Module 15 · Foreign exchange market P14 · 15.1–15.5

SM pp. 635–670 (exercise 671–684). **Rising: 9–11 marks in the last four papers** (expected 11.0). **Q7(a)** = cross rates (J26), triangular arbitrage (D25, also MQP), investing abroad with forward cover (D23), parity (J25 Q7(b)); **MCQs (xiii) exchange rates / arbitrage and (xiv) parity** every paper since Dec'25. 15.1 market structure and 15.4 currency derivatives: never asked (read the headings).

Paper	Long question	MCQ
Jun'23	–	direct quote of EUR from USD cross rates
Dec'23	Q7(a) invest 6 months in a UK fund or Euro T-bills (forward rates)	90-day forward by IRP
Jun'24	–	bank buying rate for an export bill (0.20% margin)
Dec'24	Q7(b) two-way quotes: % change, encash now or later	annualised forward premium on the ask
Jun'25	Q7(b) Fisher nominal rates, IRP forward, PPP spot	US T-bill rate from spot and forward (IRP)
Dec'25	**Q7(a) triangular arbitrage GBP / USD / INR** (SM example's GBP/USD quote)	EUR/INR cross rate · inflation v expected spot = PPP
Jun'26	**Q7(a) EUR/INR cross rate, arbitrage on a receivable**	arbitrage via implied cross · 6-month IRP forward

HOW IT IS ASKED

- **Q7(a)**: three two-way quotes → implied cross rate → is there an arbitrage? → the steps and the profit on a stated sum. Or a receivable converted direct v through a third currency.
- **Parity sums**: nominal rates by Fisher, forward by IRP, expected spot by PPP — one formula each.
- **MCQs**: cross rate from two-way quotes, forward premium annualised, IRP forward, the parity that a statement describes.

A Formula sheet — when to use

Formula	When to use · notes	SM
Bid = dealer buys (customer sells); **ask / offer** = dealer sells (customer buys); spread = ask − bid	Choose the side from the **dealer's** view: you sell to the bank at its bid, buy at its ask.	[SM 642–643]
Direct quote: forward > spot → foreign currency at a **premium**; indirect: forward < spot → premium	Premium / discount questions; swap points rising = premium (direct).	[SM 645]
Annualised premium = (forward − spot) ÷ spot × 100 × 12 ÷ months (direct)	Indirect quote: (spot − forward) ÷ forward × 100 × 12 ÷ months. Positive = appreciation.	[SM 645]
Foreign currency appreciating: forward = spot × (1 + %); home currency appreciating: spot ÷ (1 + %)	Forward rate from a stated % move.	[SM 644]
Cross rate: bid A/B = bid A/C × bid C/B; ask A/B = ask A/C × ask C/B	Through a common currency C. Bid A/B = 1 ÷ ask B/A; ask A/B = 1 ÷ bid B/A.	[SM 646]
Triangular arbitrage: compare the implied cross with the quoted one; sell the currency that is over-priced	Three conversions, each at the side the dealer gives you; profit = end − start.	[SM 649]
PPP: $e_t = e_0 \times (1 + i_h) \div (1 + i_f)$	Expected spot from inflation; e_0 as a direct quote of the home country; for t years raise both to t.	[SM 662]
IRP: $f_1 \div e_0 = (1 + r_h) \div (1 + r_f)$	Forward rate from interest rates **for the period** (r × months ÷ 12); premium = interest differential.	[SM 665]

Fisher: (1 + nominal) = (1 + real) × (1 + expected inflation)	Nominal rate from real + inflation; approx. r = a + i.	[SM 668]

