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FOREIGN CURRENCY HEDGING: A SIMULATION

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ABSTRACT

This paper presents a foreign currency hedging simulation that spans several periods yet can be completed in a single class session. The simulation can be used to introduce and reinforce the concepts of hedging and can give students experience in constructing various types of hedges.

INTRODUCTION

Games and simulations can be used to demonstrate principles and provide experiential learning. This type of active learning provides both students and instructors with a break from the traditional classroom routine and can be used to highlight and support lecture-related materials. Interactive learning activities can be designed to be very short, taking less than a single class period, or long enough to span several class periods.

Single-period activities have several advantages. A single-period game or simulation can be rich enough to provide a multi-level learning experience. Several different interactions and principles can be demonstrated with a properly constructed single-period simulation. The richness of the experience can then serve as a springboard for several future classroom discussions or lectures. A single-period activity is also flexible. An instructor can move such an activity fairly easily if it is appropriate to reschedule it; multi-period activities can make the instructor a prisoner of the calendar.

The subject of the game or simulation can often dictate the length of the activity. Simple concepts, like a demonstration of the free rider problem in economics, may require multiple repetitions of short activities. Simulation of the complexities of bank management can span an entire term. Creating single-period games and simulations that span multiple periods requires that the designer isolate the fundamental concept to be demonstrated and develop a scenario that will play smoothly.

LITERATURE REVIEW

During the last decade, pedagogy at the university level has experienced a virtual revolution. Previously, the prevailing teaching methodology was that of lecture and discussion, but today it is not unusual to find individual analysis of group roles, group dynamics, individual and group decision making, role-playing, and other human relations skill-building exercises used in the college classroom. These are generally referred to as "experimental" techniques and reflect the attempt of the business disciplines to bring realistic experiences into the university classroom. An important objective in teaching finance is to ensure that students are exposed not only to theoretical frameworks but also to real world situations where they can gain experience in applying their knowledge. A teaching approach that helps meet this objective in the classroom is the use of games and simulations that replicate many aspects of the real financial world.

The literature in the area of educational techniques indicates a steadily increasing degree of interest in the use of active learning with simulations and experiential learning (Bouton and Garth 1993, and Cooper and Mueck 1990). In particular, a review of the literature relating to the analysis of the effectiveness of business simulations and experiential learning reveals a number of studies which support the usefulness of the games and simulations (Becker 1995, Johnson and Johnson 1989, Sharan et al. 1984, and Zapalska and Brozik 1998)

Numerous games and simulations have been developed to enhance students learning in business, economics, and finance education. The games provide an environment in which students have the opportunity to experiment with new concepts by placing them in market situations. While there are a number of games that include foreign exchange factors (for example, Alston and Chi 1990, Monahan and Goode 1997, and Tansuhaj and Gentry 1988), only a few specifically mention currency hedging (Hamm et al 1990 and Thorelli 1997). Simulations dealing specifically with foreign currency hedging are not readily available.

THE SIMULATION

The Foreign Currency Hedging Simulation was designed to provide students with the opportunity to make hedging decisions in the context of a dynamic market. Students are given the chance to create several different types of hedges, and the success of these hedges is determined for each period by a roll of the dice. The randomness introduced by the dice simulates real-world market conditions and eliminates the possibility of any player being able to predict the direction of the simulation. This means that even the best laid plans may go awry, and players may choose to rethink their strategies in the process of the simulation. By keeping the focus tight and providing all necessary information, it is possible to simulate several different decision periods in a single class session. This allows the

students to experience the results of their decisions immediately, to change their strategies in response to market conditions, and to see the effects of those changes.

Attachment 1 is the simulation description which is handed out to each group of students at the beginning of the class (the fourth page is a form to help students organize their decision data; it will be necessary to provide one copy of this form for each iteration of the simulation). Since the description is fairly short, it is only necessary to take a few minutes to familiarize the students with the nature of the data presented. Attachment 2 summarizes the results of the possible dice rolls which identifies the exchange rate for each simulation period (three dice must be provided by the instructor, one marked in red). The exchange rates indicated for the various pip counts matches the probability distribution in Attachment 1. (The instructor may choose to bias the information by consistently adding or subtracting one or two cents from the values given in the table. It would then be possible to learn whether students were able to recognize a biased market and react accordingly.)

The play of the game is straightforward. Each team of students designs an initial foreign currency hedge. The instructor then rolls three dice, and the count of the pips (both red and white) determines the end-of-period exchange rate. The instructor then rolls two dice one more time to determine if there is a change in government that affects the banking system (there is a change if the sum of the pips on the two dice equals 3). This entire process takes less than one minute.

