APPENDIX A: CASES

CASE 1 (LN V): Exchange Rate Projections. Casullo Financial Services (CFS).

Ricardo Casullo, president of CFS, has been contacted by Nike Inc. to forecast exchange rates for the next five year. Ricardo Casullo assigned to the project Mr. Walter Ritz, Vice President of CFS and manager of the Forecasting Department. Mr. Ritz is an expert on currency forecast who is often quoted in the financial press and who is a regular on CNBC's Power Lunch. Mr. Ritz first task was to review several Nike's annual reports and industry reports.

Nike Inc.

Nike Inc. (NKE) likes its maverick image. In 1994, the giant footwear giant, based on Beaverton, Oregon, paid the legal bills for figure skater Tonya Harding. More controversy ensued when Nike outfitted tennis contender Mary Price in a provocative halter dress during her surprise loss at the French Open on May 31, 1996. But Nike's most shocking move may have come earlier in 2013, when Chief Executive Mark Parker brashly forecasted that Nike would grow by more than 40% in size -from USD 24 billion to USD 36 billion in revenues- by 2017. By the end of 2017, this bold prediction was almost met, with USD 34.4 billion in revenues. The fuel of this growth has been Nike's international markets. Today, worldwide revenues represent more than 55% of total revenues.

Nike is heavily counting on overseas sales for revenue growth. In 2003, international sales were 52% of the brand total, the first time international sales have surpassed U.S. sales. After spending hundreds of millions of dollars on endorsement contracts with such high-profile U.S. athletes as Jordan, Agassi, Bo Jackson, Tiger Woods, LeBron James, Kobe Bryant, Michael Vick, Roger Federer, and Cristiano Ronaldo, as well as on overseas deals including the Brazilian national soccer team and European teams Manchester United and Barcelona FC, track and field athletes in Kenya, and almost all U.S. Olympic teams, its name and logo are recognized around the world.

Industry experts say Nike's massive global expansion, coupled with its entry into new products, such as electronics, dress and casual footwear and apparel, and extreme sports (surfing, skateboarding, and snowboarding), raises questions about whether the company is losing focus.

Objective and Methodology

Mr. Ritz wants to forecast exchange rates using the following models:
(a) PPP.
(b) Forward exchange rates.
(c) Monetary approach.
(d) Ad-hoc economic models.

Data

CFS subscribes to the *International Financial Statistics* (IFS). The IFS is published by the International Monetary Fund (IMF) and contains economic and financial data for all member countries (including nominal exchange rates and nominal interest rates).

Assignment

Mr. Ritz instructed you, his Research Assistant, to prepare a 12-month currency outlook from **2021:IV** through **2022:III** for the GBP, JPY, MXN, and KOW (Korean Won). "Just do it," said Mr. Ritz. You joined CFS two months ago following your graduation from the University of Houston, where you earned an MBA, with a major in finance.

1. Test the forecasting skills of Mr. Ritz's models (in-sample). Estimate Mr. Ritz's models, on the basis of information that was available at the end of **2019:III**. Evaluate the in-sample performance of the models by evaluating the signs, the t-statistics, and the R-squared coefficients.

2. Test the forecasting skills of Mr. Ritz's models (out-of-sample, one-step-ahead forecasts), making suitable assumptions regarding future values of driving variables, prepare quarterly out-of-sample forecasts for each currency during **2019:IV–2022:IV** –i.e., twelve quarters. Check the quality of the forecasts by calculating the Mean-squared error (MSE) of your forecasts and the ability to predict the direction of exchange rates.

3. Compare your model's out-of-sample performance with the out-of-sample performance of the random walk model.

4. Select the "best" model among Mr. Ritz's models in (2). Using the best model, project the exchange rate for the GBP and JPY for next quarter, **2023:I**.

5. Briefly discuss your results and evaluate your forecasts.

Class Assignment

(1) Get the data. Go to my homepage and download the data set for this case (**datacase1.xls**). In datacase1.xls, you have inflation rates, 3-mo. interest rates, and GDP growth rates for the U.K. and the U.S, respectively, from **1978:2** to **2022:IV**. In addition, column 5 gives you the exchange rate USD/GBP.

(2) You work for Mr. Ritz and you want to predict the USD/GBP exchange rate. Mr. Ritz believes that the inflation rate differential, the interest rate differential and the income differential help to explain exchanges rates. Since it is easier to work with changes, Mr. Ritz's model has as the dependent variable the percentage change in exchange rates -i.e, 0.01 (1%), 0.025 (2.5%), etc. Using data from **1978:II** to **2021:III**, Mr. Ritz asks you to estimate the following regression:

$$s_{t,T} = \alpha + \beta_1 (I_{d,t} - I_{f,t}) + \beta_2 (i_{d,t} - i_{f,t}) + \beta_3 (y_{d,t} - y_{f,t}) + \varepsilon_t$$

1. Do the estimated signs make sense? (i.e., are there any theories that justify the signs?) Attach the results from your multiple regression.

