2413080012-international_finance_dse

Question 1.

(a) Discuss the evolution of the International Monetary System. (9 Marks)

The International Monetary System has evolved through several key stages:

- **Gold Standard (Late 1800s - Early 1900s):** Under the gold standard, the value of a country's currency was directly linked to a specific amount of gold. This provided exchange rate stability and predictability, but it limited governments' ability to conduct independent monetary policy and could lead to deflationary pressures if gold supplies didn't keep pace with economic growth.
- **Bretton Woods System (1944-1971):** Established after World War II, this system aimed to create a more stable global financial environment. It pegged the U.S. dollar to gold ($35 per ounce), and other major currencies were pegged to the U.S. dollar. This system fostered post-war economic recovery and trade, but it faced challenges due to the growing imbalance between U.S. gold reserves and dollar liabilities, ultimately leading to its collapse in 1971.
- **Flexible Exchange Rate System (Post-1971):** After the collapse of Bretton Woods, most major currencies adopted a floating exchange rate system, where their values are determined by market forces of supply and demand. This system offers greater monetary policy independence and helps absorb external shocks, but it can lead to increased exchange rate volatility, posing challenges for international trade and investment.
- **Managed Float and Regional Blocs:** In practice, many countries operate under a "managed float," where central banks occasionally intervene to influence their currency's value without maintaining a strict peg. Additionally, the emergence of regional currency blocs (like the Eurozone) represents another facet of the evolving international monetary landscape, aiming for greater stability and integration within specific regions.

(b) What are the risks involved in International Business? Discuss in detail. (9 Marks)

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International business involves several unique risks compared to domestic operations:

- **Political Risk:** This refers to the potential for government actions or political instability in a host country to negatively impact business operations and profitability. Examples include expropriation of assets, changes in laws and regulations, civil unrest, terrorism, and corruption.
- **Economic Risk:** These risks stem from economic conditions and policies in foreign markets. Key economic risks include:
    - **Exchange Rate Risk:** Fluctuations in currency exchange rates can impact the value of a company's foreign-denominated assets, liabilities, revenues, and costs.
    - **Interest Rate Risk:** Changes in interest rates in foreign markets can affect the cost of borrowing and the profitability of investments.
    - **Inflation Risk:** High or volatile inflation in a foreign country can erode the purchasing power of earnings and increase operating costs.
    - **Recession/Economic Downturn:** A decline in economic activity in a foreign market can reduce demand for products and services.
- **Cultural Risk:** Differences in cultural norms, values, languages, and business practices can lead to misunderstandings, miscommunications, and difficulties in adapting marketing strategies or managing local employees.
- **Legal and Regulatory Risk:** Variations in legal systems, regulations, and enforcement across countries can create complexities related to contracts, intellectual property, labor laws, environmental standards, and taxation.
- **Operational Risk:** These risks relate to the challenges of managing complex international supply chains, logistics, distribution networks, and adapting production processes to local conditions.
- **Competition Risk:** International markets often involve a wider array of competitors, including well-established local firms and other multinational corporations, requiring robust competitive strategies.

OR

(a) Discuss the main objectives of the Bretton Woods System. (9 Marks)

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The Bretton Woods System, established in 1944, had several key objectives aimed at preventing a recurrence of the economic instability and protectionism that characterized the interwar period:

- **Exchange Rate Stability:** A primary goal was to create a system of stable exchange rates to facilitate international trade and investment. This was achieved by pegging the U.S. dollar to gold and other currencies to the U.S. dollar.
- **Promote International Trade and Economic Growth:** By reducing exchange rate uncertainty and discouraging competitive devaluations, the system aimed to foster an open and multilateral trading system, thereby promoting global economic recovery and growth.
- **Avoid Competitive Devaluations:** In the 1930s, countries frequently devalued their currencies to gain a trade advantage, leading to a "beggar-thy-neighbor" policy that harmed global trade. Bretton Woods sought to prevent this by requiring countries to get IMF approval for significant exchange rate changes.
- **Facilitate Post-War Reconstruction:** The system aimed to provide a framework for financial cooperation and assistance to help war-torn economies rebuild and integrate into the global economy.
- **Establish International Institutions:** It led to the creation of the International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (IBRD, now part of the World Bank). The IMF's role was to oversee the exchange rate system and provide short-term financial assistance, while the World Bank was to provide long-term development financing.
- **Eliminate Exchange Controls and Promote Convertibility:** The system encouraged member countries to gradually eliminate restrictions on current account transactions, making their currencies freely convertible for trade purposes.

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(b) To what extent has globalization led to a "more secure and prosperous world"? Comment. (9 Marks)

Globalization has had a complex and multifaceted impact on global security and prosperity. While it has undoubtedly contributed to prosperity in many ways, its impact on security is more debatable and often comes with caveats.

Arguments for a More Prosperous World due to Globalization:

- **Increased Trade and Economic Growth:** Globalization has led to increased international trade, which allows countries to specialize in what they produce most efficiently, leading to higher overall output, economic growth, and lower prices for consumers.
- **Poverty Reduction:** Many developing countries have experienced significant economic growth and poverty reduction by integrating into the global economy, attracting foreign direct investment, and participating in global supply chains.
- **Technological Diffusion:** Globalization facilitates the rapid spread of technology, knowledge, and innovation across borders, boosting productivity and living standards worldwide.
- **Greater Access to Goods and Services:** Consumers worldwide have access to a wider variety of goods and services at competitive prices due to global production and trade.
- **Increased Capital Flows:** Facilitates cross-border investment, enabling companies to access new markets and capital, and supporting development in recipient countries.

Arguments for a More Secure World (to some extent) due to Globalization:

- **Interdependence and Reduced Conflict:** The economic interdependence created by globalization can make armed conflict less appealing, as it would disrupt valuable trade relationships and supply chains, leading to significant economic costs for all parties involved.
- **Promotion of Democratic Values:** Some argue that globalization can indirectly promote democratic values and human rights as countries become more interconnected and exposed to international norms.
- **International Cooperation:** Global challenges like climate change, pandemics, and terrorism necessitate international cooperation, which globalization fosters through various international organizations and forums.

Counterarguments and Challenges to Security and Prosperity:

- **Increased Inequality:** While some have prospered, globalization has also contributed to income inequality within and between countries, leading to social unrest and political instability in some regions.

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- **Job Displacement:** In developed countries, globalization can lead to job losses in certain sectors due to outsourcing and increased competition from lower-wage economies.
- **Financial Crises Contagion:** Interconnected financial markets mean that financial crises can spread rapidly across borders, as seen in the 1997 Asian Financial Crisis or the 2008 Global Financial Crisis, potentially undermining global economic security.
- **Environmental Degradation:** Increased industrialization and consumption driven by globalization can exacerbate environmental problems like pollution and climate change.
- **Loss of National Sovereignty:** Some argue that globalization can erode national sovereignty as international agreements and institutions gain influence over domestic policy.
- **Increased Transnational Crime and Terrorism:** While fostering legitimate trade, globalization also provides avenues for illicit trade, drug trafficking, and the spread of terrorism, posing new security threats.
- **Vulnerability to Supply Chain Disruptions:** Over-reliance on global supply chains can make countries vulnerable to disruptions from natural disasters, political conflicts, or pandemics.

In conclusion, globalization has been a powerful engine for economic prosperity, particularly in terms of trade, growth, and poverty reduction in many parts of the world. However, it has also brought challenges related to inequality, financial instability, and new forms of security threats. The extent to which it has created a "more secure and prosperous world" is therefore a nuanced picture, requiring careful management and policy responses to mitigate its negative consequences and maximize its benefits.

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Question 2.

(a) The following quotes are available for USD vs GBP:

Spot	One-Month	Three-Month	Six-Month
1.9072/77	32/30	57/54	145/138

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Calculate Outright quotes for 1 month, 3 month and 6 month forward. Also calculate the spread. (8 Marks)

The quotes are given as USD/GBP, where the first number (1.9072) is the bid rate (rate at which the dealer buys GBP or sells USD) and the second number (1.9077) is the ask rate (rate at which the dealer sells GBP or buys USD). The points for forward rates are given in the format Bid/Ask.

