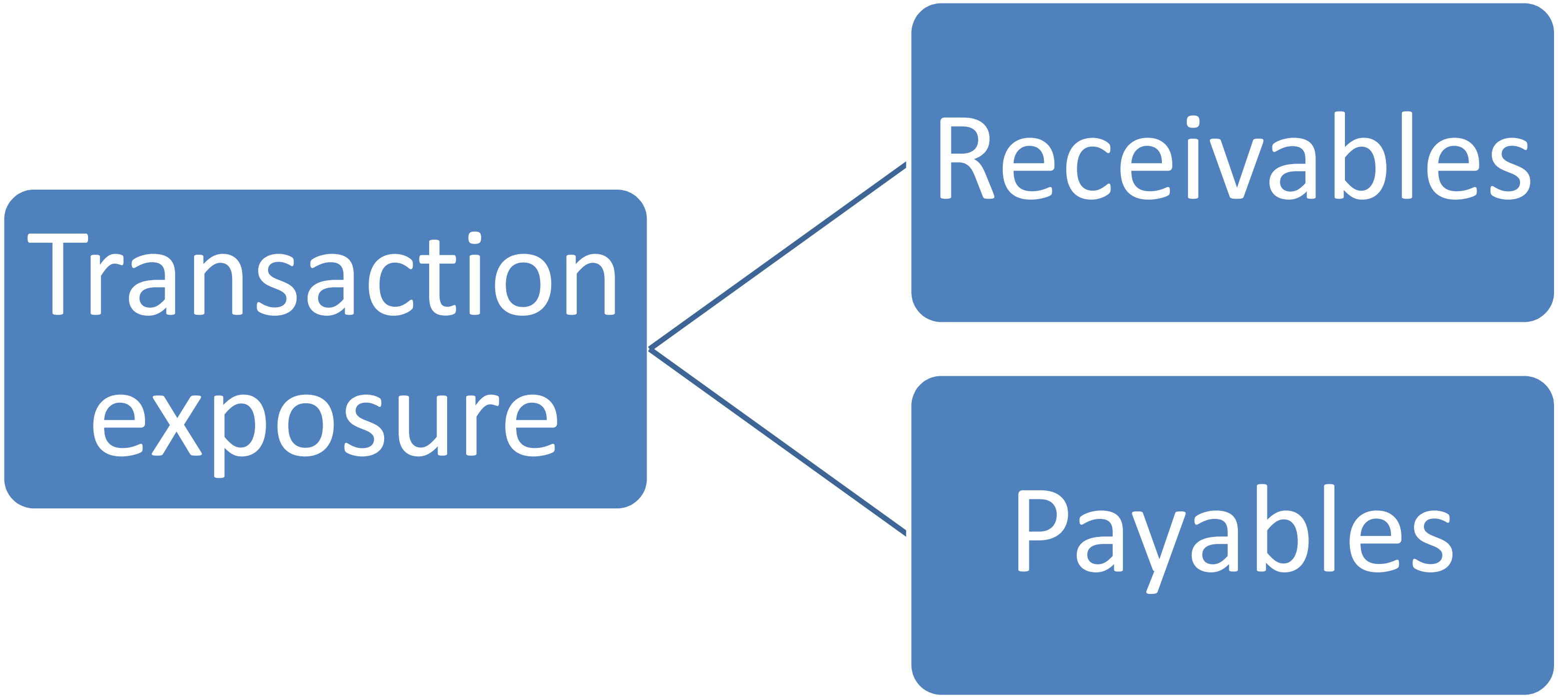
Foreign Exchange Exposures

Foreign exchange exposure is the risk associated with activities that is involved when a global firm trade in currencies other than its home currencies.

- **Transaction exposure**
- **Translation exposure**
- **Economic/Operating exposure**