2. Given the t-statistics and the R^2, a priori, would you recommend this model to Nike Inc.?

3. Using the data in datacase1.xls, forecast S_t for **2021:IV** to **2022:IV**. (Assume that the past is an unbiased predictor of the future.) Recall that $S_{t+T} = S_t (1 + s_{t,T})$.

4. Evaluate your forecasts using the mean absolute error (MAE) metric.

5. Calculate the 3-mo USD/GBP forward rates, using IRPT, for the period **2021:IV** to **2022:IV**. Do forward rates predict better than Mr. Ritz's prediction? That is, calculate the forward rate's MAE and compare this MAE with the MAE in question 4.

6. Briefly discuss the failure/success of Mr. Ritz's regression.

CASE 2 (LN VIII): Hedging Transaction Exposure. Popescu, Hagi & Associates

Georgi Popescu defected from the Romanian delegation in 1972 while he was participating in the Olympic Games of Munich. He was a 20-year old gymnast, who was promptly offered a scholarship at Columbia University. He chose business as his major. "I thought it was the easiest subject," he says in his office, based in Hartford, Connecticut. Soon he found that his Romanian education, with a strong emphasis on mathematics, was very helpful in the new field of derivatives. "Not everything was bad in Romania," he says, when he talks about his Romanian high school education. After finishing his B.A. at Columbia, he enrolled in the MBA program at MIT. At MIT he met Sorin Hagi, the only son of two Romanian immigrants, who was also interested in derivatives. In 1982, three years after getting their MBA degrees, Mr. Popescu and Mr. Hagi founded a consulting firm that specialized in derivatives, Popescu, Hagi & Associates (PHA).

In December 2012, Len Mirman, founder and president of DW Inc., approached PHA with a very specific problem. DW is a ten-year old, fast growing company, dubbed by many analysts "the next Wang." DW manufactures computers in Los Angeles, California. DW computers are primarily sold in California, under different labels. DW has a problem of mismatch outflows and inflows. Inflows are denominated in USD. Outflows, however, are mainly denominated in foreign currency: all parts are imported, 50% of them from Japan, and the rest from Korea, China and Malaysia. DW has never hedged and has taken the fluctuations of its cost structure as a given. Mr. Mirman is planning to take DW public next year. He has been told that Wall Street analysts value a predictable cost structure. DW's revenue in 2011 was USD 105 million. Last year, due to the strengthening of the JPY against the USD, DW's total expenditures were up 10% to USD 7 million.

PART I

In early December 2012, DW ordered Japanese parts valued at JPY 200,000,000. Delivery usually takes two months. Payment is due within 30 days of delivery. This morning, **December 6**, DW received a confirmation notice that the Japanese parts would be delivered in April. The exact delivery date could not be guaranteed, but an informal telephone call from Japan stated the expected delivery date to be by mid-March, and, likely, with payment due in **April 17**.

The Assignment

PHA assigns you to solve DW's hedging problem associated with the December transaction. You have the data in Table C2 available to make your decision.

1. Using different scenarios, evaluate the risk associated with the open position. Do the following:
a.- Calculate range using a worst/best case scenario; a normal, a simulation.
b.- Calculate the VaR (99%)
2. Suppose you decide to use the PHLX options market. How many contracts would you buy? Estimate the total premium cost.
3. How does the cost of using the traded option compare to the OTC option?
4. How does the forward alternative compare to the cost of using options? Graph the expected net cash flows for DW in **April 17**.
5. Which method would you recommend to Mr. Mirman?

PART II

It is now, **May 6**. The Japanese parts arrived on April 11 and payment is due in five days. The exchange rate is .01004 USD/JPY. The 1-mo. and 3-mo. forward USD/JPY rates are .010464, and .0100593, respectively. U.S. short interest rates for two months or less are .0909-0.1165. The CME June futures trades at .010002. The PHLX June options have the following prices (in USD cents):

JPY June .008	p	0.00004
JPY June .009	p	0.00117
JPY June .010	p	0.02342
JPY June .008		0.20465
JPY June .009		0.10592
JPY June .010		0.02827

The Assignment

What would be the effective total cost (in USD) of the Japanese parts if you had advised:

1. Using three months forward? (You need the value of the three months forward in March.)
2. Using six months forward?
3. Using June futures?
4. Using the OTC JPY option?
5. Using JPY June options?
6. Left the position open?

DATA

TABLE C2

Foreign exchange rates (**December 6, 2012**)

• Spot rate (USD/JPY)		.012470
• Forward rate	1mo	.012485
	3mo	.012494
	6mo	.012561

• CME Futures

March .01250

June .01257

• Interest rates	3-month	6-month
USD (%)	0.18105-0.19230	0.23080-0.26205
JPY (%)	0.10100-0.10850	0.15158-0.15205

• PHLX options (premium in cents per unit)

JPY June .008	p	0.00407
JPY June .009	p	0.01052
JPY June .010	p	0.01425
JPY June .008		0.45830
JPY June .009		0.36255
JPY June .010		0.29542

OTC options with expiration date **April 17**.

