Managing Translation Exposure

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Agenda

- **Translation Methods**
- **Translation Exposure**
- **Translation Exposure Hedging**

Part-I

Translation Methods

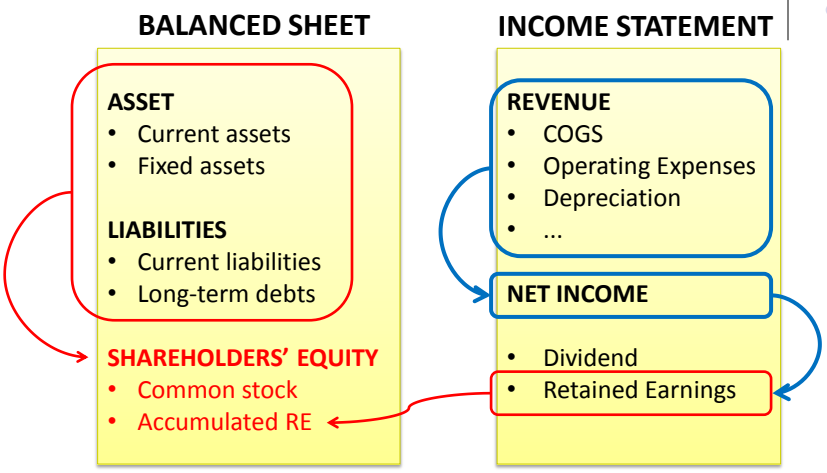
Introduction

- A multinational company must consolidate all financial statements of its subsidiary around the world → consolidated financial statement
- When financial statement of foreign subsidiary must be translated into parent's home currency, its values will vary with external factors, such as interest rate and exchange rate
- This variation influeces the value of net income and shareholders' equity

Example

- The Swiss subsidiary of an US company has an 1-year time deposit of CHF 1 million:
  - Previous USD/CHF = 2.0 → time deposit = USD 500,000
  - If spot USD/CHF = 2.5 → time deposit = USD 400,000
- An unrealized loss of USD 100,000 is incured without involving any real cash inflows (only a paper gain)
- This loss (or gain) could produce a distorted impression of what is happening to the company

Financial Statement



Translation exposure impacts on shareholders's equity in consolidated balanced sheet

Translation Problems

- If all items in balance sheet and income statement are translated using single exchange rate, there would be no problem
- Translation principles in many countries set some exchange rates to translate financial statement items
  - It compromises among **historical**, **current**, and **average** exchange rate
- As consequence, the imbalance in balance sheet would potentially occur

Translation Methods

- **Current (Closing) Rate Method**
  - All assets and liabilities are translated using current rate
- **Temporal Method**
  - Monetary items: items that represent claim of expected future cash inflow and outflow (cash, AR, AP, short- and long-term debts) → current rate
  - Nonmonetary items: inventory, fixed assets, long-term investment → historical rate
- Both methods translate shareholders' equity items using historical rate

Balanced Sheet

		Temporal Metod	Current Rate Metod
ASSET	Cash	Current	Current
	Receivable	Current	Current
	Inventory	Historical	Current
	Fixed assets	Historical	Current
LIABILITIES	Payable	Current	Current
	Short-term debts	Current	Current
	Long-term debts	Current	Current
EQUITY	Common stock	Historical	Historical
	Accum. Retained Earning (RE)	Historical	Historical
	Translation gain/loss (CTA)	0	> 0

Income Statement

	Temporal Metod	Current Rate Metod
Revenue	Average	Average
COGS	Historical	Average
Expenses	Average	Average
Depreciation	Historical	Average
Taxes	Average	Average
Net Income	**B**	**C**
Exchange gain/loss	Translation gain/loss (T)	0
Net Income	**B - T**	**C**

Expressed in CTA, not appear in Income Statement

It reduces accumulated RE in Balanced Sheet

Current Rate and Temporal Method

Current Rate Method	Temporal Method
• All assets and liabilities are translated with current rate	• Monetary → current rate Nonmonetary → historical rate
• **Philosophy**: ▪ reflect all assets and liabilities to current market value	• **Philosophy**: ▪ only claim of expected future cash inflow and outflow are exposed to exchange rate volatility ▪ Nonmonetary items are more influenced by local inflation rather than exchange rate volatility
• It understates fixed assets in hyperinflation countries	• It is more rational in hyperinflation countries

