Foreign Exchange Trading

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ABSTRACT

This simulation examines the way in which foreign exchange rates are established. Participants act as currency traders within a competitive market to determine what pricing strategies are most profitable.

BACKGROUND

Foreign trade and the need for foreign exchange have existed for millennia. There has always been some need to purchase and sell items across international borders, but it has only been in the last several decades that international trade has become a major source of economic activity around the world. In 2013, the Bank for International Settlements estimated that the trading in the foreign exchange markets averaged about $5.3 trillion per day, up from $4 trillion per day in 2010 and $3.3 trillion per day in 2007. It is quite likely that currency trading has increased in the ensuing period. This level of activity reflects that the amount of international trade has become important to every country in the world.

The crucial point for the development of international trade came in 1944 with the Bretton Woods Agreement. The plan to rebuild the post-World War II economies was based on creating a level of international trade never before conceived and creating both consumer and producer economies to maintain that trade. Between 1900 and 1960, exports for all countries grew at an average rate of 4.3%. From 1960 to 2014, exports for all grew at an average annual rate of 8.7%. The value of US exports was $2.34 trillion and exports was $2.85 trillion in 2014.

The need for currencies to support this level of trade has spawned the development of the international foreign exchange market, the most liquid financial market in the world. Participants include large international banks, central banks, institutional investors, currency speculators, and governments. The financial instruments traded include spot, forward, swap, futures, and option contracts. This diverse set of market makers compete for business by setting bid and ask rates at which the will buy and sell other currencies. Not all firms establish markets in all currencies, but there is sufficient activity and interest to assure that competition does exist for all currencies.

The size and competitiveness of the market creates an unusual pattern in the pricing mechanism, the size of the bid/ask spread. In most decision making processes, the decision will hinge on the value of either the first or second significant digit. A change of "1" in the first significant digit can change the answer by 100% to 10%. A change of "1" in the second significant digit will result in changes of 10% to 1% in the answer. Most estimation techniques are suspect when their accuracy is less than 1%, so digits beyond the first and second are of no practical use. In foreign currency trading, decisions regarding the bid/ask prices for the major currencies are made on the fifth significant digit. This is possible due to the sheer size of the market. With trillions of dollars trading every day, even 1/100% can represent an economically viable profit.

There is no accepted theory that explains foreign exchange rates or their fluctuations. The demand for and supply of any given currency can be affected by the level of trade between two or more countries, economic factors, market psychology, and political conditions. Any and all of these factors can be present and different for all of the market makers at any given time. While it may be difficult to model this type of market behavior, it can be experienced, and that experience can make it more understandable.

THE SIMULATION

The Foreign Exchange Trading simulation provides participants with the opportunity to contribute to the setting of exchange rates in an open, competitive market. Players take the role of market makers and proceed to establish their own bid and ask rates for a specific currency. Several teams work against each other in an attempt to secure the most business and make the highest profit. The actions and interactions of the teams create the boundary conditions for currency trading.

Participants are provided with information relevant to the exchange rates between two currencies and the forms needed to record information (Attachment 1). Economic conditions are assumed to be stable for the duration of the simulation in order to focus on the price setting behavior. Any market is subject to random events, if only at a minor level. Participants are provided with probability distributions of demand and supply levels. With this information and their own market position, participants set their bid and ask prices and quantities for the round and convey that information to the clearinghouse (instructor).

A roll of the dice determines the demand and supply for any given trading period (Attachment 2), and the team with the highest bid price will be will be sold the currency up to the specified amount. If there is currency remaining, it will go to the bidder with the second highest bid price and so on until the entire supply of the currency is exhausted. A similar process is followed with the purchase of the currency with the lowest ask price getting the first part of the distribution. There is no guarantee that any participant will either buy or sell currency. That will be determined by the bid and ask prices and quantities of the competitors.

Once the currency allocations have been made, participants update their portfolios subject to certain provisos that assure each portfolio contains a minimum amount of both trading currencies. Participants then make their decisions concerning the bid and ask prices that will be offered during the next round, and the process is repeated. After three or four rounds, participants liquidate their portfolios to a common currency, and it is determined who was most successful in the market. A roll of a die will determine the final exchange rate to be used to convert to a common currency. The discussion that ensues identifies which market strategies were most successful.

