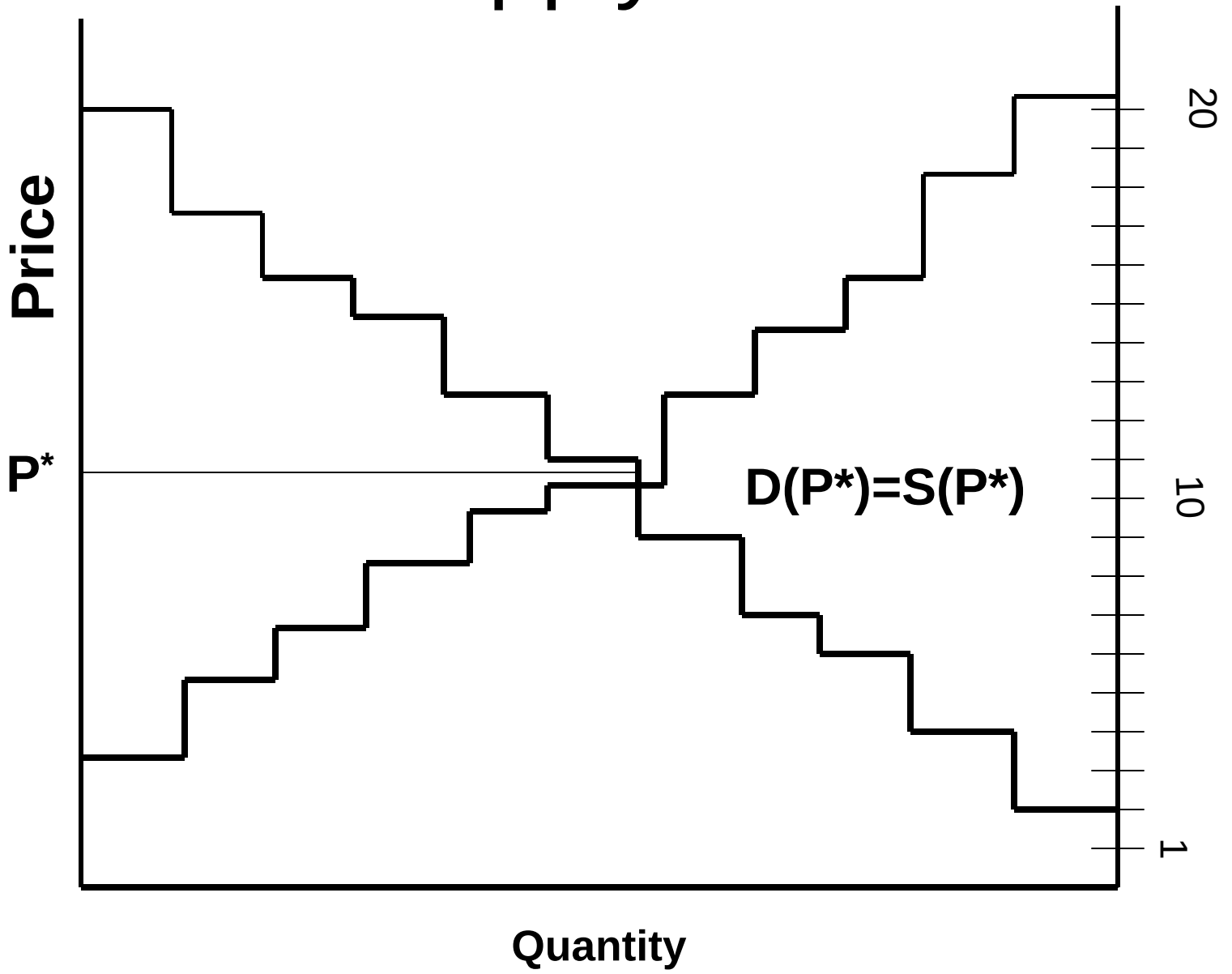
Continuous Random Arrival Markets: A New Experimental Environment for the Study of Price Discovery