Understanding Forward Points:

- If Bid points > Ask points, it's a discount. Subtract points from spot.
- If Bid points < Ask points, it's a premium. Add points to spot.

Let's break down the calculations:

Spot Rate:

- Bid: 1.9072 USD/GBP
- Ask: 1.9077 USD/GBP
- Spread: 1.9077 - 1.9072 = 0.0005 USD

1-Month Forward:

- Points: 32/30 (Bid: 32, Ask: 30)
  - Since Bid points (32) > Ask points (30), this indicates a **discount**.
- 1-Month Forward Bid: Spot Bid - 0.0032 = 1.9072 - 0.0032 = 1.9040 USD/GBP
- 1-Month Forward Ask: Spot Ask - 0.0030 = 1.9077 - 0.0030 = 1.9047 USD/GBP
- **Outright Quote (1-Month): 1.9040/47 USD/GBP**
- Spread (1-Month): 1.9047 - 1.9040 = 0.0007 USD

3-Month Forward:

- Points: 57/54 (Bid: 57, Ask: 54)
  - Since Bid points (57) > Ask points (54), this indicates a **discount**.
- 3-Month Forward Bid: Spot Bid - 0.0057 = 1.9072 - 0.0057 = 1.9015 USD/GBP
- 3-Month Forward Ask: Spot Ask - 0.0054 = 1.9077 - 0.0054 = 1.9023 USD/GBP
- **Outright Quote (3-Month): 1.9015/23 USD/GBP**
- Spread (3-Month): 1.9023 - 1.9015 = 0.0008 USD

6-Month Forward:

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- Points: 145/138 (Bid: 145, Ask: 138)
    - Since Bid points (145) > Ask points (138), this indicates a **discount**.
- 6-Month Forward Bid: Spot Bid - 0.0145 = 1.9072 - 0.0145 = 1.8927 USD/GBP
- 6-Month Forward Ask: Spot Ask - 0.0138 = 1.9077 - 0.0138 = 1.8939 USD/GBP
- **Outright Quote (6-Month): 1.8927/39 USD/GBP**
- Spread (6-Month): 1.8939 - 1.8927 = 0.0012 USD

Summary of Outright Quotes and Spreads:

Period	Outright Quote (USD/GBP)	Spread (USD)
Spot	1.9072/77	0.0005
1-Month	1.9040/47	0.0007
3-Month	1.9015/23	0.0008
6-Month	1.8927/39	0.0012

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(b) What is meant by a currency trading at a discount or at a premium in the forward market? (5 Marks)

In the forward market:

- **Currency Trading at a Discount:** A currency is said to be trading at a **discount** in the forward market when its forward exchange rate is *lower* than its spot exchange rate. This implies that market participants expect the currency to depreciate against the other currency over the forward period. From the perspective of the *base currency* (the currency whose price is expressed in terms of the quoted currency), if the forward rate is lower, it means you get less of the quoted currency for one unit of the base currency in the future.
    - *Example:* If the spot USD/GBP is 1.2500 and the 3-month forward USD/GBP is 1.2450, then GBP is trading at a discount against USD because you get fewer USD for 1 GBP in the future. Equivalently, USD is at a premium against GBP.
- **Currency Trading at a Premium:** A currency is said to be trading at a **premium** in the forward market when its forward exchange rate is *higher* than its spot exchange rate. This implies that market participants expect the currency to appreciate against the other

currency over the forward period. From the perspective of the *base currency*, if the forward rate is higher, it means you get more of the quoted currency for one unit of the base currency in the future.

- *Example:* If the spot USD/EUR is 1.1000 and the 3-month forward USD/EUR is 1.1050, then EUR is trading at a premium against USD because you get more USD for 1 EUR in the future. Equivalently, USD is at a discount against EUR.

The existence of a premium or discount is often explained by interest rate differentials between the two currencies, as per the Interest Rate Parity (IRP) theory. A currency with a lower interest rate typically trades at a forward premium, while a currency with a higher interest rate trades at a forward discount.

(c) Suppose exchange rate between INR and USD is 46.25. Three months forward rate is 45.85. Calculate annualized premium/discount of rupee versus dollar. (5 Marks)

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Given:

- Spot Rate (INR/USD) = 46.25
- 3-Month Forward Rate (INR/USD) = 45.85

Since the forward rate (45.85) is *lower* than the spot rate (46.25), the Rupee (INR) is trading at a **premium** against the Dollar (USD), or equivalently, the Dollar (USD) is trading at a **discount** against the Rupee (INR). The question asks for the premium/discount of *Rupee versus Dollar*.

If the forward rate (INR/USD) is lower than the spot rate (INR/USD), it means you get fewer INR for 1 USD in the future. This implies that USD has depreciated against INR, or INR has appreciated against USD. Therefore, INR is at a premium.

Formula for Annualized Premium/Discount:
Annualized Premium/Discount=Spot RateForward Rate−Spot Rate ×Number of Months12×100%

Substituting the values:
Annualized Premium/Discount of INR vs. USD=46.2545.85−46.25×312 ×100% =46.25−0.40×4×100% =−0.0086486×4×100% =−0.0345944×100% =−3.45944%

Since the result is negative, it indicates a premium for INR versus USD. (If the question was asking for USD versus INR, it would be a discount).

Answer: The annualized premium of Rupee versus Dollar is approximately **3.46%**.

OR

(a) Complete the following exchange rate matrix assuming that there is no transaction cost. (8 Marks)

Given Rates:

- USD/USD = 1
- USD/GBP = 1.8 (meaning 1 USD = 1/1.8 GBP, or 1 GBP = 1.8 USD)
- USD/CHF = 0.5 (meaning 1 USD = 1/0.5 CHF = 2 CHF, or 1 CHF = 0.5 USD)
- USD/DEM = 0.4 (meaning 1 USD = 1/0.4 DEM = 2.5 DEM, or 1 DEM = 0.4 USD)
- USD/JPY = 0.004 (meaning 1 USD = 1/0.004 JPY = 250 JPY, or 1 JPY = 0.004 USD)

Let's fill the matrix. The format is Currency A / Currency B meaning how many units of Currency B you get for 1 unit of Currency A.

	USD	**GBP**	**CHF**	**DEM**	**JPY**
USD	1	1.8/GBP	0.5/CHF	0.4/DEM	0.004/JPY
GBP		1			
CHF			1		
DEM				1	
JPY					1

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We need to complete the rates.

- **USD row is given.**
- **Diagonal is 1** (e.g., GBP/GBP = 1).

Now calculate other rates:

GBP Rates:

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- **GBP/USD:** If 1 USD = 1.8 GBP (USD/GBP = 1.8), then 1 GBP = 1/1.8 USD.
    - 1/1.8 ≈ 0.5556 USD
- **GBP/CHF:** If 1 GBP = 1.8 USD, and 1 USD = 2 CHF, then 1 GBP = 1.8 * 2 CHF = 3.6 CHF
- **GBP/DEM:** If 1 GBP = 1.8 USD, and 1 USD = 2.5 DEM, then 1 GBP = 1.8 * 2.5 DEM = 4.5 DEM
- **GBP/JPY:** If 1 GBP = 1.8 USD, and 1 USD = 250 JPY, then 1 GBP = 1.8 * 250 JPY = 450 JPY

CHF Rates:

- **CHF/USD:** If 1 USD = 0.5 CHF (USD/CHF = 0.5), then 1 CHF = 1/0.5 USD = 2 USD
- **CHF/GBP:** If 1 CHF = 2 USD, and 1 USD = 1.8 GBP, then 1 CHF = 2 * 1.8 GBP = 3.6 GBP
- **CHF/DEM:** If 1 CHF = 2 USD, and 1 USD = 2.5 DEM, then 1 CHF = 2 * 2.5 DEM = 5 DEM
- **CHF/JPY:** If 1 CHF = 2 USD, and 1 USD = 250 JPY, then 1 CHF = 2 * 250 JPY = 500 JPY

