Group Assignment II

Problem 1 (Rationale for Hedging Currency Risk):

Gidget International is domiciled in the Land of Make Believe. The local currency is called the Goodwill (abbreviated G). Gidget will own assets worth either G6,000 or G16,000 this year (with equal probability), depending on the value of the local currency on world currency markets. Gidget has a promised payment to debt of G10,000 due in one year. Although there are no taxes in the Land of Make Believe, there are lawyers (this isn't a perfect world, after all). If Gidget cannot meet if debt obligations, legal fees will impose direct bankruptcy costs of G2,000 as the firm is divided amongst its creditors.

(a) How much will debt and equity owners receive at asset values of G16,000 and of G6,000? Calculate the expected value of equity, debt, and the firm.

(b) How can hedging increase the value of Gidget International in the presence of direct costs? Who wins – debt, equity, or both?

Solution:

(a) At $6,000 in taxable income, debt receives $4,000 and equity receives nothing. At $16,000 in taxable income, debt receives $10,000 and equity receives $6,000. Firm value as a combination of debt plus equity:

(b) Unhedged

$E[V_{Bonds}]$ $= (½)(\$6,000-\$2,000)$ $+$ $(½)(\$10,000) =$ $\$7,000$

$E[V_{Stock}]$ $= (½)(\$0)$ $+$ $(½)(\$6,000) =$ $\$3,000$

$E[V_{Firm}]$ $= (½)(\$6,000-\$2,000)$ $+$ $(½)(\$16,000) =$ $\$10,000$

Hedged

$E[V_{Bonds}]$ $=$ $\$10,000$

$E[V_{Stock}]$ $=$ $\$1,000$

$E[V_{Firm}]$ $=$ $\$11,000$

Firm value rises from $10,000 when unhedged to $11,000 when hedged. Hedging results in a $3,000 increase in the value of debt and a $2,000 decrease in the value of equity, for a net gain of $1,000. The $1,000 net gain is captured by avoiding the ½ probability of a $2,000 deadweight bankruptcy cost.

Whether equity chooses to hedge in this circumstance depends on whether the gain in firm value is more or less than the shift in value from equity to debt from the reduction in risk.

In this example, debt gains at equity's expense. The $3,000 shift in value from equity to debt is less than the $1,000 net gain to the firm, so equity bears the $2,000 net loss. In the absence of a renegotiation of the debt contract, equity would choose to leave its currency risk exposure unhedged.

Problem 2 (Transactional Currency Risk):

You work for an Argentinean wine exporter and expect to receive USD 1 million in one year from a U.S. client. You can trade at the following prices:

Spot rate, Argentinean pesos per dollar	ARS 3.02 / USD
One-year forward rate	ARS 3.09 / USD
One-year Argentinean interest rate	5.050%
One-year dollar interest rate	4.050%

(a) Form a forward market hedge. Identify which currency you are buying and which you are selling forward. When will currency change hands? Today? Or in one year?

(b) Replicate the payoff on the forward contract with a money market hedge by using the spot currency and interest rate markets. Identify each contract in the hedge.

(c) Are quoted prices in these currency and interest rate markets in equilibrium? If not, explain briefly how you would arbitrage this disequilibrium (you do not need to make any calculations related to the possible arbitrage opportunity).

Solution:

(a) Since the Argentinean Corporation is exporting wine, it will have in its balance sheet a monetary asset (Account receivable). Therefore, it has a positive exposure to currency risk: if the foreign currency (USD) increases in value, the value of the monetary asset increases. If the foreign currency gets weaker relative to the local currency, the monetary asset loses value.

Since we will receive USD in one year, we need to create a monetary liability (negative exposure) to cancel our monetary asset (positive exposure): therefore, we need to sell USD one-year forward (which is the same as buying ARS forward). Although the forward contract is structured today, the cash is exchanged in one year.

(b) Done in class! The synthetic forward rate is ARS3.04/USD

(c) Since $\dfrac{F_1^{ARS/USD}}{S_0^{ARS/USD}} > \dfrac{\left(1+i^{ARS}\right)}{\left(1+i^{USD}\right)}$, you need to borrow ARS at i^{ARS} , buy USD at the spot, deposit the USD earning i^{USD} , and finally, sell USD forward.

Problem 3 (Hedging using Options)

Bernd lives in Berlin and uses the euro as his currency of denomination. Bernd has an accounts payable balance of $10 million due in three months. The spot exchange rate is $S^{€/\$} = €1.20/\$$. How can a currency option hedge reduce Bernd's exposure to currency risk. Assume a striking price of €1.20/$ and an option premium of €0.20/$. Draw a graph of $V^{€/\$}$ versus $S^{€/\$}$ showing the risk exposures of the underlying position, the currency option hedge, and the net position.

Bernd is short the dollar, so a long call option on the dollar can reduce Bernd's exposure.

A long call option on the U.S. dollar