He Said, She Said: *Agent Based Model of Financial Markets Based on Consumer Confidence*

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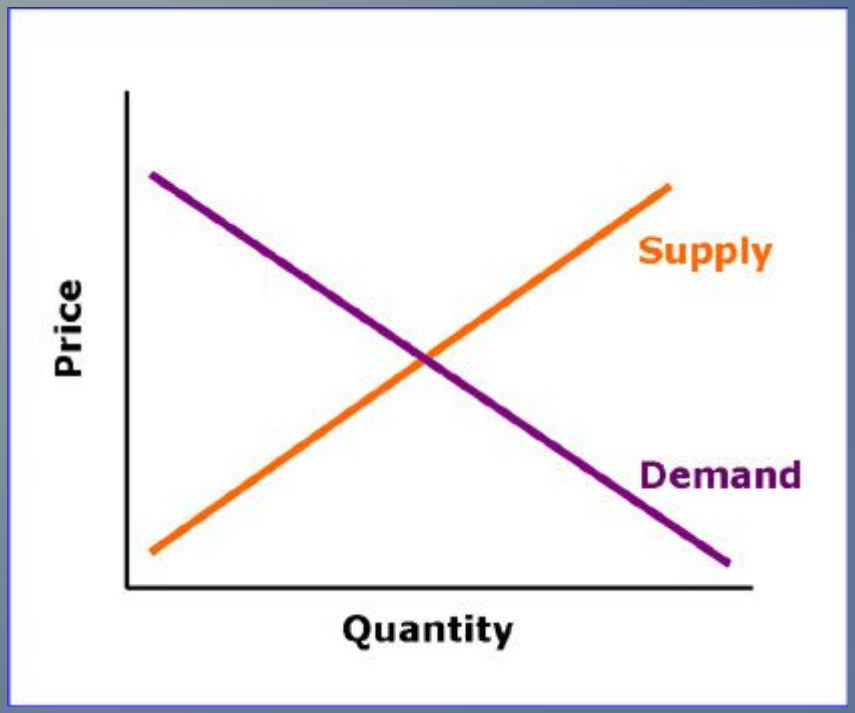
Spring 2013

Final Project for EECS 372, Northwestern University

Introduction

The mechanism behind the financial markets is supply and demand. If there are more people willing to buy than sell a product (more demand than supply), then the price of the product will rise. If more there are more people willing to sell a product than buy (more supply than demand), then the price of the product will fall.

So what drives the supply and demand of a product? Consumer products like livestock, vegetables, electronics have a supply function based on the producers (farmers, factories, etc). The demand functions are determined by the need of the consumers, with some influence from outside parties (advertising). Under normal operations, the supply and demand in the market would be in equilibrium, with stable prices. However, supply/demand shocks may occur (such as news of outbreak of Mad Cow Disease or Bird Flu) and the supply/demand functions will be affected, and in turn, affecting the equilibrium price in the market.


Price
Supply
Demand
Quantity

Non-Consumer Based Products

But how is the price determined for a product that has no direct intrinsic value for the consumer? How are the prices of products which cannot be consumed, such as stocks and bonds, determined in the financial market? How are the supply/demand of these finance products determined?