Current Rate and Temporal Method

Current Rate Method	Temporal Method
• Simpler, maintain almost all financial ratios, but violate accounting principles	• More complex, and change almost all financial ratios
• Translation gain/loss are accumulated in CTA (cummulative translation adjustment)	• Translation gain/loss are distributed in current net income
• Net income are more stable (pressure to hedge is smaller than Temporal Method)	• Net income are more volatile (large swing) → pressure to hegde translation exposure

Historical USD/CHF = 2.0

		Spot USD/CHF = 1.0		Spot USD/CHF = 2.5	
	CHF	Current	Temporal	Current	Temporal
Cash	CHF 300	$ 300	$ 300	$ 120	$ 120
Receivable	400	$ 400	$ 400	$ 160	$ 160
Inventory	600	$ 600	$ 300	$ 240	$ 300
Property	700	$ 700	$ 350	$ 280	$ 350
TOTAL ASSETS	**2,000**	**$ 2,000**	**$ 1,350**	**$ 800**	**$ 930**
Payable	300	$ 300	$ 300	$ 120	$ 120
LT-debts	900	$ 900	$ 900	$ 360	$ 360
Common stock	100	$ 50	$ 50	$ 50	$ 50
Accum. RE	700	$ 350	$ 100	$ 350	$ 400
CTA	---	**$ 400**	---	**$ (80)**	---
LIAB + EQUITY	**2,000**	**$ 2,000**	**$ 1,350**	**$ 800**	**$ 930**

Dimensions for Translation

- **Subsidiary characteristic**
  - **Integrated foreign entity**: subsidiary that operates as an extension of the parent (highly interrelated with parent) → **Temporal Method**
  - **Self-sustaining foreign entity**: subsidiary that operates independent of the parent → **Current Rate Method**
- **Currency classification**
  - **Reporting (presentation) currency**: currency used by the parent to report its financial statement (parent's home currency)
  - **Local currency**: currency of country in which a subsidiary operates (to express subsidiary's financial statement)
  - **Functional currency**: dominant currency used by subsidiary to receive cash or incure expense (cash inflow and cash outflow)

Example: US Translation Practices

US-based company has subsidiary in Switzerland

- Reporting currency = USD (to express parent's FS)
- Local currency = CHF (to express subsidiary's FS)

Currency used in Subsidiary's Financial Statement	Functional Currency	Translation Method
CHF	USD	CHF → USD: Temporal Method
CHF	CHF	CHF → USD: Current Rate Method
CHF	EUR	• CHF → EUR: Temporal Method • EUR → USD: Current Rate Method

Subsidiary that operates in hyperinflation country must be translated using Temporal Method.

Part-II

Translation Exposure

Definition

- Translation exposure is the changes in income statement items and assets and liabilities in balance sheet that are caused by exchange rate movement
- Note
  - Translation loss/gain is expressed in reporting currency (parent's home currency)
  - Use middle exchange rate or midrate to calculate translation loss/gain
  - Translation loss/gain does not influence taxes

Calculating Translation Loss/Gain

- Identify which assets and liabilities are exposed to exchange rate movement
  - Exposed items → translated using current exchange rate
  - Net Exposure = Exposed Assets – Exposed Liabilities
- Calculate the depreciation or appreciation of foreign currency against reporting currency
- Calculate translation loss/gain (expressed in reporting currency)

Depreciation and Appreciation of Local Currency

- Spot rate USD/CHF = 2.0 (direct quotation)
  - Future spot rate USD/CHF = 2.5 → CHF is depreciated
  - Future spot rate USD/CHF = 1.0 → CHF is appreciated

If local currency is depreciated

$$D = \frac{|e_t - e_0|}{e_t} \Rightarrow e_t = \frac{e_0}{1-D}$$

$$D = \frac{|2.5-2.0|}{2.5} = 20\%$$

If local currency is appreciated

$$A = \frac{|e_t - e_0|}{e_0} \Rightarrow e_t = e_0(1+A)$$

$$A = \frac{|1.0-2.0|}{2.0} = 50\%$$

Exercise-1

		Spot USD/CHF = 2.5	
	CHF	**Current**	**Temporal**
Cash	CHF 300	$ 120	$ 120
Receivable	400	$ 160	$ 160
Inventory	600	$ 240	$ 240
Property	700	$ 280	$ 350
TOTAL ASSETS	**2,000**	**$ 800**	**$ 870**
Payable	300	$ 120	$ 120
LT-debts	900	$ 360	$ 360
Common stock	100	$ 50	$ 50
Accum. RE	700	$ 350	$ 350
CTA	---	**$ (80)**	**$ (10)**
LIAB + EQUITY	**2,000**	**$ 800**	**$ 870**

