Ec485 Lecture 4, WT2024

# 1 DYNAMICS and Nonlinearities:

Case 1: +delta*y(t-1): (A) or (B) depending on *where* lagged DV enters:
Case 2: ARMA in the errors Typically (B) because of Koyck transformations

# 2 Major Difficulties with B. Nonadditive Errors:

## 2.1 Difficulty 1:

FD/Delta, Within differencing, GLS quasi-differencing transformations do not achieve anything special/useful

## 2.2 Difficulty 2:

Fe-type alternative idea of introducing N intercepts/dummies leads to "Infinite Incidental Parameters" problem

## 2.3 Difficulty 3:

The epsilon–>y transformation — Jacobian is not 1; is not constant; depends on data and unknown parameters

***Very interesting class of models with Nonadditive Nonlinearity is LDV class of models

### 2.4 Difficulty 4:

T*contemporaneous_correlated_dimension = M_i correlated dimensions per individual observation i —> typically *integrals* of order M_i for each likelihood contribution

—> Motivating Simulation-Based Inference, *PROVIDED* next two simplifications do not apply and/or are not realistic:

## 2.5 Simple PD LDV version 0:

Assume epsilon(i,t) is i.i.d. over both i and t

## 2.6 Simple PD LDV version 1:

Multiperiod Binary Probit Model (Heckman 1981)

Case 1: without lagged DV dynamics

Case 2: Lagged Limited DV vs. Lagged Latent DV —> State-Dependence *vs* Unobserved Persistent Heterogeneity

## 2.7 Simple PD LDV version 2:

Multiperiod Binary Probit Model (Avery, Hansen, and Hotz IER 1983)