Strike price .009 p	0.00921
Strike price .010 p	0.01386
Strike price .009	0.40810
Strike price .010	0.31976

Class Assignment

1. Go to the CME website, www.cmegroup.com. What is the volume of JPY/USD futures at the CME? Go to the NASDAQ-PHLX website, www.nasdaq.com. What is the volume of JPY/USD PHLX calls? Which strategy do you think would be easier to close?

2. Go to my homepage to get the JPY/USD exchange rate (**database2.xls**). Using **10 years of past data** (Dec 2002 – Dec 2012), calculate the VAR associated with DW's open position, using a 97.5% confidence interval and assuming a normal distribution. Since there is uncertainty regarding delivery date, you decide on a conservative **5-mo maturity** for the payable. (Recall that you need to adjust the monthly returns to the correct frequency –i.e., **5-mo** (Dec-May) frequency.)

3. Using the same data, calculate the best case and worst case scenarios for DW. (Again, recall that you need to adjust the monthly returns to the correct frequency –i.e., **5-mo** (Dec-May) frequency.)

4. Continuation of 3. Now, calculate a 95% confidence interval for DW using a simulation.

5. In the past, your Japanese counterpart has not been reliable with respect to delivery dates. Thus, you decide, on **December 6, 2012**, to do a 6-mo futures hedge. DW buys the JPY Dec futures contract. Value this contract on May 6, 2013.

6. On **December 6, 2012**, you decide to do a 6-mo. money market hedge, calculate the cost of this alternative on May 6, 2013. (Remember to discount the cash flows back to May 6, 2013.)

CASE 3 (LN XVII): TEMPLETON GROWTH FUND

The Templeton organization follows the investment philosophy of its founder, Sir John Templeton. The Templeton Funds' managers were among the first to invest in world markets. For example, Templeton began investing in Japan in the 1960's, long before others had recognized that country as an emerging economic power. Templeton pioneered quantitative security analysis worldwide investment. Templeton's Approach to equity investing is based on three basic principles: bargain hunting, worldwide diversification, and long-term investors. Templeton's funds have one of the lowest rates of portfolio turnover in the mutual fund industry. Today, Templeton is part of the Franklin-Templeton Group, which has assets under management in excess of USD 150 billion on behalf of more than four million investors.

The best-known Templeton fund is the *Templeton Growth Fund*, which was introduced in November 1954. According to its prospectus, the Templeton Growth Fund seeks to achieve long-term capital appreciation by investing primarily in global equities. Since inception the performance of the Templeton Growth Fund has been very solid: it has averaged an annual rate of return of 11.67%. In the past 10 years, however, the performance of the Templeton Growth Fund has declined for an annual rate of return of 6.30% (or 5.70%, after sales charges).

<u>The Assignment</u>
You should evaluate Templeton's international portfolio management and performance by using standard portfolio management theory. More specifically, please address the following question:

1. Determine whether Templeton, in **December 2019**, has provided U.S. investors with an optimal portfolio. More specifically, review Templeton's portfolio composition on the basis of the data provided below. Utilize the data on risk and return per country as reflected by the MSCI Indexes. Calculate the beta and RVOL of the Templeton Growth Fund. Compare it to passive MSCI World & EAFE investments, and to a simple equally weighted portfolio. Assume that MSCI data set was available to you prior to the investment. (Get the data from my homepage, datacase3.xls.)

2. Construct an internationally diversified portfolio by identifying countries to be invested in, and determine the amount to be allocated to each country. Calculate the beta and RVOL of the optimal portfolio.

3. Many economists believe that observed (ex-post) returns are measured with error. Many institutions do not feel comfortable with the mean-variance allocation determined using historical (ex-post) data. It is common to observe that money managers are faced with caps and floors. For example, money managers cannot allocate more than a given percentage (the cap) in a foreign market. These caps and floors try to minimize the effects on the asset allocation of measurement error in ex-post returns. Now, you face a cap of 10.0% for each foreign market and a floor of 45% for the U.S. Incorporate these restrictions (the caps and floors) in the construction of your internationally diversified portfolio. That is, you build an “optimal constrained portfolio.” Calculate the beta and RVOL of the optimal constrained portfolio.

4. Compare the performance of your constructed portfolios, in (2) and (3), in terms of beta, RVOL, and the rate of return and with the performance of Templeton's Growth Fund, the MSCI USA, and the MSCI World Index.

5. Answer 4, but with the **2020-21** annual returns data. Use the same weights you obtained in (2) and (3), but the new data on returns. That is, compare the out-of-sample performance of your portfolios.

