Universal Supply and Demand Function for the New York Stock Exchange

Fabrizio Lillo*

Istituto Nazionale per la Fisica della Materia,

Unità di Palermo, Viale delle Scienze, I-90128, Palermo, Italia

J. Doyne Farmer†

McKinsey Professor, Santa Fe Institute,

1399 Hyde Park Road, Santa Fe, NM 87501

Rosario N. Mantegna‡

Istituto Nazionale per la Fisica della Materia, Unità di Palermo,

Viale delle Scienze, I-90128, Palermo, Italia and

Dipartimento di Fisica e Tecnologie Relative,

Università di Palermo, Viale delle Scienze, I-90128 Palermo, Italia.

Abstract

We study the short term response of prices to fluctuations in supply and demand on the New York Stock Exchange. After appropriate averaging and rescaling, the data for 1000 stocks collapses onto a universal function, giving average price shift as a function of transaction size. This function increases as roughly the 1/2 power for small orders on highly capitalized stocks, and roughly a 1/3 power for large orders on less capitalized stocks, with a smooth crossover between these two limits. The results appear to be consistent with recently proposed theories for price impact based on a random process model for the storage of supply and demand.

*`lillo@lagash.dft.unipa.it`

†`jdf@santafe.edu`

‡`mantegna@unipa.it`