CONCLUSION

The Foreign Currency Trading simulation is appropriate for students in finance, international business, and economics. These disciplines all have direct links to the activities of the foreign exchange market. The simulation can also prove useful for students of any discipline that involves an active, open, competitive market. In the final analysis, foreign currency is an intermediate good that permits the holder to obtain goods and services not available with a home currency. The market for foreign currency is quite similar to the markets for other items, and this realization and demonstration may help participants to identify the commonalities between market structures and assist in decision making under various conditions.

REFERENCES

Bank for International Settlements. (2013). *Triennial Central Bank Survey*. Basel, Switzerland.

United States Census Bureau. (2015). *U.S. Trade in Goods and Services - Balance of Payments (BOP) Basis*. Washington, D.C.

Foreign Exchange Trading

THE SCENARIO:

You work for a major foreign exchange trading company. Other areas of the firm specialize in trading the major currencies like the yen and the euro, but you and your team have the responsibility for trading the garbanzo (Gb), the currency of Hummus, a small Mideast nation with trading activities all over the world. There are several other currency trading companies that also make a market for the garbanzo, so you and your team will have to compete for the trading business that is available. Your success or failure will be determined by the amount of money you are able to earn by trading this currency in the foreign exchange market.

RELEVANT INFORMATION:

The garbanzo floats freely against the dollar. The recent exchange rates between the garbanzo and the dollar are shown in the graph below.
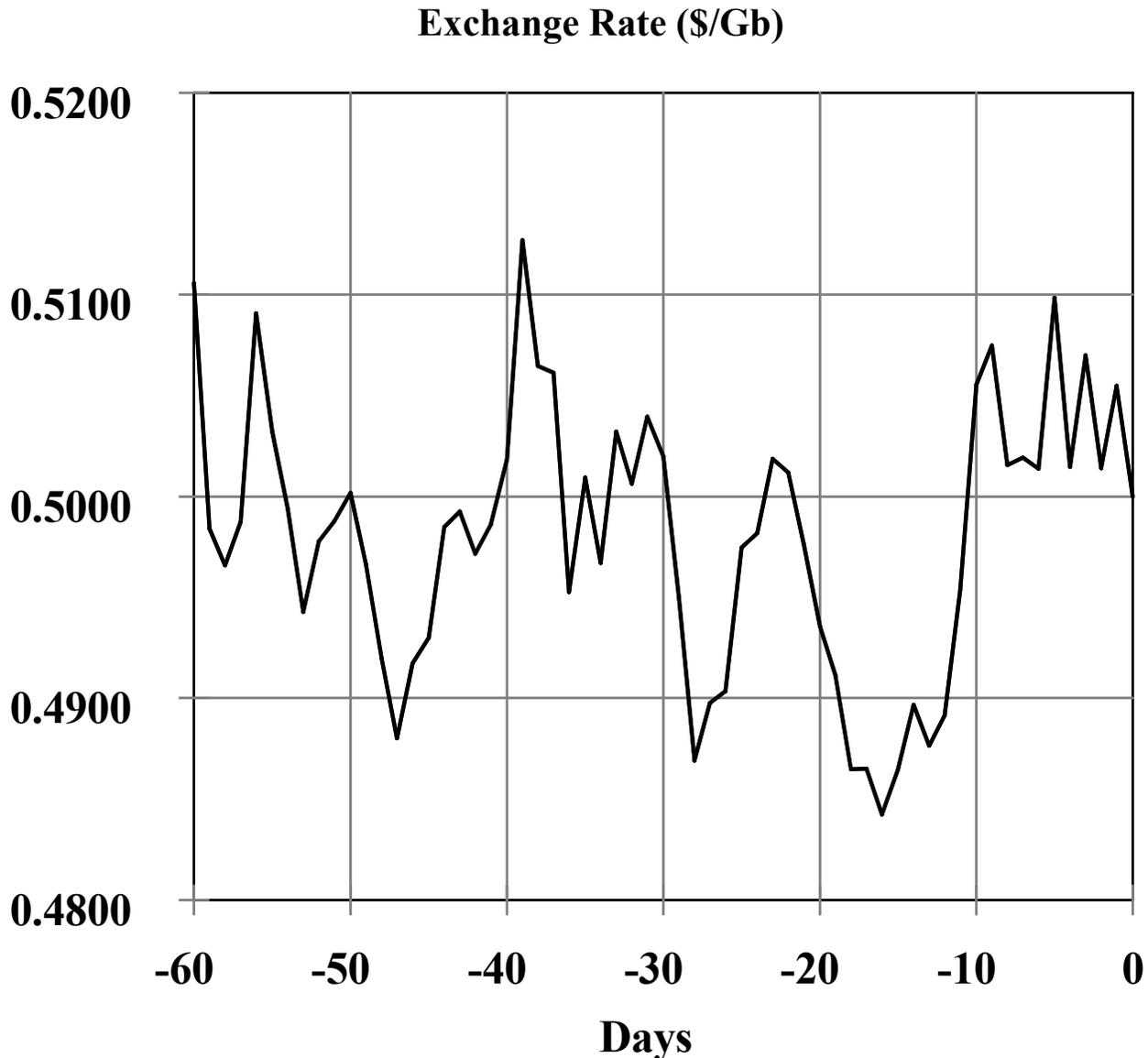
Exchange Rate ($/Gb)