Transaction exposure
Receivables
Payables

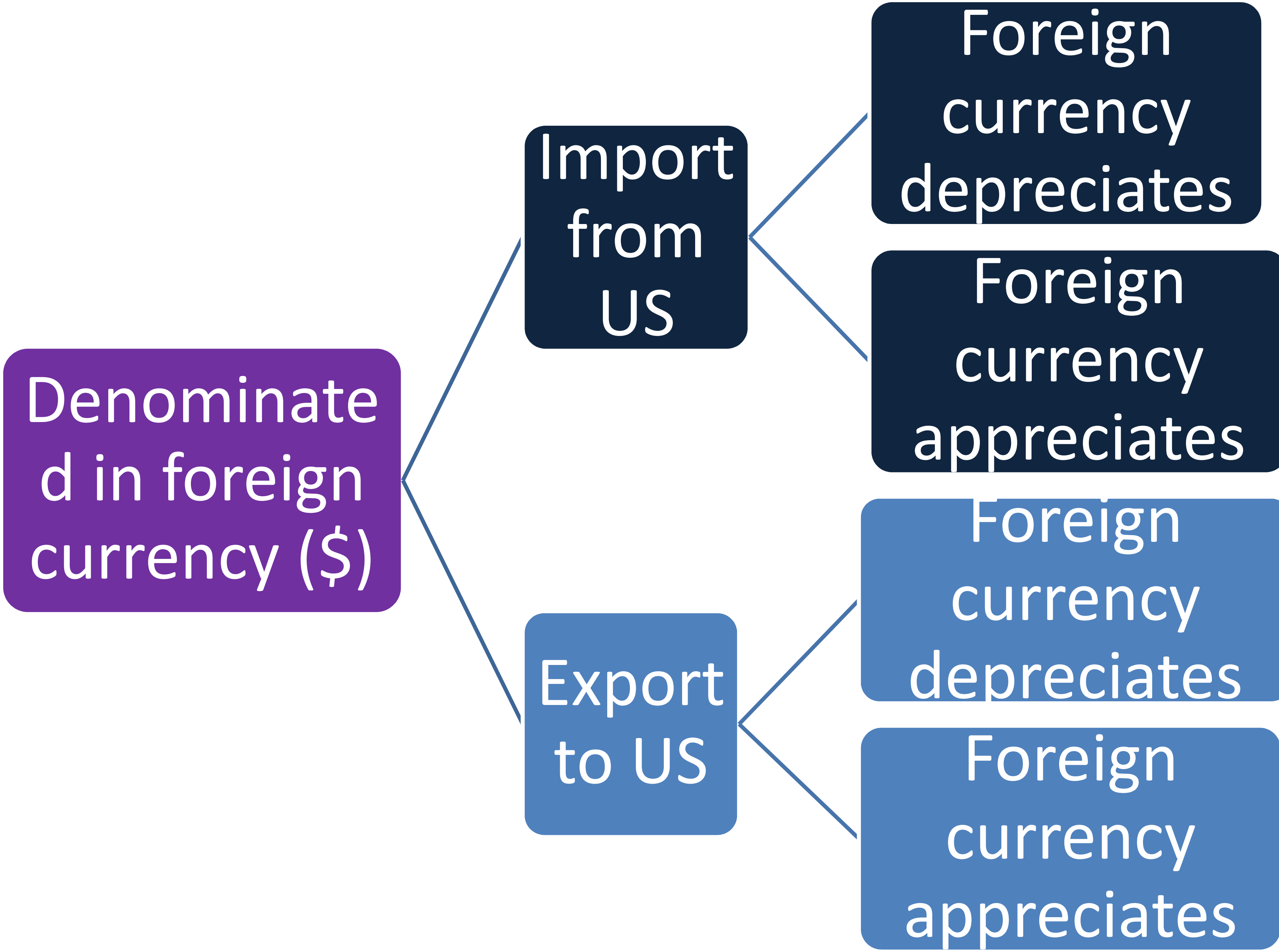
- **Transaction exposure** is the risk faced by companies involved in international trade that <u>*currency exchange rates will change after the companies have already entered into financial obligations.*</u>
  - Leads to major losses i.e. due to receivables expected or payments due in foreign currency
  - It is short term to medium term exposure

1. Transaction exposure

- The *sensitivity of the firm's contractual transactions in foreign currencies to exchange* rate movements is referred to as **transaction exposure.**
- Transaction exposure can have a **substantial impact** on a firm's value.
- It is **not unusual** for a currency to change by as much as 10 percent in a given year.

For EX

- If an Indian exporter denominates its exports in a foreign currency (U.S. Dollars), a 10 percent decline in that foreign currency will reduce the value of Indian company's receivables by 10 percent.
- This effect could possibly eliminate any profits from exporting.


Denominated in foreign currency ($)
Import from US
Foreign currency depreciates
Foreign currency appreciates
Export to US
Foreign currency depreciates
Foreign currency appreciates