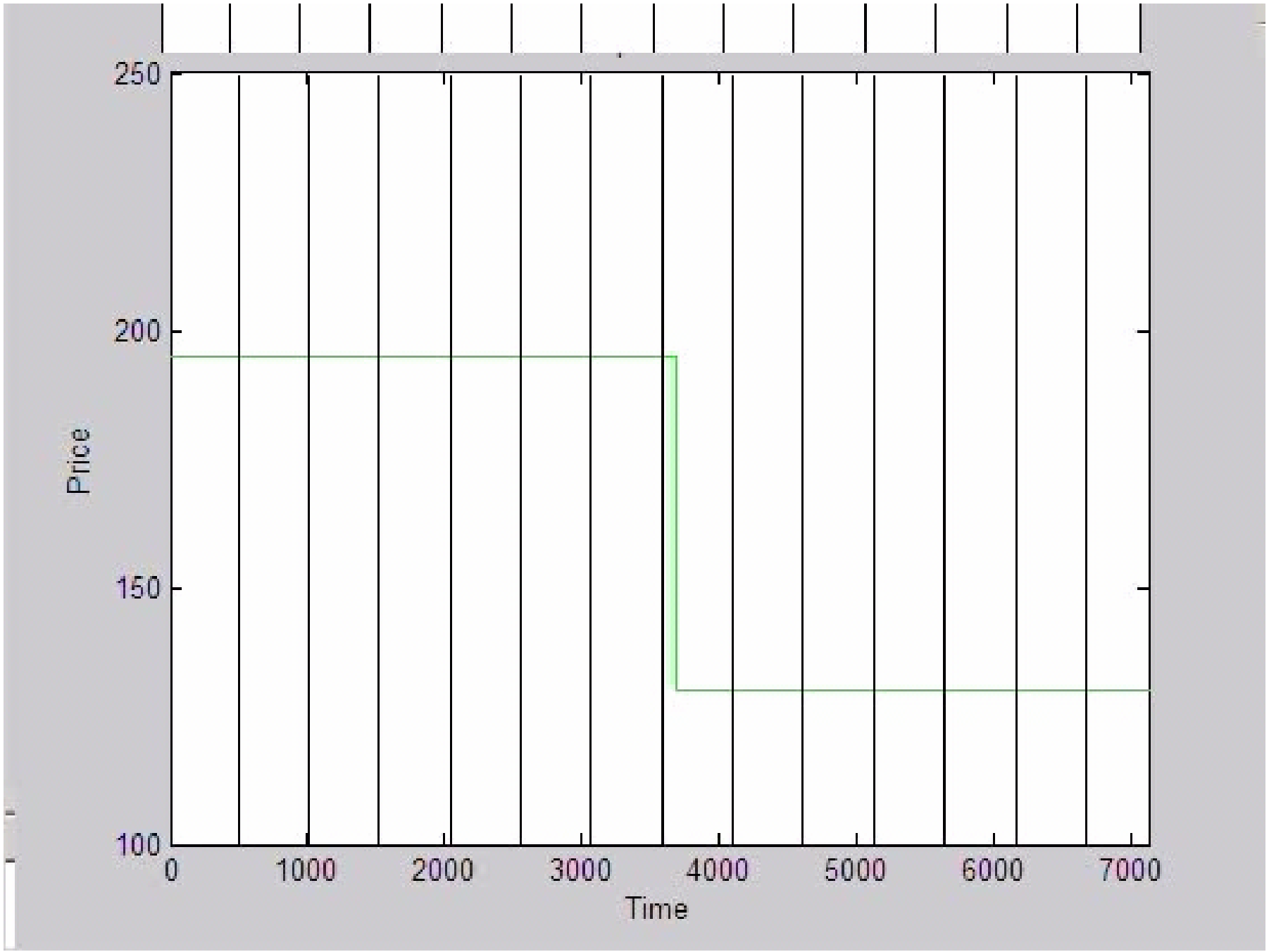
Michael R. Alton
Charles R. Plott

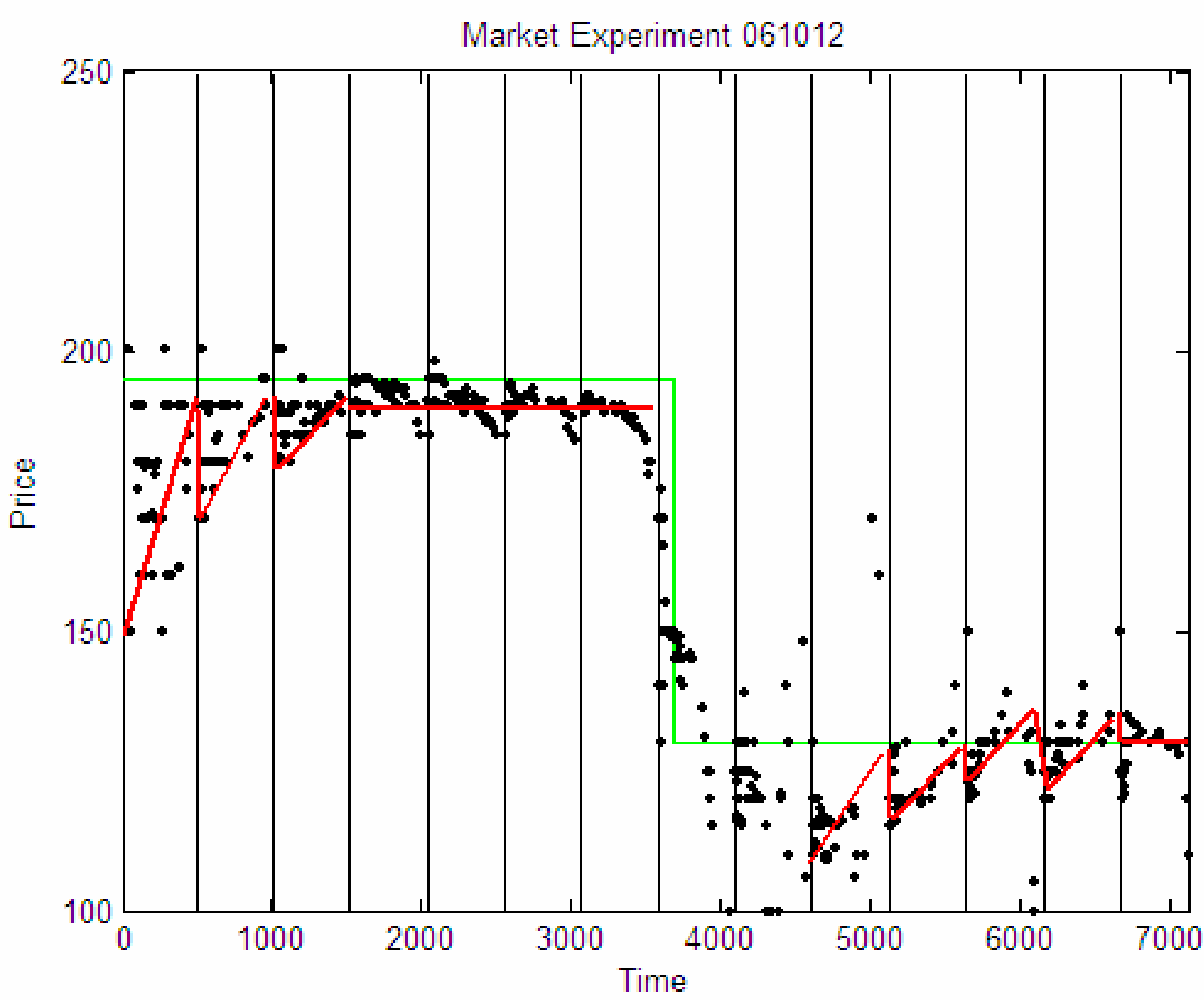
Lee Center Workshop

May 2007

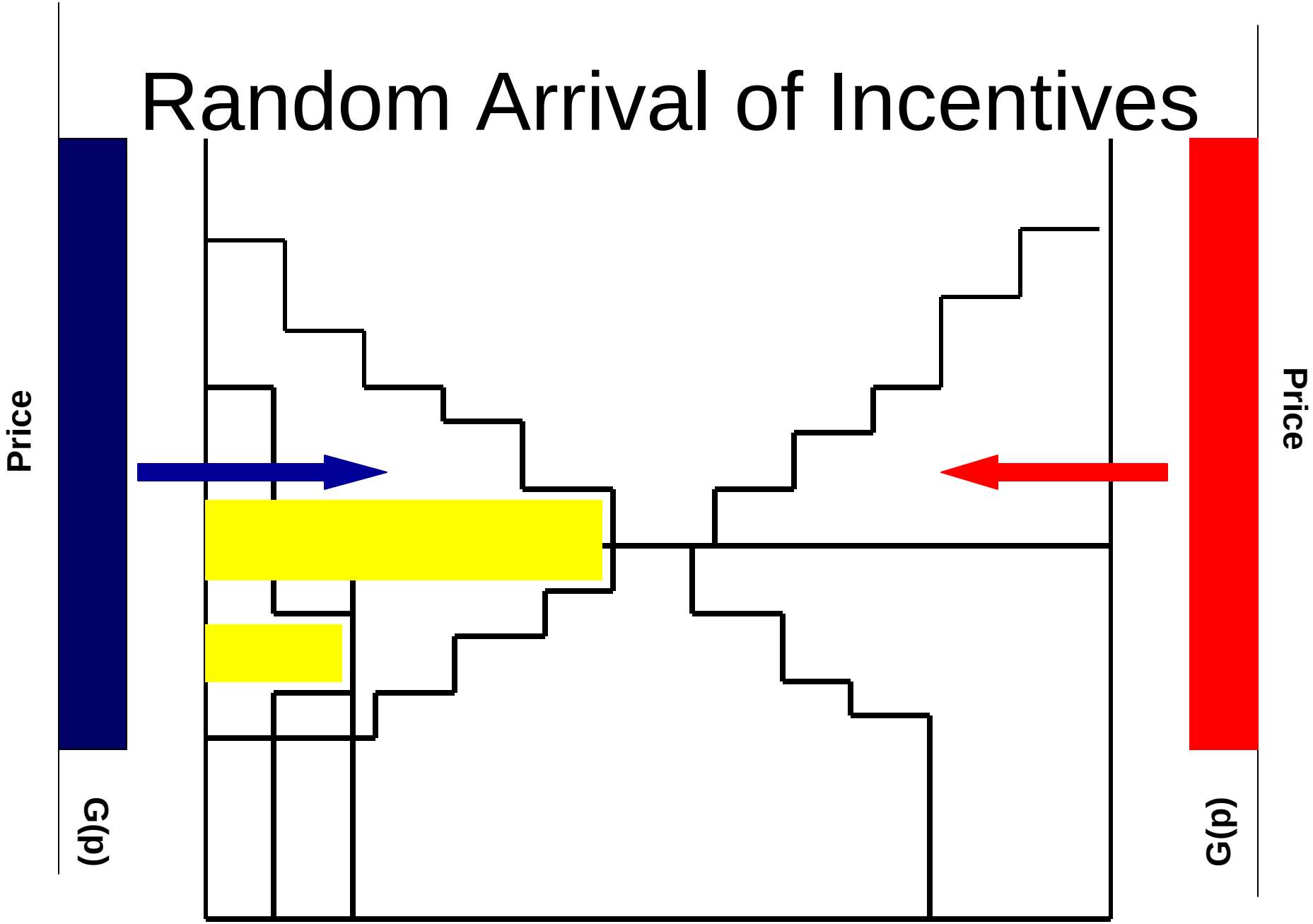
Classical Supply and Demand

