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| indiff = singular control  when decompose |u|, concern signs   * Look at Hamilton relation with u, and consider effect of u on state constraint, considering initial and final condition * Method: Like, Speed, Focus, Quick, Derive | * Mixed constraint: both control and state variable * Set up lagrangian, and derivative w.r.t. u (cntrl) =0 * In switching point marginal of states are equal * Analyze increasing decreasing func form * Quickly convert min=> max | * Max principle with mixed equality constraints: | |  |
| \* Analysis if bound if T goes to infty | * Condition on the coefficients of controls in the Hamiltonean and analyze * Define optimal control with high level analysis * Then analyze when switch out from the condition * Find state var value at switching point (boundary) | \* put parameter for boundary lambda to determine | | \* suff condition = solve..  \* First: just check the conditions and Guess  \* Moving on boundary of state just plug and fnd u |
| \* to maintain singular control the derivative of its coeff e.g. W1(t2)=0 must be zero.  \* you can directly plug in value of lambda in lambdaDot and see how switches between cases  \* Infinit Horizon: Solve for Finite Horizon T=>Infty and show all condition and logic maintains (e.g. remain in A3 condition region)  \* sink or pessimal solution when stockholder never collect dividends  \* Don’t forget to reverse the order when you calc the reverse time format  \* Formulate always as maximization  \* Two point Boundary Problem => Simultaneous equation =>Variable Elimination => quadratic euations => Roots as general solution (e.g. I(t)=a1exp(m1t)+a2exp(m2t)+Q(t),I(0)=I0, Q(t) special particular  \* based on t separate solution into starting correction(significant begin), Turnpike Expression(related to special sol), Ending (significant end) Correction  \* When constant => derivative is zero (e.g S’=0)  \* More about plugging in and chck the result (multchc) | | \* backward analysis gives the Jump points  \* slope of marginal equal to difference in benefit (e.g. price before and after)  \* when max over var in obj func => Hamilton also and the state but what obj main is | | **\*\* Key: Intuition**  use the solution to go back and identify boundary conditions  \* Hamiltonean eq linear = bang-bang with the value of coefficient as response  \* Natural resource: no discount (inf Horiz):Nsttnry  \* Linear Mayer: only last period in obj func  \* Different multiplier for different state variables  \* Calc adjoint eq  \* Terminal condition just derivative of obj func w.r.t. final point x(T),..  \* Solve adjoint eq with simple linear diff eq.  \* Start to check the boundary of stock and step by step move on constraint saying it becomes zero or … based on control  \* apply rigorously by saying what advantage per time, and then select what is efficient (e.g. 1 nunit jump of price=> not efficient to hold more than 2 time with storage cost ½) => marginal analysis [over the simple optimal control analysis] => use intuition for selling all wheat (3-t\*=t\*\*-3) => the rest singular control [sgn is singular control]  => check whether control is defined, otherwise singular  \* prove by showing Max Princ Nec Cond Hold  \* For state constraint(pure), use derivative rather than state: indirect approach (multiplier >0, multiplier\*condtion(y)=0,multipl\*RHS(st)=0).  \* Put derivative of Lagrangian (w.r.t control)=0, to find other parameters  \* Marginal cost=Marginal Revenue gives the jump point: e.g. lambda2(t)=p(t)  \* when by fw-bw analysis you find jump point, then just find the multipliers within each of the intervals  \* Ensure continuity of Hamiltonean  \* Jump works at entry point (defines adjoint, marginal of trajectory jump) => backward find the adjoint in every interval  \* Once got sol, make sure conditions satisfied  \* Price shield (optim sol unchngd)=> Things remain the same (indep future): Dec/Forecast Horizon  \* When change simply= control and put condition of not overshoot ->break the solution of general prb |
|  | | | \* No Jump at exit point from a constraint (only on entry to a constraint) => touch constraint and leave only  \* when on constraint then derivative of marginal objf is zero  \* Jump affects both adjoint(lambda) and Hamiltonean (H)  \* to show single cntrl ndd: w=u+v  \* Mk Sure Not Miss Pres Val.  \* Adjoint eq is based of differential w.r.t. state variable  \* In Lagrangian when pure state just include et\*I’, where I’ is change in state variable  \* In taking derivative of Lagrangian Don’t forget the Hamiltonean Derivative that is included  \* Continuity of Hamiltonean can help to identify adjoint(lm)  \* Find where adjoint var (lm) equals zero to find sign to check max principle about coeff (mu)  \* When Guess fail on t~, t\*, then keep positive (amelioration of Guess) => Create switching point | |