DEM Rates:

- **DEM/USD:** If 1 USD = 0.4 DEM (USD/DEM = 0.4), then 1 DEM = 1/0.4 USD = 2.5 USD
- **DEM/GBP:** If 1 DEM = 2.5 USD, and 1 USD = 1.8 GBP, then 1 DEM = 2.5 * 1.8 GBP = 4.5 GBP
- **DEM/CHF:** If 1 DEM = 2.5 USD, and 1 USD = 2 CHF, then 1 DEM = 2.5 * 2 CHF = 5 CHF
- **DEM/JPY:** If 1 DEM = 2.5 USD, and 1 USD = 250 JPY, then 1 DEM = 2.5 * 250 JPY = 625 JPY

JPY Rates:

- **JPY/USD:** If 1 USD = 0.004 JPY (USD/JPY = 0.004), then 1 JPY = 1/0.004 USD = 250 USD (This is incorrect, it should be 1 JPY = 0.004 USD). Let's re-read the USD/JPY: "004/JPY" seems to imply 1 JPY = 0.004 USD. Let's stick to that interpretation: JPY is the base currency. So 1 JPY = 0.004 USD.
    - If the table is "USD (column) / JPY (row)", it means how many USD per 1 JPY. So USD/JPY given as 0.004 means 1 USD = 1/0.004 JPY = 250 JPY.
    - Let's assume the given USD row lists Foreign Currency / USD or USD per Foreign Currency.

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- USD/GBP means how many GBP for 1 USD. So 1 USD = 1.8 GBP. Incorrect, typically it's how many foreign currency units for 1 domestic unit.
- Let's re-interpret the given table structure.
- The first row is "USD", "GBP", "CHF", "DEM", "JPY". The first column is also "USD", "GBP", "CHF", "DEM", "JPY".
- The cell "USD 1" means USD/USD = 1.
- "1.8/GBP" is in the USD row, GBP column. This means 1 USD = 1.8 GBP. This is unusual as the standard quote for USD/GBP would be the number of USD per GBP (e.g., 1.25 USD/GBP).
- Let's assume the table is Base Currency (Row) / Quoted Currency (Column). So Row Currency per Column Currency.
- If it's USD row, GBP column, "1.8/GBP" is hard to interpret. If it's a direct quote from USD perspective, it would be USD/GBP, i.e., how many USD per GBP. But the numbers are small for GBP and CHF.
- Let's assume the format is Number of units of Column Currency per 1 unit of Row Currency.
- USD/GBP = 1.8 means 1 USD = 1.8 GBP.
- USD/CHF = 0.5 means 1 USD = 0.5 CHF.
- USD/DEM = 0.4 means 1 USD = 0.4 DEM.
- USD/JPY = 0.004 means 1 USD = 0.004 JPY.
- This interpretation means JPY is extremely strong (1 USD is worth only 0.004 JPY, so 1 JPY = 250 USD). This is highly unlikely given real world rates.

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Let's re-interpret the given rates as Number of units of Row Currency per 1 unit of Column Currency (this is the most common way exchange rate tables are presented, e.g., GBP in USD column means GBP/USD).

- USD/GBP (Row USD, Col GBP) = 1.8. This means 1 GBP = 1.8 USD. (This is a more typical quote format for USD/GBP)
- USD/CHF (Row USD, Col CHF) = 0.5. This means 1 CHF = 0.5 USD. (This is a typical quote format for CHF/USD)
- USD/DEM (Row USD, Col DEM) = 0.4. This means 1 DEM = 0.4 USD. (This is a typical quote format for DEM/USD)
- USD/JPY (Row USD, Col JPY) = 0.004. This means 1 JPY = 0.004 USD. (This is a typical quote format for JPY/USD)

Let's proceed with this interpretation:

- **1 GBP = 1.8 USD**
- **1 CHF = 0.5 USD**
- **1 DEM = 0.4 USD**
- **1 JPY = 0.004 USD**

Now let's fill the matrix (Row Currency per 1 unit of Column Currency):

| | USD | GBP | CHF | DEM | JPY | |-------|---------|-------------|----------|-------------|---------------| | **USD** | 1 | **1.8** | **0.5** | **0.4** | **0.004** | | **GBP** | 1/1.8 | 1 | (1/1.8)*0.5 | (1/1.8)*0.4 | (1/1.8)*0.004 | | **CHF** | 1/0.5 | (1/0.5)*1.8 | 1 | (1/0.5)*0.4 | (1/0.5)*0.004 | | **DEM** | 1/0.4 | (1/0.4)*1.8 | (1/0.4)*0.5 | 1 | (1/0.4)*0.004 | | **JPY** | 1/0.004 | (1/0.004)*1.8 | (1/0.004)*0.5 | (1/0.004)*0.4 | 1 |

Calculations:

- **GBP/USD** = 1/1.8 ≈ 0.5556
- **CHF/USD** = 1/0.5 = 2
- **DEM/USD** = 1/0.4 = 2.5
- **JPY/USD** = 1/0.004 = 250
- **GBP/CHF**: 1 GBP = 1.8 USD. 1 USD = 1/0.5 CHF = 2 CHF. So 1 GBP = 1.8 * 2 CHF = 3.6 CHF.
- **GBP/DEM**: 1 GBP = 1.8 USD. 1 USD = 1/0.4 DEM = 2.5 DEM. So 1 GBP = 1.8 * 2.5 DEM = 4.5 DEM.
- **GBP/JPY**: 1 GBP = 1.8 USD. 1 USD = 1/0.004 JPY = 250 JPY. So 1 GBP = 1.8 * 250 JPY = 450 JPY.
- **CHF/GBP**: 1 CHF = 0.5 USD. 1 USD = 1/1.8 GBP. So 1 CHF = 0.5 * (1/1.8) GBP = 0.5 / 1.8 ≈ 0.2778 GBP.
- **CHF/DEM**: 1 CHF = 0.5 USD. 1 USD = 2.5 DEM. So 1 CHF = 0.5 * 2.5 DEM = 1.25 DEM.
- **CHF/JPY**: 1 CHF = 0.5 USD. 1 USD = 250 JPY. So 1 CHF = 0.5 * 250 JPY = 125 JPY.
- **DEM/GBP**: 1 DEM = 0.4 USD. 1 USD = 1/1.8 GBP. So 1 DEM = 0.4 * (1/1.8) GBP = 0.4 / 1.8 ≈ 0.2222 GBP.
- **DEM/CHF**: 1 DEM = 0.4 USD. 1 USD = 2 CHF. So 1 DEM = 0.4 * 2 CHF = 0.8 CHF.
- **DEM/JPY**: 1 DEM = 0.4 USD. 1 USD = 250 JPY. So 1 DEM = 0.4 * 250 JPY = 100 JPY.
- **JPY/GBP**: 1 JPY = 0.004 USD. 1 USD = 1/1.8 GBP. So 1 JPY = 0.004 * (1/1.8) GBP = 0.004 / 1.8 ≈ 0.002222 GBP.
- **JPY/CHF**: 1 JPY = 0.004 USD. 1 USD = 2 CHF. So 1 JPY = 0.004 * 2 CHF = 0.008 CHF.

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- **JPY/DEM**: 1 JPY = 0.004 USD. 1 USD = 2.5 DEM. So 1 JPY = 0.004 * 2.5 DEM = 0.01 DEM.

Completed Exchange Rate Matrix:

| | USD | GBP | CHF | DEM | JPY | |---|---|---|---|---|---| | **USD** | 1 | 1.8 | 0.5 | 0.4 | 0.004 | | **GBP** | 0.5556 | 1 | 3.6 | 4.5 | 450 | | **CHF** | 2 | 0.2778 | 1 | 1.25 | 125 | | **DEM** | 2.5 | 0.2222 | 0.8 | 1 | 100 | | **JPY** | 0.004 | 0.002222 | 0.008 | 0.01 | 1 |

Note: The USD/JPY (0.004) given in the question implies 1 JPY = 0.004 USD. So in the USD row, JPY column, it's 0.004 USD per JPY. And in the JPY row, USD column, it's 1/0.004 = 250 JPY per USD. My interpretation for the table (Row Currency per Column Currency) seems consistent now.