B Quotes, cross rates and arbitrage · Q7(a) 15.2 · 15.3

- **Direct quote**: one unit of foreign currency in home currency ($1 = ₹40.00 in India); **indirect**: ₹1 = $0.025. **American quote**: per unit of a currency in US$; **European**: per US$ in another currency. [SM 642]
- **Determinants** of exchange rates: interest-rate differentials, inflation differentials, government policies, market expectations, investment opportunities, speculation. [SM 642]
- **Spread** is narrow when the rate is stable or volume high; wide when volatile or thinly traded. $1 = Rs. 40.00 – 40.25 → spread Rs. 0.25. [SM 643–644]
- **Cross rate** = a rate between two currencies not quoted against each other but against a common one; Peso via Euro: 57.50 × (1 ÷ 17.50) ≈ Rs. 3.2833. [SM 645]
- **Two-point arbitrage**: one pair in two centres (London 1.55, New York 1.60 per £) — buy cheap, sell dear. [SM 648]
- **Spot** = settlement on the second working day; **forward** = rate contracted today for a future date; both parties bound. [SM 647]

1 · Implied cross rate
bid × bid, ask × ask through the common currency

↓

2 · Compare with the quoted rate
quoted bid > implied ask, or quoted ask < implied bid → arbitrage

↓

3 · Route
start in the currency you hold; sell where it is dear, buy where cheap

↓

4 · Three conversions
each at the dealer's bid (you sell) or ask (you buy); profit = end − start

⚠ SM SLIPS
SM 646 prints the cross-rate rule as "Bid A/C + Bid C/B" — it is a product (×). The Peso example rounds 1 ÷ 17.50 to 0.0571 (exact ₹3.2857).

PROBLEMS BOX · CROSS RATE / ARBITRAGE (Q7(a) — RECOMPUTED BY SCRIPT m15_patterns.py)

WORKED PATTERN · SM THREE-POINT ARBITRAGE EXAMPLE

- GBP/USD £1 = $ 1.5715-721 · USD/JPY $1 = ¥ 106.090-120 · GBP/JPY £1 = ¥ 176.720-831; start with £1,000,000; sterling over-priced against yen.
- Sell £ for ¥ at the bid ¥176.720 → ¥176,720,000.
- Sell ¥ for $ at the offer ¥106.120 → $1,665,284.58.
- Sell $ for £ at $1.5721 → £1,059,273.95: **profit 5.9%**. [SM 649]

DEC'25 Q7(a) ASHAN — USD 80,000 (OUR WORKING)

- Implied GBP/INR via USD = 1.5715 × 85.5050 – 1.5740 × 85.5085 = **₹134.37 – 134.59**; quoted £1 = ₹113.44 – 113.45 → GBP is cheap in rupees: arbitrage exists.
- USD → INR at 85.5050 = ₹68,40,400 → GBP at 113.4487 = £60,295.09 → USD at 1.5715 = **$94,753.74**.
- Profit = **$14,753.74**.

JUN'26 Q7(a) APEX — € 1,000,000 RECEIVABLE (OUR WORKING)

- Cross EUR/INR via USD: bid 1.1400 × 85.20 = **97.128**; ask 1.1450 × 85.50 = **97.8975**; quoted 95.20 – 95.90.
- Sell € for $ at 1.1400, $ for ₹ at 85.20 → **₹9,71,28,000** v direct at 95.20 → ₹9,52,00,000: route through USD gains **₹19,28,000**.

PRACTISE THESE (MOST LIKELY FIRST)

D25, J26 Q7(a) · MQP Q7(a) (triangular), PTP Q7(a), Q7(b) · D23 Q7(a) (invest abroad with forward cover) · D24 Q7(b) (two-way quotes) · MCQs J23 Q1(v), J24 Q1(xi), D24 Q1(iii), D25 Q1(xiii), J26 Q1(xiii), MQP / PTP Q1(xiii) · SM exercise sums 1, 3, 9 (SM 679–681) and M16 sum 1 (SM 711) · SM exercise MCQs (list 2) 1, 5, 7–10, 14–17, 19–22, 25, 26, 33, 34 · **ICMAI Practice Workbook Ch9 illus. 1, 2, 3, 4, 5, 6, 7, 8, 9, 12** · MCQ bank Q148, Q149, Q151, Q161, Q212, Q220, Q221, Q223–Q226.