Background of Financial Market

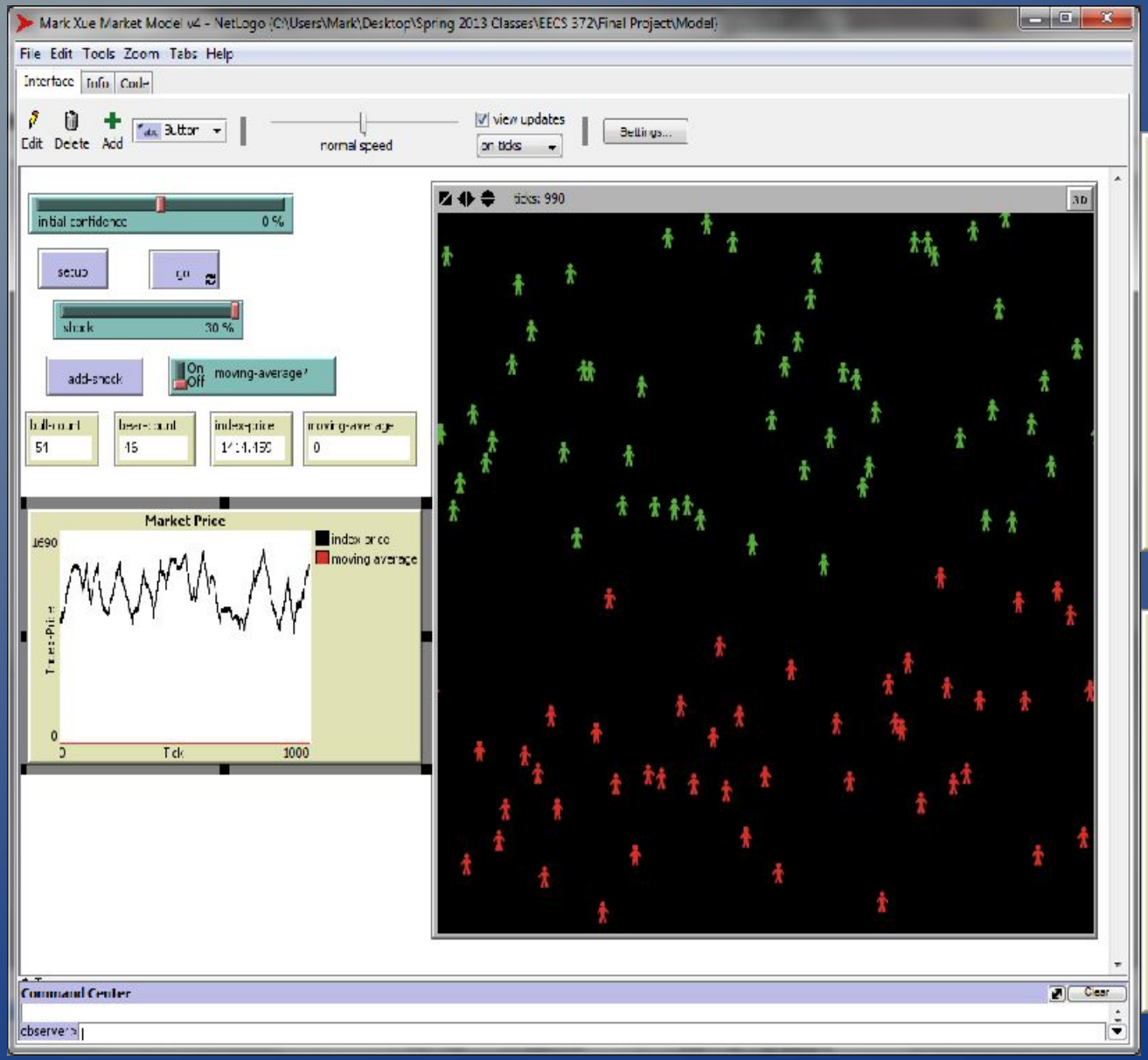
Financial instruments were first created to facilitate business. For example, a farmer planting next year's crops may be worried about the price a year in the future. What if the price of the corn he plants falls and he cannot afford next year's seed crop? Likewise, industrialist may want to expand his cereal factory, but may be worried that the price of corn may rise too high next year and he may not have enough money to expand his factory and afford the cost of cereal production. Therefore, futures derivatives were created to provide price stability. Stocks and bonds were created to raise money for business ventures.