The teams now calculate the net cost of their hedge. A second round is conducted, and the teams now have the choice of how to create a hedge for the next period. The process is repeated through several iterations to give teams the chance to use all types of hedges or gain experience with a specific type of hedge.

The key learning event in the simulation is the debriefing session. The focus of the debriefing session should be on how and why certain hedging strategies worked. The results will indicate which strategies were the most and least profitable in this market session, but it should be pointed out that if the dice had fallen differently the results could have changed. If the instructor chose to bias the outcomes by adding/subtracting from each roll, it is necessary to discuss what happened and to determine whether any of the students noticed the bias and took actions accordingly. Students can be made to recognize that despite the best intentions of the money managers, the real world will have its own input on hedging performance. By allowing students the ability to make multiple decisions within a single period, they can see how different strategic and tactical plans may succeed or fail.

CONCLUSION

The Foreign Currency Hedging Simulation creates a dynamic environment in which students make decisions concerning hedges and see the results of those decisions. The simulation focuses on the decision making process, and several rounds can be completed within a single class session. The simulation does not require any detailed knowledge of the way in which the foreign currency exposure was created, so the simulation can be conducted with students who may not have a background in corporate finance. The focus is on managing an existing foreign exchange exposure.

One important aspect of the simulation is that there are no winners or losers. The purpose of the exercise is to explore decision making techniques and see the results of specific decisions. The debriefing session allows the class members to discuss the nature of their decision making, and comparisons can be made between various teams in a noncompetitive environment. Everyone can learn from everyone else. The Foreign Currency Hedging Simulation gives instructors an interactive learning tool that can be used in this specific, and often confusing, area of finance.

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ATTACHMENT 1

STUDENT HANDOUT

HEDGING FOREIGN EXCHANGE RISK

BACKGROUND

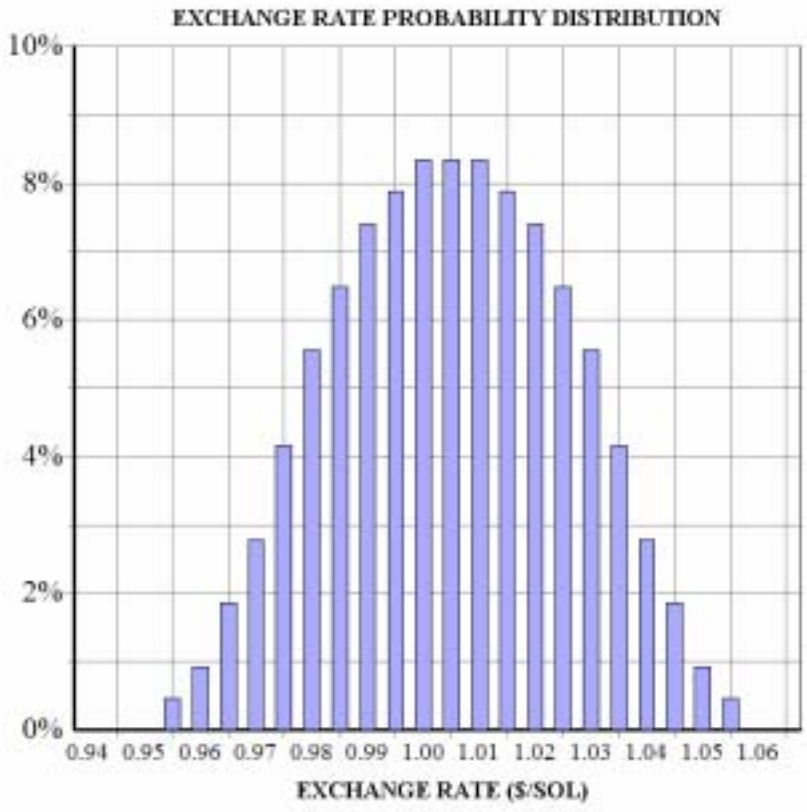
The purpose of foreign currency hedging is to minimize a firm's exposure to changes in foreign exchange rates. There exist a number of ways for a firm to hedge this type of risk, each having its own particular characteristics. Properly constructed hedges can help assure the stability of a firm's income stream while a lack of hedging can cause a firm various levels of financial distress.

OVERVIEW

You and your team members work for Consolidate Imports (CI). The firm imports consumer goods from all parts of the world and thus is often exposed to exchange rate risk. CI has begun buying merchandise from companies in the South American country of Parador. The government of Parador requires that all contracts be denominated in its home currency, the Sol, in order to protect domestic firms from exchange rate risk. If you want to do business in Parador, you will have to denominate all contracts in the Sol. Due to the quality and price of the merchandise, CI has chosen to do business in Parador even if it means assuming all the exchange rate risk. It is your job to design and monitor foreign currency hedges for CI's business transactions in Parador.