Class Assignment

1. Go to my website (**datacase3.xlsx**) to obtain the MSCI's USD monthly returns on the U.S., U.K., France, Switzerland, China, India, Singapore, South Korea, Brazil, Mexico, and South Africa during the 26-year period **1993-2019**. Annualized the returns and estimate the annualized return on an equally weighted portfolio. Using the r_f and β_i's provided in the data set (you can calculate it too!), calculate the RVOL for this equally weighted portfolio.

2. For the ten countries mentioned in (1), use the **1993-2019** annualized returns from MSCI, calculating also the variances and correlations coefficients, to estimate the return of an optimal portfolio. Calculate the RVOL for this portfolio. Determine the *optimal* weights for your portfolio using the Elton and Gruber approach. (See Exercise XVII.3 – Remember to first order the countries according to their RVOLs.)

3. Assume you need to invest exactly **50%** in the U.S. market. Recalculate the optimal weights. Calculate the return and RVOL for this constrained optimal portfolio. Does the performance of the portfolio improve? Does it make sense to impose caps and floors to fund managers?

4. Compare the performance of the optimal portfolio in (2), your constrained portfolio (3), and the performance of your equally weighted portfolio in (1). Which one would you select for next year?

5. For the same ten countries obtain the **2020-2021** annual USD returns. Calculate the ex-post performance of the equally weighted portfolio, the optimal portfolio from (2), and the constrained optimal portfolio from (3) during this two-year period. Has your answer in (4) changed? Briefly discuss the results.

Data

• Investment Portfolio – **December 31, 2019** Geographic Distribution (percent)

TABLE C3
MSCI Indexes: Performance and Risk Measures (annualized, **1970-2019**)

	Weight	Mean	SD	$ß_{World}$	RVOL
U.S. (18)	27.5	0.0831	0.1501	0.9136	0.0402
Japan (11)	14.4	0.0956	0.2046	0.9473	0.0520
France (6)	8.5	0.0880	0.2195	1.1064	0.0377
Germany (5)	7.1	0.0880	0.2148	1.0582	0.0394
U.K. (6)	6.6	0.0737	0.2120	1.0716	0.0256
South Korea (2)	3.8	0.1107	0.3452	1.2664	0.0508
China (5)	3.6	0.0470	0.3256	1.1205	0.0006
Hong Kong (3)	3.5	0.1606	0.3323	1.1165	0.1023
Switzerland (1)	2.9	0.1034	0.1764	0.8756	0.0652
Canada (2)	2.4	0.0795	0.1921	1.0111	0.0328
Singapore (1)	2.3	0.1132	0.3442	1.1518	0.0580
Netherlands (1)	1.9	0.0930	0.1877	1.0411	0.0448
Norway (1)	1.5	0.1045	0.2644	1.1372	0.0511
Thailand (2)	1.3	0.1144	0.3487	1.1357	0.1936
Denmark (1)	1.2	0.1182	0.1917	0.8111	0.0886
Indonesia (1)	0.8	0.1033	0.3275	0.9366	0.0608
Italy (1)	0.8	0.0537	0.2522	0.9961	0.0074
India (1)	0.5	0.1109	0.2826	0.9403	0.0687
Ireland (1)	0.1	0.0481	0.2153	1.0652	0.0017

Total Equity	90.7
Short-Term Investments (TD)	3.9
Other	5.4

Note: Number of stocks in parenthesis.

Risk-free Rate (annualized)

90-day T-bill (Dec 2019):	1.57%
90-day T-bill (average 70-19):	4.64%

CASE 4 (LN IX): Hydro Aluminium Consolidated (HAC).

Hydro Aluminium Consolidated (HAC) is engaged in the production and distribution of aluminum. In 2018, HAC produced 780,000 tons of primary aluminum and had revenues of USD 45 billion. HAC's ratios show that the rate of return on shareholders's investment averaged 10.8% in 2000-2019, the rate of return on sales was approximately 5%, and the total debt to shareholders' equity ratio was 19.4 percent.

In July 2020, HAC was approached to help Brazil's Vale SA –previously known as Companhia Vale do Rio Dolce, or CVRD- to capitalize Alumina do Norte do Brasil SA (Alunorte) alumina refinery in Para, Brazil. Vale is a mining conglomerate that operates iron ore mines in Itabira, in Minas Gerais state. Vale is the world's largest producer and exporter of iron ore and, with reserves sufficient for 500 years, is likely to retain this position for a long time. Vale has been described as a "tier one natural resources and transportation company." Vale has very good financials. Since listing in the NYSE in 2002, Vale shares has shown a 15.75% annual return, a 27% return on equity, a 38% debt-equity ratio, and average cost of debt of 5%.