Steps in measuring transaction risk

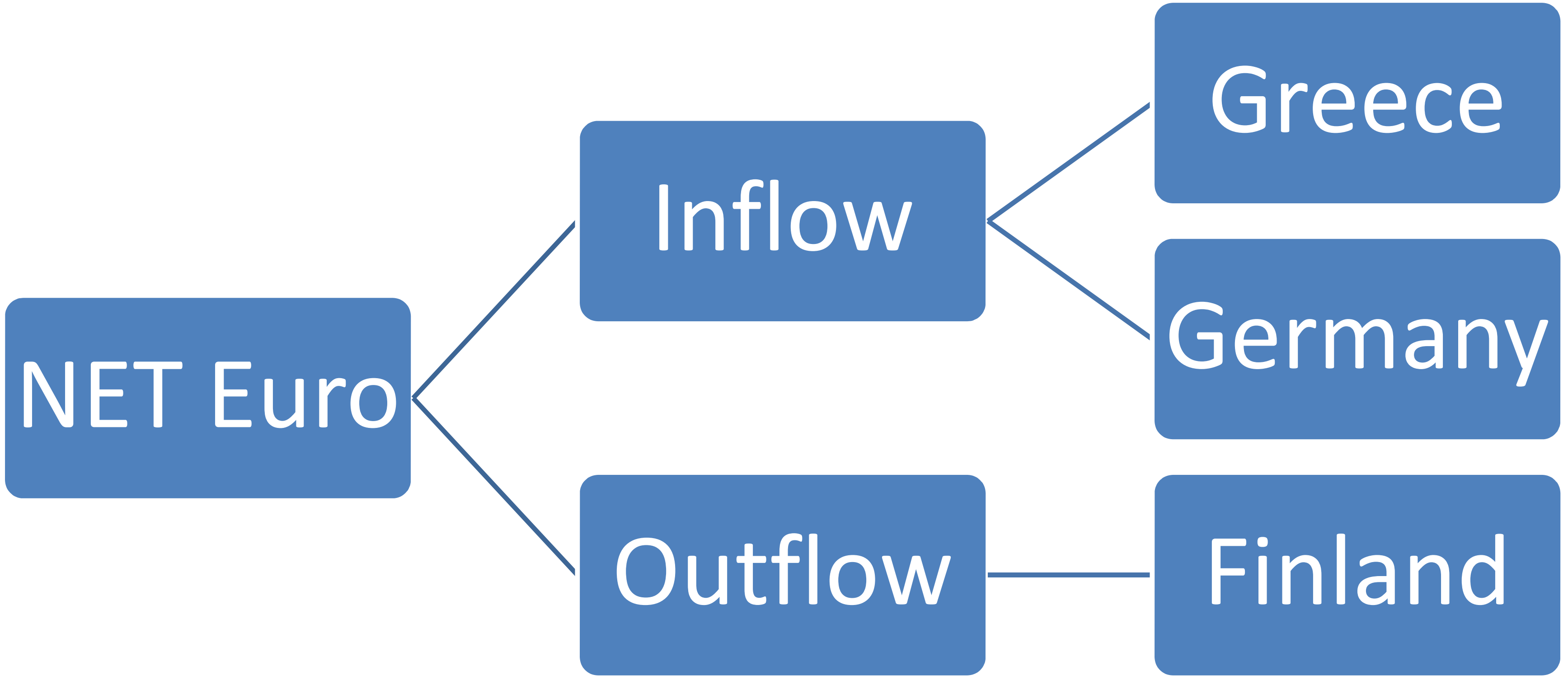
- To assess transaction exposure, an MNC needs to
  - (1) Estimate its net cash flows in each currency
  - (2) Measure the potential impact of the currency exposure.