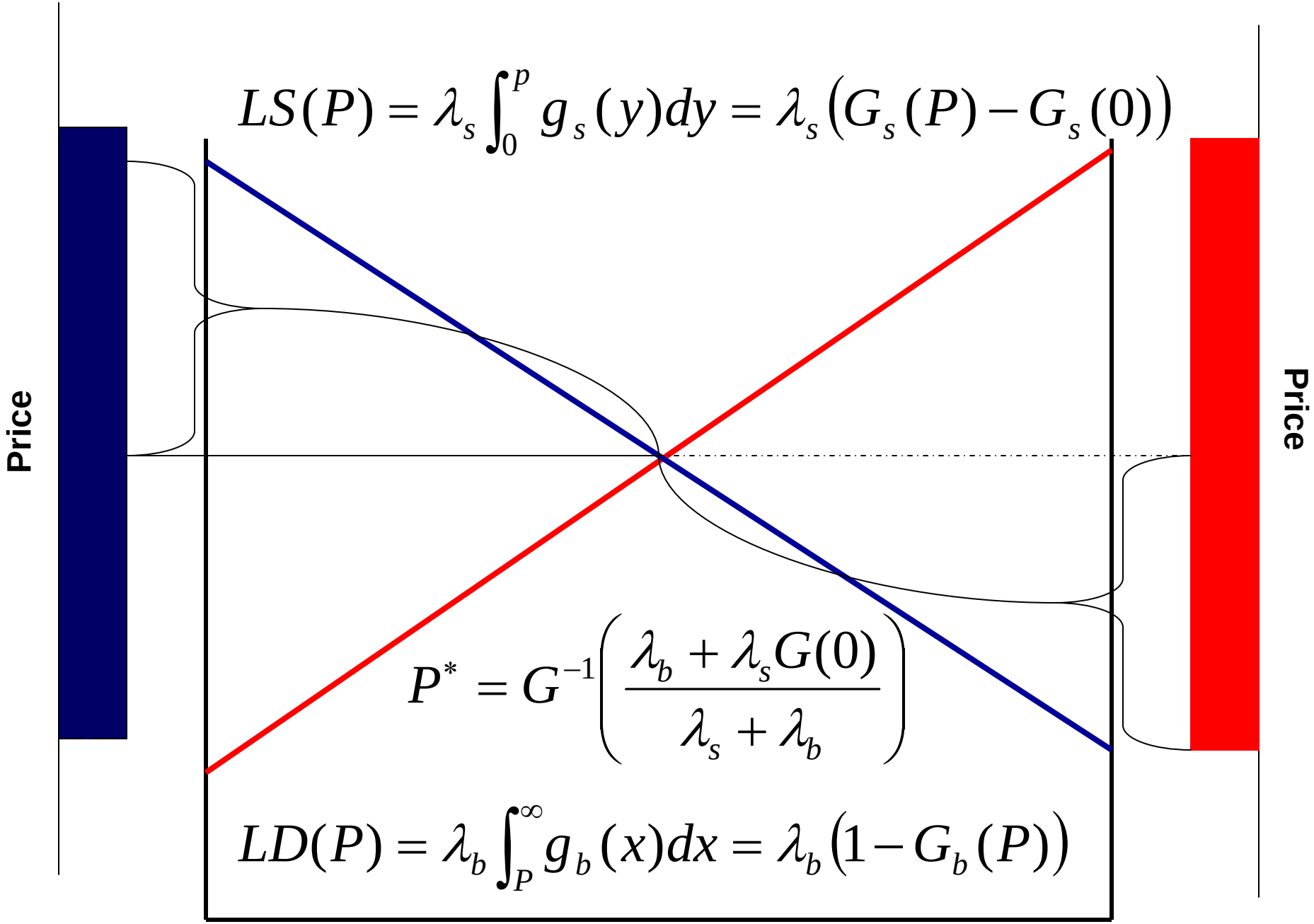



250
200
150
100
Price
0
1000
2000
3000
4000
5000
6000
7000
Time

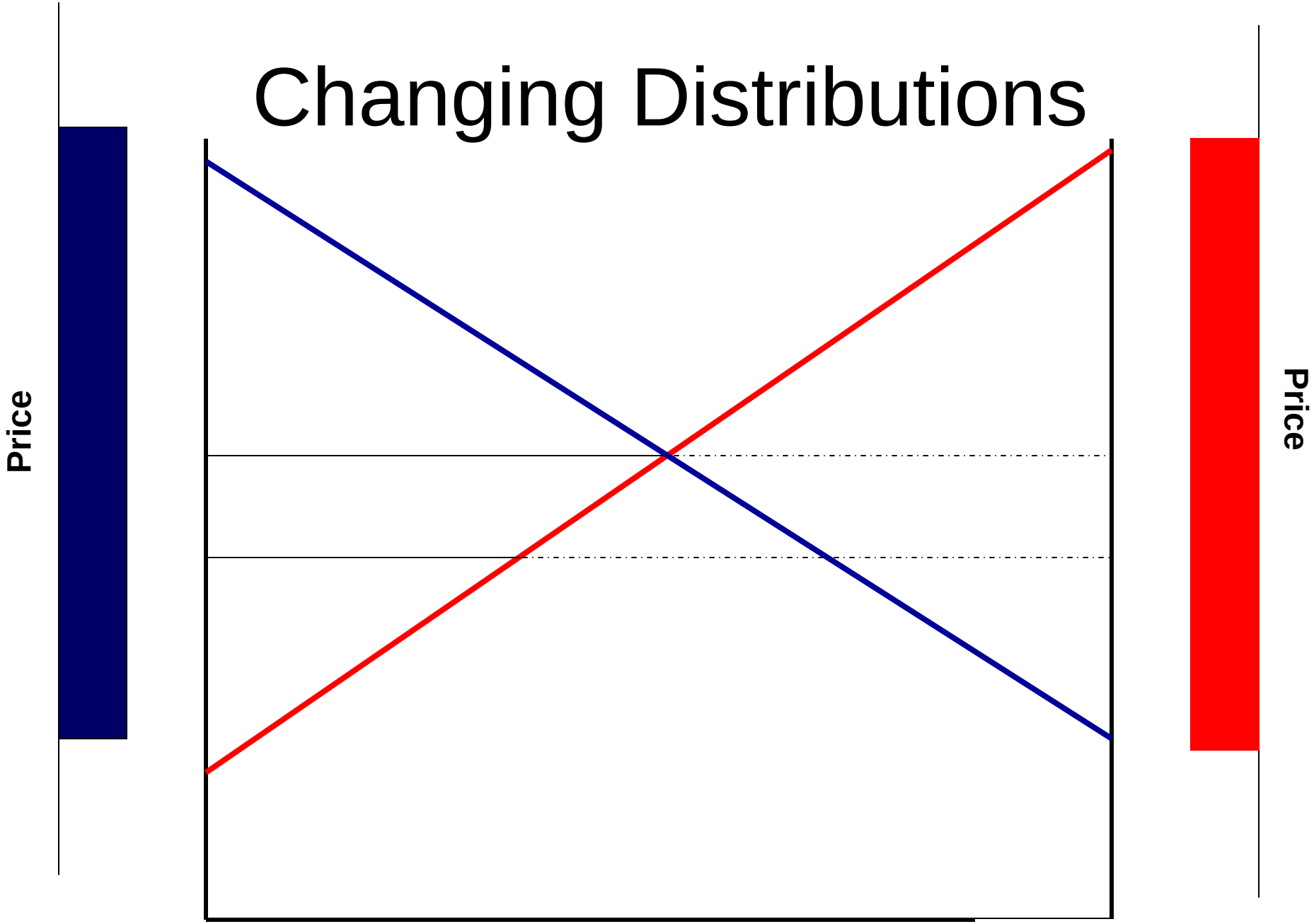

Market Experiment 061012
250
200
150
100
Price
0
1000
2000
3000
4000
5000
6000
7000
Time