(b) Distinguish between direct and indirect quote. (5 Marks)

- **Direct Quote:** A direct quote expresses the price of one unit of a foreign currency in terms of the domestic currency. In other words, it tells you how much of your home currency you need to buy one unit of the foreign currency.
  - *Example (from an Indian perspective):* INR 83.50/USD. This means you need 83.50 Indian Rupees to buy 1 US Dollar.
  - *Example (from a US perspective):* USD 1.20/EUR. This means you need 1.20 US Dollars to buy 1 Euro.
- **Indirect Quote:** An indirect quote expresses the price of one unit of the domestic currency in terms of the foreign currency. It tells you how much foreign currency you get for one unit of your home currency.
  - *Example (from an Indian perspective):* USD 0.012/INR. This means you get 0.012 US Dollars for 1 Indian Rupee.
  - *Example (from a US perspective):* EUR 0.83/USD. This means you get 0.83 Euros for 1 US Dollar.

Key Difference and Perspective: The distinction between direct and indirect quotes depends on the perspective of the domestic currency.

- **Direct:** Foreign currency is the base currency (1 unit of foreign currency = X units of domestic currency).
- **Indirect:** Domestic currency is the base currency (1 unit of domestic currency = Y units of foreign currency).

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It's important to note that a direct quote for one country is an indirect quote for the other country involved in the exchange. For instance, INR 83.50/USD is a direct quote for India but an indirect quote for the US.

(c) If annualized premium on USD is 7% and spot rate is 44.35 INR. Calculate the forward rate for 3 months. (5 Marks)

Given:

- Annualized Premium on USD = 7%
- Spot Rate (INR/USD) = 44.35
- Period = 3 months

The annualized premium on USD means that USD is expected to be more expensive in the future, relative to INR. This implies that USD is at a premium against INR.

Formula for Annualized Premium/Discount:
Annualized Premium/Discount=Spot RateForward Rate−Spot Rate ×Number of Months12×100%

We need to find the Forward Rate (FR). 7%=44.35FR−44.35×312×100% 0.07=44.35FR−44.35×4 40.07=44.35FR−44.35 0.0175=44.35FR−44.35 0.0175×44.35=FR−44.35 0.776125=FR−44.35 FR=44.35+0.776125 FR=45.126125

Answer: The forward rate for 3 months is approximately **INR 45.1261/USD**.

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Question 3.

(a) International Fisher Effect combines the Interest Rate Parity and Purchasing Power Parity Principle. Explain. (9 Marks)

The statement "International Fisher Effect combines the Interest Rate Parity and Purchasing Power Parity Principle" is not entirely accurate in its common formulation. The **International Fisher Effect (IFE)** is often seen as a *direct extension* of the Fisher Effect (which relates nominal and real interest rates and expected inflation) to an international context, implying a relationship between interest rate differentials and *expected changes in the spot exchange rate*. It *does not explicitly combine*

Interest Rate Parity (IRP) and Purchasing Power Parity (PPP) in a formal derivation.

However, there is an interconnectedness and theoretical consistency among these three theories:

1. **Fisher Effect (Domestic):** States that the nominal interest rate (i) in a country is approximately equal to the real interest rate (r) plus the expected inflation rate (πe). (1+i)=(1+r)(1+πe) or i≈r+πe
2. **International Fisher Effect (IFE):** Extends the Fisher Effect to two countries. It postulates that the difference in nominal interest rates between two countries is approximately equal to the expected change in their exchange rates. Specifically, the currency of the country with a higher nominal interest rate is expected to depreciate against the currency of the country with a lower nominal interest rate. S0S1=1+idomestic1+iforeign Where:
    - S0 = Spot exchange rate (domestic/foreign)
    - S1 = Expected future spot exchange rate (domestic/foreign)
    - iforeign = Foreign nominal interest rate
    - idomestic = Domestic nominal interest rate

    The intuition is that if real interest rates are assumed to be equal across countries (due to perfect capital mobility), then the difference in nominal interest rates must reflect the difference in expected inflation rates. According to PPP, higher inflation leads to currency depreciation. Thus, the IFE predicts that the currency of the country with a higher interest rate (and thus higher expected inflation) will depreciate.

3. **Purchasing Power Parity (PPP):** States that exchange rates adjust to equalize the price of a basket of goods and services in different countries.
    - **Absolute PPP:** S=Pdomestic/Pforeign (Spot rate = Price in domestic / Price in foreign)
    - **Relative PPP:** Predicts that the percentage change in the exchange rate between two currencies is approximately equal to the difference in their inflation rates. S0S1−S0 ≈πdomestic−πforeign
4. **Interest Rate Parity (IRP):** States that the difference between the spot and forward exchange rates equals the interest rate differential between two countries. It is a no-arbitrage condition, meaning that the returns from investing in two different currencies

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should be equal when covered by a forward contract. SF =1+iforeign1+idomestic Where:
    - F = Forward exchange rate (domestic/foreign)
    - S = Spot exchange rate (domestic/foreign)

The Interconnectedness (How they *could* be seen as "combined" indirectly):

While IFE doesn't formally derive from IRP and PPP, there is a theoretical chain of relationships that links them if certain assumptions hold (e.g., efficient markets, no transaction costs, capital mobility, and equal real interest rates).

- If **Relative PPP** holds: Expected change in spot rate ≈ Inflation differential.
- If the **Fisher Effect** holds internationally (i.e., real interest rates are equal across countries): Nominal interest rate differential ≈ Expected inflation differential.
- Combining these two: If (Inflation differential = Expected change in spot rate) and (Nominal interest rate differential = Expected inflation differential), then it logically follows that (Nominal interest rate differential = Expected change in spot rate), which is the **IFE**.
- Furthermore, if **IRP** holds (F/S=(1+idomestic)/(1+iforeign)) and **Uncovered Interest Rate Parity (UIRP)** holds (which posits that the forward rate is an unbiased predictor of the future spot rate, i.e., F≈S1), then this would lead to IFE.
    - S1/S0≈(1+idomestic)/(1+iforeign) (from UIRP and IRP)
    - If UIRP is combined with IRP, it implies that S1/S0≈F/S. This connection means that if IRP holds, and the forward rate is a good predictor of the future spot rate, then the interest rate differential can be used to predict future spot rate changes, which is essentially the IFE.

In essence, IFE relies on the idea that expected differences in inflation rates (as explained by PPP) drive interest rate differentials (as per the Fisher Effect) which, in turn, explain expected changes in exchange rates. While not a direct mathematical combination, these theories form a coherent framework in efficient financial markets.

(b) Given the following information:

- Spot Rate: Can$ 0.665/DM
- 3 Mth Forward Rate: Can$ 0.670/DM
- Interest Rate in DM: 7% p.a.

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- Interest Rate in Can: 9% p.a. **Is there any arbitrage opportunity? Calculate the gain, if any. (9 Marks)** This question involves **Covered Interest Arbitrage (CIA)**. We need to compare the actual forward rate with the implied forward rate derived from Interest Rate Parity (IRP). **Step 1: Determine the quoted currency and base currency.** The exchange rate is Can/DM. So, DM is the base currency, and Can$ is the quoted currency. This means the rates tell us how many Canadian Dollars (Can$) for 1 Deutsche Mark (DM).

Step 2: Calculate the implied forward rate using Interest Rate Parity (IRP). The IRP formula is: Forward Rate=Spot Rate×1+ibase currency ×(Days/360)1+iquoted currency×(Days/360) Or, if the exchange rate is Base/Quoted (DM/Can$), then:
Forward Rate (Can$/DM)=Spot Rate (Can$/DM)×1+iDM×(3/12)1+iCan$ ×(3/12)

Given:

- Spot Rate (Can$/DM) = 0.665
- Can$ Interest Rate (iCan$) = 9% p.a. = 0.09 p.a.
- DM Interest Rate (iDM) = 7% p.a. = 0.07 p.a.
- Period = 3 months (3/12 = 0.25 years)

Implied Forward Rate: Implied FR=0.665×1+0.07×0.251+0.09×0.25 Implied FR=0.665×1+0.01751+0.0225 Implied FR=0.665×1.01751.0225 Implied FR=0.665×1.0049139 Implied FR≈0.668266 Can$/DM

Step 3: Compare the implied forward rate with the actual forward rate.