Estimating “Net” Cash Flows in Each Currency

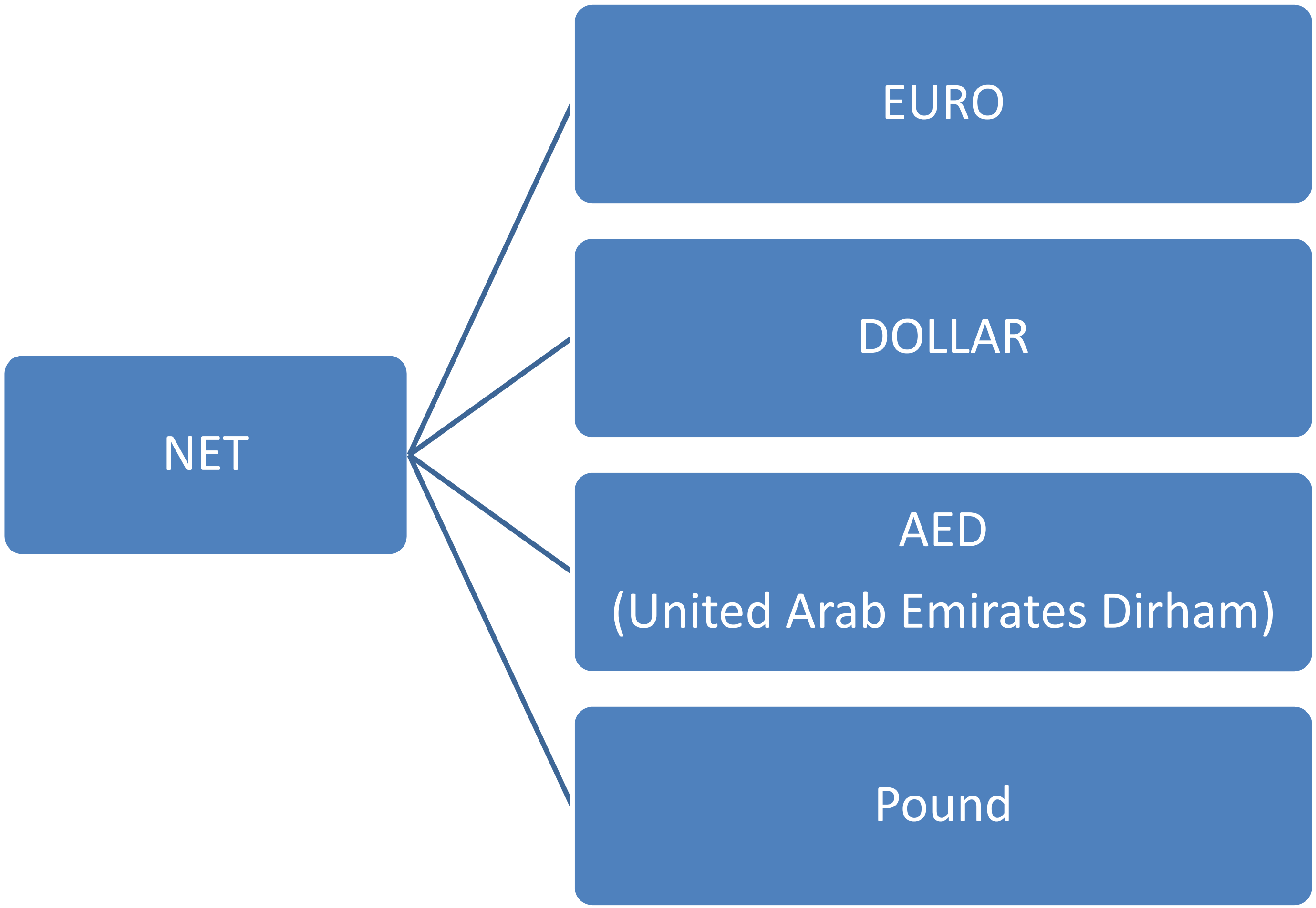
- MNCs tend to focus - an upcoming **short-term period** (such as the next month or the next quarter) for which they can anticipate foreign currency cash flows with reasonable accuracy.
- **Information system** - Internet
- To measure its transaction exposure – project a **consolidated net amount in currency inflows or outflows for all its subsidiaries, categorized by currency**.

- One foreign subsidiary may have inflows of a foreign currency while another has outflows of that same currency.
- In that case, the MNC’s net cash flows of that currency overall may be negligible.

Eg....



Eg....



Measuring the Potential Impact of the Currency Exposure

- The home country’s net cash flows of an MNC are generated from a portfolio of currencies.
- The exposure of the portfolio of currencies can be measured by **the standard deviation of the portfolio,** which indicates how the portfolio’s value may deviate from what is expected.

- **Consider an MNC that will receive payments in two foreign currencies.**
- The risk (as measured by the standard deviation of monthly percentage changes) of a two-currency portfolio (*p) can be estimated as follows:*

$$\boldsymbol{p = \sqrt{Wx^2\ S.Dx^2 + Wy^2\ S.Dy^2 + 2\ Wx\ \ Wy\ \ S.Dx\ \ S.Dy\ \ CORRxy}}$$

- *Wx - proportion of total portfolio value that is in currency X*
- *Wy - proportion of total portfolio value that is in currency Y*
- *S.Dx - standard deviation of monthly percentage changes in currency X*
- *S.Dy - standard deviation of monthly percentage changes in currency Y*
- *CORRxy - correlation coefficient of monthly percentage changes between currencies x* and y

- The equation shows that an MNC’s exposure to multiple currencies is influenced by
  - **the variability of each currency and**
  - **the correlation of movements between the currencies.**
- The **volatility** of a currency portfolio is positively related to a currency’s volatility and positively related to the correlation between currencies.
- Each component in the equation that affects a currency portfolio’s risk can be measured using a series of **monthly percentage changes** in each currency.

Example for SD calculation

Date	Currency exchange rate	Percentage change
31st Jan 2016	Rs.60 / $	
29th Feb 2016	Rs.63 / $	
31st March 2016	Rs.65 / $	
30th April 2016	Rs.62 / $	

- Go to investing.com
- Type the currency in search box
- View historical data
- Select monthly data

Date	Currency exchange rate	Percentage change X
31^{st} jan 2016	Rs.60 / $	-
29^{th} Feb 2016	Rs.63 / $	(63-60) / 60 * 100
31^{st} March 2016	Rs.65 / $	(65-63) / 63 * 100
30^{th} April 2016	Rs.62 / $	(62-65) / 65 * 100

With this X value can u calculate S.D ?
Variance?

