Assignment NO.3 FTS

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1. (a) The stochastic process $X(t)$ is a set of random variables that depend on the real parameter t, which generally has the meaning of time. The set of possible values of a random process $X(t), t \in T$ is called the state space of this random process , denoted S. For instance, the number of customers a store receives during the period from time t_0 to time t_k is a set of random variables that depend on time$t$, that is, random processes.

   (b) Use the regression model (1) to explain the defination of DGP.

$$y_t = \beta_0 x_t + \varepsilon_t, \varepsilon_t \sim i.i.d.(0, \sigma_0^2), t = 1, 2, ..., T \tag{1}$$

   Suppose that all the coefficients in this model are known. If we are given a set of observations on x_t, we can generate a set of corresponding y_t, and thus the regression model (1) is a DGP.

   (c) White noise process. The weakly stationary process whose expectation and autocovariance (given a fixed j) of y_t equal to 0 for all t.

   Gaussian white noise refers to the white noise process in which the probability distribution is a normal function.

   Gaussian white noise refers to the white noise process in which is a normal distributed.

   Stationarity. The first class is weakly stationarity. It requires that, for all t, the expectation, variance and autocovariance (given a fixed j) of y_t, should all stay the same. The second is the strictly stationary process, meaning that all the statistical properties of the series do not change over time.