Vale is also Brazil's largest aluminum producer and it is trying to expand its alumina producer Alunorte and its bauxite producer Mineracao Rio do Norte (MRN), two firms in which it holds majority stakes, in order to strengthen the financial profile of its aluminum sector. Vale, with a 53.6% stake in Alunorte, during the past year has boosted the plants alumina output to 1.4 million tons per year from 1.1 million tons through minor investments and efficiency gains. Vale currently uses Alunorte's nominal output to supply the adjoining Vale-controlled Albras smelter with 690,000 tons of alumina and Vale-controlled Valesul aluminum plant with 100,000 tons of alumina, exporting the rest to other Alunorte shareholders or via spot sales.

If HAC decides to participate in the capitalization of Alunorte, HAC will manage the restructured plant. HAC is expected to put USD 70 million for the plant modernization for 7 years, but would be given the option of converting its credit to equity after the sixth year of operation by acquiring Vale's common shares at a discount of 30 percent from the price, which would be determined on the basis of a comparable P/E multiplier (for comparable public or private companies), or capitalized over 6 years at Vale's weighted average cost of capital, or at the long-term U.S. government bonds yield rate plus 5 percent, whichever is lower.

During preliminary discussions between HAC and Vale officials, and according to the investment prospectus that was issued by a U.S. investment bank, it was estimated that the modernization of the aluminum plant could cost USD 160 million equivalent, of which 65%-75% was expected to be in local currency. Conservative projections estimate a profitable operation immediately after the restructure of the facilities in 2021.

Investment Opportunity

In **August 2020**, Ms. Joan Casey, a board member of HAC, went to Brazil and was impressed by Brazil's economy. The Brazilian economy has been steadily growing due to the deregulation and liberalization of the economy that started in 1991. Ms. Casey recommended a review of the project, with the objective of (1) determining under which terms and conditions should HAC accept the Brazilian offer, and (2) whether an investment in the proposed project is viable, given the alternatives opportunities that are being considered by HAC.

Mr. Torben Fields, a senior vice president of HAC, was instructed to travel to Brazil and collect information, including:

- Country reports
- .Review of Brazil's energy sector
- .Analysis of the project, including investment and cash flow analysis for 2014-2021.

Mr. Fields agreed to make a presentation to the board with preliminary findings next month.

The Assignment

You work for Mr. Fields. During his flight to Sao Paulo, Mr. Fields faxed you the following list of issues that he plans to present to the Board of Directors:

1. Do a brief country report. Based on the country report and using the checklist method, determine the country risk.

2. Determine the project's risk by calculating the "beta" and/or standard deviation (of comparable firms if necessary) to access the systematic and unsystematic risk.

3. Determine the feasibility of the project, on the basis of the Projected Income Statement. (You can calculate the NPV. You will need to forecast the USD/BRL exchange rate according to PPP. You should use Vale's weighted average cost of capital as the discount rate.) Based on your calculations, you will advise HAC to invest USD 10 million in the modernization of Vale's power plant.

4. Propose a funding policy for HAC with the objective of minimizing funding cost and economic exposure.

5. Formulate a foreign currency hedging policy for HAC. (Be aware that HAC exposure consists of two parts: (i) the initial international bidding process requires a 5% deposit of the proposed investment, and (ii) in case HAC's bid is accepted it needs to make a substantial investment in BRR-denominated assets.)

6. Calculate the value of the option (use Black-Scholes formula) that is offered to HAC.

Class Assignment

Answer 3. Do not add back depreciation to your cash flows -i.e., assume depreciation matches changes in working capital and capital expenditures. Assume that the estimated **USD 160 million** investment is proportionately spent throughout the seven-year period. (Note that the investment is in USD, but the cash flows generated by the project are in BRL.) Use as the discount rate Vale's WACC. Assume the Brazilian tax rate for this project is 20%. (Hint: What is an appropriate discount rate for this project: a Brazilian discount rate or a U.S. discount rate?)

Answer 4. Hint: You should take into account currency risk considerations.

Data

• Projected Income Statement, **2021-2027**
(In BRL millions)

	2021	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Operating revenue	48.00	86.20	120.00	163.00	217.50	300.50	348.00
Operating expenses	4.75	6.45	8.60	19.75	21.00	49.00	66.60
Depreciation	1.25	2.75	5.00	11.50	20.00	35.00	50.00
Operating income	42.00	77.00	106.40	131.75	176.50	216.50	231.40
Interest cost	34.50	56.70	73.20	93.00	109.10	121.50	130.10
Interest income	1.00	1.20	1.40	1.85	2.00	2.40	2.80
Net interest cost	33.50	55.50	71.80	91.25	107.10	119.10	127.30
Net income	**8.50**	**21.50**	**34.60**	**40.50**	**69.40**	**97.40**	**104.10**

• Selected Economic and Financial Data

USD/BRL	0.1985						
CPI Index							
USA	196.0	201.4	208.3	216.0	223.6	231.7	240.1
Brazil	190.8	203.2	220.4	241.5	267.2	292.4	314.5

• Cost estimates (millions of USD)

Total	160
BRL	130
USD	30

• Financial (available) resources (millions of USD)

World Bank	40-60	(Debt in USD)
Government	40-50	(Debt and Equity in BRL)
Suppliers	40-50	(Debt in BRL)
Investors	10-15	(Equity in USD and BRL)

CASE 5 (LN XII): GE Capital.