The current exchange rate is 1Gb = $.5000. This is also the rate on the 90 day forward contract for the garbanzo. There is no economic information that indicates there will be a significant shift in the underlying value of the currencies for the next 90 day period.

Any fluctuation in the exchange rate will be due to supply/demand forces in the market. These changes will be due to variations in the normal level of business activity and the actions of the individual firms trading with the businesses located in Hummus. There is an average Gb2,000,000 traded each day. Statistical analysis of the daily demand for the garbanzo is shown in the following probability distribution. It is expected that this distribution will remain appropriate for the next 90 days. This distribution holds both for the supply and demand of the currency (Gb).

Daily Supply/Demand Probability Distribution

Millions of Garbanzos (Gb)
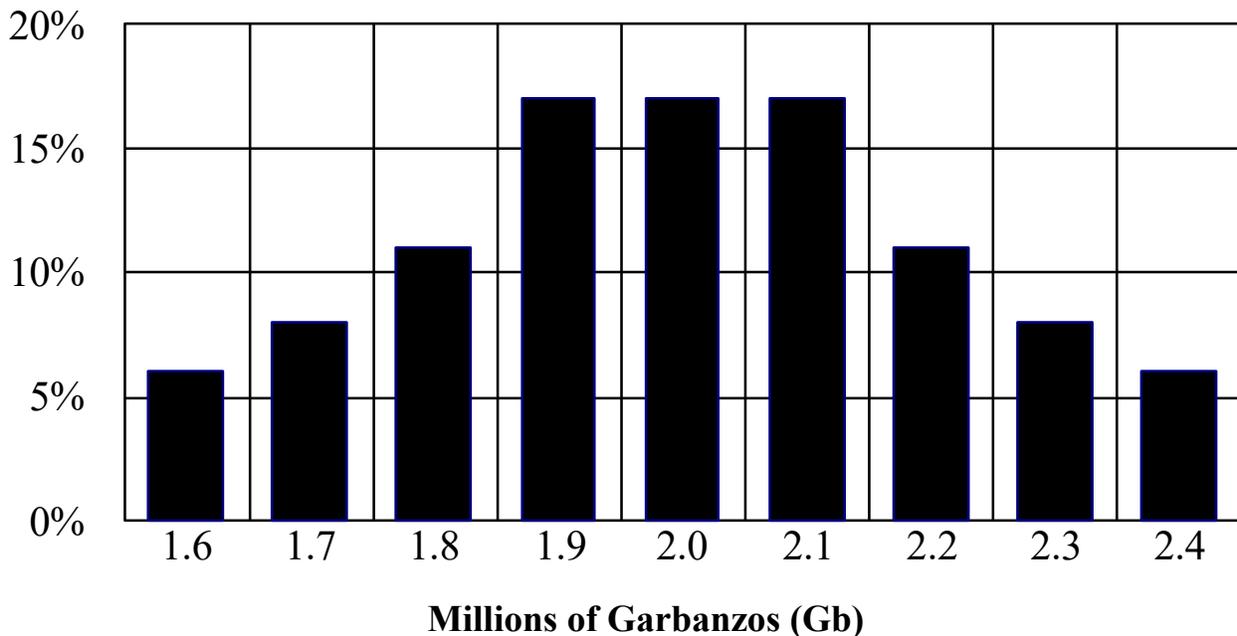
PORTFOLIO STRUCTURE:

Your team has a beginning portfolio consisting of $1,000,000 and Gb1,000,000. Your firm has given you guidelines that you should not have fewer than Gb100,000 nor should you have more than Gb2,500,000 at the close of any trading period.

DECISION REQUIREMENTS:

You and your team are to develop a currency trading strategy for the garbanzo. In each of several rounds, you will be asked to provide bid/ask prices for the currency. For example, in a given round, you may choose to:

> Bid $.4900 each for up to Gb1,000,000
> Ask $.5100 each for up to Gb500,000

Each team will submit its bid/ask prices to the clearing agent on the appropriate form. All bid/ask quantities of currency must be in units of Gb100,000. Once all positions are established and displayed, the actual supply/demand for garbanzos will be determined by a roll of the dice. The lowest ask price will be filled first, with any additional demand going to successively higher bidders. If two or more teams submit the same ask price, the demand shall be allocated

equally to each team. Allocation will proceed until all demand has been met, if possible. A similar process will be followed with bid prices and the purchase of the garbanzo. Each team will then calculate its profit/loss for the round.

PROVISOS:

If after the trading round ends you hold a portfolio of less than Gb100,000, you will need to purchase enough garbanzos to achieve that position at the best available asking price. Should your portfolio exceed Gb2,500,000, you will have to sell the excess at the best available bid price.

If the dollar position of your portfolio ever drops below $100,000, you will sell garbanzos at the best available ask price available after all portfolios have been adjusted for their minimum/maximum garbanzo exposure.

ORDER OF PLAY:

Each team will provide its initial bid/ask position to the clearing agent. After the dice determine the supply/demand for garbanzos each trading round, the allocation will be announced. Each team will then adjust its portfolio, purchase/sell garbanzos if necessary, and calculate the profit earned that round. Each team will then develop a new bid/ask position for the next round. After several rounds have been completed, the simulation will end. Teams will calculate their position in dollars and garbanzos. All garbanzos will be converted to dollars at a rate to be determined by the roll of the dice; the probability distribution for the final exchange rate is shown below. Teams will then announce their overall dollar position.