- Actual 3 Mth Forward Rate = 0.670 Can$/DM
- Implied 3 Mth Forward Rate ≈ 0.668266 Can$/DM

Since the Actual Forward Rate (0.670) is *higher* than the Implied Forward Rate (0.668266), there is an arbitrage opportunity.

Step 4: Design the arbitrage strategy. The strategy involves borrowing the currency with the lower interest rate (adjusted for exchange rates) and investing in the currency with the higher interest rate, while locking in the forward exchange rate.

Since the Actual Forward Rate is higher than the IRP rate, it means the market is offering a more favorable rate to sell DM forward (i.e., convert

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DM back to Can$) than what IRP suggests. This indicates we should invest in the currency whose interest rate is relatively lower compared to its appreciation or convert to the currency that can be bought cheaper in spot and sold dearer in forward.

Let's start with borrowing Can$ (higher interest rate) and converting to DM (lower interest rate), investing in DM, and then converting back to Can$ at the actual forward rate.

Assume you borrow Can$1,000,000 for 3 months.

1. **Borrow Can$:** Borrow Can$1,000,000 at 9% p.a. for 3 months.
    - Interest payable = Can$1,000,000 * 0.09 * (3/12) = Can$22,500
    - Total repayment = Can$1,000,000 + Can$22,500 = Can$1,022,500
2. **Convert Can$ to DM at Spot:**
    - Can$1,000,000 / 0.665 Can$/DM = 1,503,759.398 DM
3. **Invest DM:** Invest DM 1,503,759.398 at 7% p.a. for 3 months.
    - Interest earned = 1,503,759.398 DM * 0.07 * (3/12) = 26,315.789 DM
    - Total DM received = 1,503,759.398 + 26,315.789 = 1,530,075.187 DM
4. **Sell DM Forward to Can$:** Enter a 3-month forward contract to sell the accumulated DM and buy Can$ at the actual forward rate of 0.670 Can$/DM.
    - Can$ received = 1,530,075.187 DM * 0.670 Can$/DM = 1,025,150.375 Can$

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Step 5: Calculate the Arbitrage Gain.

- Can$ received at maturity = Can$1,025,150.375
- Can$ repayment = Can$1,022,500
- **Arbitrage Gain = 1,025,150.375 - 1,022,500 = Can$2,650.375**

Yes, there is an arbitrage opportunity, and the gain is approximately Can$2,650.38.

OR

(a) What is exchange rate? Discuss the various factors affecting exchange rate. (9 Marks)

What is an Exchange Rate? An exchange rate is the price of one country's currency in terms of another country's currency. It specifies how much one currency is worth in relation to another. For example, if the exchange rate between the US Dollar and the Euro is 1.10 USD/EUR, it means that 1 Euro can be exchanged for 1.10 US Dollars. Exchange rates are crucial for international trade, investment, and tourism, as they determine the cost of goods, services, and assets across borders.

Various Factors Affecting Exchange Rate:

Exchange rates are determined by the forces of supply and demand in the foreign exchange market. Numerous factors influence these supply and demand dynamics:

1. **Interest Rate Differentials:**
    - A higher real interest rate in a country, relative to other countries, tends to attract foreign capital, as investors seek higher returns. This increases demand for the domestic currency, leading to its appreciation. Conversely, lower interest rates tend to cause depreciation. This is explained by the **Interest Rate Parity (IRP)** and **International Fisher Effect (IFE)** theories.
2. **Inflation Rate Differentials:**
    - Countries with persistently lower inflation rates tend to see their currency's value appreciate, as their goods and services become relatively cheaper internationally. Conversely, higher inflation erodes purchasing power, leading to currency depreciation. This is the core idea of **Purchasing Power Parity (PPP)**.
3. **Economic Performance and Outlook (GDP Growth, Employment, etc.):**
    - A strong and growing economy tends to attract foreign investment, increasing demand for the domestic currency and leading to appreciation. Positive economic data (e.g., strong GDP growth, low unemployment, robust industrial production) signal a healthy economy, bolstering investor confidence.
    - Recessions or weak economic performance can lead to capital outflow and currency depreciation.
4. **Balance of Payments (Current Account and Capital Account):**
    - **Current Account:** A country with a persistent current account deficit (importing more than it exports) needs to sell

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its currency to buy foreign goods, increasing the supply of its currency and causing depreciation. A surplus leads to appreciation.
    - **Capital Account:** A strong capital account (net inflow of foreign investment) increases demand for the domestic currency, leading to appreciation. Outflows lead to depreciation.
5. **Government Debt/Fiscal Policy:**
    - Large government deficits and accumulating debt can make a country less attractive to foreign investors, potentially leading to capital flight and currency depreciation. Markets may worry about inflation (if the government monetizes the debt) or future tax increases.
6. **Political Stability and Performance:**
    - Political stability, a transparent legal system, and sound governance are crucial for attracting foreign investment. Political instability, uncertainty (e.g., elections, policy changes), or geopolitical risks can deter investors, leading to capital outflow and currency depreciation.
7. **Terms of Trade:**
    - An improvement in a country's terms of trade (the ratio of its export prices to its import prices) means its exports are becoming more valuable relative to its imports. This indicates strong demand for its exports, leading to higher export revenues and increased demand for the domestic currency, causing appreciation.
8. **Speculation and Market Sentiment:**
    - Large-scale speculative trading by financial institutions, hedge funds, and other market participants can significantly influence exchange rates. If speculators anticipate a currency to appreciate, they will buy it, pushing its value up. Market rumors, news events, and investor confidence play a significant role.
9. **Central Bank Intervention:**
    - Central banks can intervene in the foreign exchange market by buying or selling foreign currencies to influence their own currency's value. They might do this to stabilize the exchange rate, boost exports, or counter inflationary pressures.
10. **Commodity Prices (for commodity-exporting/importing countries):**
    - For countries heavily reliant on commodity exports (e.g., oil, minerals), a rise in global commodity prices can boost their

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export earnings, leading to an appreciation of their currency. Conversely, a fall in prices can lead to depreciation.

These factors often interact in complex ways, making exchange rate forecasting a challenging task.

(b) Suppose a Company has 10,000 USD to invest for 3 months and the following information is available to you:

	USD	SFR	GBP	JPY
Rate of Interest	4.5%	4%	5.25%	2.5%
Spot Rate	1	SFR 1.4065/USD	USD 1.52/BP	JPY 104.025/USD
Forward Rate	1	SFR 1.4052/USD	USD 1.512/BP	JPY 103.40/USD

Export to Sheets

Suggest where should the Company place its funds. (9 Marks)

The company has USD 10,000 to invest for 3 months. We need to compare the returns from investing in USD directly versus investing in other currencies (SFR, GBP, JPY) and covering the exchange rate risk using forward contracts (Covered Interest Arbitrage concept).

Initial Investment: USD 10,000 **Investment Period:** 3 months

Let's calculate the future value of USD 10,000 if invested in each currency.

1. Investing in USD (Direct Investment):

- Interest Rate (USD) = 4.5% p.a.
- Interest for 3 months = 4.5% * (3/12) = 1.125%
- Future Value (USD) = USD 10,000 * (1 + 0.01125) = USD 10,000 * 1.01125 = **USD 10,112.50**

2. Investing in SFR (Swiss Franc):

- Spot Rate (SFR/USD) = 1.4065
- Forward Rate (SFR/USD) = 1.4052 (This is how many SFR per USD)
- Interest Rate (SFR) = 4% p.a.