- Swiss subsidiary of US company
- The balanced sheet in CHF are expressed as beside
- Historical USD/CHF = 2.0
- If CHF weakens to 2.5, calculate the translation loss/gain
- The answers have to be **($ 80)** for Current Rate Method, and **($10)** for Temporal Method.

Exercise-2:
Identifying Exposed Items

	CHF	Current	Temporal	
Cash	CHF 300	CHF 300	CHF 300	
Receivable	CHF 400	CHF 400	CHF 400	
Inventory	CHF 600	CHF 600	CHF 600	
Property	CHF 700	CHF 700	---	
TOTAL ASSETS	**CHF 2,000**	**CHF 2,000**	**CHF 1,300**	**Exposed Assets**
Payable	CHF 300	CHF 300	CHF 300	
LT-debts	CHF 900	CHF 900	CHF 900	
Common stock	CHF 100	---	---	
Accum. RE	CHF 700	---	---	
LIAB + EQUITY	**CHF 2,000**	**CHF 1,200**	**CHF 1,200**	**Exposed Liabilities**
		CHF 800	**CHF 100**	**NET EXPOSURE (exposed to USD/CHF fluctuation)**

Exercise-1:
Calculating Translation Loss/Gain

- **Method-1:**

$$\text{Translation L/G} = \frac{NE}{e_t} - \frac{NE}{e_0}$$

- **NE** is in local currency
- **e** is in direct quotation

For current method = $\frac{800}{2.5} - \frac{800}{2.0}$ **= (USD 80)**

- **Method-2:**

$$\text{Translation L/G} = \frac{NE}{e_0} \text{ x D/A}$$

- **NE** is in local currency
- **e** is in direct quotation

For current method = $\frac{800}{2.0}$ x -20% **= (USD 80)**

Exercise-1:
Calculating Translation Loss/Gain

	Current Rate Method	Temporal Method
Exposed Assets (EA)	CHF 2,000	CHF 1,300
Exposed Liabilities (EL)	CHF 1,200	CHF 1,200
Net Exposure (in CHF)	**CHF 800**	**CHF 100**
Historical rate USD/CHF :	÷ 2.0	÷ 2.0
Net Exposure (in USD)	**USD 400**	**USD 50**

- Historical USD/CHF = 2.0
- Spot USD/CHF = 2.5

} CHF is depreciated against USD 20%

Translation loss/gain (in USD)	**USD 400 * -20% = (USD 80)**	**USD 50 * -20% = (USD 10)**

Exercise-2

	CHF
Cash	CHF 300
Receivable	400
Inventory	600
Property	700
TOTAL ASSETS	**2,000**
Payable	300
LT-debts	900
Common stock	100
Accum. RE	700
LIAB + EQUITY	**2,000**

- Swiss subsidiary of US company:
  - Cash: 50% in CHF, 30% in JPY, 20% in USD
  - Receivable: 40% in CHF, 30% in JPY, 30% in USD
  - Payable: 60% in CHF, 30% in JPY, 10% in USD
  - The rest items are in CHF
- Historical USD/CHF = 2.0
- Using Current Rate Method, if:
  - CHF is depreciated 20% against USD
  - JPY is depreciated 10% against USD

  calculate the total translation loss/gain.