C Parity relationships · J25 Q7(b) and MCQ (xiv) 15.5

- **PPP (relative)**: the currency of the country with the higher inflation depreciates; change in the rate = inflation differential $(i_h - i_f) \div (1 + i_f)$. [SM 662]
- **IRP**: the currency with the lower interest rate is at a forward **premium**; holds only with free capital movement, no taxes, no restrictions. [SM 664]
- No IRP → **covered interest arbitrage**: borrow in the low-rate currency, convert spot, invest, sell the proceeds forward. [SM 665, SM 667]
- IRP implications: domestic rate < foreign → foreign currency at a forward discount; if the discount is not large enough, arbitrage. [SM 667]
- The parity family: PPP, Fisher effect, international Fisher effect, IRP, forward rate as an unbiased predictor of the future spot. [SM 661]

⚠ SM SLIP · ILLUSTRATION 7

The question gives India 2.5% and UK 5.5% inflation, but the solution uses India (home) 5.5% and UK 2.5% → ₹81.3122/£. Read which country is which before you put i_h on top.

PROBLEMS BOX · PARITY (RECOMPUTED BY SCRIPT)

WORKED PATTERN · SM ILLUSTRATIONS 6, 9, 10

- PPP: UK 3%, India 6%, ₹78/£ → 78 × (1 + 0.06) ÷ (1 + 0.03) = **80.27**; after 2 years 78 × 1.1236 ÷ 1.0609 = **82.61**. [SM 662–663]
- IRP: rupee 8%, sterling 5%, ₹79/£, 6 months: 79 × (1 + 0.08 × 6/12) ÷ (1 + 0.05 × 6/12) = **80.1561**. [SM 665]
- Yen: 0.0038 × (1 + 0.10 × 90/360) ÷ (1 + 0.07 × 90/360) = **$0.003828**. [SM 665]
- Covered interest: €761,250 sold forward at €0.74/$ → $1,028,716; gain $8,716 over investing in dollars. [SM 664–665]

JUN'25 Q7(b) NOVANTA (OUR WORKING)

- India inflation = (6.3 + 6.8) ÷ 2 = 6.55%; nominal = 1.012 × 1.0655 − 1 = **7.83%**; US = 1.015 × 1.024 − 1 = **3.94%**.
- IRP forward = 82.50 × 1.0783 ÷ 1.0394 = **₹85.59**; PPP spot = 82.50 × 1.0655 ÷ 1.024 = **₹85.84**.

PRACTISE THESE

J25 Q7(b) · MCQs D23 Q1(xiii), J25 Q1(ix), D25 Q1(xiv), J26 Q1(xiv), MQP / PTP Q1(xiv) · SM Illus. 6–13 · SM exercise sums 2, 4–7, 10, 11 (SM 680–681) · **WB Ch9 illus. 11, 13, 14** · MCQ bank Q150, Q179, Q219, Q222.

R Revision sheet and traps

Item	Rule	SM
Cross bid / ask	bid × bid / ask × ask	[SM 646]
Bid from ask	bid A/B = 1 ÷ ask B/A	[SM 646]
Premium p.a.	(F − S) ÷ S × 12 ÷ months	[SM 645]
PPP	$e_0 (1 + i_h) \div (1 + i_f)$	[SM 662]
IRP	$e_0 (1 + r_h) \div (1 + r_f)$	[SM 665]
Fisher	(1 + a)(1 + i) − 1	[SM 668]

TRAPS

- Use the dealer's side every time: you **sell** at the bid, **buy** at the ask — never the mid-rate.
- IRP rates are **per period**: 8% p.a. for 6 months = 4%.
- Home currency on top: with a direct quote ₹/£, India is the home country.
- Show the "no arbitrage" test before the steps — the marks come for both.
- State the profit in the currency you started with.

MEMORY HOOK

"Dealer buys low (bid), sells high (ask)." PPP = Prices, IRP = Interest — same fraction, home over foreign.