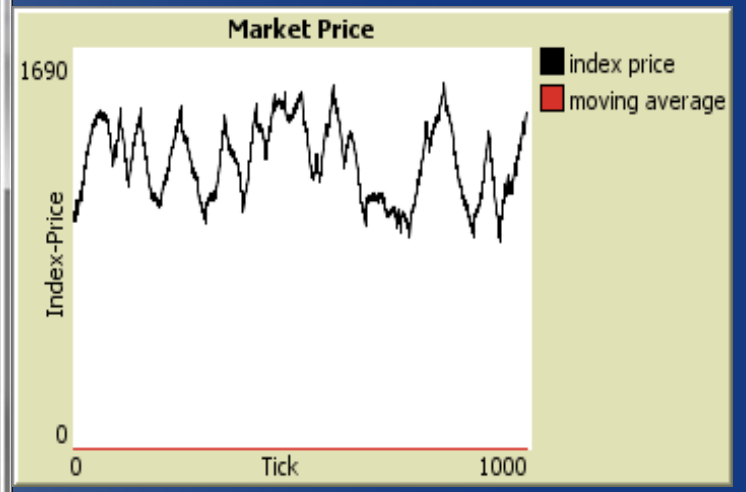
There are many agents in the financial markets. There are brokers, corporations, market makers, speculators, etc. What drives the way they buy and sell financial instruments, is their perception of the market confidence for a product.

Motivation

The market is a system and those who operate in it are it's agents. There is a cycle effect where the market affects the agents and the agents also affect the market. This model aims to explore how the market price affects the confidence level of its participants and vice versa. It aims to experiment and analyze different ways the agents react to external events.

The Model


Mark Xue Market Model v4 - NetLogo (C:\Users\Mark\Desktop\Spring 2013 Classes\EECS 372\Final Project\Model)
File Edit Tools Zoom Tabs Help
Interface Info Code
Edit Delete Add Button normal speed view updates on ticks Settings...
initial confidence 0 %
setup go
shock 30 %
add-shock On Off moving-average?
ticks: 990
Market Price
index price
moving average
1690
Index-Price
0
Tick
1000
Command Center
Clear
observer>


Market Price
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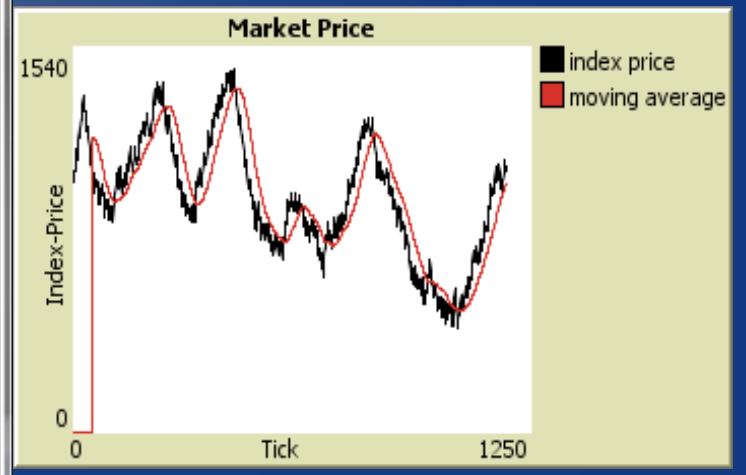
index price
moving average
Index-Price
0
Tick
1000


Market Price
1540
index price
moving average
Index-Price
0
Tick
1250

- 100 agents in the market, traders
- Each have a confidence level, -100 to 100
    - The more positive the confidence level is, the more bullish the agent is
    - The more negative the confidence level is, the more bearish the agent is
- The market price is determined by the weighted average of the confidence level of agents in the market
- The confidence level is affected by the market price (backward looking).
- Shocks added through changing confidence levels of the agents
- Moving-average function mimics popular mean reversion trading strategies

Results

- All time high and low price level provides support and resistance levels market index price
- Adding in confidence shock moved the market, but needed huge shock to break past all time highs/lows
- Turning moving-average on changed the way the market behaved
- Within the code, moving-average only had a small effect on confidence levels
- Designed to mimic mean-reversion strategy of traders
- Market tracked moving-average more, tended to break all time highs/lows more often.

Next Steps

- Extend to HubNet to see how real market participants react to events
    - How does their trading behavior change?
    - How does certain keywords affect their confidence levels?
- Create user input box in NetLogo model with results from HubNet
    - Weight certain keyword to confidence level changes according to HubNet result