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- Interest for 3 months = 4% * (3/12) = 1%
- **Step 1: Convert USD to SFR at Spot Rate.**
  - SFR amount = USD 10,000 * 1.4065 SFR/USD = 14,065 SFR
- **Step 2: Invest SFR at SFR Interest Rate.**
  - Future Value (SFR) = 14,065 SFR * (1 + 0.01) = 14,065 * 1.01 = 14,205.65 SFR
- **Step 3: Convert SFR back to USD at Forward Rate.**
  - The forward rate is SFR 1.4052/USD. This means 1 USD = 1.4052 SFR. So, to convert SFR to USD, we divide by this rate.
  - USD amount = 14,205.65 SFR / 1.4052 SFR/USD = **USD 10,109.34**

3. Investing in GBP (British Pound):

- Spot Rate (USD/BP) = 1.52 (Meaning 1 GBP = 1.52 USD)
- Forward Rate (USD/BP) = 1.512 (Meaning 1 GBP = 1.512 USD)
- Interest Rate (GBP) = 5.25% p.a.
- Interest for 3 months = 5.25% * (3/12) = 1.3125%
- **Step 1: Convert USD to GBP at Spot Rate.**
  - GBP amount = USD 10,000 / 1.52 USD/GBP = 6,578.9474 GBP
- **Step 2: Invest GBP at GBP Interest Rate.**
  - Future Value (GBP) = 6,578.9474 GBP * (1 + 0.013125) = 6,578.9474 * 1.013125 = 6,665.399 GBP
- **Step 3: Convert GBP back to USD at Forward Rate.**
  - USD amount = 6,665.399 GBP * 1.512 USD/GBP = **USD 10,086.27**

4. Investing in JPY (Japanese Yen):

- Spot Rate (JPY/USD) = 104.025 (Meaning 1 USD = 104.025 JPY)
- Forward Rate (JPY/USD) = 103.40 (Meaning 1 USD = 103.40 JPY)
- Interest Rate (JPY) = 2.5% p.a.
- Interest for 3 months = 2.5% * (3/12) = 0.625%
- **Step 1: Convert USD to JPY at Spot Rate.**
  - JPY amount = USD 10,000 * 104.025 JPY/USD = 1,040,250 JPY
- **Step 2: Invest JPY at JPY Interest Rate.**
  - Future Value (JPY) = 1,040,250 JPY * (1 + 0.00625) = 1,040,250 * 1.00625 = 1,046,751.5625 JPY

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- **Step 3: Convert JPY back to USD at Forward Rate.**
    - The forward rate is JPY 103.40/USD. This means 1 USD = 103.40 JPY. So, to convert JPY to USD, we divide by this rate.
    - USD amount = 1,046,751.5625 JPY / 103.40 JPY/USD = **USD 10,123.32**

Summary of Returns:

- **USD Investment:** USD 10,112.50
- **SFR Investment:** USD 10,109.34
- **GBP Investment:** USD 10,086.27
- **JPY Investment:** USD 10,123.32

Suggestion: The company should place its funds in **Japanese Yen (JPY)** as it yields the highest return of USD 10,123.32 after 3 months, when covered against exchange rate risk.

Question 4.

(a) Explain the significance and implication of any two types of foreign exchange exposure and risks on the cash flow of a Company. (9 Marks)

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Foreign exchange exposure refers to the degree to which a company's cash flows, assets, and liabilities are affected by changes in exchange rates. It presents risks that can significantly impact a company's profitability and financial stability. Let's discuss two major types:

1. **Transaction Exposure:**
    - **Significance:** Transaction exposure arises from contractual obligations denominated in a foreign currency that must be settled at a future date. These are specific, identifiable foreign currency cash flows (receivables or payables) that will convert to a different domestic currency value if the exchange rate changes between the time the transaction is agreed upon and the time it is settled.
    - **Implication on Cash Flow:**
        - **Foreign Currency Receivables (e.g., Export Sales):** If a company is expecting to receive foreign currency, a depreciation of that foreign currency against the domestic currency (or appreciation of the domestic

currency) will mean that when the foreign currency is converted, it will yield fewer domestic currency units. This directly reduces the domestic currency equivalent of the expected cash inflow, impacting profitability.
        - *Example:* An Indian company expects to receive USD 100,000 for exports in 3 months. If the spot rate is INR 80/USD at the time of invoicing, the expected receipt is INR 8,000,000. If the USD depreciates to INR 78/USD by the time of receipt, the company will only receive INR 7,800,000, a loss of INR 200,000 in cash flow.
    - **Foreign Currency Payables (e.g., Import Purchases):** If a company needs to pay in foreign currency, an appreciation of that foreign currency against the domestic currency (or depreciation of the domestic currency) will mean that more domestic currency units are required to obtain the necessary foreign currency for payment. This directly increases the domestic currency cost of the payment, negatively affecting cash outflow and profitability.
        - *Example:* An Indian company needs to pay USD 50,000 for imports in 3 months. If the spot rate is INR 80/USD at the time of agreement, the expected payment is INR 4,000,000. If the USD appreciates to INR 82/USD by the time of payment, the company will have to pay INR 4,100,000, an additional INR 100,000 cash outflow.
- **Risk:** The primary risk is the unpredictable change in the domestic currency value of future foreign currency denominated cash inflows or outflows, leading to potential gains or losses that impact net cash flow and reported earnings.

2. **Translation Exposure (or Accounting Exposure):**
    - **Significance:** Translation exposure arises from the need to "translate" the financial statements of foreign subsidiaries from their local currency into the parent company's reporting currency for consolidation purposes. It does not involve actual cash flows but affects the reported financial performance and position (e.g., assets, liabilities, equity, and earnings) on consolidated statements.
    - **Implication on Cash Flow:**

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        - **No Direct Cash Flow Impact:** Importantly, translation exposure does not directly affect a company's immediate cash flows. It is an accounting phenomenon.
        - **Impact on Reported Earnings and Equity:** Fluctuations in exchange rates can cause reported assets, liabilities, and equity to change in value when translated into the parent company's currency. For example, if a foreign subsidiary's local currency assets (like inventory or property) are translated into a depreciating parent currency, their reported value on the consolidated balance sheet will decrease. This can impact financial ratios, loan covenants, and investor perception, even if the underlying operational cash flows remain strong in the local currency. Similarly, translated foreign earnings can appear higher or lower depending on the exchange rate movements, affecting consolidated net income.
            - *Example:* A US parent company has a subsidiary in Europe. If the Euro depreciates against the USD, the translated value of the European subsidiary's assets and earnings in USD terms will be lower, even if the Euro-denominated performance is stable. This might lead to a negative translation adjustment in the parent's equity section or lower reported consolidated profits.
    - **Risk:** The risk is the impact on a company's reported financial statements, which can influence stock prices, credit ratings, and management's perceived performance, despite no immediate impact on cash liquidity.

In summary, transaction exposure directly impacts a company's actual cash inflows and outflows, affecting its operational profitability. Translation exposure, while not directly affecting cash, impacts the reported financial health and performance, influencing stakeholder perceptions and strategic decisions. Managing both types of exposure is crucial for multinational companies.

(b) A Company has to pay 3 Million USD for imports after 6 months. It enters a 6 month Call Option contract at INR 42.40/USD with a premium of 5%. What is the final cost to the Company if on expiry of Option (i) It is expected that there would be a discount of 1.887%

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on INR. (ii) it is expected that there would be a premium of 7.06% on INR. (9 Marks)

Understanding the Scenario:

- Company needs to pay USD 3,000,000 in 6 months. This is a USD payable.
- The company buys a Call Option on USD (which means it has the right to buy USD).
- Strike Price (Exercise Price) = INR 42.40/USD
- Option Premium = 5% of the strike price
- Contract Period = 6 months

Calculation of Option Premium (Total Cost upfront):

- Premium per USD = 42.40 INR/USD * 5% = 42.40 * 0.05 = INR 2.12/USD
- Total Premium for USD 3,000,000 = USD 3,000,000 * INR 2.12/USD = **INR 6,360,000** This premium is paid upfront, regardless of whether the option is exercised or not.

Case (i): It is expected that there would be a discount of 1.887% on INR (after 6 months).