Exercise-2:
Identifying Exposed Items

	CHF		In CHF	In JPY	In USD
Cash	CHF 300		CHF 150	CHF 90	CHF 60
Receivable	400		CHF 160	CHF 120	CHF 120
Inventory	600		CHF 600	---	---
Property	700		CHF 700	---	---
TOTAL ASSETS	**2,000**	**EA =**	**CHF 1,610**	**CHF 210**	**CHF 180**
Payable	300		CHF 180	CHF 90	CHF 30
LT-debts	900		CHF 900	---	---
Common stock	100		---	---	---
Accum. RE	700		---	---	---
LIAB + EQUITY	**2,000**	**EL =**	**CHF 1,080**	**CHF 90**	**CHF 30**
		NET EXPOSURE =	**CHF 530**	**CHF 120**	

Exercise-2:
Calculating Translation Loss/Gain

	Items in CHF	Items in JPY
Exposed Assets (EA)	CHF 1,610	CHF 210
Exposed Liabilities (EL)	CHF 1,080	CHF 90
Net Exposure (in CHF)	**CHF 530**	**CHF 120**
Historical rate USD/CHF :	÷ 2.0	÷ 2.0
Net Exposure (in USD)	**USD 265**	**USD 60**

- CHF is depreciated by 20% against USD
- JPY is depreciated by 10% against USD

Translation loss/gain (in USD)	**USD 265 * -20%** **= (USD 53)**	**USD 60 * -10%** **= (USD 6)**

Total Translation loss = (USD 59)

Part-III

Translation Exposure Hedging

Hedging Method

- Hedging activities focus more on translation loss rather than translation gain
  - Translation loss: EA > EL, and local currency is depreciated
  - Translation loss: EA < EL, and local currency is appreciated
- The success of this hedging depends on prediction of future spot rate (the date of balanced sheet)
  - Because precise predictions are rare, translation exposures are difficult to zero
- Hedging methods:
  - Balance sheet hedging
  - Financial technique, such as money market, forward, etc.

Balanced Sheet Hedging

- Balanced sheet hedging aims to zero the net exposures (EA = EL) operationally
- Example:
  - Convert a portion of cash in functional or local currency to reporting currency (in spot market or with other subsidiary)
  - Convert debt from reporting currency to functional currency
  - Acquire earlier fixed assets in reporting currency (if any)
  - Buy more inventories (only for Temporal Method)
- If EA > EL, this hedging aims to reduce EA without simultaneously reduce EL

Example: Balanced Sheet Hedging

	CHF		Functional currency In CHF	In JPY	Reporting currency In USD
Cash	CHF 300	Temporal	CHF 150	CHF 90	CHF 60
Receivable	400		CHF 160	CHF 120	CHF 120
Inventory	600		CHF 600	---	---
Property	700		CHF 700	---	---
TOTAL ASSETS	**2,000**	**EA =**	**CHF 1,610**	**CHF 210**	**CHF 180**
Payable	300		CHF 180	CHF 90	CHF 30
LT-debts	900		CHF 900	---	---
Common stock	100		---	---	---
Accum. RE	700		---	---	---
LIAB + EQUITY	**2,000**	**EL =**	**CHF 1,080**	**CHF 90**	**CHF 30**
		NET EXPOSURE =	**CHF 530**	**CHF 120**	

Financial Technique Hedging

- Financial technique
  - Estimate the future spot exchange rate
  - Grasp profit based on that future rate
  - Record profit to offset translation loss
- Problem with money market hedging:
  - When estimated spot rate is inaccurate, it creates transactional exposures
  - This method is risky in country with high volatility exchange rate
- We focus on the condition where **positive NE** and **local currency is weakening**

Money Market Hedging Formula

- **Assumption:**
  - Reporting currency : USD
  - Local currency : CHF
- **Quotation (USD/CHF)**
  - Spot rate $= e_0$
  - Estimated future rate $= e_t$
- **Interest Rate**
  - USD investment rate $= i_{USD}$
  - CHF loan rate $= i_{CHF}$
- **Formula:**

$$\text{Money borrowed (in CHF)} = \frac{\text{Potential Translation loss (in USD)}}{\frac{1+i_{USD}}{e_0} - \frac{1+i_{CHF}}{e_t}}$$

e_0 (ask), e_t (bid)

Example

- **Swiss subsidiary of US company:**
  - Potential translation loss = USD 80
  - Estimated for the next three months
- **Exchange rate:**
  - Spot USD/CHF = 1.95 – 2.05
  - Estimated USD/CHF = 2.40 – 2.60
- **Interest rate:**
  - USD deposit rate = 8% p.a.
  - CHF loan rate = 12% p.a.
- **Amount should be borrowed:**