GE Capital Services was the financial arm of General Electric, one of the world's largest companies, which before the 2008 Financial Crisis was keenly interested in the concept of international diversification. GE Capital operated in over 50 countries and it has more than 60,000 employees worldwide. During the 2008 Financial Crisis, GE Capital weighed heavy on General Electric's balance sheet. Three years later, it was one of GE's top performing units, like it used to be. Prior to the financial crisis, GE Capital used to earn more than 35% of GE's profits.

It is January 1994. GE Capital is considering a big push in Europe: they are planning to take over several businesses in the next ten years. The strategy is to revive run-down assets by reshaping them with the company's "non-bank bank" formula.

Christopher Mackenzie, president of GE Capital Europe, has ordered Kathleen Amichi, director of the Investment Department to analyze the convenience of holding a diversified bond portfolio.

GE's bond portfolio has been a purely U.S. bond portfolio. Ms. Amichi thinks that international bonds present a great diversification opportunity for GE. Managing a non-USD bond portfolio represents completely uncharted territory for GE. In the past two years the USD has been very volatile. Ms. Amichi knows that investing in non-USD bonds adds an additional risk to the traditional interest rate-risk of any portfolio: exchange rate risk. Ms. Amichi and her analysts have collected the international bond data presented in Table C4. She thinks that GE should start by investing in the safe market of international government bonds.

PART I

It is 1994. Ms. Amichi has asked her research assistants to answer the following questions:

1. The USD has been very volatile in the past 5 years. Is investing in non-USD bonds a good idea? (Draw an efficient portfolio frontier for the expanded GE bond portfolio, with non-USD bonds.)

2. Does the currency exposure need to be managed? (Draw two efficient portfolio frontiers for the expanded GE bond portfolio, with hedging and no-hedging exchange rate exposure.)

3. Is diversification in non-USD bonds a "bond market play" or rather a "currency play," or both?

4. From GE's overall perspective, is diversification advantageous?

Based on the answers to the above questions, Ms. Amichi has to determine the optimal allocation for non-USD and USD bonds. Hints: Calculate the efficient frontier for U.S. bonds plus the international bonds. Calculate the efficient frontier in USD and in local currency. Compare the unhedged (in USD) and the hedged (using forward rates) frontiers.

PART II

It is **2006**. Ms. Amichi convinced GE Capital to invest in international bonds. By now, you know that GE Capital has heavily invested in Europe: over the past six years GE Capital has taken over 34 European businesses. Moreover, GE Capital has recently been buying Eastern European banks.

1. You should evaluate ex-post the short-term and long-term risk-adjusted returns of the bond portfolio of GE Capital. (Calculate RVARs and RVOLs for your constructed optimal portfolio. Report the ex-ante and ex-post –i.e., **1994-2006**- results. Compare your results with an equally weighted portfolio. You should take into consideration hedging issues.)

2. Suppose GE is only using the Government bonds Ms. Amichi suggested. Should GE Capital expand its bond portfolio to incorporate Eastern European government bonds? What about Latin American government bonds? What about African and Chinese government bonds? (Draw different efficient frontiers, incorporating the different Emerging Market bonds.)

3. It is **2019**. Evaluate the ex-post performance of GE's bond portfolio with and without Emerging Market bonds.

Class Assignment

1. It is **2019**. You are a U.S. investor and you have available data for Long-term Government Bonds, downloadable from my homepage, datacase5.xls.You are considering investing in Australia, the U.S., the U.K., Germany, Italy, Japan, South Africa and in Brady Bonds from emerging markets. You are planning to invest 60% of your bond portfolio in foreign long-term government bonds. Using the techniques discussed in Chapter XVII, construct an optimal portfolio. (Assume a risk free rate of 3%.)

2. Should you hedge your currency exposure?

CASE 6 (LN XIII): LDC Debt and the Brady Bonds

From the comforts of his third floor office in mid-town Manhattan, Bill Rhodes, the Citibank vice-chairman and veteran debt negotiator, relaxes in his chair and remembers the time when he joined the bank as a fresh-faced recruit in the late 1950s. "There was this little guy with a green eye-shade sitting in the corner of the office," he says with a smile. "I asked what his job was. The answer? He was still sorting out sovereign bond issues which had defaulted a quarter-century earlier."