Daily Supply/Demand Probability Distribution

$/Gb
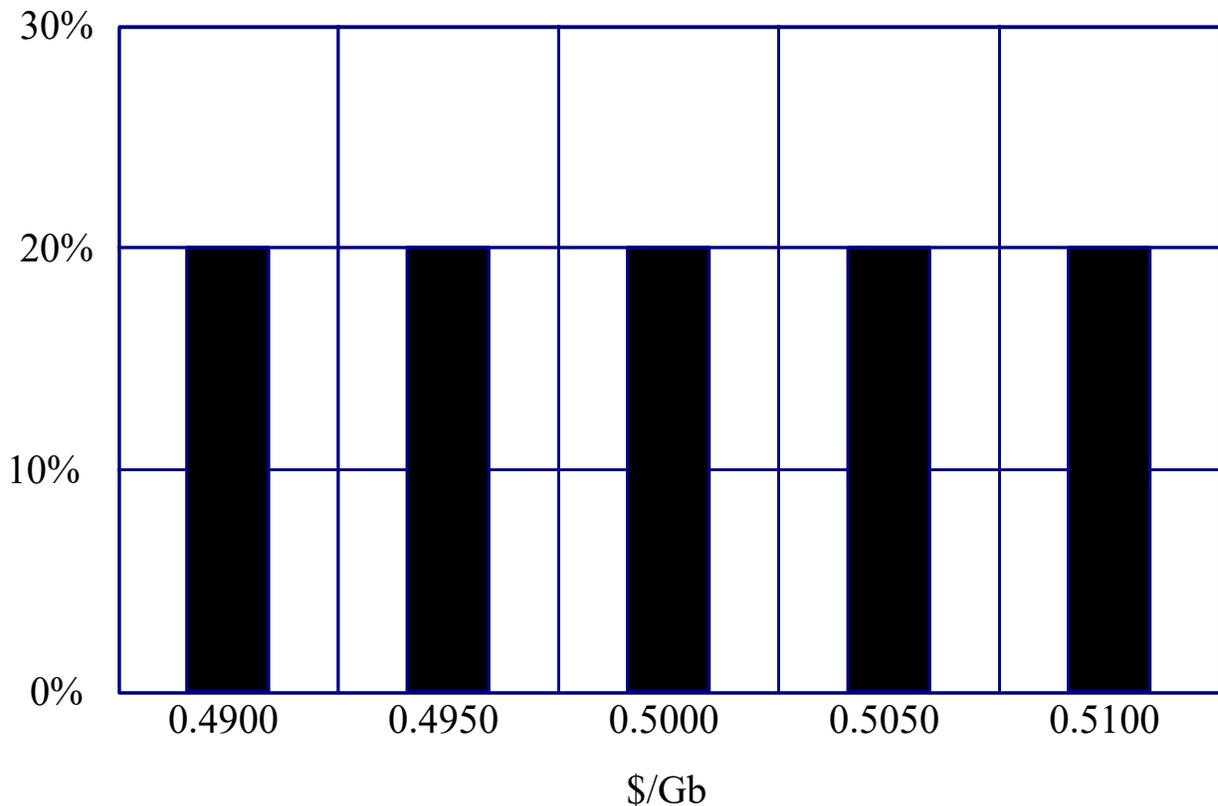
FOREIGN EXCHANGE TRADING FORM

ROUND 1
TEAM: _____

INITIAL PORTFOLIO

Garbanzos (Gb)	GB1,000,000
Dollars ($)	$1,000,000

BID/ASK PRICES (in $)

BID	for Gb
ASK	for Gb

RESULTS OF TRADE

BOUGHT Gb	for $ each	total cost
SOLD Gb	for $ each	total income
net Gb	Change in portfolio	net $

PROVISO ADJUSTMENTS (if necessary)

If fewer than Gb100,000, buy Gb _____ for $ _____ each.

If more than Gb2,500,000, sell Gb _____ for $ _____ each.

If fewer than $100,000, sell Gb _____ for $ _____ each.

ENDING PORTFOLIO

Garbanzos (Gb)	
Dollars ($)	

FOREIGN EXCHANGE TRADING FORM

ROUND 2

TEAM: _____

INITIAL PORTFOLIO

Garbanzos (Gb)	
Dollars ($)	

BID/ASK PRICES (in $)

BID	for Gb
ASK	for Gb

RESULTS OF TRADE

BOUGHT Gb	for $	each	total cost
SOLD Gb	for $	each	total income
net Gb	Change in portfolio		net $

PROVISO ADJUSTMENTS (if necessary)

If fewer than Gb100,000, buy Gb _____ for $ _____ each.

If more than Gb2,500,000, sell Gb _____ for $ _____ each.

If fewer than $100,000, sell Gb _____ for $ _____ each.

ENDING PORTFOLIO

Garbanzos (Gb)	
Dollars ($)	

FOREIGN EXCHANGE TRADING FORM

ROUND 3
TEAM: _____

INITIAL PORTFOLIO

Garbanzos (Gb)	
Dollars ($)	

BID/ASK PRICES (in $)

BID	for Gb
ASK	for Gb

RESULTS OF TRADE

BOUGHT Gb	for $	each	total cost
SOLD Gb	for $	each	total income
net Gb	Change in portfolio		net $

PROVISO ADJUSTMENTS (if necessary)

If fewer than Gb100,000, buy Gb _____ for $ _____ each.