Eg… correlation between 5currency portfolio

Exhibit 10.3 Correlations among Exchange Rate Movements

	British Pound	Canadian Dollar	Euro	Japanese Yen	Swedish Krona
British pound	1.00				
Canadian dollar	.35	1.00			
Euro	.91	.48	1.00		
Japanese yen	.71	.12	.67	1.00	
Swedish krona	.83	.57	.92	.64	1.00

Exhibit 10.4 Impact of Cash Flow and Correlation Conditions on an MNC's Exposure

If the MNC's Expected Cash Flow Situation Is:	And the Currencies Are:	The MNC's Exposure Is Relatively:
Equal amounts of net inflows in two currencies	Highly correlated	High
Equal amounts of net inflows in two currencies	Slightly positively correlated	Moderate
Equal amounts of net inflows in two currencies	Negatively correlated	Low
A net inflow in one currency and a net outflow of about the same amount in another currency	Highly correlated	Low
A net inflow in one currency and a net outflow of about the same amount in another currency	Slightly positively correlated	Moderate
A net inflow in one currency and a net outflow of about the same amount in another currency	Negatively correlated	High

For eg..

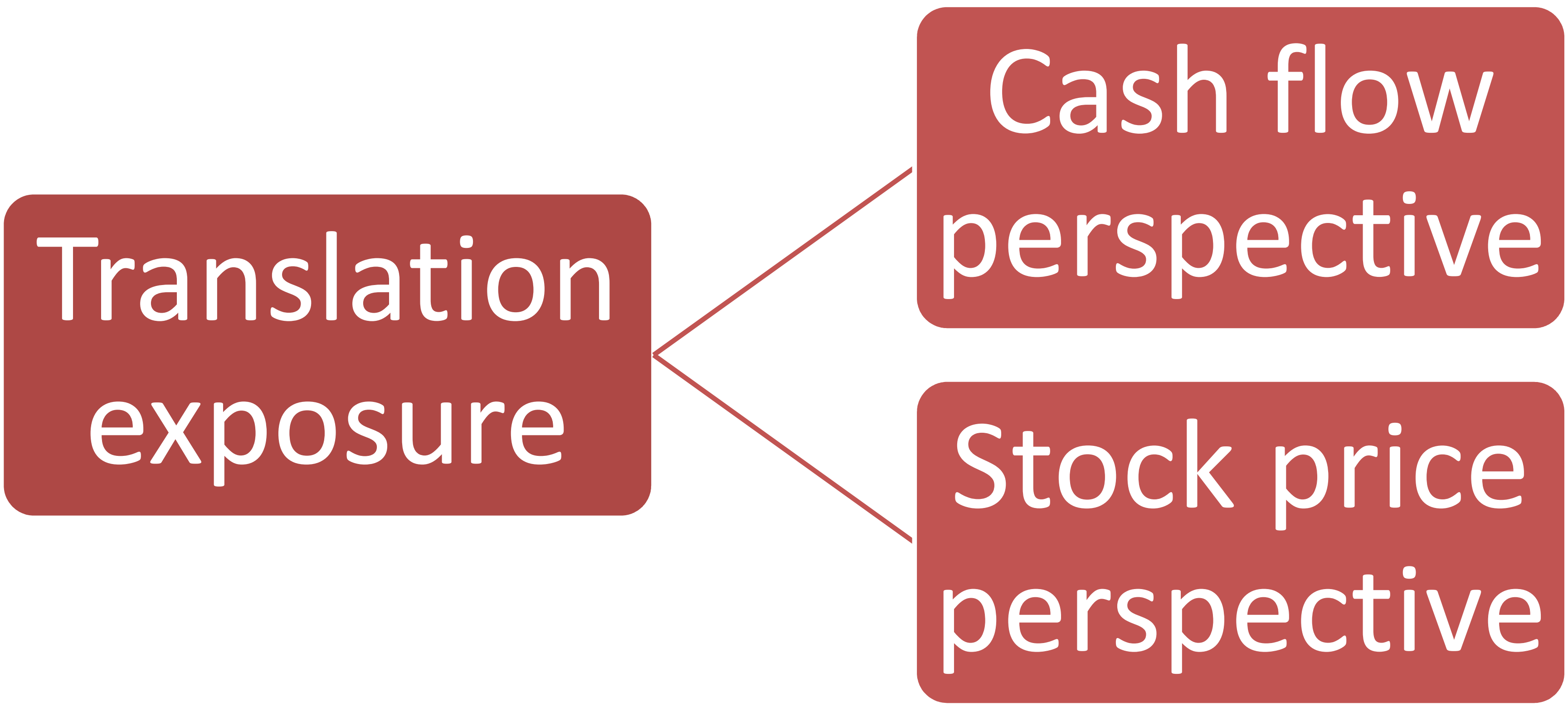
- ***India shipped US$261 billion worth of goods around the globe in 2016, up by 47.7% since 2009***

