belond faco caters, the Rⁿ for the Inger maturity hands hardly When a belond faco caters, the Rⁿ for the Inger maturity hands hardly However, including two factors Guses the R² on the short end to just draftically. Examines the composition of the second Libiting (a six-month and This Organs again that the returns on londs of different maturities are affected by at least we factors. The last column six bonds clasest to it. Examining R" for the shorter maturity Drwady par more Examinate the supposition of the first factor aboves the in it is called in the three year bond and approximately 10 percent in Acros on factor portfolios for one- to four-factor solutions. The first Table IV shows the adjusted R2 of a regression of returns of the various mover the structure Net rador in the the ser we then is associated with surprise, his gives us a better chance of 0'840 0.9420.840 0.976 0.988 0.966 0.9790.976 0'868 0.987 0.977 T'000 1.080 0.406 the returns on the six-month and four-year bonds there ferior cointians. The last column shows the explanatory power of a prespecified two-factor 3103 tuble shows the adjusted R2 in the regression returns on factor portfobus for one to Apleastory Mower



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Poly (
$$p^2 \alpha' + 1$$
) + p'] $y' - \alpha' p' p^3 1 + 19 p' p' 1 + 19 p' 1 +$

Comparing (11) and (12) we see that The Eigenvalues of F, and F2, are The Same as The Cigonvalues of A, \, and \, \, and \, \, 2.