Random Arrival of Incentives

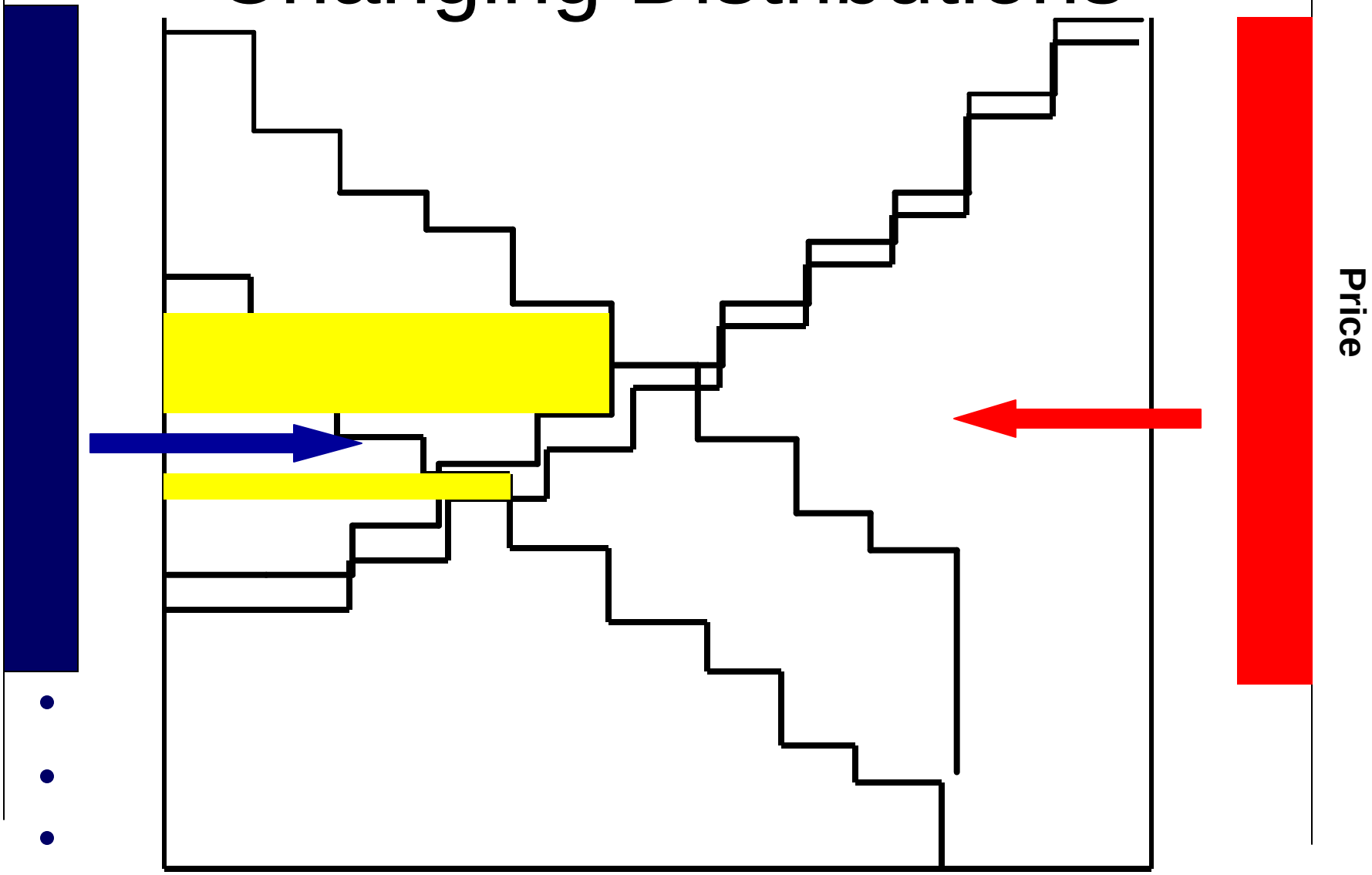



$LS(P) = \lambda_s \int_0^p g_s(y)dy = \lambda_s\left(G_s(P) - G_s(0)\right)$
Price
Price
$P^* = G^{-1}\left(\frac{\lambda_b + \lambda_s G(0)}{\lambda_s + \lambda_b}\right)$
$LD(P) = \lambda_b \int_P^\infty g_b(x)dx = \lambda_b\left(1 - G_b(P)\right)$