From a continental perspective,

- ***49.1% of Indian exports by value are delivered to Asian countries while***
- ***19.5% are sold to European importers.***
- ***India ships another 18.1% to North American customers with 8.7% worth arriving in Africa.***

2.Translation Exposure

- **Translation exposure** – is a risk that a company's equities, assets, liabilities or income will change in value as a result of foreign exchange rate changes.
  - which occurs because assets or liabilities are denominated in a foreign currency.
  - Hence known as accounting exposure
  - It is a medium term to long term exposure


Translation exposure
Cash flow perspective
Stock price perspective

Determinants of Translation Exposure

- Some MNCs are subject to a greater degree of translation exposure than others. An MNC’s degree of translation exposure is dependent on the following:

1. The proportion of its business conducted by foreign subsidiaries
2. The locations of its foreign subsidiaries
3. The accounting methods that it uses.

The proportion of its business conducted by foreign subsidiaries

- More subsidiaries higher the exposure Due to translation

The locations of its foreign subsidiaries

Higher the stability of the currency lower the exposure

The accounting methods that it uses

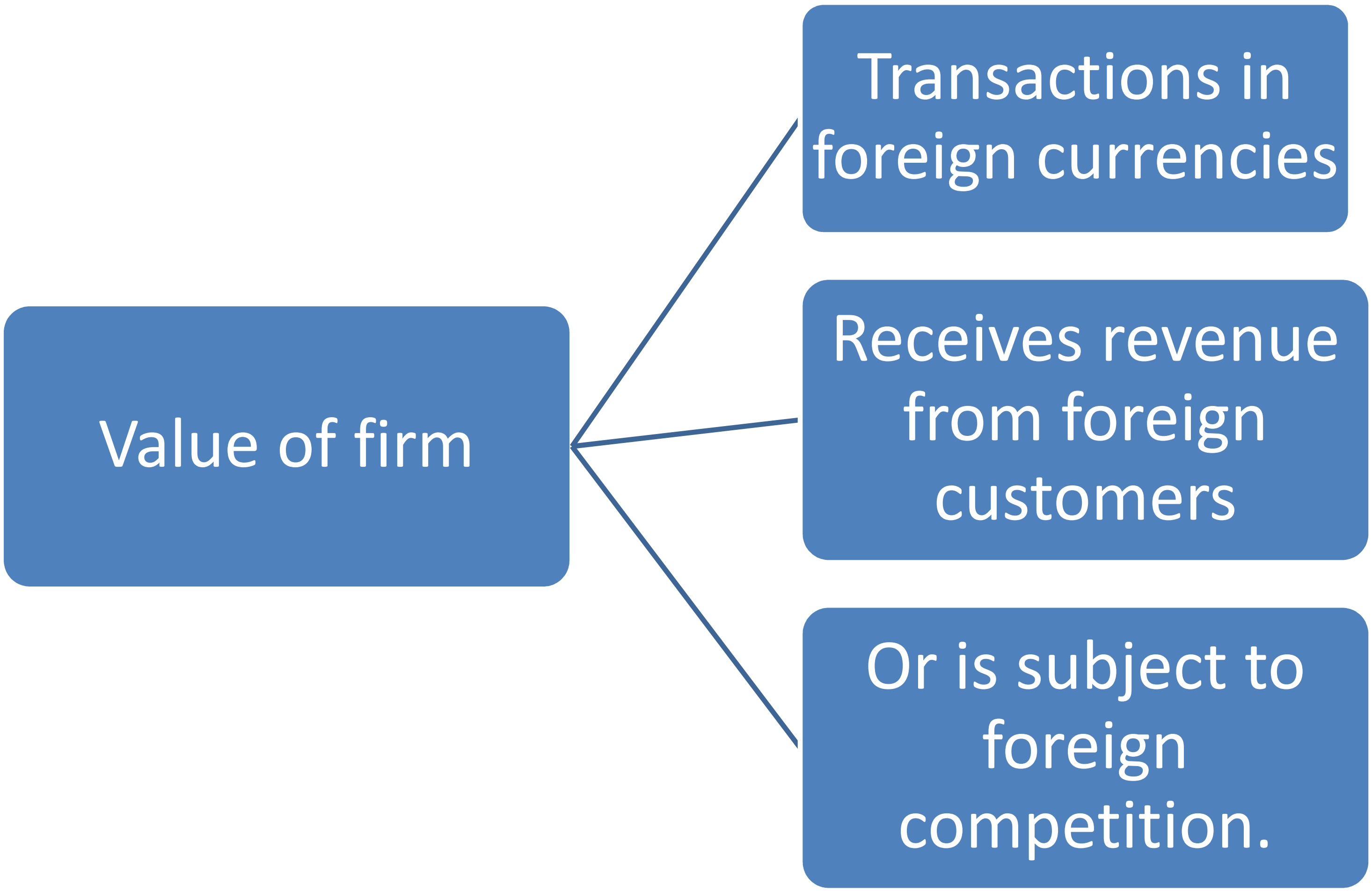
- The **functional currency of an entity** is the local currency where the entity operates.
- The current exchange rate as of the **reporting date** is used.
- The **weighted average exchange rate** over the relevant period is used
- Translated income gains or losses due to changes in foreign currency values are not recognized in current net income but are reported as **a second component of stockholder's equity**
- **Realized income gains or losses due to foreign currency transactions are recorded in current net income,** although there are some exceptions.