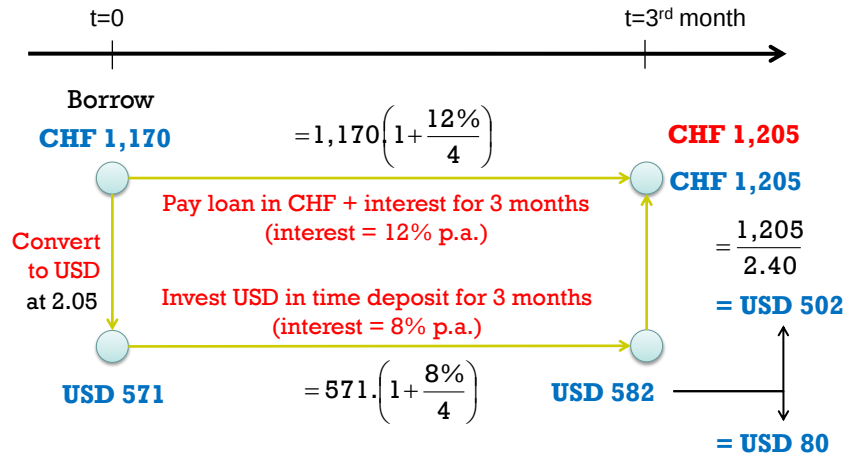
$$= \frac{80}{\frac{1+8\%/4}{2.05} - \frac{1+12\%/4}{2.40}} = \text{CHF}1,170$$

  - Borrow CHF 1,170
  - Convert in USD, and invest it
  - Convert back to CHF at maturity
  - Repay CHF loan

Money Market Illustration

Spot USD/CHF = 1.95 – 2.05
3-month estimated USD/CHF = 2.40 – 2.60

USD deposit rate = 8% p.a.
CHF loan rate = 12% p.a.



Forward Hedging Formula

- **Assumption:**
  - Reporting currency : USD
  - Functional currency: CHF
- **Quotation:**
  - Forward rate $= f_{USD/CHF}$
  - Estimated future rate $= e_{USD/CHF}$
- **Formula:**

$$\text{Forward Contract Size (in CHF)} = \frac{\text{Potential translation loss (in USD)}}{\frac{1}{f_{USD/CHF}} - \frac{1}{e_{USD/CHF}}}$$

(ask) (bid)

Exercise-3

	CHF	Current Rate Method
Cash	CHF 300	CHF 300
Receivable	CHF 400	CHF 400
Inventory	CHF 600	CHF 600
Property	CHF 700	CHF 700
TOTAL ASSETS	**CHF 2,000**	**CHF 2,000**
Payable	CHF 300	CHF 300
LT-debts	CHF 900	CHF 900
Common stock	CHF 100	---
Accum. RE	CHF 700	---
LIAB + EQUITY	**CHF 2,000**	**CHF 1,200**
		CHF 800

- Spot USD/CHF = 1.95 – 2.05
- CHF is estimated to depreciate by 20% against USD in the next 3 months
- Forward rate USD/CHF = 8% - 12%
- **Question:s**
  a. Calculate forward size contract to hedge potential translation loss
  b. If CHF is only depreciated by 10% in the next 3 months, calculate translation gain/ loss recorded in balanced sheet

Exercise-3a: Answer

- USD/CHF → CHF is depreciated by 20%

USD/CHF	bid	ask	Midrate
Spot rate	1.9500	2.0500	2.0000
Estimated future spot rate	2.4375	2.5625	2.5000
	$=\frac{1.95}{1-20\%}$	$=\frac{2.05}{1-20\%}$	

- Translation Loss:
  - Net Exposure = CHF 800 → NE = 800 / 2.00 = USD 400
  - Translation loss = 400 x -20% = (USD 80)

Exercise-3a: Answer

- Forward Rate:

USD/CHF	bid	ask	Midrate
Spot rate	1.9500	2.0500	2.0000
Estimated future spot rate	2.4375	2.5625	2.5000
3-month forward rate	8%	12%	
3-month forward rate	1.9890	2.1115	

- Forward Contract Size (FCS):

$$FCS = \frac{80}{\frac{1}{2.1115} - \frac{1}{2.4375}} = \text{CHF } 1{,}263$$

Aggrement to deliver CHF 1,263 and receive USD at 2.1115 in the next three months

Exercise-3a: Offseting Translation Loss

- CHF is precisely depreciated by 20% in the next 3months:

USD/CHF	bid	ask	
Spot rate	1.9500	2.0500	CHF is depreciated by 20%
Prevailing spot rate	2.4375	2.5625	
3-month forward rate	1.9890	2.1115	FCS = CHF 1,263

- **Forward realization (in the next 3 months):**
  - Deliver CHF = CHF 1,263
  - Receive USD = 1,263 / 2.1115 = USD 598
- **Sell some portion of USD in spot market:**
  - To receive = CHF 1,263
  - USD must be delivered (sold) = 1,263 / 2.4375 = USD 518
  - Profit/loss in USD = 598 – 518 = **USD 80**

record as profit to offset translation loss

Exercise-3b: Answer

- CHF is only depreciated by 10% in the next 3months:

USD/CHF	bid	ask	Midrate
Spot rate 10%	1.9500	2.0500	2.0000
Prevailing spot rate	2.1167	2.2778	2.5000
3-month future rate	1.9890	2.1115	

- Translation Loss:
  - Net Exposure = CHF 800 → NE = 800 / 2.00 = USD 400
  - Translation loss = 400 x -10% = **(USD 40)**
- Translation loss decreases from **(USD 80)** to **(USD 40)**

Exercise-3b: Answer

- CHF is only depreciated by 10% in the next 3months:

USD/CHF	bid	ask	
Spot rate	1.9500	2.0500	CHF is depreciated by 10%
Prevailing spot rate	2.1167	2.2778	
3-month forward rate	1.9890	2.1115	FCS = CHF 1,263

- **Forward realization (in the next 3 months):**
  - Deliver CHF = CHF 1,263
  - Receive USD = 1,263 / 2.1115 = USD 598
- **Sell some portion of USD in spot market:**
  - USD must be delivered (sold) = 1,263 / 2.1167 = USD 583
  - Profit/loss in USD = 598 – 583 = **USD 15** → **gain**
  - Recorded translation loss = 40 – 15 = **(USD 25)**

Exercise-4

	CHF		In CHF	In JPY	In USD
Cash	CHF 300		CHF 150	CHF 90	CHF 60
Receivable	400		CHF 160	CHF 120	CHF 120
Inventory	600		CHF 600	---	---
Property	700		CHF 700	---	---
TOTAL ASSETS	**2,000**	**EA =**	**CHF 1,610**	**CHF 210**	**CHF 180**
Payable	300		CHF 180	CHF 90	CHF 30
LT-debts	900		CHF 900	---	---
Common stock	100		---	---	---
Accum. RE	700		---	---	---
LIAB + EQUITY	**2,000**	**EL =**	**CHF 1,080**	**CHF 90**	**CHF 30**
		NET EXPOSURE =	**CHF 530**	**CHF 120**	

Exercise-4

- Spot Rate:
  - USD/CHF = 1.95 – 2.05
  - USD/JPY = 119.50 – 120.50
- 3-month Forward Rate:
  - USD/CHF = 8% – 12%
  - USD/JPY = 6% – 10%
- CHF and JPY are predicted to depreciate by 20% and 10%, respectively, against USD in the next 3 months
- Questions:
  a. Calculte Forward Contract Size in CHF and in JPY to hedge potential translation loss
  b. If both CHF and JPY are depreciated only by 5% against USD in the next 3 months, calculate total translation gain/loss recorded in balanced sheet

Exercise-4a: Answer

Spot USD/CHF = 1.95 – 2.05 → Midrate = 2.0
Spot USD/JPY = 119.50 – 120.50

	In CHF	In JPY
Net Exposure (CHF)	CHF 530	CHF 120
Net Exposure (USD)	530/2.0 = **USD 265**	120/2.0 = **USD 60**
Translation loss	265*20% = **(USD 53)**	60%*10% = **(USD 6)**

Midrate = 2.0
CHF = -20%
JPY = -10%

Estimated future USD/CHF = depreciate 20% → 2.4375 – 2.5625
Estimated future USD/JPY = depreciate 10% → 132.78 – 133.89

3-mo forward USD/CHF = 8% - 12% → 1.9890 – 2.1115
3-mo forward USD/JPY = 6% - 10% → 121.29 – 123.51

Forward Contract Sz	**CHF 837**	**JPY 10,620**

$$= \frac{53}{\frac{1}{2.1115} - \frac{1}{2.4375}} \qquad = \frac{6}{\frac{1}{123.51} - \frac{1}{132.78}}$$


Thank
You