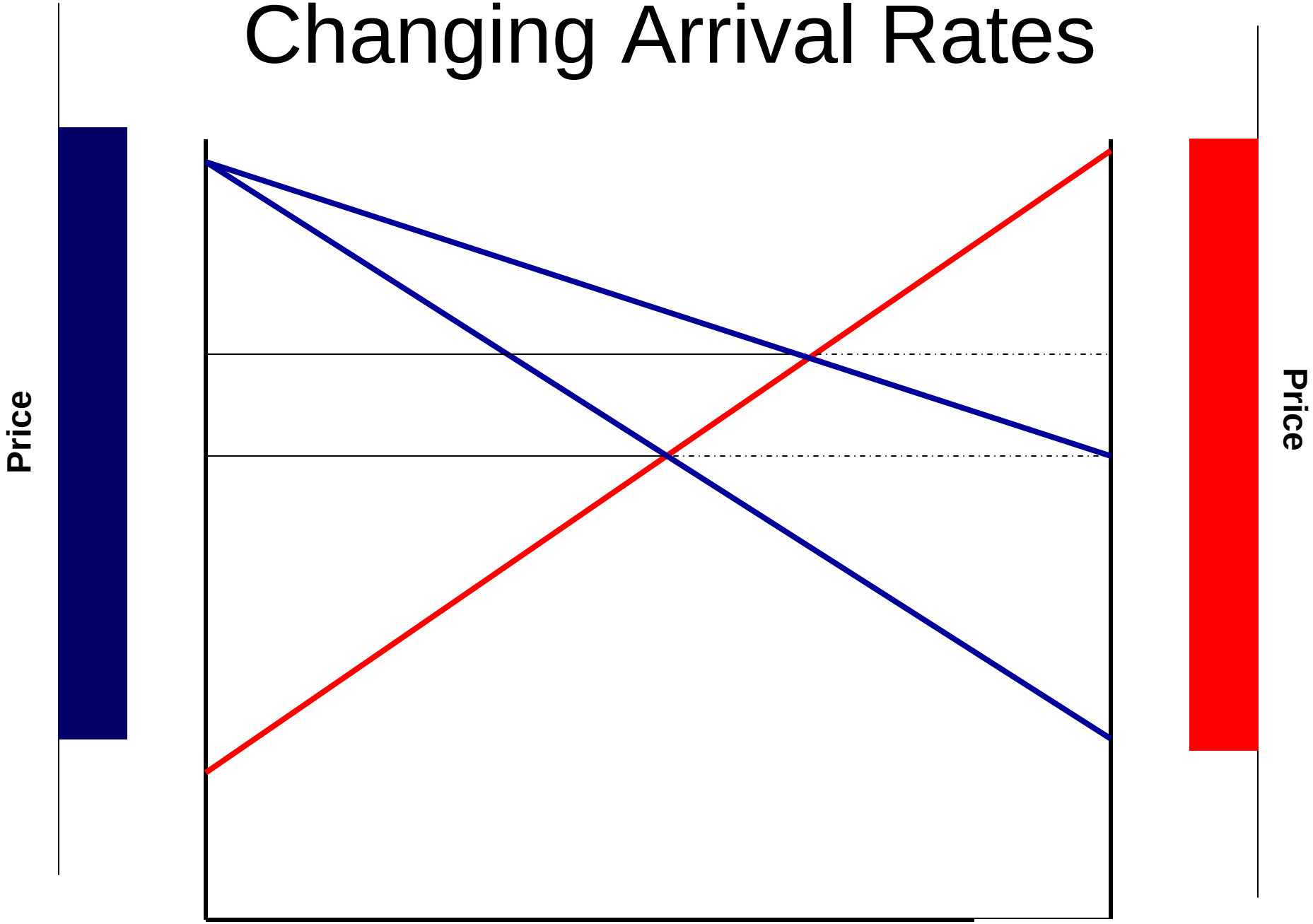
Changing Distributions



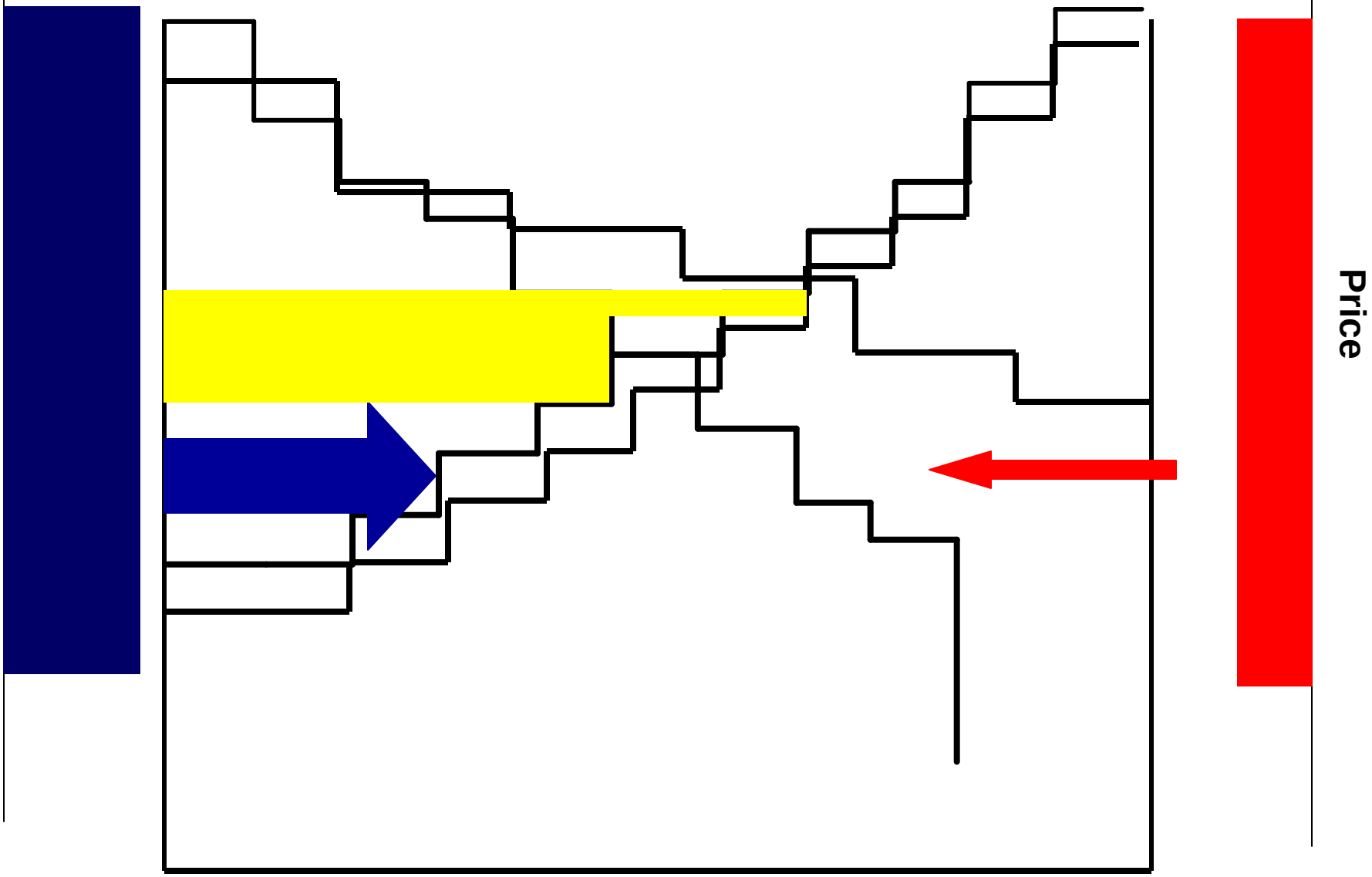
Changing Distributions



Changing Arrival Rates

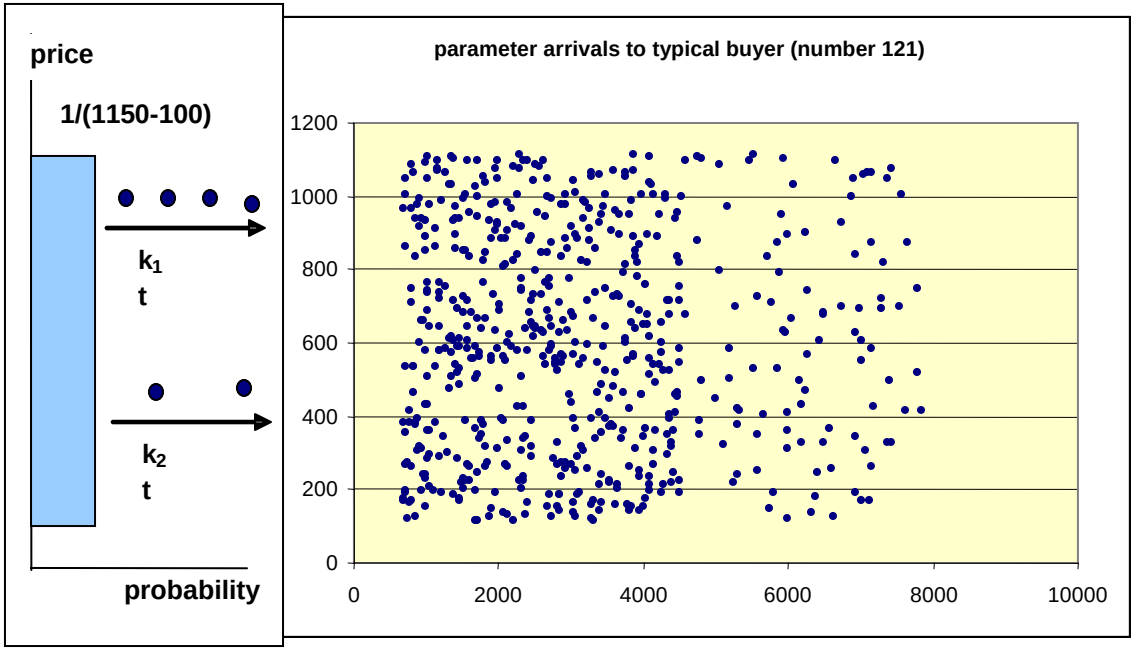


Changing Arrival Rates

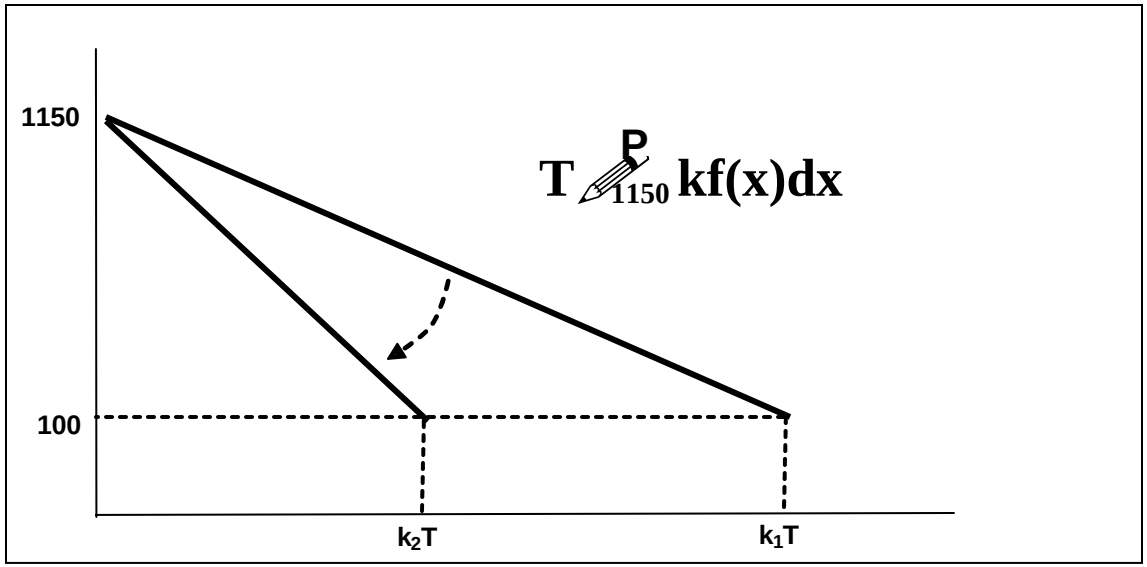


Environment

Opportunities for buyers begin with fast arrival and then the arrival rate is decreased.