Eg..

Reporting Period	Local Earnings of British Subsidiary	Weighted Average Exchange Rate of Pound over the Reporting Period	Translated U.S. Dollar Earnings of British Subsidiary
Year 1	£10,000,000	$1.70	$17,000,000
Year 2	£10,000,000	$1.50	$15,000,000

3.Economic/Operating Exposure - Meaning

- The sensitivity of the firm's cash flows to exchange rate movements is referred to as **Economic Exposure** (also sometimes referred to as operating exposure).
- Transaction exposure is a subset of economic exposure.


Value of firm
Transactions in foreign currencies
Receives revenue from foreign customers
Or is subject to foreign competition.

If INR value increases (exchange rate increases for INR in terms of Euro)

Company A

(India)

Sells 65% products in India in INR

No transaction exposure

But economic exposure exist

Exporting to US

Payment in INR

Both transaction and economic exposure exist

- Economic exposure to Local Currency Appreciation
- Economic Exposure to Local Currency Depreciation
- Economic Exposure of Domestic Firms
  - Although our focus is on the financial management of MNCs, even purely domestic firms are affected by economic exposure.

Exhibit 10.7 Economic Exposure to Exchange Rate Fluctuations

Transactions That Influence the Firm's Local Currency Inflows	Impact of Local Currency Appreciation on Transactions	Impact of Local Currency Depreciation on Transactions
Local sales (relative to foreign competition in local markets)	Decrease	Increase
Firm's exports denominated in local currency	Decrease	Increase
Firm's exports denominated in foreign currency	Decrease	Increase
Interest received from foreign investments	Decrease	Increase
Transactions That Influence the Firm's Local Currency Outflows		
Firm's imported supplies denominated in local currency	No change	No change
Firm's imported supplies denominated in foreign currency	Decrease	Increase
Interest owed on foreign funds borrowed	Decrease	Increase