THE SOL

The Sol is the national currency of Parador. The Sol (SL) floats freely against all other currencies, and the central government makes no attempt to influence its value in the international markets. The current exchange rate is SL1.000 = $1.005. The exchange rate between the Sol and the dollar has been relatively stable and is expected to remain that way. The distribution of expected exchange rates is shown below:



developed. There are a number of international financial institutions and multinational banks that offer various types of financial contracts. A review of the markets indicates that the following contracts are available:

Forward Contracts - The TransAmerican Financial Corporation (TFC) offers forward contracts of various maturities for the Sol. The contracts can be customized to any size, but TFC only offers fixed maturities. The current rates are:

All prices are given in $/Sol		
Length of contract	Buy Sols	Sell Sols
30-day	.995	1.020
60-day	.990	1.025
90-day	.985	1.030
180-day	.975	1.040

Futures and Options Contracts - The InterAmericas Commodity Exchange (ICE) offers futures contracts on the Sol. These contracts are for SL100,000 each and mature on the 20th of the month. The prices of currently available contracts are:

All prices are given in $/Sol	
Maturity Month	Price
January	1.008
March	1.015
June	1.023

ICE also offers option contracts on the Sol. These contracts are for SL100,000 each and mature on the 15th of the month. The prices of currently available contracts are:

All prices are given in $/Sol		
Maturity Month (Strike Price)	Call Price	Put Price
March (1.000)	.025	.020
June (1.000)	.030	.035

Banking Relationships - CI has ongoing banking relationships with the First Consolidated Bank (FCB) in the United States and the Banco National de Parador (BNP) in Parador. FCB is CI's principal US bank. Loans from this bank with maturities less than one year will cost CI 8%; deposits in appropriately liquid accounts will yield 4%. CI has recently opened its accounts with BNP, but at this time the Paradoran government is guaranteeing certain foreign accounts in order to attract investment to the country. CI can get short-term loans (less than two years) for 6%, and deposit accounts will return 4%.

It must be noted that there has been news recently about political unrest in Parador. While the current government does not interfere with the banking system, if a new populist government comes to power, one of its first acts would be to nationalize the banking system. Should nationalization occur, any amount of money you had deposited in the Paradoran banks would be lost, but any amount of money that you had borrowed would not have to be repaid due to severing of diplomatic relations with the US. There is a 5% probability that such a change of government will occur. Any change in government would not affect the forward contracts offered by TFC or the futures and options contracts offered by ICE since these organizations are not in Parador.

THE SITUATION

Today is January 1st. Consolidated Imports has entered into a contract to purchase SL250,000 worth of merchandise from a Paradoran firm. The merchandise will be delivered in 90 days, and payment will be due on delivery. Your team has the responsibility for deciding whether to hedge CI's exposure and, if so, exactly how to do it. You may choose to remain unhedged or use any instrument or combination of instruments to create the hedge. The only restriction you face is the firm's general reluctance to become a currency speculator. It is understood that a hedge may not be "perfect", but there should be no excess number of financial contracts beyond what is needed for the hedge.

HEDGE FORMATION

1. Consider the firm's situation and the state of the foreign exchange market. Determine how you will construct your hedge.

2. Use the form provided to describe the hedge.

3. The instructor will roll dice to determine the final exchange rate between the Dollar and the Sol. The dice will also determine if there is a change in government.

4. Calculate the final net cost of the hedge to Consolidated Imports.

5. Steps 1-4 will be repeated as time allows.

6. At the end of the simulation, groups will discuss their hedging philosophy and how well it worked in this market.

HEDGING FOREIGN EXCHANGE RISK

ROUND: TEAM:

EXPOSURE: SL250,000

AMOUNT TO BE HEDGED:

DESCRIBE HOW THE HEDGE IS CONSTRUCTED:

FINAL EXCHANGE RATE: $/SL

NET PROCEEDS TO CI (show calculations):

ATTACHMENT 2

EXCHANGE RATES FROM DICE ROLLS ($/SOL)

Sum of Black Dice	Value of Red Die: 1	2	3	4	5	6
2	.955	.975	1.035	1.035	1.035	.98
3	.96	.975	.985	1.035	1.035	1.015
4	1.00	.985	.985	.985	.985	.98
5	.965	.99	.99	.99	.99	.98
6	1.00	1.00	1.00	1.015	1.015	1.015
7	.97	1.04	.975	1.005	1.005	1.005
8	1.01	1.01	1.01	.995	.995	.995
9	1.045	1.02	1.02	1.02	1.02	.98
10	1.01	1.025	1.025	1.025	1.025	1.03
11	1.05	1.025	1.03	1.03	1.03	.995
12	1.055	1.035	1.035	1.03	1.03	1.03