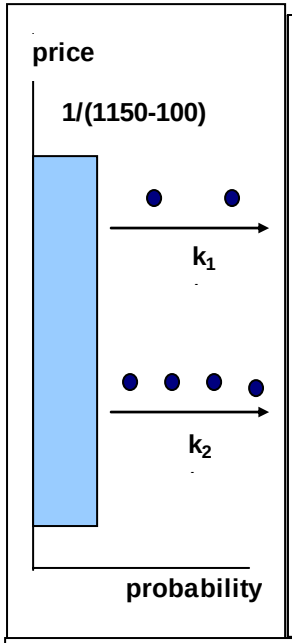


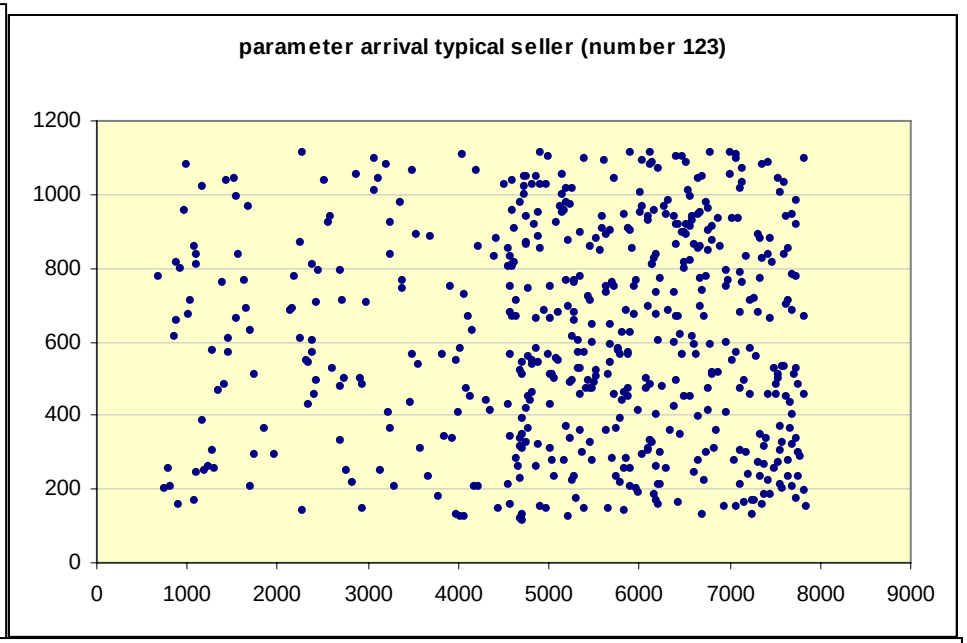
Law of market demand formulation



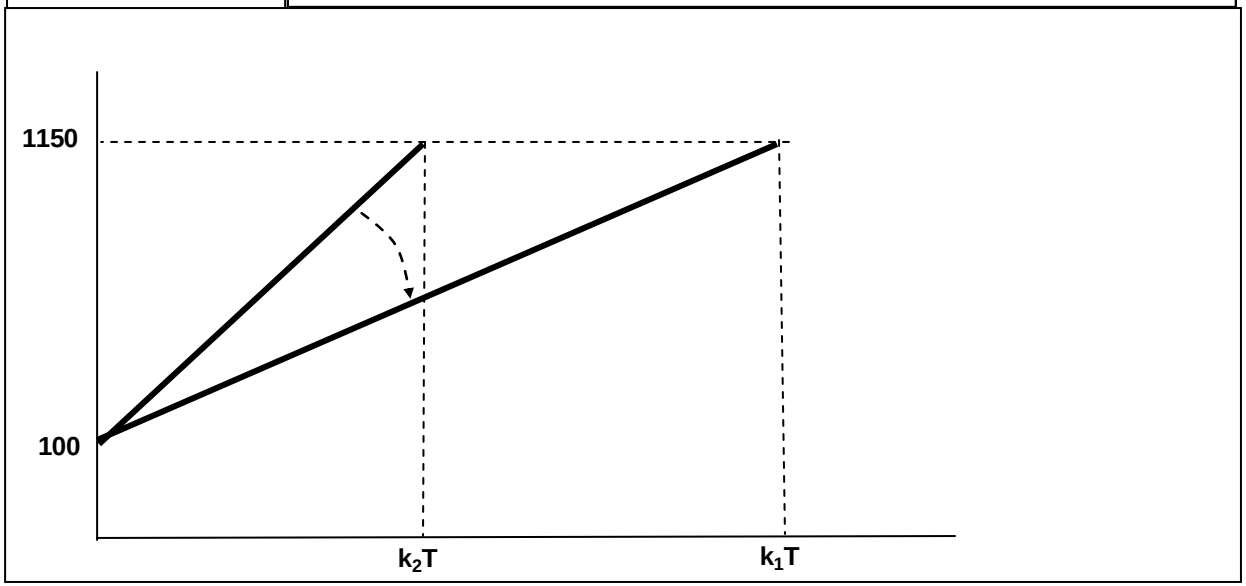
Environment

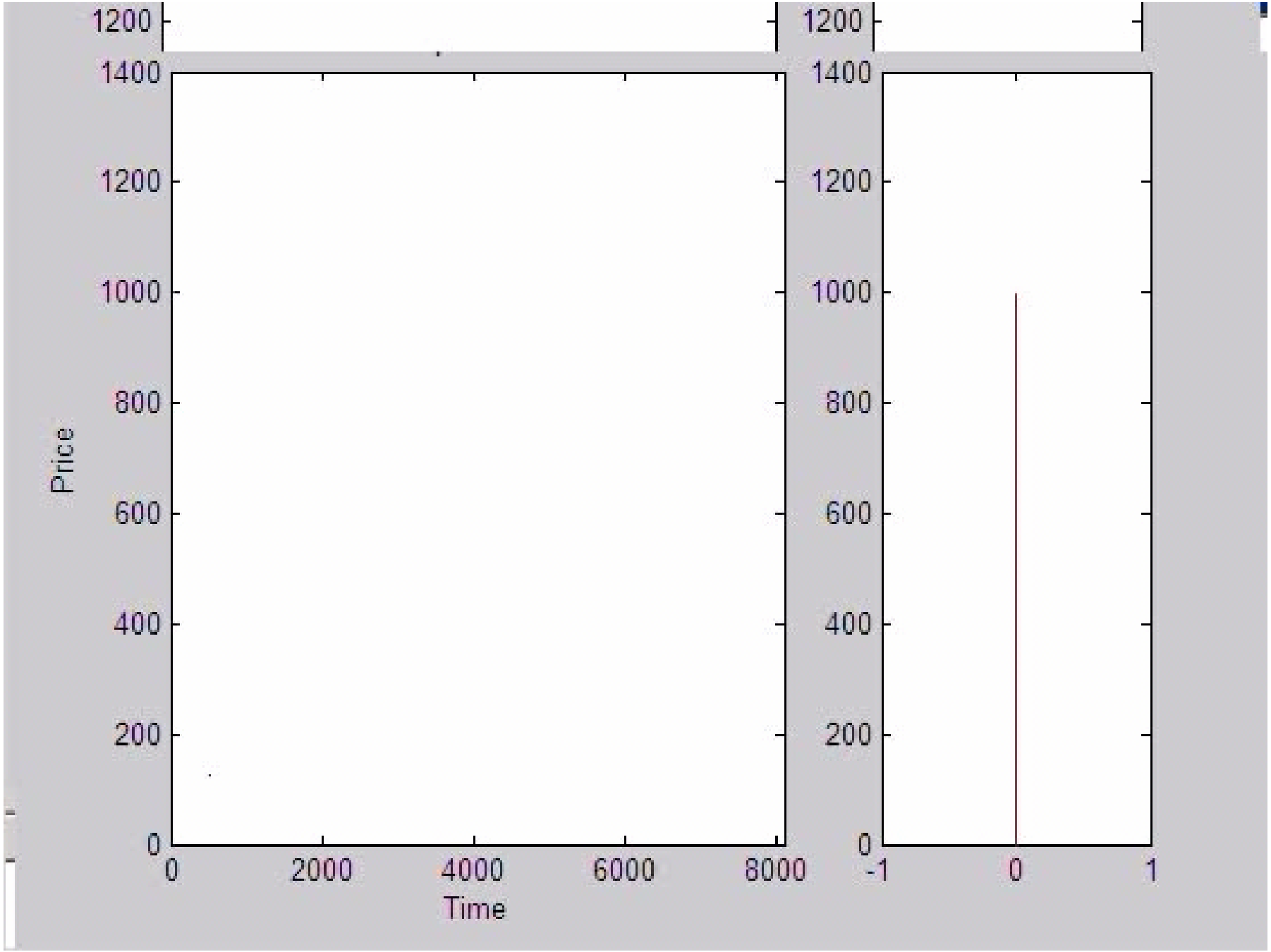
Opportunities for sellers begin with a slow arrival rate which is then increased