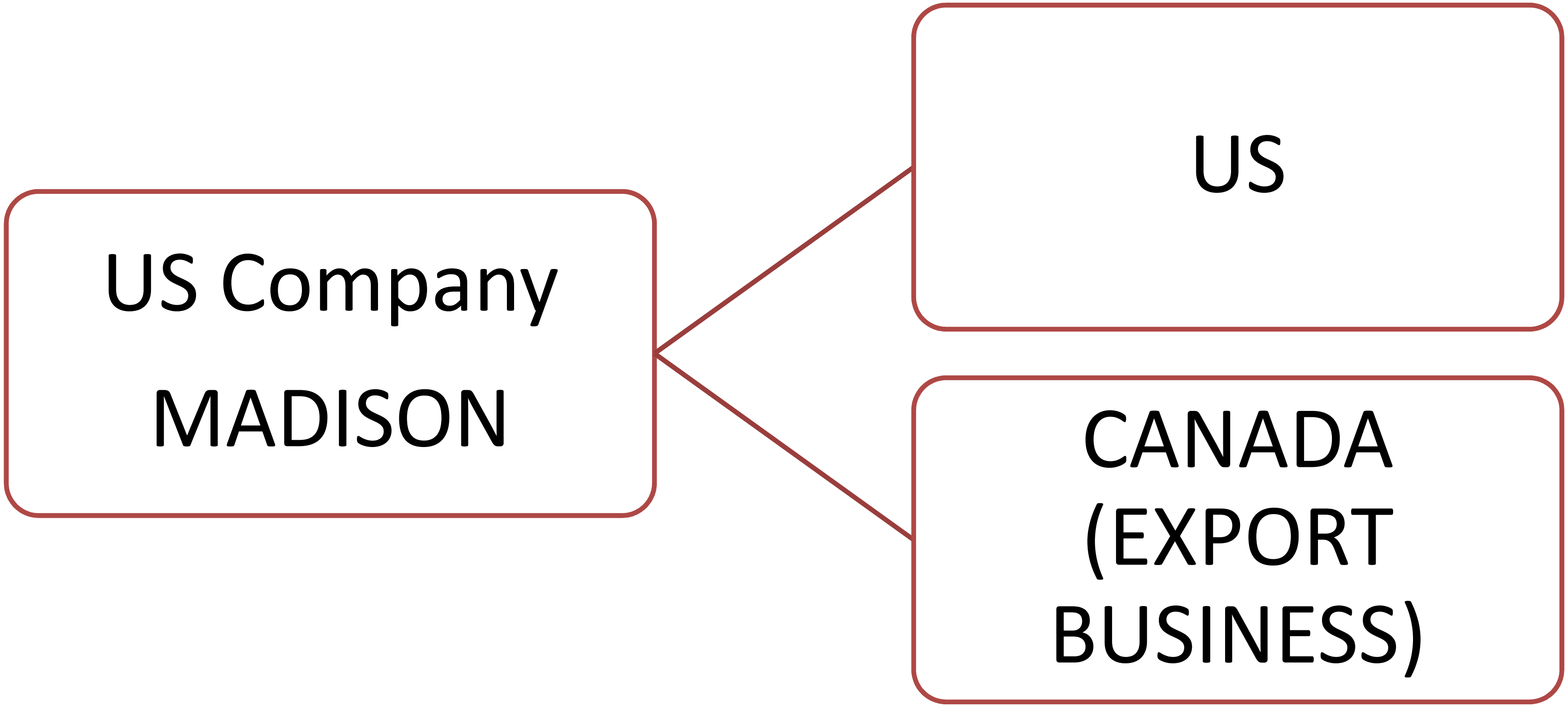
Measuring Economic Exposure

- Using Sensitivity Analysis to Measure Economic Exposure.
- Using Regression Analysis to Measure Economic Exposure.

Sensitivity Analysis

- One method of measuring an MNC's economic exposure is to separately consider how sales and expense categories are affected by various exchange rate scenarios.

Eg



Using Regression Analysis to Measure Economic Exposure

- A firm's economic exposure to currency movements can also be assessed by applying regression analysis to historical cash flow and exchange rate data as follows:
- $\boldsymbol{PCFt = a0 + a1\, et + \mu t}$
- where
- *PCFt* - percentage change in inflation-adjusted cash flows measured in the firm's home currency over period *t*
- *et* - exchange rate fluctuation
- *μt* - random error term
- *a*0 - constant
- *a*1 - regression coefficient

- **Operating exposure**
  - Also known as economic exposure
  - The impact of change in foreign exchange rate on firm’s value is known as the operating exposure.
  - It has a substantial impact on the company’s market value
  - Occurs when unexpected currency fluctuations affects the company’s future cash flows and market value
  - It has a long term impact

CONCLUSION

- Firms with more in foreign costs than in foreign revenue will be unfavorably affected by a stronger foreign currency.
- Firms with less in foreign costs than in foreign revenue will be favorably affected by a stronger foreign currency.

CASE

Exhibit 10.8 Estimated Sales and Expenses for Madison's U.S. and Canadian Business Segments (in Millions)

	U.S. Business	Canadian Business
Sales	$320	C$4
Cost of materials	$50	C$200
Operating expenses	$60	—
Interest expenses	$3	C$10
Cash flows	$207	–C$206

Exhibit 10.9 Impact of Possible Exchange Rates on Cash Flows of Madison Co. (in Millions)

	Exchange Rate Scenario					
	C$1 = $.75		C$1 = $.80		C$1 = $.85	
Sales						
(1) U.S. sales		$320.00		$320.00		$320.00
(2) Canadian sales	C$4 =	$ 3.00	C$4 =	$ 3.20	C$4 =	$ 3.40
(3) Total sales in U.S. $		$323.00		$323.20		$323.40
Cost of Materials and Operating Expenses						
(4) U.S. cost of materials		$ 50.00		$ 50.00		$ 50.00
(5) Canadian cost of materials	C$200 =	$150.00	C$200 =	$160.00	C$200 =	$170.00
(6) Total cost of materials in U.S. $		$200.00		$210.00		$220.00
(7) Operating expenses		$ 60.00		$ 60.00		$ 60.00
Interest Expenses						
(8) U.S. interest expenses		$ 3		$ 3		$ 3
(9) Canadian interest expenses	C$10 =	$ 7.5	C$10 =	$ 8	C$10 =	$ 8.50
(10) Total interest expenses in U.S. $		$10.50		$11.00		$11.50
Cash Flows in U.S. Dollars before Taxes		$52.50		$42.20		$31.90