If more than Gb2,500,000, sell Gb _____ for $ _____ each.

If fewer than $100,000, sell Gb _____ for $ _____ each.

ENDING PORTFOLIO

Garbanzos (Gb)	
Dollars ($)	

FOREIGN EXCHANGE TRADING FORM

ROUND 3
TEAM: _____

INITIAL PORTFOLIO

Garbanzos (Gb)	
Dollars ($)	

BID/ASK PRICES (in $)

BID	for Gb
ASK	for Gb

RESULTS OF TRADE

BOUGHT Gb	for $ each	total cost
SOLD Gb	for $ each	total income
net Gb	Change in portfolio	net $

PROVISO ADJUSTMENTS (if necessary)

If fewer than Gb100,000, buy Gb _____ for $ _____ each.

If more than Gb2,500,000, sell Gb _____ for $ _____ each.

If fewer than $100,000, sell Gb _____ for $ _____ each.

ENDING PORTFOLIO

Garbanzos (Gb)	
Dollars ($)	

FOREIGN EXCHANGE TRADING FORM

ROUND 5

TEAM: _____

INITIAL PORTFOLIO

Garbanzos (Gb)	
Dollars ($)	

BID/ASK PRICES (in $)

BID	for Gb
ASK	for Gb

RESULTS OF TRADE

BOUGHT Gb	for $ each	total cost
SOLD Gb	for $ each	total income
net Gb	Change in portfolio	net $

PROVISO ADJUSTMENTS (if necessary)

If fewer than Gb100,000, buy Gb _____ for $ _____ each.

If more than Gb2,500,000, sell Gb _____ for $ _____ each.

If fewer than $100,000, sell Gb _____ for $ _____ each.

ENDING PORTFOLIO

Garbanzos (Gb)	
Dollars ($)	

CLEARING HOUSE FORM

ROUND _____1_____   TEAM _____

BID/ASK PRICES (in $)

BID	for Gb
ASK	for Gb

CLEARING HOUSE FORM

ROUND _____2_____   TEAM _____

BID/ASK PRICES (in $)

BID	for Gb
ASK	for Gb

CLEARING HOUSE FORM

ROUND _____3_____   TEAM _____

BID/ASK PRICES (in $)

BID	for Gb
ASK	for Gb

CLEARING HOUSE FORM

ROUND _____4_____   TEAM _____

BID/ASK PRICES (in $)

BID	for Gb
ASK	for Gb

CLEARING HOUSE FORM

ROUND _____5_____   TEAM _____

BID/ASK PRICES (in $)

BID	for Gb
ASK	for Gb

ATTACHMENT 2

To determine the amount of Garbanzos supplied or demanded for any round, roll two dice. The pip count of the dice will determine the amounts. If you have colored dice, you can roll two dice of two different colors, say white and red, to determine both supply and demand on the same roll. It is recommended to use a dice cup for the roll (a plastic drinking cup will do). The rattling of dice in the cup stresses the fact that the numbers rolled are random.

Pip Count	Amount (Gb)	Probability
3	1,600,000	6%
4	1,700,000	8%
5	1,800,000	11%
2 or 6	1,900,000	17%
7	2,000,000	17%
8 or 12	2,100,000	17%
9	2,200,000	11%
10	2,300,000	8%
11	2,400,000	6%

At the end of the simulation, it is necessary to determine the final exchange rate to convert holdings to a common currency. The pip count of a single die can be used. Use a dice cup to roll a single die. The pip counts of 1 through 5 will determine the rate. If the die roll yields a six, roll the die again until a value of 1 through 5 occurs.

Pip Count	Exchange Rate ($/Gb)	Probability
1	0.4900	20%
2	0.4950	20%
3	0.5000	20%
4	0.5050	20%
5	0.5100	20%