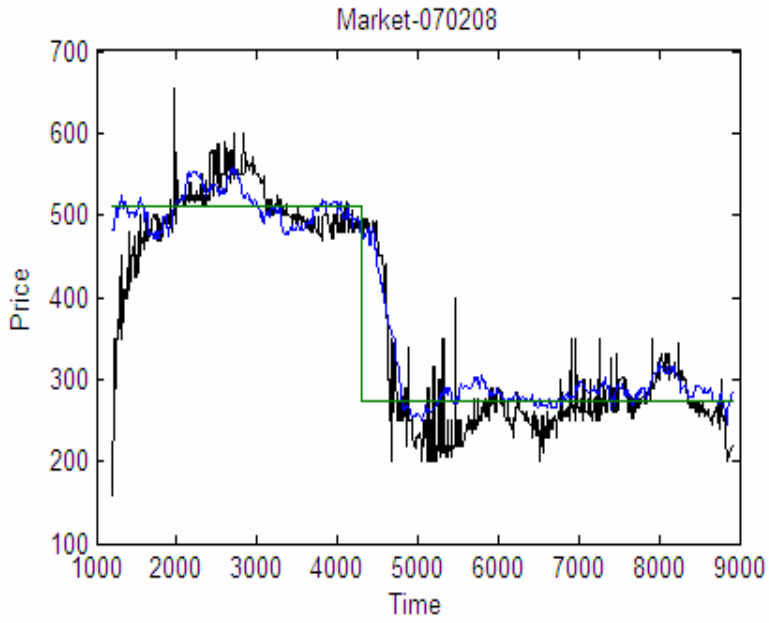


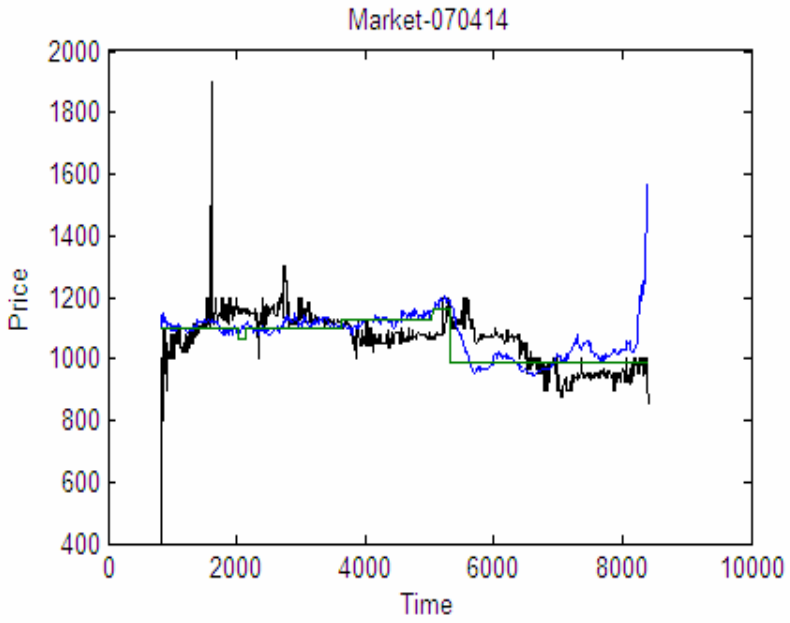


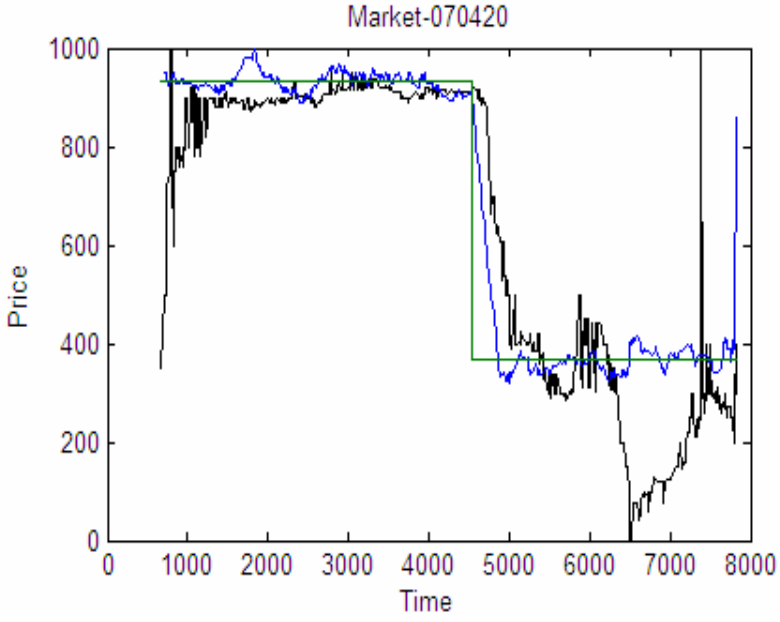
Law of market supply formulation

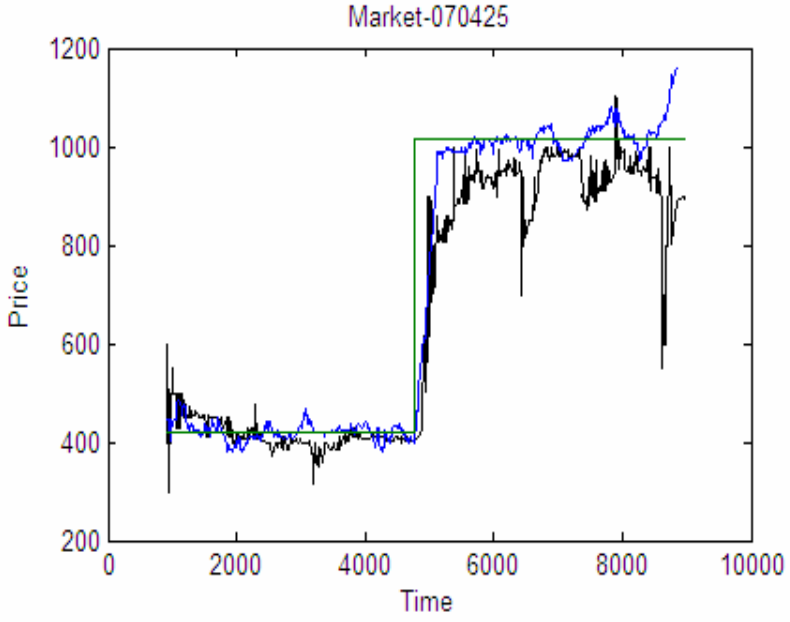


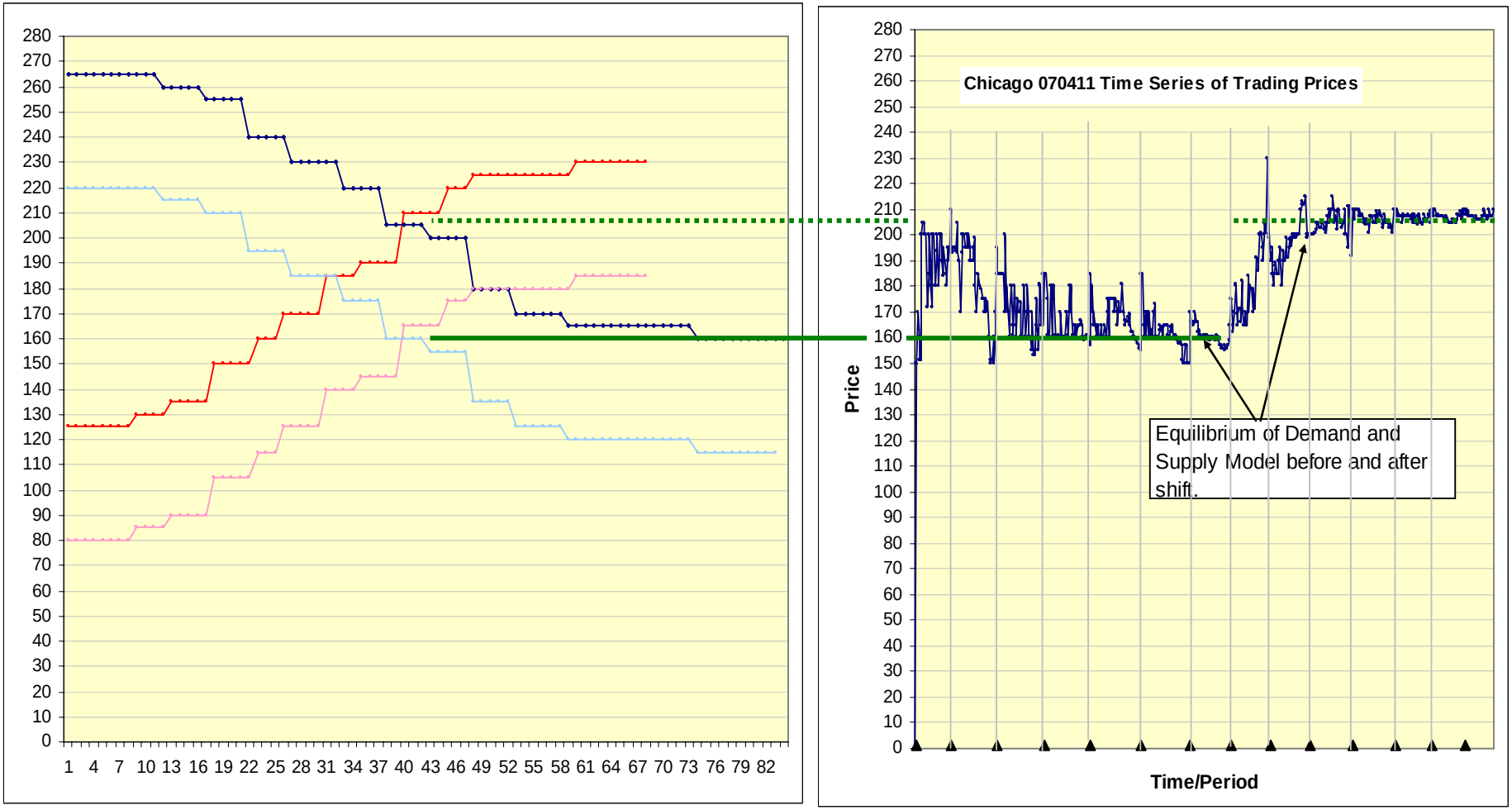

1200
1400
1200
1000
800
600
400
200
0
Price
0
2000
4000
6000
8000
Time
1200
1400
1200
1000
800
600
400
200
0
-1
0
1


Market-070208
Price
Time
700
600
500
400
300
200
100
1000
2000
3000
4000
5000
6000
7000
8000
9000

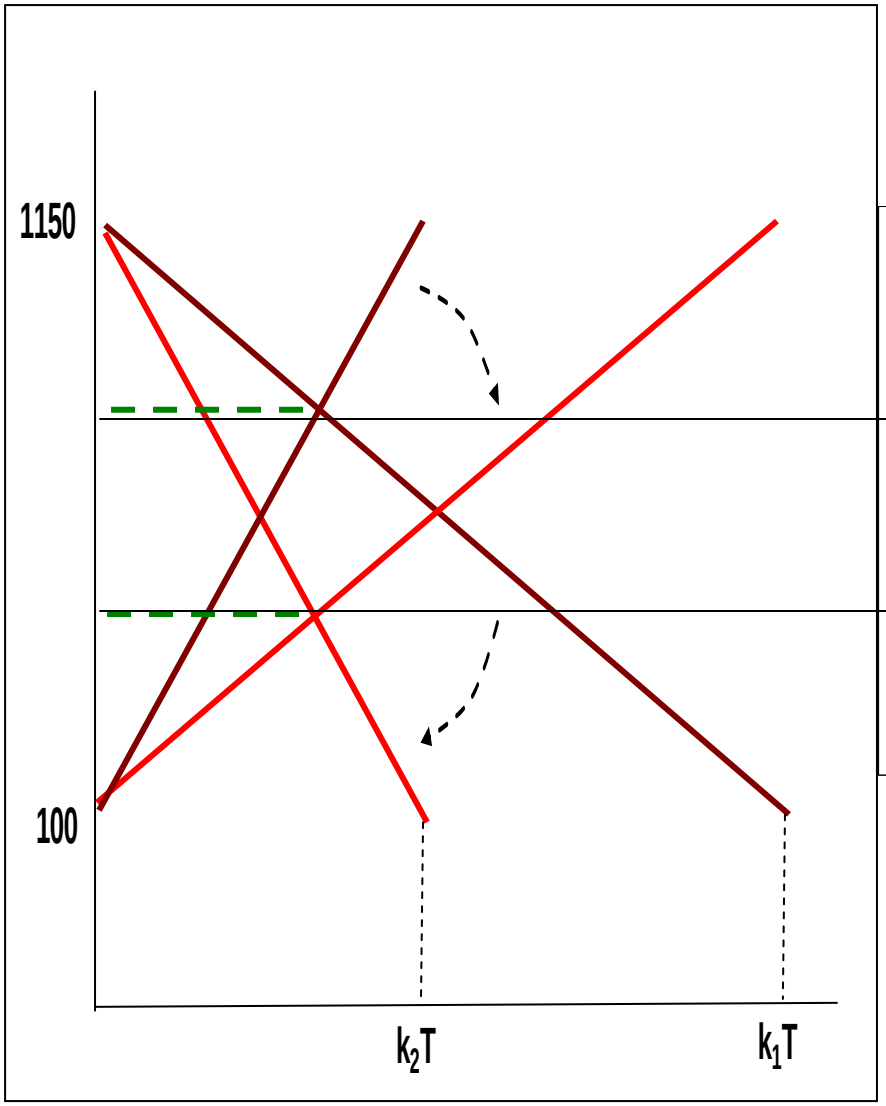

Market-070414
Price
Time
2000
1800
1600