It seems an odd reflection from a man who has spent the 1990s busily converting defaulted sovereign bank loans into Brady bond debt. The last major wave of sovereign bond defaults took more than two decades to resolve. The next, some observers say, could still be worse still. Many of the popular Brady bonds have been specifically designed to make the consequences of default extremely messy. For example, most of the Brady bonds require unanimous approval from all creditors to change the terms of principal and interest payments.

The hapless Citibank official with green eye-shade may belong to another generation of bankers, but his problems are contemporary ones. Cross border capital flows to LDC are once again dominated by private finance. Much of this is in the form of bond debt. According to World Bank estimates, for example, in 1980 the total stock of all LDC bond issues outstanding stood at USD 19.12 billion. By 1993, this had grown nearly twelve-fold to USD 224.19 billion.

Brady Bonds

The USD 180 billion market in Brady bonds contains different kinds of bonds. These bonds were proposed in March 1989 by U.S. Treasury Secretary Brady to resolve the LDC debt problem and to restore the creditworthiness of restructuring countries. Secretary Brady urged a shift in emphasis toward permanent relief through market-based debt and debt service reduction for countries adopting strong economic reform programs. Instead of providing new money, banks would voluntarily reduce their claims on the debtor countries in return for credit enhancements on their remaining exposure, such as collateral accounts to guarantee the principal and/or interest in a bond exchange or cash payments in the context of buybacks.

Mexico, Costa Rica, and Venezuela were the first three countries to issue bonds as part of the Brady plan. All three issued a fixed-rate and a floating-rate bond for debt conversion. The Mexican and Venezuelan fixed and floating rate issues are referred to as the par and discount bond. The Mexican bonds have the largest amount outstanding, are the most liquid, and have the smallest bid/ask spread.

The Mexican par and discount bonds were issued in March 1990 with an initial maturity of 30 years. Bank debt could be exchanged for the par bond with principal equal to the original face value of the debt. The par bond pays a fixed coupon of 6.25% of principal. Creditors could also exchange debt for the discount bond at a rate of USD 65 of original face value per USD 100 of principal. The discount bond pays a coupon of LIBOR plus 13/16. The principal of both bonds is guaranteed by collateral in the form of thirty-year U.S. Treasury zero-coupon bonds. A rolling interest guarantee is provided by a pool of collateral sufficient to cover eighteen months of coupon payments -3 semester payments- at an assumed coupon rate of 10%. Should the borrower fail to make a coupon payment, the lender will receive the coupon from the collateral. Both bonds also include an oil price recapture clause that pays off if oil prices rise in 1997 and beyond.

The Venezuelan par and discount bonds were issued in December 1990 with an initial maturity of thirty years. The debt conversion terms were similar to those associated with the Mexican bonds, with a conversion of bank debt to discount bonds occurring at 70% of original face value and the par bond carrying a coupon rate of 6.75%. The principal guarantee, rolling fourteen months interest rate guarantee, and oil price recapture clause are also similar to those attached to the Mexican bonds.

The Costa Rican fixed and floating-rate Brady bonds are called the Principal Series A and Interest Series A bonds, respectively. The bonds come with no collateral guarantee but both have rolling interest guarantees. The Principal Series A bond was issued in May 1990 with an initial maturity of 20 years, pays a coupon 6.25% and has a rolling interest guarantee of eighteen months of interest. The Interest Series A bond was also issued in May 1900. The initial maturity was 15 years and the bond pays a coupon of LIBOR plus 13/16%. A rolling guarantee covers thirty-six months of interest.

The Mexican issues began trading at the end of March 1990 with prices around USD 40 for the par bond and USD 60 for the discount bond. Both prices showed a sharp increase in 1991. In 1991, the relative price of the par bond exhibited a simultaneous rise. Since then, the two prices have moved more or less in parallel. Trading in the Venezuelan issues began in December 1990, with the discount bond priced around USD 70 and the par bond priced around USD 50. The price of the Venezuelan issues have shown a similar behavior to the price of the Mexican issues.

In 2003, Mexico became the first country to retire its Brady debt. The Philippines bought back all of its Brady bonds in May 2007, joining Colombia, Brazil, Venezuela, and Mexico as countries that have retired the bonds.

The Assignment

1. It is **March 1990**. You work for Citibank. Bill Rhodes has personally asked you for advice: should Citibank buy the Mexican par or discount bonds? What would be your advice?

2. In **December 1990**, you are faced with the same question, but for Venezuela.

3. It is **May 1990**. What should be a fair opening price for the Costa Rican Principal Series A bonds?

4. It is **November 6, 1996**. Assume Citibank still holds Mexican Brady bonds. Should Citibank sell the Mexican bonds? Have they been useful diversification tools?

5. Mexico retired the Brady Bond debt in **2003**. The Mexican government has issued different international bonds. Among them is the UMS 3.50% Global Notes due 2034, denominated in USD, issued in **January 2022**. Can you provide a method and an estimate of country risk for Mexico using the UMS 3.50% Global Notes?