- "Discount of 1.887% on INR" means INR is expected to **depreciate** against USD by 1.887%. This means USD is expected to be at a premium against INR.
- Let's assume the current Spot Rate is the strike price (or the basis for calculation). The problem implies we need to find the future spot rate.
- If INR is at a discount, it means (Future Spot - Current Spot)/Current Spot = -1.887%. This is problematic wording. A discount *on INR* means INR depreciates, meaning the INR/USD rate goes up.
- Let's assume "discount of 1.887% on INR" means the **forward rate (future spot)** for INR is 1.887% lower than some implied spot, or it is a general statement about INR's weakness.
- If INR is at a discount, it implies that the future spot rate (INR/USD) will be *higher* than the current spot rate. So, the spot rate for INR would effectively be discounted.
- Let's re-interpret: If INR is at a "discount" means its value is less than implied, or if we are talking about a forward rate in INR terms, it means less INR for a foreign currency.

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- The standard way to express "discount on INR" means INR depreciates. If INR depreciates, the INR/USD rate goes up.
- Let's assume "discount of 1.887% on INR" means the future spot rate for INR/USD is **higher** by 1.887% relative to some base. The strike price is 42.40. Let's assume the implied spot rate if the option was not exercised would be higher than 42.40.

Let's clarify the wording: "discount of 1.887% on INR" typically means the future value of INR is lower. If we consider the INR/USD rate, a "discount on INR" means the USD becomes more expensive in INR terms. So, the INR/USD spot rate will be higher.

Let's re-interpret "discount of 1.887% on INR" to mean that the INR is expected to depreciate by 1.887% over 6 months. So, the expected spot rate at expiry (Sexp) will be higher. Sexp
=Strike Price×(1+Depreciation Rate) Sexp
=42.40×(1+0.01887)=42.40×1.01887=43.199728 INR/USD

Now, compare this expected spot rate with the strike price.

- Expected Spot Rate = 43.199728 INR/USD
- Strike Price = 42.40 INR/USD

Since the expected spot rate (43.199728) is **higher** than the strike price (42.40), the company will **exercise the Call Option** because it can buy USD at 42.40 INR/USD, which is cheaper than buying it from the open market at 43.199728 INR/USD.

- Cost of buying USD 3M: USD 3,000,000 * 42.40 INR/USD = INR 127,200,000
- Total Final Cost (i) = Cost of buying USD + Premium Paid
  - = INR 127,200,000 + INR 6,360,000 = **INR 133,560,000**

Case (ii): It is expected that there would be a premium of 7.06% on INR. (after 6 months).

- "Premium of 7.06% on INR" means INR is expected to **appreciate** against USD by 7.06%. This means USD is expected to be at a discount against INR.
- If INR appreciates, the INR/USD rate goes down.
- Expected Spot Rate (Sexp) = Strike Price ×(1−Appreciation Rate)
- Sexp=42.40×(1−0.0706)=42.40×0.9294=39.40776 INR/USD

Now, compare this expected spot rate with the strike price.

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- Expected Spot Rate = 39.40776 INR/USD
- Strike Price = 42.40 INR/USD

Since the expected spot rate (39.40776) is **lower** than the strike price (42.40), the company will **NOT exercise the Call Option** because it can buy USD from the open market at 39.40776 INR/USD, which is cheaper than exercising the option at 42.40 INR/USD.

- Cost of buying USD 3M from open market: USD 3,000,000 * 39.40776 INR/USD = INR 118,223,280
- Total Final Cost (ii) = Cost of buying USD from open market + Premium Paid
    - = INR 118,223,280 + INR 6,360,000 = **INR 124,583,280**

Summary of Final Costs:

- **(i) INR Discount Scenario:** INR 133,560,000
- **(ii) INR Premium Scenario:** INR 124,583,280

Important Note on "Discount/Premium on INR": The common convention for quoting discount/premium is on the *foreign currency*. However, the question states "on INR".

- If INR is at a discount, it means you get fewer foreign currency units for 1 INR, implying INR is depreciating, hence INR/USD rate would increase.
- If INR is at a premium, it means you get more foreign currency units for 1 INR, implying INR is appreciating, hence INR/USD rate would decrease. My interpretation follows this common understanding and leads to the logical outcome for option exercise.

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Question 5.

(a) An Indian firm is planning to invest in US. The project will require an initial outlay of USD 100 Million. The expected cash flow after tax for next 5 years is as following:

Yrs.	**1**	**2**	**3**	**4**	**5**
CFAT (in USD millions)	20	35	40	40	50

Export to Sheets

The cost of capital of the company is 15%. It is forecasted that INR will depreciate by 3% p.a. with the initial exchange rate being INR46/USD. Evaluate the project on the basis of NPV. (12 Marks)

To evaluate the project using Net Present Value (NPV), we need to:

1. Forecast the exchange rates for each year.
2. Convert the USD cash flows into INR cash flows using the forecasted exchange rates.
3. Discount the INR cash flows using the company's cost of capital (15%).
4. Calculate the initial outlay in INR.
5. Calculate the NPV.

Step 1: Forecast Exchange Rates (INR/USD) Initial Exchange Rate (Year 0) = INR 46/USD INR is forecasted to depreciate by 3% p.a. This means the INR/USD rate will *increase* by 3% each year.

- Year 0 (Initial Outlay): $S0=46.00$ INR/USD
- Year 1: $S1=46.00\times(1+0.03)1=46.00\times1.03=47.38$ INR/USD
- Year 2: $S2=46.00\times(1+0.03)2=46.00\times1.0609=48.8014$ INR/USD
- Year 3: $S3=46.00\times(1+0.03)3=46.00\times1.092727=50.2694$ INR/USD
- Year 4: $S4=46.00\times(1+0.03)4=46.00\times1.12550881=51.7874$ INR/USD
- Year 5: $S5=46.00\times(1+0.03)5=46.00\times1.15927407=53.3576$ INR/USD

Step 2: Convert USD Cash Flows to INR Cash Flows (All CFAT are in USD millions, so final INR CF will be in millions)

- Initial Outlay (Year 0): USD 100 Million
  - INR Outlay = USD 100 Million × 46.00 INR/USD = INR 4,600 Million
- Year 1 CFAT (USD 20 Million):
  - INR CFAT = USD 20 Million × 47.38 INR/USD = INR 947.6 Million
- Year 2 CFAT (USD 35 Million):
  - INR CFAT = USD 35 Million × 48.8014 INR/USD = INR 1,708.049 Million
- Year 3 CFAT (USD 40 Million):
  - INR CFAT = USD 40 Million × 50.2694 INR/USD = INR 2,010.776 Million
- Year 4 CFAT (USD 40 Million):

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    - INR CFAT = USD 40 Million × 51.7874 INR/USD = INR 2,071.496 Million
- Year 5 CFAT (USD 50 Million):
    - INR CFAT = USD 50 Million × 53.3576 INR/USD = INR 2,667.88 Million

Step 3: Calculate Present Value of INR Cash Flows Company's Cost of Capital = 15% (0.15)

- PV of Year 1 CFAT = (1+0.15)1947.6=1.15947.6 =824.00 Million INR
- PV of Year 2 CFAT = (1+0.15)21,708.049=1.32251,708.049 =1,291.56 Million INR
- PV of Year 3 CFAT = (1+0.15)32,010.776=1.5208752,010.776 =1,322.18 Million INR
- PV of Year 4 CFAT = (1+0.15)42,071.496=1.749006252,071.496 =1,184.38 Million INR
- PV of Year 5 CFAT = (1+0.15)52,667.88=2.01135718752,667.88 =1,326.40 Million INR

Step 4: Calculate Total Present Value of Cash Inflows Total PV of Inflows = 824.00 + 1,291.56 + 1,322.18 + 1,184.38 + 1,326.40 = **INR 5,948.52 Million**

Step 5: Calculate NPV NPV = Total PV of Inflows - Initial Outlay NPV = INR 5,948.52 Million - INR 4,600 Million **NPV = INR 1,348.52 Million**

Evaluation: Since the Net Present Value (NPV) is positive (INR 1,348.52 Million), the project is financially viable and should be accepted. The positive NPV indicates that the project is expected to generate returns greater than the company's cost of capital, adding value to the firm.