1400
1200
1000
800
600
400
0
2000
4000
6000
8000
10000

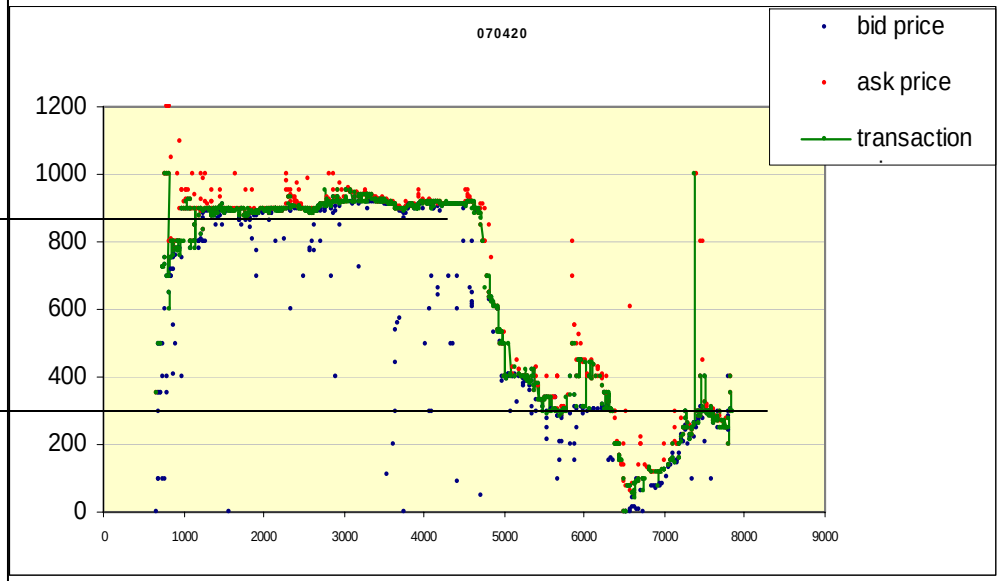

Market-070420
Price
Time
1000
800
600
400
200
0
0
1000
2000
3000
4000
5000
6000
7000
8000


Market-070425
Price
Time
1200
1000
800
600
400
200
0
2000
4000
6000
8000
10000



The classical environment is a set of periods or days in which each starts fresh with a new set of incentives. Notice the "sawtooth" feature of the data – a direct consequence of refreshing the parameters each period.





Formulation of market Equilibrium P: D(P)=S(P)