6. Assume Citibank holds **USD 600 million** of UMS 3.50% Global Notes. How can Citibank hedge its Mexican exposure?

7. Looking forward, do you think the probability of a Mexican default is substantial?

Class Assignment

1. It is **November 1996**. Describe how you would value the Mexican par bond.

2. Value the Mexican Brady par bond in **November 1996**. (Do not just get the value from the newspaper or the Internet! But you should get the YTMs from newspapers or the internet). Show your calculations.

3. Assume Citibank holds **USD 600 million** of UMS 3.50% Global Notes. How can Citibank hedge its Mexican exposure? (You can visit the CME or MexDer (Mexican Derivatives Exchange) website to check available instruments).

4. Ignoring liquidity and speculative trades, who buys Mexican USD bonds and who sells Mexican USD bonds?

Data

Summary Statistics of Mexican Brady Bonds - Historical Weekly Returns

	Mean	S.D.	ρ_{par}
Par	0.001486	0.02394	1.00
Discount	0.000545	0.02530	0.76
State Variable	0.001210	0.11895	0.71

November 6, 1996 Mexican Brady Bonds Prices (source: www.bradynet.com)

	Bid	Ask	Dura	US Rate DVBP
PAR	71.50	71.75	5.95	8.48
DISC	83.38	83.62	6.23	2.61

US Rate DBVP: The price rise (fall) of the bond for a 100 basis point shift downward in the U.S. yield curve.

Note: the state variable provides an estimate of country risk embedded in the bond -the higher the state value, the lower the risk of the bond.

More Data for all countries on the St. Louis Fed:

https://fred.stlouisfed.org/categories/32264

CASE 7 (LN XIV): SWAPS INC.

Note: Before reading the attached case, you should read Chapter XIV in your lecture notes.

This case will be distributed in class.

Class Assignment

Answer questions 1 and 4.

CASE 8 (LN XV): Maybank

Malayan Banking Berhad, better known as Maybank, is the biggest Malayan private bank. Maybank and its subsidiaries operate more than 400 branches, mostly in Malaysia and Southeast Asia. At the end of June 2003, Maybank had a 21% domestic market share in loans and a 30% domestic market share in deposits. Maybank's net profit was equal to MYR 2 billion for the financial year ended June 2003, over 20% higher than last year's MYR 1.66 billion. (S_t=3.80 MYR/USD).

It is November 2003. Maybank is considering a loan request from a large customer. This large customer wants to fix the interest rate on the loan, which would start in six months. To hedge this loan, Maybank is trying to lock in an interest rate for USD 200 million six-month LIBOR-based funding that begins in six months. Maybank can make a commitment only if it can lock in the cost of funds through the FRA market or an alternative hedging method.

Maybank seeks on November 11, 2003 to fund a USD 200 million six-month loan at LIBOR plus 37.5 basis points, which equals to 2 5/8 plus 3/8 of 1 percent. To hedge the bank could buy an FRA for six against twelve quoted at a bid/offer of 2.68 - 2.74. Alternative the bank could hedge its position in the Eurodollar futures market.

The Assignment

You work for Maybank. You have to advise the board of directors on the feasibility of the USD 200 million loan.

1.- Estimate the cost and benefit of interest rate hedging using FRA and Eurodollar futures (strip and stack hedges). Based on your analysis and based on the characteristic of both instruments, which interest hedging approach do you recommend?

2.- Suppose you want Maybank consider the use of a floor/cap instead. Examine the cost and benefit of this alternative. Simulate different scenarios.

3.- Could swaps be used to hedge the risk?

4.- Ex-post, which one was the best hedge?

Class Assignment

Answer question 1.

Data: Interbank USD interest rates: Eurodollar futures, FRAs and Eurodeposits.

	Euro-USD -3 mo.	FRA -3 mo.		FRA -6 mo		Eurodeposits	
1MO	2 1/4 - 2 3/8	1X4	2.35 - 2.41	1X7	2.52 - 2.58	1MO	2.41 - 2.44
2MO	2 11/32 - 2 14/32	2X5	2.45 - 2.52	2X8	2.55 - 2.61	2MO	2.44 - 2.47
3MO	2 3/8 - 2 1/2	3X6	2.46 - 2.53	3X9	2.57 - 2.63	3MO	2.48 - 2.51
4MO	2 13/32 - 2 17/32	4X7	2.52 - 2.60	4X10	2.62 - 2.68	6MO	2.52 - 2.56
5MO	2 7/16 - 2 9/16	5X8	2.53 - 2.61	5X11	2.65 - 2.71	9MO	2.55 - 2.60
6MO	2 7/16 - 2 9/16	6X9	2.58 - 2.64	6X12	2.68 - 2.74	12MO	2.60 - 2.63
9MO	2 15/32 - 2 19/32	9X12	2.71 - 2.77				
1YR	2 17/32 - 2 21/32						