(b) The following quotes are available from New York:

- S(USD/GBP) = 1.60/1.61
- S(USD/MYR) = 0.200/0.201

Suppose that in London you get the quote S(MYR/GBP) 8.10/8.20 and you have 10000 USD. Is there an arbitrage opportunity? If so, how? (6 Marks)

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This is a **Three-Point Arbitrage (Triangular Arbitrage)** problem. We need to check if the cross-rate implied by the New York quotes is different from the direct quote available in London.

Given Quotes:

1. **New York: S(USD/GBP) = 1.60/1.61**
    - Dealer sells 1 GBP for 1.61 USD (ask)
    - Dealer buys 1 GBP for 1.60 USD (bid)
    - Equivalently: Dealer sells 1 USD for 1/1.60 = 0.625 GBP (bid for USD)
    - Dealer buys 1 USD for 1/1.61 = 0.6211 GBP (ask for USD)
2. **New York: S(USD/MYR) = 0.200/0.201**
    - Dealer sells 1 MYR for 0.201 USD (ask)
    - Dealer buys 1 MYR for 0.200 USD (bid)
    - Equivalently: Dealer sells 1 USD for 1/0.200 = 5 MYR (bid for USD)
    - Dealer buys 1 USD for 1/0.201 = 4.9751 MYR (ask for USD)
3. **London: S(MYR/GBP) = 8.10/8.20**
    - Dealer sells 1 GBP for 8.20 MYR (ask)
    - Dealer buys 1 GBP for 8.10 MYR (bid)

Step 1: Calculate the Implied Cross-Rate (MYR/GBP) from New York Quotes. We want to find MYR/GBP. We have USD/GBP and USD/MYR.

- To get MYR per GBP: You can go USD → MYR and GBP → USD.
- We need MYR / GBP. This means MYR per 1 GBP.
- We know 1 GBP can be converted to USD (using USD/GBP).
- Then those USD can be converted to MYR (using MYR/USD, which is the inverse of USD/MYR).

Let's find the implied MYR/GBP rate using the 'buy low, sell high' principle. To determine if arbitrage is possible, we calculate the implied buying and selling rates.

Implied Bid Rate for MYR/GBP (how many MYR would a New York bank pay for 1 GBP):

- Start with 1 GBP.
- Convert GBP to USD using the **bid rate** for GBP (1 GBP = 1.60 USD).
- Then convert USD to MYR using the **bid rate** for USD in terms of MYR (1 USD = 5 MYR, from 1/0.200).

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- Implied MYR/GBP Bid = (1 GBP * 1.60 USD/GBP) * (1/0.200 MYR/USD) = 1.60 * 5 = **8.00 MYR/GBP**
    - So, New York implies they would buy 1 GBP for 8.00 MYR.

Implied Ask Rate for MYR/GBP (how many MYR would a New York bank charge for 1 GBP):

- Start with 1 GBP.
- Convert GBP to USD using the **ask rate** for GBP (1 GBP = 1.61 USD).
- Then convert USD to MYR using the **ask rate** for USD in terms of MYR (1 USD = 4.9751 MYR, from 1/0.201).
- Implied MYR/GBP Ask = (1 GBP * 1.61 USD/GBP) * (1/0.201 MYR/USD) = 1.61 / 0.201 **≈ 8.00995 MYR/GBP**
    - So, New York implies they would sell 1 GBP for 8.00995 MYR.

Implied Cross-Rate from New York = 8.00 / 8.00995 MYR/GBP

Step 2: Compare Implied Cross-Rate with London Quote.

- Implied from NY: 8.00 / 8.00995 MYR/GBP
- Actual from London: 8.10 / 8.20 MYR/GBP

We see that in London, you can **buy GBP for 8.10 MYR** (London's ask for MYR/GBP). And New York implies you can **sell GBP for 8.00 MYR** (NY's bid for MYR/GBP). This comparison alone doesn't directly show arbitrage. Let's consider the direct arbitrage loop:

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Yes, there is an arbitrage opportunity.

Step 3: Design the Arbitrage Strategy with USD 10,000. The goal is to find a loop where you start with USD, convert it through two other currencies, and end up with more USD. Compare London's bid (8.10 MYR/GBP) to NY's implied ask (8.00995 MYR/GBP).

- You can buy GBP cheaper in New York (implied 8.00995 MYR/GBP) and sell them for more in London (8.10 MYR/GBP). This means you should aim to get GBP through USD-MYR-GBP route and then sell GBP for USD.

Let's try a loop: USD → MYR → GBP → USD.

- **Starting with USD 10,000.**

1. **Convert USD to MYR in New York:**
    - To get MYR, you sell USD. Dealer's ask for USD is 1 USD = 4.9751 MYR (using S(USD/MYR) ask rate for MYR/USD inverse).
    - MYR amount = USD 10,000 * (1/0.201) MYR/USD = 10,000 * 4.975124 = 49,751.24 MYR
2. **Convert MYR to GBP in London:**
    - In London, you want to buy GBP with MYR. You use the London MYR/GBP bid rate, which means London bank buys GBP for 8.10 MYR (so you sell MYR to get GBP). No, this is incorrect. You use their ask rate if you want to buy GBP.
    - London MYR/GBP: 8.10/8.20. To buy GBP, you must pay 8.20 MYR per GBP.
    - GBP amount = 49,751.24 MYR / 8.20 MYR/GBP = 6,067.22 GBP
3. **Convert GBP back to USD in New York:**
    - You want to sell GBP for USD. Use New York's S(USD/GBP) bid rate, meaning NY bank buys GBP for 1.60 USD.
    - USD amount = 6,067.22 GBP * 1.60 USD/GBP = **USD 9,707.55**

This loop results in a loss (started with 10,000, ended with 9,707.55). This means we chose the wrong direction. The loop should exploit the actual discrepancy.

Let's re-evaluate the cross rates:

- Implied NY (Bid/Ask MYR/GBP): **8.00 / 8.00995**
- Actual London (Bid/Ask MYR/GBP): **8.10 / 8.20**

Observation: The London market offers a higher bid for GBP (8.10 MYR for 1 GBP) than what New York's implied market offers to sell GBP for (8.00995 MYR for 1 GBP). This means you can effectively buy GBP cheaper (in terms of MYR) in New York's implied market and sell it for more in London.

Arbitrage Strategy: Start with USD 10,000.

1. **Convert USD to GBP in New York:** (You buy GBP)
    - Use the ask rate for S(USD/GBP): 1.61 USD/GBP.
    - GBP amount = USD 10,000 / 1.61 USD/GBP = 6,211.18 GBP
2. **Convert GBP to MYR in London:** (You sell GBP)
    - Use the bid rate for S(MYR/GBP) in London: 8.10 MYR/GBP.

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    - MYR amount = 6,211.18 GBP * 8.10 MYR/GBP = 50,310.56 MYR
3. **Convert MYR back to USD in New York:** (You sell MYR)
    - Use the bid rate for S(USD/MYR): 0.200 USD/MYR.
    - USD amount = 50,310.56 MYR * 0.200 USD/MYR = **USD 10,062.11**

Arbitrage Gain: USD 10,062.11 - USD 10,000 = **USD 62.11**

Yes, there is an arbitrage opportunity, and the gain is USD 62.11.

How the Arbitrage Works (Summary of steps):

1. Start with USD 10,000.
2. In New York, convert USD to GBP using the dealer's ask price for GBP (1 GBP = 1.61 USD), so 10,000/1.61=6,211.18 GBP.
3. In London, convert these GBP to MYR using the dealer's bid price for GBP (1 GBP = 8.10 MYR), so 6,211.18×8.10=50,310.56 MYR.
4. In New York, convert these MYR back to USD using the dealer's bid price for MYR (1 MYR = 0.200 USD), so 50,310.56×0.200=10,062.11 USD.
5. The net gain is USD 10,062.11−10,000=62.11.

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